Conference Proceedings: Abstracts of Presented Papers

PROCESSES + IMPACTS

CALLS UPON LANDSCAPE ARCHITECTURE EDUCATORS TO MEET THIS CHALLENGE AND DRIVE MEANINGFUL IMPACT

CELA 2025 ANNUAL CONFERENCE

March 27-29 Portland, Oregon

CELA
Council of Educators in Landscape Architecture

Processes + Impacts

Conference Proceedings: Abstracts of Presented Papers

CELA 2025

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And most importantly, we thank all participants for sharing your scholarship, creativity, and passion for advancing landscape architecture education and practice.

CELA belongs to everyone who contributes to a community committed to fostering the processes and impacts shaping our landscapes, profession, and shared future.

Foreward

CELA 2025 – Processes + Impacts | Portland, Oregon

Over these recent years, CELA has made meaningful progress in bridging academia and industry, integrating theory into practice, and strengthening our shared purpose across allied professional organizations to advance the discipline of landscape architecture.

At CELA 2023 Align | Realign in San Antonio, Texas, we reconnected with practitioners to explore design research collaborations that strengthen ties between academia and professional practice.

At CELA 2024 | Taking Action: Making Change in St. Louis, Missouri, we invited educators and practitioners worldwide to spark collaborative actions aimed at making a difference in our communities and environment. We formerly established Memorandums of Understanding (MOU) with the Landscape Architecture Foundation (LAF) and the International Federation of Landscape Architects (IFLA), respectively.

For CELA 2025 | Processes + Impacts in Portland, Oregon, we welcomed landscape architecture educators, students, practitioners, allied professionals, stakeholders, and community partners to share and document design processes that assess and evaluate the impacts of landscape architecture on people, places, and the planet. We formerly established an MOU with the Council of Landscape Architectural Registration Boards (CLARB).

This year marks a milestone for CELA—with record-breaking attendance of 479 participants and unprecedented sponsorship support totaling $26,500 under the initiative of a sponsorship campaign led by the CELA Conference Committee with the support of IMI staff. These achievements demonstrate the growing recognition of CELA as a vital platform for aligning academic research with the evolving needs of practice. Industry partners are increasingly joining us in bringing the latest technologies into classrooms and helping identify research opportunities that advance the profession.

The sponsorship was particularly impactful in lowering student registration fees and supporting student participation—critical to CELA's mission of educating the next generation of leaders in landscape architecture. We extend our sincere appreciation to the CELA 2025 Sponsors:

- Overall Conference Sponsor: Maglin Site Furniture
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Each year, when the CELA Annual Conference convenes in a new location, our collective presence leaves both social and ecological footprints—positive, through our contributions to local economies and communities, and challenging, through the carbon impacts of our travel. Yet, these gatherings offer invaluable opportunities to learn from the landscapes and communities that host us. We were deeply honored to open this year's conference with remarks by Councilor Candace Avalos, City of Portland, District 1. As a first-generation Guatemalan immigrant and Black American, Councilor Avalos shared her inspiring journey in public service

and reflected on how landscape architecture contributes to environmental justice and green infrastructure investment in Portland's neighborhoods. Her words reminded us of the transformative role landscape architects play in connecting people, places, and policy. With tremendous support from the Oregon Chapter of ASLA, we hosted field sessions that immersed participants in Oregon's diverse landscapes from the award-winning Portland Japanese Garden to exemplary city's Green Streets stormwater management projects and new urban developments, and parks and open spaces that blend conservation and restoration with design innovation.

Our keynote address by Dr. James LaGro, Editor of Landscape Journal, highlighted the essential connections between research and practice. The scholarship represented in Landscape Journal and Landscape Research Record continues to demonstrate the rigor, depth, and vision that define landscape architecture as a distinguished field of study and a profession vital to our planet's sustainability, resilience, and justice.

We celebrated the CELA Lifetime Achievement Award honoring Frederick "Fritz" Steiner for his remarkable contributions to the field of landscape architecture as an educator, researcher, leader, and steward of Design with Nature. His keynote address inspired a new generation of landscape architects and educators to be bold, reflective, persevering, and resilient.

This year also marks a strengthening of CELA's partnerships as we hosted three CELA Panels with allied organizations—LAF, ASLA, LAAB, CLARB, and IFLA—aiming to continue building global linkages between education and practice, identifying research needs in climate and biodiversity action, and advancing collaborative models of landscape architecture education. These partnerships are vital in positioning landscape architecture as a discipline that embodies responsibility and leadership in shaping sustainability and resilience within communities around the world.

For CELA 2025, we chose to forego a theme track, recognizing that processes and impacts are embedded in every aspect of research and practice. We celebrate the contributions of all participants across each standing conference track, whose diverse perspectives enrich our collective understanding. We are particularly inspired by our students, whose enthusiasm and quality of research illuminate the future of our discipline.

The conference aimed to address the following questions:

- Define and Employ Processes: How do landscape architects utilize and define their design processes?
- Measure Impacts: How can we understand and demonstrate the true impact of landscape architecture?
- Transform Education and Practice: How can we use these insights to transform landscape architecture education and advance the profession?
- Enhance Equity and Accountability: How can we ensure equity and accountability throughout the processes and outcomes of education, scholarship, and practice?

This volume of Landscape Research Record presents a curated selection of peer-reviewed conference proceedings, offering a sampling from a rich body of knowledge and insight shared during the conference. We hope you enjoy reading this publication and reflecting on the

culmination of the CELA 2025 conference. We look forward to your continued support and participation in CELA 2026 in Cincinnati, Ohio.

Chingwen Cheng, Ph.D., PLA, LEED AP

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Communication and Visualization

60 An Encounter with Foreign Lands

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Keywords: Affective encounters; Walking; Appalachia; Landscape Documentation; Foreign landscapes

As an immigrant to the United States, I have struggled to connect to the native vegetation patterns and species. The stark difference between the ecologies of Appalachia and those of my home country, Aotearoa New Zealand has left me feeling a sense of mourning for far away landscapes and in some senses a degree of environmental illiteracy. In response to these sensations of loss and disconnection I turned to what I can relate to and understand in my Appalachian context: topography and geology. In contrast to flora which is often regionally distinct – Aotearoa New Zealand being an extreme example where 80% is endemic – landform and geologic structures share commonalities across vast distances. This project explores my affective relationships to the landscapes and environments of the Jefferson National Forest, specifically the areas adjacent to Blacksburg, VA where I currently live, work, and play. As a designer-researcher this work has been critical in developing a sense of 'groundedness' away from my own tūrangawaewae – the place from which draw empowerment and connect to the world around me. The inquiry is founded upon theories of affect and assemblage (Deleuze, 1994; Deleuze, 2003; Deleuze and Guattari, 1994/2015; O'Sullivan, 2001), encounter (Angerer, 2017), movement (Basset, 2004; Ingold, 2011, 2015; Tilley, 2008) and aesthetics of materiality (Opperman 2021; Roberts, 2014; Tilley, 2004, 2010). By walking through the Jefferson Forest, the project develops and documents an account of my relationality to the topographic, orographic, and geologic aesthetic forces and material. It does so through using my body as an affective register to discern what is relevant or impactful rather than the disinterested distance of scientific investigation. The project presents the findings of my aesthetic coming to grips with the deep-time, deep space, entanglements of this landscape. It provides insights into approaches for engaging with, understanding, and documenting landscapes foreign to ourselves, as is often the case for many of our students or ourselves as practitioners/academics when relocating. Revised Abstract As an immigrant to the United States, I have struggled to connect to the native vegetation patterns and species. The stark difference between the ecologies of Appalachia and those of my home country, Aotearoa New Zealand has left me feeling a sense of mourning for far away landscapes and in some senses a degree of environmental illiteracy. In response to these sensations of loss and disconnection I turned to what I can relate to and understand in my Appalachian context: topography and geology. In contrast to flora which is often regionally distinct – Aotearoa New Zealand being an extreme example where 80% is endemic – landform and geologic structures share commonalities across vast distances. This project explores my affective relationships to the landscapes and environments of the Jefferson National Forest, specifically the areas adjacent to Blacksburg, VA where I currently live, work, and play. As a designer-researcher this work has been critical in developing a sense of 'groundedness' away from my own tūrangawaewae – the place from which draw empowerment and connect to the world around me. The inquiry is founded upon theories of affect and assemblage (Deleuze, 1994; Deleuze and Guattari, 1994/2015; O'Sullivan, 2001), encounter (Angerer, 2017), movement (Basset, 2004; Ingold, 2011, 2015; Tilley, 2008), aesthetics of materiality (Opperman 2021; Roberts, 2014; Tilley, 2008, 2010), and a Goethean notion of a 'slow perceptual science'. By walking through the Jefferson Forest, the project

develops and documents an account of my relationality to the topographic, orographic, and geologic aesthetic forces and material. It does so through using my body as an affective register to discern what is relevant or impactful rather than the disinterested distance of scientific investigation. Maps, photographic studies, plan, and sectional studies are developed to produce this expressive account through an expressive assemblage of representation. The project grapples with how one can come to grips with the aesthetic entanglements of landscape. It provides insights into approaches for engaging with, understanding, and documenting landscapes foreign to us. Given many of our student's relocate significant distances to study landscape architecture, starting small (Knox, 2023) via a pedagogy of site and landscape learning based on affective understandings offers potential for stronger or perhaps new forms of landscape sensitivities.

65 Soft Sites: Textiles as Feminist Praxis

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Keywords: Textiles; Community Engagement; Haptic Learning; Craft

This paper will analyze tufted textiles as a form of landscape representation. The textiles bridge feminist craft traditions sampled from contemporary artist Faith Ringgold's quilt series, Paj Ntaub story cloths that tell oral histories of traditional lifeways and forced migration of the Hmong people, and Chilean Arpillera resistance quilts with contemporary skills of Landscape Architects such as model making and GIS. In this paper, I will present three case studies to explore this novel process of textiles as an emergent design method deployable by Landscape Architects. The case studies will follow the author's process through project ideation, fabrication, utilization, and reception. In Project 1 [name redacted], the first case study, I document the translation process required to fabricate the textiles, its critical reception as a teaching tool, and limitations of the work as a tool for design. In the second case study, Project 2 [name redacted], I detail design decision-making opportunities through the textile, integration of site topography and cross-referencing ability with construction documents. In the third case study, Project 3 [name redacted], I detail a co-design textile process, and explore techniques to document climate change on a generational time scale. Tufted textiles are made by stretching a loose weave fabric on a loom and then tufted into using mechanical guns with yarn, often wool or cotton. Fibers are appropriate because they are responsive to water, material, and pressure, and mimic weathering and aging that occurs in landscapes. The landscape fiber models show dynamic and soft ecological systems using the skillsets of Landscape Architects, such as mapping, reading a site, and translating materials. A haptic approach adds to the available means of analysis and representation of professionals to a wider range of audiences. The textiles serve as a tool for participatory and hands-on learning of environmental change, utilizing color, pattern, texture, and topography as methods of communication. Tufted textiles are a haptic tool that unlock new ways to represent the complexity of design decisions that ecological practitioners communicate daily. This is what separates the textiles in study from more traditional forms of textile art, although this author is interested in dissolving that distinction. This work challenges STEM-inclined "rigor" with a nuanced understanding of social, environmental, and personal associations with site. By building on feminist traditions and translating contemporary technology to new forms, textiles present a novel technique for Landscape Architects to engage community members in new ways. Revised Abstract Textiles are a traditional site of feminist storytelling (Rosner, 2018). They bridge global feminist craft traditions from contemporary artist Faith Ringgold's quilt series, Paj Ntaub story cloths, and Chilean Arpillera resistance quilts. Building on these traditions and layering them on top of site representation techniques of Landscape Architecture, this research develops a methodological innovation of tufted textiles as landscape models. This paper will present three case studies to explore novel outcomes of textiles as an emergent feminist design method. The case studies will follow the author's methodological innovation within landscape architecture representation. Each case study begins with traditional landscape architecture skills, beginning with site analysis through GIS, aerial photography, and long-term climate projections (CLARB), and results in layering the data into maps. Each project translates this data into a tufted textile. These case studies then apply this methodology to different sites and audiences. In Project 1 [name redacted], the first case study, I establish the translation process required to fabricate

the textiles and limitations of the work as a tool for design. In the second case study, Project 2 [name redacted], I integrate site topography, and cross-reference with construction documents. In the third case study, Project 3 [name redacted], I detail a co-design textile process, and explore techniques to document climate change on a generational time scale. The resulting landscape fiber models serve to map dynamic and soft ecological systems. In all case studies, the haptic textiles as site model increases the available experiences of analysis and representation through multi-sensory perception (Driver and Spence, 1998). The textiles serve as a tool for participatory and hands-on learning of environmental change, utilizing color, pattern, texture, and topography as methods of communication, which is only possible through the multi-step process outlined in Project 1 [name redacted]. As a process of mapping and analysis, the physical softening of sites as a textile challenges STEM-inclined "rigor" with a nuanced understanding of social, environmental, and personal associations with site, and establishes it as a feminist textile methodology. By building on feminist traditions and translating contemporary technology to new forms, textiles present a novel technique for representation, experiencing designed places through touch.

95 Stories That Shape: Fiction as a Tool for Environmental Literacy in Landscape Design Pedagogy

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Keywords: Fiction; Pedagogy; storytelling; speculative design; Environmental literacy

This paper demonstrates the usefulness of incorporating fiction into landscape architectural pedagogy. Although fiction is a contested source in design disciplines, it has historically influenced design, and vice versa [1]. Storytelling practices, including fiction, are becoming more significant as the field reexamines its accessibility to and inclusivity of more diverse publics [2]. By reopening the debate on fiction in landscape pedagogy, we aim to tap into unprecedented sources and alternative methods to generate design ideas and enhance environmental literacy [3]. Acknowledging the tension between storytelling and traditional Western scholarship [4], an additional aim of incorporating fiction into design pedagogy is to generate methods that uplift a broader range of voices and perspectives, and furthermore validate the experiences and communication methods of those engaging non-Western axiologies [5] [6] [7]. "Worldbuilding with Fiction" shares pedagogical methods practiced at two design institutions, drawing from architectural theses and landscape architecture seminars. Fictional worldbuilding and storytelling were integrated into the design curricula in three key ways: using fictional characters to build empathy in the design process, mapping fictional landscapes to access environmental knowledge, and employing creative writing to enhance environmental literacy. In an analysis of the outcomes from these courses,we track the ways in which fictional writing and drawing exercises introduce greater access to environmental literacy and cultivate empathic approaches to design. We argue that incorporating fiction in teaching and making landscapes accomplishes two unique objectives: first, it quickly cultivates an empathic mindset through relational ways of thinking about the environment and one another; and second, it made landscapes accessible to students from interdisciplinary backgrounds, serving as an effective method for expanding cultural literacy of landscapes and the environment. Ultimately, including fictional sources and storytelling techniques in landscape design [8] deepens disciplinary tools of analysis and increases environmental awareness, literacy, and ethics—all of which are important to increasing the field's visibility and relevancy to the wider public. Revised Abstract This paper argues for the use of storytelling in landscape design to advance environmental literacy and enhance the field's relevancy and accessibility for students. The design disciplines have traditionally viewed fiction as less valuable source material, yet fictional stories and images have influenced how environments are managed, and how landscapes are understood [1] [2] [3] [4]. Examples such as Repton's Redbooks, Hudson River School paintings, and Piransi's drawings attest to the potency of fictional works to capture the attention of diverse audiences. Borrowing from this heritage, we argue that literary genres, such as historical fiction, sci-fi, and horror, offer great potential to students in their exposure to topics core to the discipline. These sources provide knowledge relevant to landscape architecture, by engaging students in complex cultural and environmental issues [2] [3] [4] [5] [6]. Through work produced in thesis projects and landscape seminars, we share pedagogies from two universities that weave storytelling into design imaging and narration. Students analyze texts and films that demonstrate the effectiveness of storytelling from figures including; bell hooks, O.E. Butler, and R. Kimmerer [7] [8] [9]. This pedagogy represents a break from traditional approaches which rely on a more

limited range of analytical precedents and conventional presentation methods. Such limited approaches miss the immersive qualities that engaging storytelling presents to students for interpreting and conveying ecological knowledge. Storytelling skills inform students' design process in three key ways: students examine real and fictional stories to gain insight into complex points of view and ecosystem relations, map fictional landscapes to uncover intricate environmental knowledge, and compose stories to demonstrate newly-acquired environmental literacies. Including fiction and storytelling in landscape pedagogy accomplishes two unique objectives: first, it accelerates students' understanding of environmental issues through compelling narratives; and second, it makes these topics accessible to students with a variety of backgrounds and skills. For instance, instead of reading abstract accounts of the effects of climate change in a distant future, students can learn about speculative environments informed by these reports through the lived experiences of fictional characters in Becky Chambers' Psalm of the Wild Built and T. Kingfisher's Thornhedge. By immersing in the characters' experiences, students have been more attentive to design to the level of detail and precision as depicted in the stories. For these reasons, we find that engaging with fiction in design classrooms serves an important and effective role in expanding students' literacy of landscapes.

168 **Envisioning Rewilding Futures of Impounded Rivers**

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Keywords: Communication; Landscape visualization; Modelling; River restoration

Since its completion in 1923, the Tugaloo Dam flooded seven kilometers of the iconic Wild and Scenic Chattooga River and the confluence of the Tallulah River for an entire century, transforming the area into Lake Tugaloo in northeastern Georgia and northwestern South Carolina. Because the Chattooga is an important recreation resource for fishing and paddling, there is a growing interest among conservation and recreation organizations to visualize the pre-impoundment channel and floodplain. If dam removal proceeds, channel restoration design will require knowledge of the rivers' pre-1923 morphology. A previous study (Leigh et al., 2023) assessed the pre-1923 Chattooga River channel characteristics, including slope, width, depth, sinuosity, bed and bank composition, based on historical survey data, photographs, and maps, as well as modern fluvial geomorphic models. This study extends that work by creating a landscape visualization of the lower 7 km of the Chattooga River and the lower 3 km of the Tallulah River after dam removal. Our method integrates historical survey data and field investigation with modern visualization techniques. Using hundreds of photos of the Chattooga River on low-flow days, we captured geomorphic features such as rock types, shapes, and streambed characteristics to inform the restored rivers' appearance. Investigating riparian plant communities will guide realistic plant placement in the visualizations. To create the landscape visualization, we will use a suite of modeling tools, including ArcGIS, Civil 3D, AutoCAD, 3ds Max, SketchUp, Lumion, and Photoshop. The final products will include high-quality renderings of the stream valley and a video fly-through. We anticipate the aesthetically appealing renderings will effectively communicate the aesthetic and ecological benefits of river restoration to local communities and stakeholders, helping them envision the future of the rivers, fostering greater engagement, and supporting informed decision-making. Additionally, this workflow offers landscape architects a practical model for visualizing large-scale terrains and stream corridor restoration, potentially improving public engagement in environmental planning efforts. Revised Abstract Since its completion in 1923, the Tugaloo Dam has flooded seven kilometers of the iconic Wild and Scenic Chattooga River and the confluence of the Tallulah River, transforming the area into Lake Tugaloo in northeastern Georgia and northwestern South Carolina. Because the Chattooga is an important recreation resource for fishing and paddling, conservation and recreation organizations are increasingly interested in visualizing the pre-impoundment channel and floodplain. If dam removal proceeds, channel restoration design will require knowledge of the rivers' pre-1923 morphology. A previous study (Leigh et al., 2023) assessed the pre-1923 Chattooga River channel characteristics using historical survey data, photographs, maps, and fluvial geomorphic models. This study extended that work by creating a landscape visualization of the lower 7 km of the Chattooga River and the lower 3 km of the Tallulah River after dam removal. Historical survey data and field investigation were integrated with modern visualization techniques. Photos taken during low-flow conditions captured geomorphic features to inform the restored rivers' appearance. Investigating riparian plant communities guided realistic plant placement in the visualizations. To create the visualizations, we used modeling

and rendering tools, including ArcGIS, Civil 3D, AutoCAD, 3ds Max, SketchUp, Lumion, and Photoshop. We derived high-resolution (1m) digital elevation model of the study area from the U.S. Geological Survey (2022a, 2022b) for modeling. Due to the complexity of the channel morphology parameters and the model's large scale, traditional landscape architecture workflows (e.g., hand drawing to AutoCAD to SketchUp) were challenging to implement. Therefore, we employed a combination of Civil 3D corridor tools and 3ds Max terrain tools to build the river channel based on the morphology parameters, effectively addressing the challenges in creating an accurate large-size river corridor. For tributaries without morphology parameters, we used the regional curve relationships (Bieger et al., 2015) to estimate channel morphology. The final products included high-quality renderings and a video fly-through of the restored stream valley. We anticipate the aesthetically appealing renderings will effectively communicate the aesthetic and ecological benefits of river restoration to local communities and stakeholders, helping them envision the future of the rivers, fostering greater engagement, and supporting informed decision-making. Additionally, compared to previous studies (Lin et al., 2016; Mazagol et al., 2021) relying on costly echosounder-derived bathymetric DEMs for modeling, our workflow offers landscape architects a practical, cost-effective model for visualizing large-scale terrains and river corridor restoration by integrating fluvial geomorphic and landscape modeling techniques.

198 Motion as a Catalyst for Spatial Generation: Exploring Found Landscapes through Photography and Film

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Keywords: Motion; Found landscapes; Spatial generation; Experimental media

This study explores the role of motion as a spatially generative activity and the implications of representing landscape phenomena through experimental techniques in photography and filmmaking. Drawing on Francesco Careri's "Anti Walk"1 and Giuliana Bruno's concept of motion in "Cartography of the Subjective,"2 this research investigates how movement challenges the conventional relationship between individuals and their physical surroundings. It extends this exploration beyond walking, considering various modes of transport and speed to understand how movement generates new spatial perceptions. Through video essays documenting movement in urban and peripheral landscapes, the study examines how spaces are perceived differently in stillness versus motion, and how new dimensions of space emerge through bodily interaction with the environment. In parallel, this study identifies and analyzes "Found Landscapes" that lie at the intersection of Lorenzo Romito's "Actual Territories"3 and Michel Foucault's heterotopias.4 "Found landscapes" are spaces that have no counterpart in traditional landscapes, awaiting a new aesthetic reading to rediscover what we already have but may elude our recognition and appreciation. By utilizing aesthetic reading and experimental media, this research uncovers overlooked spaces—those marginal, interstitial, and transformative areas that influence perception beyond their physical existence. These "Found Landscapes" resist traditional urban design interventions, calling for a more nuanced understanding of how spaces function and interact with human behavior. The analysis of these spaces challenges the conventional urge to fill landscapes with objects, instead emphasizing the need to infuse them with meaning. Experimenting with various photography and filmmaking techniques—camera angles, movement, lighting, and editing—further illuminates the phenomena of landscape spatiality, temporality, and materiality, as defined by James Corner.5 The study explores the conceptual implications of these techniques, demonstrating that landscape cannot be adequately understood through static representation alone. By embracing experimental media as a method of inquiry, this research proposes that understanding motion, representation, and the identification of "Found Landscapes" can reveal new possibilities for landscape architectural practice. This research contributes to the field by advocating for movement-based exploration and innovative representation techniques, which challenge existing spatial perceptions and encourage a deeper, phenomenological reading of landscape. The findings suggest that integrating these methods into design practices can lead to more inclusive, dynamic, and meaningful interventions in the built environment. Revised Abstract This study explores the role of motion as a spatially generative activity and the implications of representing landscape phenomena through experimental techniques in photography and filmmaking. Drawing on Francesco Careri's Walkscapes: Walking as an Aesthetic Practice and Giuliana Bruno's Atlas of Emotion, this research investigates how movement challenges the conventional relationship between individuals and their physical surroundings. Through video essays documenting movement in landscapes—from transporting the frame across spaces of varying types to observing moving agents through a still frame—the study examines how spaces are perceived differently in stillness versus motion, and how new dimensions of space emerge through bodily interaction with the environment. Certain spaces, otherwise overlooked, are found to be

accessible or fully comprehensible only through the act of motion. The methodology combines visual documentation—photo series and video essays—with a phenomenological approach to analyze the subjective experience of space. Reflective journaling and frame-by-frame analysis of videos are used to observe and interpret the spatial and temporal qualities of landscapes. This iterative process of filming, framing, and reflecting on these spaces becomes both a tool for analysis and a method of inquiry, foregrounding the importance of bodily perception in understanding landscapes. In parallel, this study identifies and analyzes “Found Landscapes” that lie at the intersection of Lorenzo Romito's "Actual Territories" and Michel Foucault's heterotopias. Similar to found objects or found art, which are created from undisguised but often modified items or products not traditionally considered materials for art, “Found Landscapes” are spaces that have no counterpart in traditional landscapes. They await a new aesthetic reading to rediscover what already exists but often eludes recognition and appreciation. This study uncovers overlooked spaces—those marginal, interstitial, and transformative areas that influence perception beyond their physical existence. The analysis of these spaces challenges the conventional urge to fill landscapes with designs, instead emphasizing the need to infuse them with meaning. This study argues that landscapes cannot be adequately understood through static representation alone. It contributes to the field by advocating for movement-based exploration and innovative representation techniques, which challenge existing spatial perceptions and encourage a deeper, phenomenological reading of the landscape. The findings suggest that integrating these methods into design practices can lead to more inclusive, dynamic, and meaningful interventions in the built environment.

268 Vacancy Atlas for Connecticut

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Keywords: Vacant land; Atlas; Planning; Conservation; Scale

Vacant and deteriorated properties harm neighbors and neighborhoods (Garvin et al., 2013). They threaten public health and safety (Sivak et al. 2021), keep residents from building wealth, and destabilize local government finances. Due to a legacy of inequitable policies and racist systems, low-income neighborhoods and communities of color bear an unfair share of the burden of vacant properties (Kremer et al., 2013). This project focuses on the creation of a vacant land census and atlas at the State level, as a pilot for a national vacant land census and atlas (Newman et al. 2016, Bowman and Pagano 2004). Historically, vacant land is addressed locally, on a parcel-by-parcel basis. Due to the current mechanics of the data, collaboration, planning, and solutions-making is confined to individual jurisdictions. Yet, transformation hinges on scale. Vacant property could be addressed at a portfolio scale rather than through individual projects. Tens of thousands of acres of vacant land nationally await more purposeful maintenance. Hundreds of thousands of people live amidst these properties and with their downstream implications. Thousands of additional properties contribute to vacancy in these communities but are not yet consolidated under the stewardship of a land bank or land trust (Kelly 2022). Through this project, we are setting the stage for solutions-making that benefits residents, municipalities, real estate markets, and the built and natural environments. We suggest an atlas-making process that will do the upfront work to create a platform that can serve the needs of local leaders and constituent communities while speaking the language of climate finance. Vacant land transformation has the potential to promote resilient, sustainable landscapes (Anderson and Minor 2017, Burkholder 2012, Kim 2016, Nassauer and Raskin 2014) This data layer will provide an essential building block for a wide variety of research, policy, and planning efforts including, but not limited to: (1) statewide, regional, and local climate resiliency planning; (2) assessments of the scale and potential impact of vacant land at the Statewide level, (3) extension outreach and service-learning opportunities related to vacant land, (4) research and planning related to the national vacant land census and atlas. This presentation will cover (1) the challenges of documenting vacant land (2) the process for making a vacant land census (3) the potentials of a vacancy atlas at the State and ultimately, National level (4) the results of the pilot project for the State of Connecticut (5) lessons learned and next steps.

301 Moving, Mapping, Imaging, Imagining: Seeing the Midwest to Shape its Futures

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Keywords: representation; regionalism; futures thinking; collaborative cartography; workshops

As a region, the Midwest offers a rich opportunity to tackle some of the most urgent environmental, social, and economic challenges of our time - the legacy of large-scale agriculture production and deindustrialization, coupled with the mounting impacts of climate change, have left many communities in the region increasingly disconnected from the land, under-resourced, and fragile. If landscape architects are tasked to design spaces that emerge from an authentic reading and understanding of place, what are we doing to connect research and teaching to the past, present and future of the Midwest? Since its inception in 2021, the Midwest Landscape Lab (MidLL), a teaching and research arm of Ohio State's MLA program, has concerned itself with this existential question - what does it meant to design for the Midwest? To answer that, a more foundational question must also be asked: What is the Midwest? This discussion presents the results from two methods for visual and descriptive research that have attempted to answer this foundational and surprisingly challenging question. A first method of inquiry produced a series of historic, cultural, and environmental mapping products, which defines the region with a certain territorial fuzziness. This ambiguity may frustrate those who seek to reduce the region to a static, invariable, universally understood geography. Further study, however, shows the Midwest's boundaries to be out of focus due to its complexity - it is the result of colliding materials, cultures, natural systems, and ideas across timescales, resulting in a rich environment that is far from flat or invariable. A second method involves the collective efforts of landscape practitioners, community groups, and educators/students. MidLL devised and held several workshops to approach the question "what is the Midwest" from numerous angles - a sequence of surveying, collaborative mapping prompts, and strategic group imaging studies. Rather than drawing lines or urging consensus, these sessions were intended to unearth the many possibilities of how the region can be perceived, drawn, or associated. Despite this open-endedness, collection, transcription, and analysis of the visual products from these workshops have also resulted in a series of throughlines and specific points of shared understanding across many participants, as well as an expansion of participants' appreciation and understanding of the region's complexities, allowing us to both expand and find common ground for how we might work and see our region and its future. Revised Abstract If landscape architects are tasked to design spaces that emerge from an authentic reading and understanding of place, what are we doing to connect research and teaching to the past, present and future of the regions we situate our work within? This discussion presents a combination of visual and descriptive research methods developed in order to approach foundational yet challenging questions about generating design objectives within the frames of regional identities, in this case the American Midwest, and how these methods might be carried out to strengthen designers' ties to the landscapes they should be designing with and within. Since its inception in 2021, the Midwest Landscape Lab (MidLL), a teaching and research arm of Ohio State's MLA program, has concerned itself with this existential question - what does it mean to design for the Midwest? This framing of design work comes at a crucial point for the region - environmental, social, and economic challenges abound, including the legacy of large-scale agriculture production and deindustrialization, the

mounting impacts of climate change, and communities in the region are increasingly disconnected from the land, under-resourced, and fragile. A combination and synthesis of methods will be presented: the first, a series of historic, cultural, and environmental mapping exercises defining the region with a certain territorial fuzziness; the second, a collective workshop between landscape practitioners and educators/students to approach the question of regional identity through surveys, collaborative mapping prompts, and strategic imaging studies. Collection, analysis and synthesis of the products from these methods have generated novel images of the Midwest - ones with complex, productively out-of-focus boundaries, material/cultural/natural/ideological collisions and overlays, and rich environments that are far from flat, invariable, or easily discounted. These methods and their products are presented with a particular regional focus; however, these research frameworks can be applied to other regions, scales and participant groups. The potentials, advantages, and further questions of these methods will also be discussed. Rather than drawing discrete boundary lines or urging consensus, these processes are geared to unearthing and superimposing the many possibilities of how a place can be perceived, drawn, or associated. Despite this open-endedness, collection, transcription, and analysis of the visual products from these studies can also result in throughlines and specific points of shared understanding across researchers and designers, as well as an expansion of participants' appreciation and understanding of the region's complexities.

324 Evaluating UAV and Photogrammetry Workflows for Early-Stage Site Documentation: Comparative Analysis for Small Landscape Architecture Firms

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Keywords: UAVs; Photogrammetry; 3D Models; Site Documentation

Throughout history, landscape architects have utilized advanced technologies to aid the design process. These methods have evolved from the earliest advancements in drawing to the use of computers and digital representation (Contell & Abad, 2019). Today, technological advancements in the field have opened up new opportunities for UAVs (Unmanned Aerial Vehicles) and photogrammetry to produce high-resolution imagery, contours, and 3D models. The use of these outputs makes it easier than ever to visualize abstract and complicated design intentions . By leveraging UAVs and photogrammetric technology early in the design process, landscape architects are able to maximize the advantages they offer: site analysis through computational software, 3D sectional information, and hydrology prediction. Although there are a number of ways that UAVs can be utilized, this research focuses specifically on the advantages they offer compared to established workflow methods . This presentation examines 4 unique workflows for early-stage site documentation, with a focus on aerial imagery and 3d models. Those 4 workflows are: capturing the site with UAVs through photogrammetry, generating a site plan from publicly available GIS data, gathering information from open topography (i.e. Google Earth, CADmapper), and outsourcing site inventory to a licensed contractor. The site for this study was selected for its gentle topography and moderate vegetation, which can provide a challenge to UVAs. Each of the workflows is evaluated across a series of categories including cost, aerial imagery resolution, contour resolution, speed, user-friendliness, and quality of documentation among other categories. Whereas other studies have looked at image resolution on less vegetated sites , this study explores more vegetated cover and analyzes the results through the lens of small design firms, (one to ten employees) which represents nearly half of firms in the US . The results provide an understanding of the advantages and disadvantages of UAV workflows over other common methods, enabling practitioners and academics to make informed decisions regarding this technology and its potential in the design workflow. For data captured through drone imagery and processed through photogrammetry, contour resolution is limited, imagery resolution is greatly improved and the relative cost is moderate. It can be anticipated that as this technology becomes increasingly powerful and affordable, client expectations will rise resulting in an increased presence in practice and academia.

332 Integrating Geospatial Technologies in XR for Landscape Architecture Education: Methodologies with ArcGIS and Cesium for Unreal Engine

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Keywords: XR; VR; Geospatial; Unreal Engine; Immersive Site Data

Extended Reality (XR) technologies, including Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR), are gaining traction in various design disciplines. However, in landscape architecture, XR remains predominantly used as a tool for visualization rather than for project inception or conceptualization (Johnson et al., 2019). This research aims to shift that paradigm by exploring the integration of XR technologies with site data to enhance the conceptualization and analysis stages of landscape projects, specifically focusing on educational applications for landscape architecture students. The study proposes a methodological approach for utilizing ArcGIS Maps SDK for Unreal and Cesium for Unreal to create immersive, explorable environments that can offer students a realistic sense of site context. These tools allow for the visualization of topography, spatial data, and landscape elements in an XR environment, enabling students to engage with a digital twin of real-world landscapes. By facilitating an immersive learning experience, the proposed approach moves beyond traditional uses of XR for mere visualization and into the realm of design thinking and decision-making. This study also reviews the potential of XR technologies to bridge the gap between digital landscape modeling and real-world application. Current research indicates that while XR has been successfully employed in fields such as architecture and construction, its application in landscape architecture education remains limited (Liu et al., 2024; Wang et al., 2023). Previous studies highlight that XR's integration into educational settings improves student engagement, understanding of spatial relationships, and design ideation (Wang et al., 2023; Phan & Choo, 2019) By applying XR within the early stages of design education, landscape architecture students can interact with site-specific data in an immersive manner, enhancing their ability to conceive and develop design concepts grounded in real-world conditions. In conclusion, this paper aims to provide a comprehensive methodology for integrating Map SDKs into XR production workflows, with a focus on enhancing landscape architecture education. The study also seeks to challenge the existing norms of XR usage in the discipline by presenting a case for its application in the design process, particularly during the critical stages of site analysis and project inception(Abhari et al., 2021; Liu et al., 2024) Revised Abstract Extended Reality (XR) technologies, including Virtual Reality (VR), Augmented Reality (AR), and Mixed Reality (MR), are gaining traction in various design disciplines. However, in landscape architecture, XR remains predominantly used as a tool for visualization rather than for project inception or conceptualization (Johnson et al., 2019). This research explores the integration of XR technologies with site data to enhance the conceptualization and analysis stages of landscape projects, focusing on educational applications for landscape architecture students. The study proposes a methodological approach for utilizing ArcGIS Maps SDK and Cesium for Unreal to create immersive, explorable environments that can offer students realistic site context. These tools allow for the visualization of topography, spatial data, and landscape elements in an XR environment, enabling students to engage with a digital twin of real-world landscapes. By facilitating immersion, the proposed approach moves beyond traditional uses of XR for visualization and into design thinking and decision-making. By applying XR in the early design stages, landscape architecture students can interact with and immerse in site-specific data,

enhancing their ability to conceive and develop design concepts grounded in real-world conditions. Current research indicates that while XR has been successfully employed in fields such as architecture and construction, its application in landscape architecture education remains limited (Wang et al., 2023). Previous studies highlight that XR's integration into educational settings improves student engagement, understanding of spatial relationships, and design ideation (Wang et al., 2023; Phan&Choo, 2019). By incorporating this technological methodology in a digital communication course tailored for graduate and undergraduate students, this study aims to review the potential of XR technologies to bridge the gap between digital landscape modeling and real-world application.This research takes references from established learning theories such as Self-Efficacy Theory (Bandura, 1977), User Engagement Theory (O'Brien & Toms, 2008) and Experiential Learning Theory (Kolb et al., 2014), and interrogates self-efficacy, learning outcome, likeability, and learner engagement through a mixed-method research approach to understand the overall effectiveness of the XR implementation in the landscape architecture learning process. In conclusion, this paper aims to provide a comprehensive methodology for integrating Map SDKs into XR production workflows, focusing on enhancing landscape architecture education. The study also seeks to challenge the existing norms of XR usage in the discipline by presenting a case for its application in the design process during the critical stages of site analysis and project inception(Abhari et al., 2021; Liu et al., 2024)

338 AI-Driven Feedback from Eye-Tracking Software: Unlocking the Potential for Board Layout and Visual Communication

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Keywords: Board layout; AI; Visual communication; Eye-tracking

One of the major challenges in design competitions and blind studio reviews is creating boards or panels that present a proposal as a cohesive, unified whole [1]. At last year's CELA annual conference, I explored the use of Visual Attention Software (VAS) to assess the effectiveness of visual communication in Landscape Architecture senior studio final project boards. VAS is an AI application that uses experimental eye-tracking data to predict how viewers will respond to images [2,3]. Senior students were asked to structure the content of their final project boards using a linear narrative scan path, rather than selecting their own path through the content. After receiving feedback from professors and peers, students produced a second layout that improved the linear narrative. Feedback is a key principle of successful communication design [4]. Students received comments from faculty and peers on how effectively their presentations established a clear hierarchy. Based on this input, they reorganized the graphic elements to ensure the presentation was easier to follow in the intended sequence. Before and after layouts were evaluated using VAS, with results showing an 18% improvement in distribution of gaze sequences (linear narrative paths with fewer overlaps). However, 64% of the images showed a decrease in heatmap distribution area, and 59% of the boards displayed a reduction in areas of interest. Overall, the feedback from professors and peers improved the narrative order but not the enhance the distribution of high- and low-attention areas (heatmaps). What is the potential of AI applications, such as eye-tracking simulation software, in improving visual communication when feedback is provided by machines instead of humans? Could AI critiques help organize a visual hierarchy that ensures reviewers read the same narrative and understand key points? Can a board layout be effectively structured by a single person without needing colleagues to evaluate and assess it? This presentation will highlight the outcomes of evaluating senior studio final boards using VAS, focusing on two main aspects: (1) the definition of a scan path within the board layout and (2) the hierarchical organization of areas of interest as intended by the students. All feedback will be generated solely by VAS and compared with last year's results to determine the effectiveness of AI eye-tracking simulation software in improving board layouts. This work aims to inform future empirical research on board layout design and to evaluate the potential of emerging technologies for assessing visual communication.

345 Visualizing Process as Design Context: Mapping Regional Food Systems Planning in North Carolina

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Keywords: food systems transformation; design contexts; visualizing complexity; regional planning

Regional food systems planning integrates place-based experiences and voices with cross-cutting issues of land, economy, policy, health, and equity, providing a valuable middle level approach to integrate local concerns with state, federal, and global food systems resources, pressures, and policy . Even as environmental literacy among designers has expanded to include agricultural and food infrastructures , and contemporary designers continue inquiry into urban and regional food system design solutions , an important research opportunity lies in exploring the non-spatial phenomena in regional food systems planning processes as a constructive context for meaning making in landscape design . Building from Potteiger's 2014 work in expanded respatialization of landscapes around productive as well as logistical dimensions of food systems , this study claims that in addition, non-spatial food system dimensions such as policy, process, and scale ought to be integrated into transformational food systems design . This study asks how visualization of regional food systems planning might provide new understanding for food systems designers and practitioners within complex structures of food systems transformation. In North Carolina, regional food systems planning is emerging as a practical outgrowth of local food movements. Before now, however, no clear reporting had cataloged or classified the range of regional planning projects or their implications for transformational approaches. Existing food planning projects have launched and worked independently – individual examples of this emergent phenomenon with distinct motives, structures, and scope. The primary purpose of this geospatial study is to visualize the state of regional food systems planning in North Carolina through combined, relational views of 5 key multi-county planning projects. Using a qualitative, pragmatic approach to collect, analyze, and visualize mixed data, this exploratory project provides a needed scan of an emerging scale and type of food systems planning work. Additionally, this study describes patterns in project types and goals, identifies geographies of inclusion in projects, and supports an informed multi-partner dialogue and policy frame. As part of its systems-based approach, the study explores and visualizes land use, multi-scale governance, and urban-rural relationships as factors in regional food systems planning, and asks how current planning processes address the future of rural land through strategic frameworks for change. The study concludes with a range of questions and speculations on the future potential of design research in regional food systems planning for transformative changemaking. Revised Abstract Our food systems are in urgent need of transformation. Effective food systems design responses integrate place-based experiences and voices with cross-cutting issues of land, economy, policy, health, and equity. Moving beyond change frameworks such as Slow Food or local food, a regional approach provides a strategic middle scale for food systems design that integrates local concerns with state, federal, and global food systems resources, pressures, and policy , accommodating bottom-up and top-down interactions. Leveraging Potteiger's arguments in "Eating Places: Food Systems, Narratives, Networks, and Spaces," around respatialization of landscapes based on both productive and logistical food systems dimensions , this study claims that non-spatial food

system dimensions such as policy, process, and scale ought to be integrated with place and space in transformational food systems design . This study asks how visualization of current regional food systems planning might provide new understanding for food systems designers and practitioners within complex structures of food systems transformation. As environmental literacy among designers expands to include agricultural and food infrastructures , contemporary designers continue inquiry into urban and regional food system design solutions . An important research opportunity lies in making visible the non-spatial phenomena in regional food systems planning processes as a constructive context for meaning making in landscape design . In North Carolina, regional food systems planning projects are emerging as outgrowths of local food and health dialogues. However, no clear reporting has classified the range of regional planning projects or their transformative implications. The primary purpose of this geospatial study is to visualize the motives, structures, and scope of regional food systems planning in North Carolina through combined, relational views of 5 multi-county planning projects. Using a qualitative, pragmatic approach to collect, analyze, and visualize mixed data, this project provides an exploratory scan of this emerging scale and type of food systems planning. In addition to the scan, this study describes and visualizes patterns in project types and goals: geographies of inclusion; land use; multi-scale governance; and urban-rural relationships as factors in regional food systems planning. Presentation of findings will emphasize lessons learned through the research methodology and potential applications in research and education. The nature and goals of visualizing non-visual phenomena will be discussed within a transformational context. Future research directions may include participatory design of integrated regional food landscapes, supply chains, and governance structures.

375 Hitting the Road with Homegrown Podcasts

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Keywords: Audio Narrative; Podcasting; Dissemination; Pedagogy; Travel

Audio narratives such as podcasts are an increasingly popular medium for information dissemination and entertainment, and can be effective pedagogical tools within higher education. However, collaborative podcast production as a means of researching and sharing information remains underdeveloped, especially within contemporary design education. This paper reviews the methods, results, and challenges of using a collaborative podcasting approach within a graduate design studio. It explores the potentials of podcast production through an assignment that tasks graduate students of landscape architecture with researching, scripting, and producing "audiolog" episodes that address many of the central themes and concerns of the course. The assignment precedes a week-long road trip, where (unbeknownst to the students at the time of the assignment) they will listen to their peers' audiologs while en route to destinations related to each episode. The course, a regional-scale landscape architecture studio focused on the Appalachian region, invites students to (1) interrogate how regions are defined; (2) identify opportunities and challenges throughout the study region that arise at the intersection of natural and anthropocentric interests or activities; and (3) use design as the primary approach to address those opportunities and challenges. The week-long field trip plays an integral role in helping students meet these objectives by situating them within the region of interest. To prepare for this in-situ exploration, desk research prior to the trip was necessary. Podcasts, which can be shared with classmates and played over the speakers in vehicles during the road trip, were a more appropriate medium for dissemination than a research paper that only the instructor would read. Creating audiologs requires students to thoroughly understand the assigned subject matter in order to present it in an accessible and coherent format. Furthermore, by assigning distinct topics to each student, they could explore one area in depth as opposed to skimming the surface of too many subjects. However, when each episode is broadcast to the class as a whole, breadth and depth of learning can be achieved. The act of collectively listening to each student's work while traversing through the very landscapes they studied makes for a compelling and immersive experience. Revised Abstract Podcasts are an increasingly popular medium for information dissemination (Edison Research, 2024). Although podcasts are gaining traction in higher education, there is limited empirical evidence confirming their long-term efficacy as pedagogical tools (Heilesen, 2010). As such, this paper aims to contribute to the growing body of experimental examples demonstrating how podcasts can be utilized in the classroom. Specifically, this paper reviews the methods, results, and challenges of a collaborative podcast series assigned to and produced by graduate landscape architecture students as a means of site analysis and interpretation. It posits that the portable, asynchronous format of podcasts combined with the reflective pace of a road trip, provides students opportunities for enhanced conceptions of site and place beyond what conventional reports or presentations typically offer. Students were tasked with researching, scripting, and producing podcast episodes that address many of the central themes and concerns of the course -- a landscape architecture studio focused on the Appalachian region. The assignment preceded a week-long road trip across Appalachia, where (unbeknownst to them at the time of the assignment) the students would listen to their peers' podcast episodes while en route to topically related destinations. For the students (many of them visiting Appalachia for the first

time), the trip played an integral role in contextualizing the region by situating them directly within the landscape. To support this in-situ exploration, desk research preceded the trip; however, instead of a research report or presentation, students were asked to produce an “audiolog”. The assignment encouraged students to move beyond the abstracted, birds-eye view reading of the site characteristic of modern landscape architecture practice (Meyer, Burns, Kahn, 2021). Assigning each student a unique audiolog topic (ranging from historical to contemporary Appalachian issues) enabled them to explore one subject in depth. Broadcasting each episode during the trip ensured the class as a whole gained both breadth and depth of knowledge about the region. Like other studies have suggested (Hew, 2008), creating successful podcasts requires students to thoroughly understand the assigned subject matter in order to communicate it in an accessible, coherent format for listeners. While this process helps reinforce comprehension, the creative act of podcasting also allows for self-expression, contributing to a more diverse and dynamic learning environment. This paper concludes with reflections on these observations, including the author's pedagogical aspirations for student-generated podcasts, situating the project within the larger interdisciplinary territories of geography, digital humanities, and landscape architecture.

412 Integrating Google ARCore API with Unreal Engine for Geolocated AR Experiences in Landscape Architecture Education: Methodology and Applications

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Keywords: AR; Augmented Reality; Geolocation; Community Participation; Anchored AR

This poster presents a methodology for integrating the Google ARCore API with Unreal Engine to create geolocated augmented reality (AR) experiences tailored to landscape architecture education. By combining ARCore's geospatial capabilities with Unreal Engine's 3D modeling and real-time rendering, this method enables the development of anchored AR experiences that enhance students' understanding of landscape architecture through interactive site visits and contextual learning. The process begins with 3D modeling of landscape elements, including topography, vegetation, and site structures, which are then integrated into Unreal Engine for real-time visualization. The Google ARCore API is utilized to create geolocated AR elements, allowing for the anchoring of digital content in specific outdoor locations. Through AR-enabled devices, students can explore digital contour lines, tagged site attributes, and design interventions overlaid on real-world environments, offering an enhanced understanding of spatial relationships and site-specific conditions (Billinghurst et al., 2015; Tussyadiah et al., 2018) In addition to facilitating more informed site visits, this approach holds potential for landscape learning applications, such as AR-based plant identification, construction detailing, and site analysis. For instance, users can interact with AR models of plants and ecosystems to learn about species identification, growth patterns, and sustainability considerations (Akçayır & Akçayır, 2017). Furthermore, the geolocated AR experiences could promote community participation by allowing stakeholders to engage with proposed landscape designs, fostering feedback and collaboration during public planning processes (Hussein, 2023) The outcomes of this research include enhanced student engagement, improved spatial awareness, and increased community involvement in landscape architecture projects. The integration of AR in educational settings not only improves learning outcomes but also bridges the gap between theoretical knowledge and real-world application, transforming how future landscape architects approach design and analysis (Hussein, 2023; Seichter & Schnabel, 2005).

451 Fictional Frontiers: A Mapping Framework for Advocacy

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Keywords: Mapping; Geography; Visualization; Advocacy; Community

Mapping as a creative practice has progressed into a critical space that employs iteration, mediation, and selective filtering to engender the reshaping of the world we know. It is an active participant in the narration of place, an operation necessary for authentic representation and advocacy. Social scientist and geographer Doreen Massey (2015) notes that places aren't simply physical manifestations of space on a map, but are "spatio-temporal events" (p. 130) that integrate both space and time. The inclusion of time in the mapping of place is what leads to propositions about new realities because of its innate ability to be both permanent and impermanent, long-lasting and momentary, global and intimate. Such dualities necessitate a shift in the way we view the geographies we map. The telling of a narrative, a fiction that reconstructs the world in a particular way, is dependent on the process of time. This paper investigates an approach to mapping where space and time are joined in order to uncover both the obvious and the underlying invisible forces within contested geographies as an act of advocacy. The framework for this project utilized mapping as a critical qualitative methodology to develop narratives of place and a community-based participatory research (CBPR) methodology alongside local partnerships to test frameworks for advocacy. Riverine landscapes within Arctic ecologies of Alaska served as mapping sites given their intersections of subsurface mineral resources, melting permafrost conditions, climatic flooding, migrating forests, and Indigenous people groups who call them home. Within these sites, water plays a crucial role in space; however, it also serves as an agent of change over time. Operating under the premise that water has memory, the rivers then became the narrators of their own stories. The process traced memory across these landscapes by making visible the invisible. It uncovered the ways in which water had made and remade space over time and reconstructed the world in a particular way so as to forefront narratives held within invisible spaces. The act of imagination is bound up with memory – in the imagining of new and changing worlds amongst memories that tether ephemerality to permanence, a place is made more known. Extracting narratives in order to make these sites more known was the first outcome of this approach. From there, narratives were then used to build the second outcome – a proposed framework for advocacy, where they serve as a platform to give communities a voice. Revised Abstract Mapping as a creative practice has progressed into a critical space that employs iteration, mediation, and selective filtering to engender the reshaping of the world we know. It is an active participant in the narration of place, an operation necessary for authentic representation and advocacy. Social scientist and geographer Doreen Massey (2015) notes that places aren't simply physical manifestations of space on a map but are "spatio-temporal events" (p. 130) that integrate both space and time. The inclusion of time in the mapping of place is what leads to propositions about new realities because of its innate ability to be both permanent and impermanent, long-lasting and momentary, global and intimate. Such dualities necessitate a shift in the way we view the geographies we map. The telling of a narrative, a fiction that reconstructs the world in a particular way from both memory and imagination, is dependent on the process of time. This paper investigates an approach to mapping where space and time are joined to uncover both the obvious and the underlying invisible forces within contested geographies as an act of advocacy for the marginalized and under-represented, both human and non-human. The

framework for this project utilized mapping as a critical qualitative methodology to develop spatial narratives and a community-based participatory research (CBPR) methodology leveraging local partnerships to record memories and imagine futures tied to place. Riverine landscapes within Arctic ecologies of Alaska served as mapping sites given their intersections of subsurface mineral resources, melting permafrost conditions, climatic flooding, migrating forests, and Indigenous people groups who call them home. Within these sites, water plays a crucial role in space; however, it also serves as an agent of change over time. Operating under the premise that water also has memory, the rivers point of view was mapped in tandem with the memories and imagined futures recorded given the inextricable link between them. The process traced memory across these landscapes by making visible the invisible. It uncovered and imagined the ways in which water had made, remade, and would remake space over time and reconstructed the world in a particular way to forefront narratives of innumerable human and non-human protagonists. This approach to mapping resulted in novel cartographic explorations that collectively serve as a storytelling platform to creatively advocate for these protagonists in governmental spheres where they are often misrepresented or unheard altogether.

548 Landform catalog: a landscape approach for reading and representing coastal geomorphology

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Keywords: Coast; Landform; Fieldwork; Cartography; Infrastructure

Ask an engineer, geomorphologist, ecologist, fisherman, or child what they see and value in a coast, and you will encounter a diverse array of perceptions shaped by their knowledge, experiences, and curiosities. Landscape architects can take these perspectives and blend them into rich representations of coastal environments. As we increasingly engage in coastal infrastructure research and design — work often dominated by reductive approaches overly reliant on quantitative analysis — one of our key contributions is in cultivating a sensitive observation of place. To achieve this, we need well-situated representational modes that highlight the wonder of such landscapes. This presentation describes and demonstrates the application of one such representation strategy, a landform catalog, for studying geomorphology along the Gulf and Atlantic coasts. Acting as an analytical tool, the catalog combines observation with rigorous documentation of typical and intriguing spatial characteristics of various coastal landforms such as beach ridges, dunes, marshes, and mudflats. It is also a framework for comparing those characteristics, facilitating knowledge creation through the discovery of relationships. The catalog is structured to integrate three scales of study and representation of landforms: "Observing Form" uses aerial imagery and Digital Elevation Models to identify and reveal their distinctive geometries and relief patterns; "Mapping Evolution" zooms out to illustrate larger temporal and spatial scales of landscape formation in synthetic cartographies (Holmes, 2020), and, "Capturing Essence" merges analog media with photography to interpret the body-scale experiential qualities of each site (Lutsky, 2017). The landform catalog has been an instrument to guide and compile our team's understanding of extensive coastal areas, enhance recognition of landform diversity, and inspire design ideas as we advance the Natural Innovation Infrastructure Project, a USACE-funded initiative focused on developing richer, place-specific nature-based infrastructure. To show the catalog's value, this presentation includes a graphic study of marshes from Texas to South Carolina, integrating representations of the physical conditions, such as tidal range, channel morphology, and vegetation types; ephemeral characteristics; and the unique contexts of the range of marshes spanning these coasts. This approach to geomorphology invites landscape architects to confidently and enthusiastically embrace our representational tools when working with new landscapes and disciplines. By emphasizing sensitive observation rigorously documented and communicated, we address the reductiveness of traditional approaches to coastal infrastructure. We can strengthen coastal infrastructure research and design by offering representations of the coast that blend the precision of scientific analysis and the curiosity of a child. Revised Abstract Ask an engineer, geomorphologist, ecologist, fisherman, or child what they see and value in a coast, and you will encounter diverse answers shaped by their knowledge, experiences, and curiosities. Landscape architects can blend these perspectives into rich representations of coastal environments. As we increasingly engage in coastal infrastructure research and design — work often dominated by reductive approaches overly reliant on quantitative analysis — one of our key contributions is in cultivating a sensitive observation of place. To achieve this, we need representation modes that highlight the wonder of such landscapes. This presentation describes and demonstrates the application of one such

representation strategy, a landform catalog, for studying geomorphology along the Gulf and Atlantic coasts. As a research tool, the catalog's objective is to offer a method for observing and analyzing the physiographic conditions and cultural trajectories that shape coastal landforms. It integrates field observation and research on a range of coastal features — from beach ridges, marshes, and mudflats to man-made earthworks like impoundments — while providing a framework to compare them and read patterns along the coast. The catalog integrates three scales of study and representation of landforms: "Capturing Markers" emphasizes elements that spark curiosity during fieldwork, serving as markers for investigating forces shaping the landscape. It combines field observations with subsequent research through photogtaphy and hybrid section drawings. "Mapping Evolution" zooms out to illustrate larger temporal and spatial scales of landscape formation in synthetic cartographies (Holmes, 2020). "Observing Form" uses aerial imagery and Digital Elevation Models (DEMs) to analyze samples of landform relief patterns and their context. The catalog has been an instrument to guide and compile our team's understanding of coastal areas, enhance recognition of landform diversity, and inspire design ideas as we advance the Tidelands Project, a USACE-funded initiative focused on developing richer, place-specific nature-based infrastructure. To show the catalog's value in our work, this presentation includes a graphic study of marshes in the Southeastern United States, analyzing physiographic conditions such as tidal range, channel morphology and vegetation; ephemeral qualities, and cultural contexts. This approach to geomorphology invites landscape architects to enthusiastically embrace our representational tools when working with new landscapes and disciplines. By emphasizing sensitive observation rigorously documented and communicated, we address the reductiveness of traditional approaches to coastal infrastructure. We can strengthen coastal infrastructure research and design by offering representations of the coast that blend the precision of scientific analysis and the curiosity of a child.

558 Advancing Eye-Tracking Applications for Project Presentation Boards: Insights from an Initial Study in Landscape Architecture

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Keywords: Eye tracking; Visual narrative; Presentation layout; Boards

Eye tracking technology allows researchers to collect data on eye movements, providing insights into where participants look, what specifically captures their attention, and for how long. With a wide range of applications, eye tracking is becoming an increasingly popular tool in visual and media studies. In landscape architecture, current uses of this technology focus on landscape perception, landscape evaluation, and therapeutic landscapes. Research on therapeutic landscapes examines how individuals' visual attention responds to environments dominated by natural elements and explores their therapeutic effects. In studies of landscape perception, eye tracking is used to analyze the impact of various design techniques in both urban and natural settings. Landscape evaluation research investigates the relationship between evaluators' psychological responses and landscape quality, aiming to understand how objective landscape features relate to subjective visual experiences. Future applications of eye tracking in landscape architecture may involve optimizing ecological environments, integrating the technology with psychological sensing tools like heart rate variability, and applying it to health research in combination with biofeedback technology. This study addresses a gap in the research in presentation boards in landscape architecture: no studies have explored the use of eye tracking software to evaluate effective visual communication. The purpose of a presentation board is to visually communicate ideas to an audience, with the primary challenge being to make a compelling visual argument. Effective boards require a clear visual hierarchy and a harmonious design, enabling reviewers to quickly grasp the main points. Traditionally, feedback on boards is gathered by presenting them to colleagues, especially those not familiar with the project. This research proposes using the Tobii Pro Nano eye tracking system to study final presentation boards created by senior landscape architecture students. Eye tracking technology will be used to analyze visual attention patterns, revealing key areas of focus and the visual narrative of the boards. To assess the effectiveness of visual communication, the eye tracking study will involve students from Landscape Architecture and Graphic Communication fields. Students will be presented with boards depicting landscape architecture senior studio projects, and visual sequence and hierarchy will be mapped using eye tracking software. Subjects will be asked to answer interview surveys to provide qualitative insights into the legibility and understanding of the boards. Incorporating eye tracking technology into board layout design may lead to significant improvements in visual hierarchy, organization, and overall visual communication. Revised Abstract Eye tracking technology allows researchers to collect data on eye movements, providing insights into where participants look, what captures their attention, and for how long [Isokoski et al., 2018; Steil et al., 2018]. With a wide range of applications, eye tracking is becoming an increasingly popular tool in visual and media studies [Cummins, 2017; Geise, 2014]. In landscape architecture, current uses focus on landscape perception, landscape evaluation, and therapeutic landscapes [Bao et al., 2024]. Research on therapeutic landscapes examines how individuals' visual attention responds to environments dominated by natural elements and explores their therapeutic effects. In studies of landscape perception, eye tracking is used to analyze the impact of various design techniques in urban and natural settings.

Landscape evaluation research investigates the relationship between evaluators' psychological responses and landscape quality, aiming to understand how objective landscape features relate to subjective visual experiences [Evans & Chamberlain, 2024]. Future applications of eye tracking may involve optimizing ecological environments, integrating the technology with psychological sensing tools like heart rate variability, and combining eye tracking with biofeedback technology for health research [Bao et al., 2024]. This study addresses a gap in research of presentation boards in landscape architecture: no studies have explored the use of eye tracking software to evaluate effective visual communication. The purpose of a presentation board is to visually communicate ideas to an audience, with the primary challenge being to make a compelling visual argument [Fletcher, 2020]. Effective boards require a clear visual hierarchy and a harmonious design, enabling reviewers to quickly grasp the main points [Mertens, 2009]. Traditionally, feedback on boards is gathered by presenting them to colleagues, especially those unfamiliar with the project [Fletcher, 2020]. This research proposes using the Tobii Pro Nano eye tracking system to study final presentation boards created by senior landscape architecture students. Eye tracking technology will analyze visual attention patterns, revealing key areas of focus and the visual narrative of the boards. To assess visual communication effectiveness, the study will involve students from Landscape Architecture and Graphic Communication fields. Students will view boards depicting senior studio projects, and visual sequence and hierarchy will be mapped using eye tracking software. Subjects will answer interview surveys to provide qualitative insights into the boards' legibility and understanding. Incorporating eye tracking technology into board layout design may lead to significant improvements in visual hierarchy, organization, and overall visual communication.

599 Urban Flood Risk Assessment with Virtual Reality: A Comparison of Traditional vs Immersive Media

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Keywords: Flood Risk Assessment; 3D VR Simulation; Stakeholder Engagement

Climate change is increasing flash floods, river floods and coastal floods in urban areas (UNEP, 2022; Climate.gov, 2018). Flooding due to climate change is the leading cause of both natural disasters and death (by natural disaster) in the U.S. (Doocy, 2013). Flood risk assessment helps raise community awareness about flooding and develop structural and non-structural strategies for reducing these risks (Fischer & Stanchev, 2022). Currently, the main tools for visualizing flood risk assessment are flood hazard maps, flood damage assessment, and flood vulnerability maps (Sulong and Romali, 2022). These are based on a combination of flood depth and flood extent (Sulong and Romali, 2022). Three-dimensional flood modeling visualized through virtual reality (VR) promises to improve flood risk assessment by giving more stakeholders access to understanding flood data. However, there are still questions about what strengths VR visualizations offer versus traditional media such as plans, sections and data tables. This study tests the strengths of traditional media versus VR visualization in helping different users assess flood risk. Participants included community stakeholders, public officials, and design professionals with a range of experience assessing flood risk in the city of Baltimore. Visualization tools included flood maps, section/elevations, flood data tables, eyelevel immersive flood models, and aerial immersive flood models. Participants assessed risks to properties, risks to structures, risks to personal safety, and the usefulness of each tool to answer the questions. Flooding scenarios were produced using WinTR-55 hydrologic modeling to determine various flood levels, together with realistic 3D models of the neighborhood flooding rendered in Lumion. Survey questions use Likert Scales to enable a range of statistical analyses. Data collection began in July 2024 and will continue until December 2024. The results will be presented at the conference. Revised Abstract Climate change is increasing flash floods, river floods and coastal floods in urban areas (UNEP, 2022; Climate.gov, 2018). Flooding due to climate change is the leading cause of both natural disasters and death (by natural disaster) in the U.S. (Doocy, 2013). Flood risk assessment helps raise community awareness about flooding and develop structural and non-structural strategies for reducing these risks (Fischer & Stanchev, 2022). Currently, the main tools for visualizing flood risk assessment are flood hazard maps, flood damage assessment, and flood vulnerability maps (Sulong and Romali, 2022). These are based on a combination of flood depth and flood extent (Sulong and Romali, 2022). Three-dimensional flood modeling visualized through virtual reality (VR) promises to improve flood risk assessment by giving more stakeholders access to understanding flood data. However, there are still questions about what strengths VR visualizations offer versus traditional media such as plans, sections and data tables. This study tests the strengths of traditional media versus VR visualization in helping different users assess flood risk. Participants included community stakeholders, public officials, and design professionals with a range of experience assessing flood risk in the city of Baltimore. Visualization tools included flood maps, section/elevations, flood data tables, eyelevel immersive flood models, and aerial immersive flood models. Participants assessed risks to properties, risks to structures, risks to personal safety, and the

usefulness of each tool to answer the questions. Flooding scenarios were produced using WinTR-55 hydrologic modeling to determine various flood levels, together with realistic 3D models of the neighborhood flooding rendered in Lumion. Survey questions use Likert Scales to enable a range of statistical analyses. Data collection began in July 2024 and continue until December 2024. The preliminary results indicate that users rate the use of different visualization tools differently for different tasks. Some rate higher for assessing properties, while others rate higher for assessing risk to personal safety, and others for judging characteristics of the flood. Some limitations were identified in open-ended questions that were supported by lower rating scores for certain visualization tools. Overall, the 3D visualization tools ranked higher for most risk assessment tasks, and participants reported high confidence in their ability to use the tools to answer the assessment questions.

634 From Data to Story: The EcoAtlas as a Catalyst for Biodiversity and Cultural Insight

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Keywords: Data visualization; Ecology and Culture; Visual storytelling; Biodiversity; Art and Design

In Visual Explanations, Edward Tufte ascertains that “when principes of design replicate principles of thought, the act of arranging information becomes an act of insight.” 1 Landscape architecture’s innate complexity calls for simpler and more elegant tools capable of synthesizing dynamic data ranging from ecological relationships, dynamic environmental processes, and their intersections with social and cultural content. The Ecological Atlas is a digital platform that translates complex ecological data, such as bird migrations, bloom cycles, and seasonal patterns, into intuitive and visually engaging diagrams capable of identifying patterns and the impacts of climate change on biodiversity, for example. Existing resources and digital libraries, while rich in individual species information, often fall short in communicating the interconnectedness and dynamic nature of ecosystems. Moreover, they miss the profound potential to harness art and aesthetics and leverage deep cultural connections to biodiversity and living systems, thus hindering a holistic understanding of the natural world and the ability to effectively communicate cause and effect relationships. The project, which spans research of over more than a decade, employs a dynamic visual language that mirrors the cyclical and evolving nature of ecosystems. This approach transforms complex datasets into accessible and compelling narratives, enabling users—from landscape architects and urban planners to educators and the general public—to readily grasp intricate ecological relationships, harness their power as storytelling devices, and make more informed decisions. The Ecological Atlas has garnered recognition from esteemed organizations, including Fast Company's World Changing Ideas Awards and exhibits during the Venice Biennale, underscoring its potential to transform how we perceive, interact with, and ultimately design for a more sustainable future. By bridging art, science, and technology, the Ecological Atlas transcends disciplinary boundaries and empowers a new generation of environmentally engaged citizens. The project's ultimate objective is to democratize access to ecological knowledge, fostering a deeper understanding and insights about ecosystem dynamics that promoting responsible stewardship of the natural world and the agency of landscape architects. Revised Abstract In Visual Explanations, Edward Tufte asserts that “when principles of design replicate principles of thought, the act of arranging information becomes an act of insight.”1 When available information is overwhelmingly limited to select, biased subsets, these insights can in fact be misguided. Landscape architecture inherently requires tools that synthesize dynamic data, including ecological relationships, environmental processes, and their intersections with social and cultural contexts. The Ecological Atlas is a digital platform that translates complex ecological data—such as bird migrations, bloom cycles, and seasonal patterns—into intuitive, visually engaging diagrams, designed to reveal patterns and the impacts of environmental change. The project, which spans more than a decade of research, employs a dynamic visual language that mirrors the cyclical nature of ecosystems, transforming complex datasets into accessible narratives and artistic interpretations of ecological changes over time. Initially intended as a visual catalog to enables users—from landscape architects and urban planners to educators and the general public—to readily grasp intricate ecological relationships, its digital nature and timely advances in artificial intelligence,

have positioned the platform as a storytelling device, capable of capturing qualitative impressions as well as inform decision-making. While existing resources and digital libraries offer extensive species information, they often fail to communicate the dynamic and interconnected nature of ecosystems, missing the opportunity to harness art and aesthetics and leverage deep cultural connections to biodiversity and place. The overwhelming focus of ecological research on North America and Europe, moreover, has meant that only about 10 percent of published ecological studies are based on tropical sites, even though tropical countries host an overwhelming majority of the planet's species and about 40 percent of global land.2 The evolution of the EcoAtlas from a static archive to an automated visualization tool is an expanding work in progress. Crucially, it is evolving into a vehicle that integrates cultural content and local knowledge to ensure a more comprehensive and equitable representation of biodiversity and its profound connections to culture. By embracing art, storytelling and cultural perspectives, the EcoAtlas aims to transform the understanding of and response to ecological challenges by complementing AI-enabled tools that are exponentially advancing sensing, visualization, and geospatial analysis. By bridging art, science and technology, the Ecological Atlas transcends disciplinary boundaries and democratizes access to ecological knowledge. It aims to foster a deeper understanding and stewardship of the natural world and present balanced and inspired insights about it.

Design Education and Pedagogy

12 Beyond Designation: Integration of the STEM Disciplines in Landscape Architectural Education

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Keywords: STEM Integration; STEM in Professional Curricula; STEM in Professional Development

Although landscape architects have long believed and argued that we are a STEM profession, we were only given the formal recognition by receiving a formal STEM designation by the Department of Homeland Security in 2023. This historical recognition was an important but easy part of the intent of the STEM movement in our rapidly developing world that faces both challenges and opportunities for the future. Although we all comprehend that integrated STEM education is important, a limited research has been done, specifically, in landscape architecture to conceptualize how the academy (and the professionals) conceptualize professional education and curricula in light of current and emerging real-world problems, needed 21st century knowledge, skills and abilities. The academy needs a focused and well-articulated research to explore not only the current state-of-the art but also future avenues for a fully integrated STEM education in landscape architecture. Understanding the faculties conceptions and practices for integrated STEM education is vital to the successful implementation of integrated STEM curricula in landscape architectural education. The quality of the well-integrated STEM education is vital for the future success of students and professionals. There is a need for further research in effective integration of STEM education in landscape architecture. The most effective ways to teach well-integrated STEM and professional education remain to be answered. The purpose of this presentation is to share preliminary results of an ongoing research on STEM integration in landscape architectural curricula and generate additional discussions. The research has begun with a panel on this topic at the 2023 CELA Conference. The audience participation has provided invaluable input for the general parameters and objectives of the research. The research methods include literature survey, in-person visit of several landscape architectural programs in the USA, and an online survey with the landscape architectural educators. Revised Abstract Although educators in landscape architecture comprehend that integrated STEM education is important, limited research has been done in landscape architecture to conceptualize how the academy (and the professionals) conceptualize professional education and curricula in light of current and emerging real-world problems that need 21st-century knowledge, skills, and abilities as well as a formal STEM designation. The academy needs focused and well-articulated research to explore the current state of the art and future avenues for a fully integrated STEM education in landscape architecture. Understanding conceptions and practices for integrated STEM education is vital to successfully implementing integrated STEM curricula in landscape architectural education. There is a need for further research on the effective integration of STEM education in landscape architecture. Unlike other STEM-designated fields and professions, there has been highly limited STEM pedagogy-focused research in landscape architecture. The most effective ways to teach well-integrated STEM and professional education remain to be answered. This presentation aims to share the results of ongoing research on STEM integration in landscape architectural curricula and generate additional discussions. The research began before a panel at the 2024 CELA Conference. Audience participation and interaction in that panel provided invaluable input for the current continuing phase of this research's parameters and objectives. The current phase of research methods includes an in-depth literature survey, an in-person visit to several landscape

architectural programs in the USA to observe how STEM knowledge, skills, and abilities are incorporated into pedagogy, whether or not any updates made after the formal recognition as a STEM discipline, and/or if any changes are planned as a result of the recognition. If outcomes of site visits indicate or identify a need, a national online survey with landscape architectural educators will be conducted further to enhance research findings toward scholarly dissemination and implementation. It is also hoped that this presentation will generate more interest in additional partners for collaboration and cooperation. The ultimate goal of this research is to contribute toward a more effective integration and infusion of STEM in landscape architectural education.

20 Activism and Advocacy: Engaging Students in Critical Design Pedagogy

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Russel, Kory California Polytechnic University Pomona, Pomona, CA, USA
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Coronado, Cameron University of Oregon, Eugene, Oregon, USA

Keywords: Design Advocacy; Design Activism; Critical Design; Design Pedagogy; Student Engagement

Over the past decade, college students have become increasingly engaged in political, social, and environmental activism. While this is encouraging and hopeful, many students experience significant stress and anxiety from these issues. Despite their participation in this activism, students often question the effectiveness of their own work in these systemic challenges. Landscape architecture and design as a discipline has long embodied the principles of activism but how, as educators, do we establish the potential of design as activism as well as advocacy? What are the strategies that we can implement across departments and curriculums to show students that their work and the work of designers can be meaningful acts of activism and advocacy? Many departments and organizations have already taken inspiring actions to engage design disciplines in this work and this panel aims to highlight the diverse experiences and approaches of its panelists to explore actionable strategies that can be taken at various levels to keep students inspired and motivated as they strive for the change we so urgently need. To examine how we can engage and restructure our departments and curriculum to effectively involve our students in critical design pedagogy addressing these systemic issues, it is crucial we assess the value of these approaches. Each panelist will highlight a specific approach or experience where they have addressed design's potential for advocacy/activism: Jade, will share graduate-level studio work focused on civic advocacy, including how the studio touched on various forms of activism and lessons learned. She will present speculative studio proposals and discuss how the work advanced conversations on design advocacy. Jean, is infusing landscape thinking into system-wide discussion about change, activism and community. She will share her work on landscape architecture led civic workshops, talks and department collaborations. Kory, will discuss the challenges and opportunities of using a landscape framework internationally as well as successful outcomes and failures. Kory will share lessons learned around involving the next generation of students in international research and activism. Jody will present one theoretical studio project which attempted to address geographic barriers to political discussions between antagonist groups and offer an overview of a first-year seminar that explicitly addressed this topic. Cameron will share insights from his experience as a graduate student advancing DEI initiatives within the department. He will highlight lessons learned and actionable strategies to help LA departments normalize, organize, and operationalize efforts focused on race, equity, accessibility, and inclusion.

34 Flyways as Pathways: Collaborative Ecological Planning Framework for a Biosphere Reserve

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Ko, Yekang, University of Oregon, Eugene, OR, USA
Yoo, Miyeon, Yeoncheon County, Yeoncheon County, Gyeonggi Province, Republic of Korea
Park, Sohyun, University of Connecticut, Storrs, CT, USA

Keywords: Ecological Planning; Participatory Design; Community Engagement; Ecological Democracy; Biosphere Reserve

This panel explores the community engagement principles and process for ecological democracy through a case of Pan-Pacific collaboration for Biosphere Reserve. At the core is the concept of a Flyway, traditionally a migratory route for bird species, which is extended metaphorically to represent the dynamic intersections of ecological and cultural systems. Here, the Flyway is a framework for designing landscapes that bridge distances—geographical, cultural, and temporal—while uniting people from different parts of the world to come together to achieve a shared conservation goal. This panel reviews a two-year participatory project to develop a Vision Plan for the Yeoncheon Imjin River Biosphere Reserve (YIRBR) and co-design the Nature Center and Wetland Park. Biosphere Reserves are complex ecosystems, often in remote rural areas, formally recognized by UNESCO for extraordinary biodiversity. Along the East Asian-Australasian Flyway, the YIRBR adjoins the Demilitarized Zone (DMZ) between North and South Korea, one of the most biologically diverse areas in the world (Moores, 2022, 2023). Through collaborative workshops, visual design communication, and inclusive participatory methods, the local community actively participated in shaping the Nature Center's design. Stakeholders from various backgrounds—including educators, public officials, entrepreneurs, and local citizens—were empowered to engage with the design process, providing critical feedback that informed the final proposals. Community engagement in this context goes beyond gathering input and fosters a sense of ownership and agency in the design process (Hester, 2006; De la Pena et al., 2017). The participatory workshops allowed local voices to guide the process, emphasizing the importance of listening and providing alternative designs that reflected diverse community needs. These engagements often led to “metamorphic moments,” where participants experienced personal and collective transformations, shifting from passive observers to active leaders in their community. One key finding we reconfirm is that while language barriers and cross-cultural communication posed challenges, the power of visual communication and design allowed for deeper understanding and cohesion, leading to a more inclusive design process (Treib 2008). This process exemplified the potential for design to bridge gaps and create spaces that reflect the ecological and cultural values of a place (Liu, 2001). This panel explores these themes and shares their “metamorphic moments,” demonstrating the power of community engagement. The Flyway concept emerges as a powerful metaphor for linking the movement of species with human collaboration and participation, showing how this flyway approach can shape more sustainable futures for both ecosystems and communities. Revised Abstract Panel: Randolph T. Hester (UC Berkeley), Florencia Sepulveda Trucco (UC Berkeley), Yekang Ko (University of Oregon), Miyeon Yoo (Yeoncheon County, South Korea), and Sohyun Park (University of Connecticut) This panel explores community engagement principles and processes

for ecological democracy through a Pan-Pacific collaboration in the Yeoncheon Imjin River Biosphere Reserve (YIBR). Using the Flyway concept as a metaphor for representing the dynamic intersections of ecological and cultural systems, the project developed a Vision Plan and co-designed a Nature Center and Wetland Park. Recognized by UNESCO for extraordinary biodiversity (Moores, 2022, 2023), the YIBR is located along the East Asian-Australasian Flyway near the Demilitarized Zone (DMZ) between North and South Korea. The Flyway in this project is a framework for designing landscapes that bridge distances—geographical, cultural, and temporal—while uniting people from different parts of the world to come together to achieve a shared conservation goal. Through collaborative workshops, visual design communication, and inclusive participatory methods, the local community stakeholders actively participated in shaping the Nature Center's design. Community engagement in this context goes beyond gathering input and fosters a sense of ownership and agency in the design process (Hester, 2006; De la Pena et al., 2017). The participatory workshops allowed local voices to guide the process, emphasizing the importance of listening and providing alternative designs that reflected diverse community needs. These engagements often led to “metamorphic moments,” where participants experienced personal and collective transformations, shifting from passive observers to active leaders in their community. Hester, Sepulveda Trucco, Ko, and Yoo will share key findings from their “metamorphic moments”: the critical role of listening despite cross-cultural challenges, the empowering effect of offering design alternatives, the value of co-design amidst limitations like restricted data exchange, and the destabilizing impact of concentrated power. Unexpected insights included the universal power of visual communication over language, gradual yet transformative personal leadership changes, significant moments of community transformation through deep engagement, and a spontaneous meeting that marked a pivotal power shift. In particular, the power of visual communication and design allowed for deeper understanding and cohesion, leading to a more inclusive design process (Treib 2008), bridging gaps and reflecting the ecological and cultural values of a place (Liu, 2001). As a discussant, Park will pose questions to the panel to elaborate on these findings, demonstrating how the Flyway concept emerges as a powerful metaphor for linking the movement of species with human collaboration and participation.

35 Bridging Borders: Global Engagement and Interdisciplinary Collaboration in Design Education

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Yang, Yizhao, University of Oregon, Eugene, OR, USA
Echeverri, Natali, University of Hong Kong, Hong Kong, Hong Kong, China
Elise O'Brien, University of Oregon, Eugene, OR, USA
Chingwen Cheng, The Pennsylvania State University, University Park, PA, USA
Andréanne Doyon, Simon Fraser University, Burnaby, BC, Canada

Keywords: Study abroad; Sustainability Competency; Student evaluation; Policy impact; Sustainable Development Goals (SDGs)

This panel explores the significance of global engagement in landscape architecture education and research, highlighting a case study of the APRU Sustainable Cities and Landscapes (SCL) Hub. As global challenges like climate change increasingly demand interdisciplinary and collaborative approaches (Schipper, 2021), global engagement becomes vital for fostering impactful research and enhancing student learning (Yang et al., 2022). Despite the availability of international research and student mobility programs, many institutions and disciplines still operate in silos, limiting the potential for cross-border collaboration (Amparo et al., 2021). The APRU SCL bridges this gap by connecting scholars, educators, students, and practitioners from 21 universities across the Pacific Rim. Operating under the Association of Pacific Rim Universities (APRU), the SCL aims to co-produce knowledge with policy impact emphasizing the interconnection between cities and surrounding landscapes, aligned with the United Nations' Sustainable Development Goals (SDGs) (Johnson and Ko, 2022). The SCL promotes place-based approaches to global challenges through annual conferences, field schools, webinars, and other cross-institutional activities, fostering mutual learning between local and international participants. All activities are open to everyone, regardless of their APRU memberships. This panel will feature key leaders from the APRU SCL, sharing insights into the transformative potential of global engagement in design education and research. Presentation Structure: Introduction: Yekang Ko, APRU SCL Director (University of Oregon, UO), will provide an overview of the hub, its guiding principles, and its contributions to design education and research. Student Learning: Yizhao Yang (UO) will present a study on the effectiveness of a global sustainability competency learning model (Soublis, 2017) based on the multi-institutional SCL summer field school in the Galapagos. The research utilized pre- and post-program surveys to evaluate students' sustainability competencies, as defined by UNESCO's Education for Sustainable Development (ESD) framework. Student and Faculty Experience: Elise O'Brien (UO) and Natalia Echeverri (University of Hong Kong) will reflect on their experiences participating in the SCL initiatives, including field schools and working groups, and their impact on their research and leadership skills. Policy Impact: Chingwen Cheng (Penn State University) will present a case study on policy impact through the Asia Pacific Mayors Academy, emphasizing SDG-aligned initiatives. Future Perspectives: Andreanne Doyon (Simon Fraser University) will discuss the future of interdisciplinary research and introduce the upcoming APRU SCL conference. A 15-20 minute Q&A session will explore key themes such as the alignment of place-based design strategies with SDGs and innovations needed for future design education.

41 Routes to better teaching in architecture: some signposts from CELA's pedagogical scholarship

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Keywords: Design educator training; Cross-disciplinarity; Reflection and observation; Mentor-mentee dynamics; Creative experiences

Since 2013, Landscape Research Record (LRR) has collected papers from each year's Council of Educators in Landscape Architecture (CELA) annual conference. This body of literature includes a significant amount of reflective scholarship in design education, and here we consider the potential IMPACT of CELA's pedagogical research beyond its membership. Specifically, the potential to help address a knowledge-gap in the PROCESS of training of British architect-educators (who generally lie beyond CELA's geographical and disciplinary scope). Our narrative literature review illustrates how British architecture-educator training has emerged as a key recent concern. Bodies such as the Architects Registration Board (ARB,) and the Royal Institute of British Architects (RIBA,) have called for a "sharpened focus" on student-training yet, at the same time, literature and precedents for the effective preparation of architecture-educators is scant. We do, however, note an exception: a program of training that ran at the University of East London between 1996 and 2002 and which is noteworthy in two ways (see, Andrews, 2023). First, by drawing on approaches in health-practitioner training, it established that architecture-educator training can pull from outside the discipline. Secondly, despite its innovative and increasingly prescient approach, the program was short-lived and remains an outlying example. Our review identifies key terms and themes from the literature describing processes adopted by the University of East London program. Fundamentally, the program privileged reflection and observation among trainee architecture-educators; the twinning of new faculty with more experienced colleagues; and an engaged an informed yet playful atelier model. In this, the program also foreshadowed recently published appreciations of meaningful and resonant creative experiences and person-to-person engagement (Glăveanu & Beghetto, 2021). Furthermore, we demonstrate that this rare, exemplarily effective teaching of design-educators in the UK—though curtailed in 2002 and somewhat overlooked—resonates with the pedagogical processes and reflective case studies subsequently published by CELA through more than a decade of LRR. In short, as the British architecture community currently stands bereft of good examples of practice, the pages of LRR could well be an untapped resource for the training of architecture-educators: a resonance that, to date, has gone unremarked. This paper, then, while reminding us of the value of the corpus of pedagogical research conducted by the CELA membership in terms of landscape architecture, also speculates on broader potentials for informing PROCESS and driving IMPACT in new and unexplored areas.

43 The Oregon Sequence Studios: Reflecting on the First Five Years

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Keywords: Oregon Sequence; BIPOC; houselessness; studio; pedagogy

Design studios are the core of landscape architectural education, providing the opportunity to synthesize knowledge and develop skills through project-based exploration intended to prepare students for professional practice (Tóth, 2020, p. vi; Jørgensen et al., 2020, p. vii; Steinitz, 2020, p. 122). Yet the time constraints of academic terms do not approximate the duration of most professional projects, which can often span several months to years. Additionally, studios taught in the quarter system are even poorer equivalents to professional practice; in the case of the University of Oregon, studios are a mere 9 weeks long, plus a final review week. Quarter-length studios are intense and fast-paced, which can leave little time for the exploration necessary in a design education. And for the studio instructor, identifying and developing a new studio as many as three times a year requires considerable time and effort It was out of these concerns that faculty at the University of Oregon developed the Oregon Sequence studios, which were first offered in Fall 2019 to second-to-final year BLA and MLA students. Each offering of the Oregon Sequence focuses on one theme and/or site in Oregon across fall, winter, and spring quarters. Fall quarter focuses on a comprehensive analysis of the site/theme and its history, winter quarter focuses on site design, and spring quarter focuses on design details. The overall objective behind the study of a single site across an academic year is to allow for deeper understanding of a site, greater exploration of design ideas, and more cohesive thinking across scales. While the site is local, the themes are global. The first panel speaker (first author, 10 minutes) will introduce the objectives, structure, process, and history of the Oregon Sequence studio, followed by a preview of the speakers and topics. The second and third speakers (10 minutes each) will expand on the structure of the Oregon Sequence and the opportunities that a full-year studio affords. The fourth and fifth speakers (10 minutes each) will focus on recent ASLA award-winning studios—on houselessness and BIPOC landscapes—and discuss how instructors and students engaged with various communities and partners beyond the University of Oregon. Finally, closing remarks from the first speaker (5 minutes) will look back on the Oregon Sequence and imagine future directions. In total, the presentation is planned to last 55 minutes, plus 20 minutes of discussion with the audience.

56 The Role of Experiential Learning in the Landscape Construction and Living Systems Classroom

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Keywords: experiential learning; living systems; landscape s

Experiential Learning is a vital tool for helping students in landscape architecture grasp key concepts in landscape construction and living systems courses. Students engage in a hands-on learning approach to gain understanding of construction and living systems learning goals. "Experiential learning," which describes students' "learning by doing or participating" through experiences, allows an opportunity to intertwine theoretical concepts with action. (McKeachie, 2002). Delivering hands-on experiential learning activities for undergraduate students in construction and living systems courses is increasingly vital for accreditation reviews and as landscape architecture navigates its recently acquired STEM designation in the U.S. Accredited programs in landscape architecture must keep with established educational standards, which are reviewed periodically by the Landscape Architecture Accreditation Board (LAAB). Each program is evaluated "on the basis of its stated objectives and compliance to externally mandated minimum standards" (ASLA, 2024). These include construction (construction materials/methods, landform/landscape engineering) and living systems (plants, ecosystems, climate science, green infrastructure) (LAAB, 2021). In Fall 2023, the University of Tennessee's (UT) PLSC 350: Sustainable Landscape Construction, implemented a study to explore experiential learning benefits in the classroom. The methods followed a precedent implemented at Kansas State University, where students' experiential learning experience contributed to their advanced understanding of irrigation systems (Lavis & Brannon, 2010). For UT's course, students completed a pre and post semester survey asking two questions pertaining to ten landscape construction skills: whether students had used the skill before and ranking their confidence in the construction skill (including details). Students were given traditional landscape construction coursework before being tasked with installing a patio, retaining/gabion seat wall, and matrix plantings. Following the project, students created a construction document set based on their understanding of techniques learned in the field. Before the project, survey results showed a 51.1% confidence level across the ten skills. After the experiential learning opportunity, results showed a 77.9% confidence level, a gain of 26.8% in confidence. While the sample size was small (n=11), it provides proof-of-concept for an experiential learning framework in landscape construction and living systems classrooms. This presentation explores the ways that experiential learning was incorporated in a past course at the University of Tennessee and describes the learning that is informing the use of these practices at the University of Delaware in a five-course construction and living systems sequence. This framework is adaptable to a variety of projects that can be employed in construction and living systems courses.

61 Landscape Architecture Education for the Visually Impaired

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Keywords: disability; design; education; visual impairment; learning style

Learning the profession and practice of landscape architecture are both informed by visual and spatial attributes. This research establishes a better understanding regarding visually impaired students' preparation to become professionals in landscape architecture. The goal is to better consider non-visual learners, users, faculty, and professionals in the landscape architecture discipline, and to assist non-visual learners within the visual-bias of the discipline. The authors first completed a literature review regarding how visually impaired students perceive space, ways of learning, and precedents for visually impaired professional designers in landscape architecture and related disciplines. The review led the authors to be more inclusive of different ways to perceive the world, "concepts of embodied space" (Low, 2003; Anvik, 2009), and insights on how "space-making is not necessarily dependent on sight" (Anvik, 2009: 146), where emotions and experiences play an essential role in the methodology and analysis phases (147). Within this context the authors then reflected on their experience in the classroom with a visually impaired student to describe the challenges they encountered and how they delivered design critiques and teaching material across two courses. The authors then interviewed the one visually impaired student they taught during Fall 2021 and Spring 2022 according to questions arising from the review of the literature and the author's critical self-reflection to better understand the visually impaired student's individual challenges during those courses and how he translated his perception of space into delivering his projects. Finally, the authors conducted a site visit and design exercise with the visually impaired student to observe and ask questions of his approach to the design of spaces. The authors sought to identify ways of assisting the visually impaired in their process of learning landscape architecture. What are some of their limitations, challenges, and aspirations? The authors investigated ways to deliver material that is often primarily visual in a non-visual way in order to communicate the necessary skills to be developed in an educational setting. This research has broader implications in informing educators and/or practitioners in the ways non-visual learners and designers perceive and understand the world.

83 Earthen Tectonics: A Graduate Seminar Course in Material Experimentation and Fabrication

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Keywords: Design pedagogy; Design build; Earthen materials; Interdisciplinary coursework

Developed in a research seminar with Architecture and Landscape Architecture graduate students at [Location blinded for peer review], Earthen Tectonics: Material Explorations in Rammed Earth combined an experimental earthen material practice with an iterative fabrication process. A process of iterative design, translation, and discovery used the interplay between multiple working methods, including digital modeling using Rhinoceros 8.0 (Robert McNeel & Associates), fabrication using computer numerical control (CNC) carving, physical rammed earth prototypes, and speculative representations, as generative. This exploratory working process fostered an experimental mentality that explicitly gave students space to follow emergent and unexpected discoveries. Three overlapping sequenced projects generated collective knowledge of earthen materials, fabrication processes, and experimental representation techniques. In Part I, students created a series of 4”x4”x5” typical stabilized and unstabilized material samples, using sand, clay, soil, and sometimes cement, to perfect material consistencies and tamping techniques. In Part II, students conducted a literature review to identify experimental material compositions using biochar, eggshells, mycelium, and vegetation and non-traditional techniques using flexible formwork of fabric, bubble wrap, wire, and other materials, then designed and fabricated five 4”x4”x5” samples using this knowledge. For both Parts I and II, students designed a series of stress tests at varying time scales to understand material properties and durability, such as setting the blocks outside for three months to observe impacts of snow, rain, and temperature. In Part III, students in small groups designed and fabricated custom modules for installation at [Location blinded for peer review]. Through hybrid representations, students speculated how designed forms might participate or facilitate landscape change across multiple spatial and temporal scales. The modules were installed in May 2024 and will be documented intermittently by the author to understand change at multiple time scales. This body of work demonstrates the potential for earthen materials that critically considers material, aesthetic, and formal decisions as strategies to design with landscape change. Earthen materials are able to embrace natural processes and incorporate dynamism at landscape scales, including anticipating, embracing, and responding to water flows, local invertebrates, and vegetation growth. Not just purely performative, the work of Part III considers aesthetics in modules’ formal qualities and material expression; this aesthetic celebrates motion, change, dynamic processes, and multiple visions, tying aesthetics to ecological processes. Ongoing research work by the author continues to merge temporality, materiality, site-specificity, and aesthetics in small-scale installations and prototypes.

85 Landscape Architecture is STEM: a question concerning technology

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Keywords: STEM; Innovation; Technology; Design Pedagogy; Y02 patent classification

Landscape Architecture was designated a S.T.E.M. (science, technology, engineering, and math) discipline in 2023, calling into question the role of technology and innovation in pedagogy and practice. S.T.E.M. set programs are academic programs that fall under at least one approved category from the United States Department of Homeland Security (D.H.S.). The American Society of Landscape Architects (A.S.L.A.) pursued S.T.E.M. designations through advocacy with D.H.S. to support this effort. D.H.S. uses one criterion to evaluate S.T.E.M.: innovation, research, and the development of patented technology. A recent white paper published by the A.S.L.A. and authored by a consultancy aims to link the profession of innovation in climate adaptation technologies through the classifications established by the Y02A patent classification scheme. The authors of the ASLA white paper found that “Within Y02A are more detailed categories of technologies to support climate change adaptation. An A.S.L.A. analysis of the technologies in Y02A shows that at least 22 relate directly to topics covered in the landscape architecture curricula or have been the subject of research and innovation projects by landscape architecture students and faculty,” thus claiming a distinct technological capacity, or scope, for professional education using the Y02 classification scheme. Given Landscape Architecture's need to advance the field of related technologies, opportunities exist to coordinate design pedagogy and practices with global green initiatives through the Y02 scheme. Engaging the Y02A & Y02B as a framework for climate innovation can expand the allied discipline's technological capacities and lead to new research opportunities. These changes in pedagogy are also instigating shifts in professional practice where the legal statutes that define professional licensure in New York State, Ohio, and Missouri now include clauses for patent works. This presentation explores questions related to Landscape Architecture as a technological field, and investigates methods to operationalize innovation in the field through coordinated socio-technical practices and pedagogies that ground new technologies in real-world sites, integrate new forms of knowledge infrastructure, and project forward landscape technologies that address environmental imperatives. Revised Abstract Landscape Architecture was designated a STEM (science, technology, engineering, and math) discipline in 2023, calling into question the role of technology and innovation in pedagogy and practice. STEM set programs are academic programs that fall under at least one approved category from the United States Department of Homeland Security (DHS). The American Society of Landscape Architects (ASLA) pursued STEM designations through advocacy with DHS to support this effort. DHS uses several criterion to evaluate STEM, including a fields capacities in innovation, research, and the development of patented technology. A recent white paper published by the ASLA and authored by a consultancy aims to link the profession of innovation in climate adaptation technologies through the classifications established by the Y02A patent classification scheme. The authors of the ASLA white paper-found that “Within Y02A are more detailed categories of technologies to support climate change adaptation. An ASLA analysis of the technologies in Y02A shows that at least 22 relate directly to topics covered in the landscape architecture curricula or have been the subject of research and innovation projects by landscape architecture students and faculty.” In essence, the report claims a distinct technological capacity, or scope, for the profession and thus calls into question the role of technology in Landscape Architecture as a STEM discipline. This

presentation explores questions related to Landscape Architecture as a technological field, and investigates methods to operationalize innovation in design and planning discipline through coordinated socio-technical practices and pedagogies that ground new technologies in real-world sites, integrate new forms of knowledge infrastructure, evaluate innovation through the lens of landscape architecture as a critical practice, and look forward towards landscape technologies that address environmental imperatives. Highlighting the numerous 'questions concerning technology' raised by Landscape Architecture as STEM, this presentation posits a three-part problem space that spatializes, grounds, and projects innovation in practice and pedagogy. Given the changing discourse surrounding Landscape Architecture as STEM, opportunities now exist to coordinate design pedagogy and practices with global climate adaptation initiatives through the Y02 scheme. Engaging the Y02A as a framework for climate innovation can expand the allied discipline's technological capacities and lead to new research opportunities. These changes in pedagogy are significant as shifts in professional practice also foreground innovation. Legal statutes that define professional licensure in New York State, Ohio, and Missouri now include clauses for patented works - suggesting that innovation may also become an integral component of practice.

86 STEM Teaching and Learning in Landscape Architecture Studio

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Keywords: STEM; Experimentation; Studio Teaching

With the recent recognition of landscape architecture as a designated STEM field, there is room to further develop and formalize pedagogical methods that integrate applied sciences in design education. Thus, our discipline stands in a transformative position to develop a curriculum that exposes students to experimentation, as we engage with and imagine futures that rely on scientific knowledge. Furthermore, our role as agents of change in the context of an uncertain climate calls for practitioners that can articulate and apply ecological and human sciences through design. The combination of design thinking and STEM has been discussed extensively, where integrative approaches to research are a growing field of scientific interest (Nassauer, 2023; Nassauer, 2020). There is an increasing need for disciplines to go beyond inter- and trans-disciplinary approaches (Li and Nassauer, 2021) to adequately respond to contemporary societal and environmental needs. This has been supported by intensifying efforts to center landscape architecture education around STEM disciplines (ASLA 2012, ASLA 2023) and an increasing interest in integrating STEM research into the field (Nassauer, 2023; Salliou et al 2023; Nassauer, 2020). This panel invites contributions from those interested in/ currently using approaches to teaching and learning that enable students to explore and experience the applications of science in the LA studio environment. In this regard our panel contributes to knowledge on exploratory research concerning the integration of design knowledge and STEM technologies in studio to further our understanding of science, math, and engineering as integral to the design process, as part of design pedagogy, and as applied in design practice. We are interested in different approaches that partner technical learning with the development of social competencies for building strong working relationships between and amongst different STEM affiliated disciplines and design. We hope to: (1) develop a network of educators (2) discuss novel approaches to STEM integration in LA studio (topics, methods, sites, approaches, outcomes), and (3) share techniques of STEM teaching and learning (experimentation, modeling, implementation, methods, software, cross-collaborations). The last 20 min of this panel will set aside time for more general structured discussion in hopes of starting a working group on this subject.

91 Consulting the Genius | Encountering Enchantment: A Provocative Approach to Ecological Consciousness

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Keywords: Genius loci; Observation; Ecological Consciousness; Mythology; Folklore

The concept of genius loci, or spirit of place, is foundational to landscape architectural education as well as to Indigenous practices of land stewardship and development—understand the language of the land, and its spiritual embodiment, before you deem to intervene. This wisdom has been championed over hundreds of generations, from Caesar Augustus to Alexander Pope, from Anne Whiston Spirn to Julia Watson. Throughout time people have shaped their environments according to their first-hand experiences and instinctive understandings of natural phenomena. People came to know the essence of the deserts, mountains, seacoasts, plains, and forests where they lived, and developed narratives based on their awareness of the environment and their knowledge of its definitive patterns and processes. Cultural values were embodied in myths and folklore informed by everyday experiences of the natural world. For millennia, earth spirits were venerated as peoples across the globe altered the landscape in accord with what they believed to be the sacred qualities of place. Our ancestors believed that the boundary between the physical world and the spiritual realm was not fixed. In this age of profound climate disruption and ecological upheaval, the time is ripe to reconsider and honor the sanctity of the land, to reimagine the role of the earth spirits in bringing forth a new era of environmental consciousness and care. If we believe that a river gives us life and that a forest protects us, perhaps we would be less likely to destroy them. Recognizing and honoring the genius loci can be the first step in preserving the socio-ecological integrity of place. Our research presents a survey of global myths, legends, and folklore that is based on a deep understanding of the spirit of the land, and presents a new framework for its application and interpretation. The "spirit walk" is an innovative method of environmental engagement and a tool for experiential learning that combines drawing with mindfulness. By merging Western and Eastern philosophical traditions students can examine and apply nature-based concepts of genius loci to contemporary design issues, explore the relationship between mythology, folklore and design thinking in a global context, and recognize and celebrate the historical foundations of culturally-diverse design strategies. As landscape architects and educators, we believe that helping students rediscover the energy and magic in the landscapes around them can provoke positive action towards their preservation, and ultimately advance the creation of a new, more sustainable, design ethos.

111 Developing Students' Cultural Sensitivity Through a Service-Learning Approach in a Study Abroad Design Studio

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Keywords: Cultural sensitivity; Design studio pedagogy; Service-learning; Study abroad

Cultural sensitivity is essential for landscape architecture and urban planning students as they prepare to engage with increasingly globalized urban environments. This study investigates how a service-learning urban design studio within a study abroad program can cultivate such sensitivity. The research addresses two primary questions: (1) How can cultural sensitivity be effectively developed among landscape architecture and urban planning students? (2) How can the service-learning approach be optimized to enhance study abroad programs? The research outlines the pedagogical framework and implementation of a service-learning approach in a study abroad context. Students participate in a community-engaged urban design project in Bonn, Germany, collaborating with local stakeholders to address urban challenges and navigate cross-cultural differences. The study evaluates students' learning outcomes, particularly focusing on how their cultural sensitivity evolves through this immersive experience. Data sources include teaching materials, course activities, student studio products, post-course interviews, and survey responses. A mixed-methods approach, incorporating natural observations, process documentation, interviews, and questionnaires, measures the program's impact. A control group of students who did not participate in the study abroad program is used for comparison, with both groups completing the same cultural sensitivity surveys. Feedback from previous years indicates that students who participated in the study abroad program demonstrated significantly enhanced cultural awareness, especially in their design decision-making, compared to their peers in the control group. Their studio outputs reflected a deeper understanding of environmental and cultural differences, and post-course questionnaires revealed increased sensitivity to global design challenges. This research contributes to the growing body of knowledge on service-learning in design education and provides valuable insights for educators aiming to enhance study abroad programs. The findings suggest that integrating service-learning into these programs can significantly foster cultural sensitivity, better preparing future design and planning professionals for diverse, cross-cultural environments. Revised Abstract Cultural sensitivity is essential for landscape architecture and urban planning students as they prepare to engage with increasingly globalized urban environments. This study investigates how a service-learning urban design studio within a study abroad program can cultivate such sensitivity. The research addresses two primary questions: (1) How can cultural sensitivity be effectively developed among landscape architecture and urban planning students? (2) How can the service-learning approach be optimized to enhance study abroad programs? The research outlines the pedagogical framework and implementation of a service-learning approach in a study abroad context. Students participate in a community-engaged urban design project in Bonn, Germany, collaborating with local stakeholders to address urban challenges and navigate cross-cultural differences. The study evaluates students' learning outcomes, particularly focusing on how their cultural sensitivity evolves through this immersive experience. Data sources include teaching materials, course activities, student studio products, post-course interviews, and survey responses. A mixed-methods approach, incorporating qualitative observations, process

documentation, interviews, and questionnaires, measures the program's impact. A control group of students who did not participate in the study abroad program is used for comparison, with both groups completing the same cultural sensitivity surveys. Feedback from previous years indicates that students who participated in the study abroad program demonstrated significantly enhanced cultural awareness, especially in their design decision-making, compared to their peers in the control group. Their studio outputs reflected a deeper understanding of environmental and cultural differences, and post-course questionnaires revealed increased sensitivity to global design challenges. This research contributes to the growing body of knowledge on service-learning in design education and provides valuable insights for educators aiming to enhance study abroad programs. The findings suggest that integrating service-learning into these programs can significantly foster cultural sensitivity, better preparing future design and planning professionals for diverse, cross-cultural environments.

128 Climate Change and Landscape Architecture Education: Transformations and Expansions in Curriculum and Pedagogy Towards Future Practice

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Cerra, Joshua, Cornell University, Ithaca, NY, USA
Monacella, Rosalea, Harvard University, Cambridge, MA, USA
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Keywords: climate change; landscape architecture; education; curriculum; professional practice

For nearly two decades, climate change has seeped, soaked, and at times, flooded into landscape architecture (LA) curriculum and pedagogical discourse. At-risk landscapes. Vulnerable communities. Storms. Heat. Flooding. Mega-fires. Sea-level rise. Adaptation. Mitigation. Resilience. Regeneration. Biodiversity. Decarbonization. Sequestration. These and other climate change topics also induce critical conversations about settler colonialism, extraction, racism, capitalism, landscape histories, climate justice, climate futures, institutional structures, knowledge systems, relationality, nature, uncertainty, and time in both landscape architecture and climate design (Monacello, 2023; Mertens, 2021; Hou, etal., 2020). The profession is impacted by multiple climate crises as we prepare students to expand practice in a world undergoing massive change with attendant questions regarding where, with whom, and at what scale we should work. Our educational programs and landscape architecture profession benefit from collective reflection on how we teach climate design in our schools and where our programs and curriculums fall short in geographical and cultural context and relevance (Cipriani & Villalobos, 2023) in order to create more impactful outcomes in the world. Notably, there is much attention on climate change design in LA curriculum evident in faculty research agendas, departmental missions, conference themes, and organizational programming (ECLAS, 2024; ASLA-CAP, 2022; BlackLAN, 2021; LAF, n.d.; CELA, n.d.; GND Superstudio n.d.). Yet even now in 2024, curricular adaptations remain uneven, not well disseminated, and not yet codified (LAAB, 2021). An understanding of how LA programs are meaningfully and effectively responding to climate change has been sparse, requires continued cross-institutional dialog and institutional alignment, and has also come under skeptical critique (Volk etal., 2021; Holmes, 2020; Fleming, 2019; Molthan-Hill, 2019; Moosavi, 2023). A panel of faculty and practitioners, under the conference theme of Processes & Impacts, will probe these issues and invite active audience participation. Questions the panel would like to address include: What shifts are taking place in LA education (e.g. emerging knowledge areas, technologies, workflows, cross-disciplinary collaborations) in preparation for critical climate design practice that might compose a useful framework for LA climate-informed education in the 21st century? What liberating pedagogies, new experiments, future speculations, and engagement practices are critical to a collective framework? How does climate pedagogy in LA appropriately differ among CELA member programs and our global counterparts, and where should we be working together to advance our varied and complementary missions? The discussion will inform a forthcoming survey of LA educators, students, and practitioners in 2025.

140 Enhancing Research Pedagogy in Landscape Architecture: A Comparative Analysis of Graduate and Undergraduate Final Projects

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Keywords: Research Pedagogy; Landscape Architecture education; Design Process

This study evaluates the effectiveness of research pedagogy in landscape architecture by comparing how graduate and senior undergraduate students develop theses and capstone projects. It aims to enhance pedagogical strategies by analyzing topic selection, research methods, and design approaches between these student groups. Drawing on landscape architecture pedagogy and recent educational research (Griesel, 2018; Van den Brink et al., 2017), the study employs qualitative methods, including comparative analysis, observation, interviews and documentation, to investigate project development and identify areas for pedagogical improvement. The research compares two courses—"Graduate Colloquium" for master's students and "Selected Topics" for senior undergraduates—using identical assignments and readings. These two courses are designed to prepare students for their final projects, including the development of project proposals. Preliminary data from nine students (5 graduates, 4 undergraduates) reveal that while graduate students demonstrated more advanced research design and methodological rigor, topic development processes were similar across both groups. Students predominantly based their projects on site-specific contexts, influenced by internships and professional experiences, with minimal use of theoretical approaches. The study highlights challenges in research topic selection and refinement, suggesting the need for structured assignments to better support project development. By situating findings within the broader landscape architecture theory and practice, the study underscores the necessity for improved pedagogical frameworks. Limitations include a small sample size and variability in student backgrounds, with plans to expand the sample for more comprehensive insights. In conclusion, the study offers actionable recommendations for enhancing research training in landscape architecture programs, aiming to refine pedagogical strategies and support the development of high-quality research outputs.

215 Enhancing Landscape Design Education through Parametric Modeling and Mixed Reality

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Keywords: Design pedagogy; Parametric modeling; Mixed reality; Topology optimization; Landscape design

In landscape design education, 3D modeling software like Grasshopper has been widely used to help students visualize their design ideas and concepts (Hsu and Ou, 2022). Although computer technology offers significant advantages, students face challenges in fully understanding design details such as materiality, scale, and environmental relationships. This is primarily because traditional methods, including VR, project 3D models onto 2D displays or isolate them in virtual environments, providing lower realism and immersion (Gonçalves et al.,2021). Mixed Reality (MR) technology offers a more advanced solution by seamlessly integrating virtual models with the real world, enhancing the sense of immersion and realism (Paes et al.,2017). This study aims to explore how MR, combined with parametric modeling and topology optimization, can enhance learning in landscape design compared to conventional technology. A total of 17 students participated in our research, which was conducted through the Beijing Design Marathon workshop. We asked students to create parametric landscape designs using Grasshopper and perform topology optimization using Ameba to improve structural efficiency. Then, they experienced their designs through MR using Hololens 2 with Fologram plugins, allowing real-time adjustments in actual spatial contexts. Finally, key components were 3D printed and assembled. Based on their experience, participants answered questionnaires regarding their perception of realism, scale, and the effectiveness of these technologies in the design process. Our findings revealed that students perceived greater realism and immersion when using MR compared to traditional VR and 2D displays. They had a better understanding of material textures, scales, and environmental relationships. The integration of topology optimization in the parametric design process was significant in teaching students about efficient structural design and material usage. Open-ended responses indicated that students greatly benefited in identifying design flaws and making informed decisions. These findings illustrate that MR, being more advanced than previous VR methods, combined with parametric modeling and topology optimization, enhances spatial realism and improves design decision-making processes in landscape design education.

224 Bridging the Gap: Strengthening Connections Between Landscape Architecture Education and Professional Practice Through Licensure Engagement

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Keywords: Faculty licensure; Benefits and barriers; International faculty; Clarb certification updates

There is ongoing focus on aligning landscape architecture professional knowledge and with scholarship and curriculum. While faculty contribute to the profession in various ways, faculty licensure and familiarity with Landscape Architect Registration Examination (LARE) content can enhance this alignment. Understanding faculty members' licensure status, their reasons for or barriers to obtaining and retaining licensure, and engagement in preparing students for LARE. Additionally, it is worth noting that CELA faculty members from diverse backgrounds, particularly those who were educated and have practiced in other countries, offer global perspectives but face unique challenges in their own licensure efforts. This panel reflects ongoing efforts among CELA, CLARB, ASLA, and LAAB about faculty licensure and preparation for practice and the LARE. A survey was conducted with CELA individual members via email invitation in 2021. The survey included questions on faculty members' reported benefits and barriers to obtaining licensure themselves, their involvement in educating students to become licensed in the future, and the availability of supporting resources in both regards. In addition, in 2024, an in-depth interview was conducted with eight faculty members in LAAB-accredited programs who have a background of studying and practicing in other countries. Data were analyzed through descriptive statistics and content analysis. Findings from the survey revealed a shared sentiment in favor of increased licensure and associated support among faculty who have strong practice experience and those with strong academic experience. Expenses and lack of incentives are the most mentioned reasons for faculty to not obtain or retain licensure, and the overcoming of these barriers would bear significantly for student education. The findings from the interviews highlight differences in regulatory frameworks in landscape architecture education and licensure across countries and reveal a need for continued education related to areas essential to practitioners in North America, and unique barriers to their engagement with LARE. In response to these findings and recent dialogues among CELA, CLARB, ASLA and LAAB, panelists will discuss new initiatives that promote LA faculty engagement with licensure. These initiatives include an updated CLARB certification standard which gives credit for teaching as work experience for faculty members, ASLA initiatives to encourage academics contribute to ASLA programming at conference and webinars, and plan for a new CELA-CLARB program on faculty licensure support. Panelists will share perspectives from academics, private practitioner, and CLARB officer. This panel advocates for broader engagement in enhancing professional education through faculty training and support.

243 Biodiversity Agenda for Landscape Architecture Education and Beyond

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Keywords: Biodiversity; Curriculum; Education; Learning Framework

The global importance of biodiversity is increasingly recognized (Park 2024; Nilon et al, 2024), yet its integration into landscape architecture curricula remains inconsistent, leading to knowledge gaps in design practice (Meyer, 2008). This presentation explores an educational agenda aimed at embedding biodiversity as a central component of landscape architecture curricula. It introduces the Biodiversity Learning Framework, a guide for developing new or retrofitting existing curricula to incorporate biodiversity principles. The Biodiversity Learning Framework emphasizes interdisciplinarity, scalability, and sectoral transcendence, aligning science, social studies, and environmental education with local design challenges. This talk also examines biodiversity education within landscape architecture programs, referencing global biodiversity targets, particularly those relevant to built environments, and the current status of biodiversity practice. The agenda aims to bridge academia and practice, equipping future professionals with the knowledge and skills necessary to create ecologically resilient landscapes, advocate for biodiversity at multiple scales, and potentially mainstream biodiversity in design practices (Gobster, 2007; Wu, 2014). A newly proposed landscape architecture course will be presented as a case study, highlighting content areas, course modules, student engagement, learning outcomes, and broader educational impacts. This course sets a precedent for similar offerings in landscape architecture and allied design programs and aligns with broader general education goals in higher education, potentially boosting program enrollment. The presentation emphasizes the critical need for biodiversity education in landscape architecture, aiming to empower students with a deeper understanding and long-term commitment to biodiversity conservation, shaping them into environmental stewards, regardless of career path. The comprehensive agenda and Biodiversity Learning Framework will offer valuable insights for reshaping landscape architecture curricula to promote biodiversity, with implications for the design industry, communities, and policy.

267 Reconnect South Park: integrating design activism for community-driven restorative urbanism in South Seattle

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Keywords: Community-engaged pedagogy; Design education as design activism; Dynamic learning spaces

Climate change, social injustice, dwindling public funds, industrial contamination, and displacement task the built environment, and particularly public landscapes with addressing an expanding range of physical, cultural, and infrastructural demands. These demands have typically been met in ways that are no longer viable as climate change impacts increase and are no longer preferable as the role the designed built environment has played in upholding systemic racism, environmental injustice, and inequity, especially in frontline communities is reconsidered. The South Park neighborhood in Seattle is one such frontline community. The neighborhood is bounded by transportation corridors, an EPA Superfund Site and industrial uses. It is bisected by State Route 99 (SR-99), lies directly beneath the flight path to and from SeaTac airport, and is subject to climate induced sea level rise and liquefaction in a seismic event. The life expectancy of South Park residents is thirteen years less than those living in neighborhoods nine miles to the north (Ryan, 2018) and the neighborhood faces severe displacement pressures. Yet, South Park remains a tightly knit and well-organized community of color determined to control its own destiny despite the historic and on-going environmental injustice and public health disparities it has long endured. Initially proposed by community activists and advocates, the city-sponsored Reconnect South Park project (RSP) imagines transforming a 40-acre segment of SR-99 that currently bisects the neighborhood into a site for restorative development (Reconnect South Park, 2023). However, through green gentrification, the project risks enabling the very forces it intends to disrupt (Rigolon & Christensen, 2019). In response, students in an interdisciplinary design studio engaged community advocates and neighborhood youth to explore designs and policies at multiple scales that can be implemented prior to the RSP project that build community capacity and stability, address climate change, and improve human and non-human health. As students increasingly migrate to landscape architecture in response to the environmental and social legacy that burdens their generation, community-engaged design studios offer layered opportunities for effective and meaningful change. This presentation will share how community-engaged interdisciplinary design studios enable dynamic, multifaceted learning spaces for students and can produce tangible and meaningful results for communities. On one hand, how repeated direct collaboration with community activists and youth promotes a new critical role for students as design activists. While also detailing the pedagogical challenges and opportunities for design studios that aim to achieve broader community-driven goals of just equitable development and climate resilience.

314 Bridging Design Education and Social Service through Community Gardens in Shenzhen, China

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Keywords: Community Gardens; Design Education; Public Participation; University

In existing literature, the term "community garden"(CG) refers to the open spaces managed and operated by members of local community, where food or flowers are cultivated (Holland, 2004; Kingsley et al., 2019). CGs play a pivotal role in promoting urban sustainability and residents' well-being, however, various challenges persist in their development, leading to the emergence of different governance structures tailored to local conditions such as policies, budget constraints, involved organizations, and available resources. In China, CGs have emerged in many cities, including Beijing, Shanghai, and Shenzhen, with a wide range of stakeholders – governmental institutions, neighborhood committees, non-profit organizations, design companies, and universities – participating and organizing in different ways during their development. For example, Zhang et al. (2022) analyzed a case in Shenzhen's Nanshan District, characterizing the governance model as a top-down approach with public engagement driven by nonprofit organizations. While existing literature primarily focuses on the roles of government, non-profit organizations, and the community, many universities have also been actively involved in the construction of CGs. However, in most studies and cases, universities are typically seen as supplementary resources, participating in only part of the process or in individual projects (Ding et al., 2020). There are very few cases where university students serve as the main agents of multiple CGs within a region. This article offers a new perspective by examining the case of Shenzhen Technology University, in which an educational institution played a central role in promoting public participation and providing design services for the development of local CGs. The faculty and students from the School of Design and Innovation worked proactively with multiple stakeholders, including the government, non-profit organizations, subdistrict offices, community residents, and construction teams. In 2023, they designed eight gardens, and all the gardens are now open to the public. Additionally, the project was honored by the American Society of Landscape Architects (ASLA), receiving the 2024 ASLA Student Excellence Award in the Student Community Service category. This article reveals the approaches of integrating the CG projects into the university curriculum and discusses the associated challenges. More importantly, it demonstrates how such initiatives can enhance and enrich design education by giving students practical, hands-on learning experiences. The case study also provides valuable insights for other cities or regions, showcasing a distinctive approach to developing CG projects. This approach extends beyond garden projects, serving as a model for integrating social service and design education.

337 Virtual Reality (VR) in Landscape Architecture Education to Enhance the Impact of Student Learning during the Design Process

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Keywords: Virtual Reality; Immersive Environments; Digital Representation; Scale; Proportion

Immersive technologies have enhanced applied learning in medicine, aviation, military, and police training for decades. Still, landscape architecture education has been slow to adopt these emerging technologies in the design studio environment. Virtual Reality (VR) is a captivating tool that can blur the lines between real-life applications and the built environment. This research proposal reveals the impacts of a process to integrate VR during a construction, materials, and methods seminar and a design development studio on student learning throughout the process. This exploratory study examines the process of embedding VR during the third semester of a three-year MLA program, enabling students to quickly transition from two-dimensional (2D) hand drawings into three-dimensional (3D) digital models. Through a literature review, it was observed that the majority of previous research described the use of VR as a largely passive viewing platform to visualize final design results rather than in earlier stages of the design process. (Hill, D.M., George B. H., Johnson, T., 2019). This study illustrates the creative process related to the cognitive perception of scale, proportion, and material connections in a design development studio. This study describes how VR helped students understand the potential conflicts when working with material connections that influence the buildability of their proposals prior to the final design. The methodology used in the study consisted of a pre and post-survey, observations, and interviews. Initial findings revealed that the student's design experience was enhanced by using VR during the design process. An improved understanding of scale relationships and connections to the broader context needs further evaluation. Criteria were based on a series of survey questions ranging from prior use of the technology to interacting within the virtual environment and teleporting through three-dimensional design ideation. After the VR experience, the design changes the students made to their drawings showed evidence of a change in their construction details based on scale, proportion, and materiality. Observational findings in this study reveal that the students' interest was piqued when they immersed themselves in their designs. Quality assurance standards need to include validation of the three-dimensional models used in the investigation process so that students can provide qualitative and quantitative feedback from their experiences. Such verification ensures that the VR model meets studio learning objectives and that student input can be integrated throughout the model's development in a sixteen-week semester.

365 Scaling up: a method to help students shift from climate footprint journals to climate action planning

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Keywords: Scale; Climate action; Climate footprint; Journals; Pedagogy

Faced with the climate crisis, many students feel overwhelmed. However, students in landscape architecture are preparing to work in a discipline that has tremendous opportunity to respond to climate change. As future landscape architects, they will be in positions where they can facilitate climate action throughout their careers. How can we prepare students to critically and effectively address climate change at different scales, from individual sites to entire regions? In this session, we will share a set of analytical assignments designed to help students develop skills to understand impacts, identify barriers and imagine opportunities at different scales. These projects have been used in an interdisciplinary Sustainable Planning seminar for upper-level undergraduates and graduate students in Landscape Architecture and related fields. We will share results from student work at the University of Illinois, dating back to Spring 2022. In the seminar, students engage in critical reading and discussion of important texts and current issues in sustainable planning. These readings are complemented by an active learning project where students explore how theory is made visible in their daily lives and communities. The project includes several parts. Several weeks into the semester, each student collects data by maintaining a daily consumption journal. Students then analyze their data quantitatively and use a climate footprint calculator to estimate the impacts of their daily routines. Later, in a follow-up assignment, each student explores their own community to evaluate how their routines are shaped by the landscapes, designs and institutions around them. Students identify and document how local infrastructure provides opportunities or presents barriers to climate action and sustainable routines. Over the span of the assignments, students shift from looking at small-scale actions in their own routines, then extend their study to the larger scale of their local community. During group discussions at the conclusion of the assignment, students envision themselves as professional designers, working across related professions, to shape a world that is more sustainable, humane and resilient. In this presentation, we will share examples of the actions, opportunities and barriers that are identified by the students, who demonstrate that they can become "designers versed in both environmental and cultural systems" as described in the New Landscape Declaration (2016). Through these active learning projects, students learn how design-- and designers-- can help scale up climate action from individual intention to community action.

368 Bridging Practice and Pedagogy: Transitioning from Industry to Academia

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Keywords: Industry-Academia Collaboration; Pedagogy and Professional Practice; Theory and Practice Integration

Transitioning from a career in professional practice to academia offers both distinct challenges and invaluable opportunities. This panel will delve into how experienced practitioners can harness their practical expertise to elevate academic instruction, enrich the student learning experience, and better prepare students for the demands of professional careers. Panelists will share their diverse experiences—whether they have already transitioned to teaching or are considering doing so—exploring the complexities of moving from project-based work to theory-focused teaching and the importance of aligning industry standards with educational objectives. Key strategies for navigating the academic environment will be discussed, along with insights on fostering a dynamic classroom atmosphere that mirrors real-world conditions. The conversation will also examine the mutual benefits of maintaining connections between academia and the profession, highlighting how collaboration between these realms can generate innovative approaches to teaching and learning. This discussion will provide critical perspectives on bridging the gap between practice and pedagogy, relevant to both practitioners transitioning into academia and educators aiming to deepen their engagement with industry. 4o

383 Resilience and equity in disinvested areas: A pedagogical perspective

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Keywords: Community engagement; disinvested areas; resilience; collaborative process

Across the U.S., many cities and neighborhoods are facing decline due to various factors, including disinvestment and socio-economic challenges, such as the legacy of discriminatory zoning practices that have resulted in racial segregation (Locke et al., 2021). Such segregations have led to a variety of consequences impacting marginalized communities' quality of life through lack of access to quality green spaces (Kephart, 2022), healthy food sources (Imajo, 2024), efficient transportation, equitable educational and healthcare facilities as well as safe and walkable outdoor spaces and health supporting air, water, and land. Given the significant role landscape architects can play in shaping the future of our cities—especially in the face of pressing issues such as sustainability, resilience, and socio-environmental justice—it is critical to effectively expose future generations of landscape architects to these topics. Educating landscape architecture students on how to help create resilient and equitable communities through real-world planning and design processes in collaboration with underserved communities is essential. However, while critical and rewarding, working in disinvested areas with local communities has its own challenges. This panel focuses on this topic from a pedagogical perspective and encourages the audience to think about and explore possible ways to effectively engage students and local communities in a fruitful dialogue and collaboration that leads to a win-win outcome for both groups. The topics covered in this panel will include: Integrating sustainable and equitable communities as a core element of design pedagogy Community engagement processes at multiple scales Enablers and barriers to teaching and working with communities Reciprocal benefits: learning outcomes for students, benefits for the communities involved Building long-term, ongoing relationships with communities Personal biases at educator/student levels This panel will begin with an introduction to the importance of community engagement and socio-environmental justice as key components of sustainability from a pedagogical perspective. Following that, three studio teaching experiences in disinvested areas of Eastside Kansas City, Missouri, Braddock, Pennsylvania, and Baltimore, Maryland—at large, medium, and small scales respectively—will be presented. The session will conclude with a discussion on lessons learned, key takeaways for design pedagogy, and an open dialogue with the audience.

397 Aligning Course Projects to Advance Student Learning in Landscape Architecture

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Keywords: Course alignment; Course integration; Project alignment; Project integration

This study examines the alignment of projects across multiple courses within a landscape architecture program to enhance student outcomes, optimize resource use, and improve stakeholder deliverables. By synchronizing projects between studio, lecture, and seminar courses, students engage in deeper inquiry and critical thinking, resulting in improved performance and motivation. Integrated course design allows for efficient resource utilization, delivering more thorough and detailed products to stakeholders while expediting higher-level analysis and application. The value of the studio lies in the ability to merge the knowledge gained from coursework into a single test of skills through the final studio project (Turkkan, 2010). Students who apply the concepts learned in their lecture and seminar courses to their design projects build the confidence to thrive in professional practice. This study includes the initial alignment of the following courses: interdisciplinary design and research studio, an upper-level design studio of landscape architecture and architecture students, with implementation III, an upper-level construction documentation course; implementation II, a second-year construction and materials course, and planting design, a second-year course; and community design studio, a second-year course, and planting design. These offerings took place over two years, and instruction was either one faculty member for both courses or a different faculty member for each course. The learning outcomes of each course were aligned, and the schedules were coordinated to allow flexibility for students to work between the two courses. A control group was identified to include sections of students not in aligned courses. Post-course surveys of students in aligned or un-aligned courses and faculty were conducted and analyzed to find areas of agreement and disagreement, ultimately highlighting the benefits and challenges of aligned course projects in advancing student learning. Successful project examples included the Clemson ARTS Facility, where students designed stormwater infrastructure and planting plans across multiple courses, and the Baruch Institute master plan and site design, which connected environmental enhancements with planting design. The alignment approach promoted advanced learning outcomes and increased the rigor and sophistication of design solutions by increasing efficiency in the research, analysis, and deliverables of projects. Challenges identified include the synchronization of course schedules and the need for effective faculty collaboration, which requires time, planning, and interpersonal cooperation. Overall, integrating course projects in landscape architecture education fosters an enriched learning environment, enhancing educational and practical experiences for students and stakeholders alike. Revised Abstract This study examines the alignment of projects across multiple courses within a landscape architecture program to enhance student outcomes, optimize resource use, and improve stakeholder deliverables. Studio, the core of design education, is often seen as the primary vehicle for synthesis, exploration, and assimilation and is prioritized within the design curriculum (Salama, 1995). However, there is frequently a gap between the design studio, which focuses on design projects, and lecture courses, where technical skills are taught (Aziz, 2010).

Over time, the need to shift studio pedagogy from a mechanistic approach, where courses in different subjects do not reference each other, to a systemic approach, emphasizing experiential learning and the integration of various types of knowledge, has been recognized (Salama, 2007). The value of the studio lies in the ability to merge the knowledge gained from coursework into a single test of skills (Turkkan, 2010). Students who apply the concepts learned in their lecture and seminar courses to their design projects build the confidence to thrive in professional practice. By synchronizing projects between studio and lecture courses, students engage in deeper inquiry and critical thinking, improving performance and motivation. Integrated course design allows for efficient resource utilization, delivering more thorough and detailed products to stakeholders while expediting higher-level analysis and application. This study aligned final projects in a studio (Community Design) and lecture course (Planting Design) with different faculty members. Historically, these courses have been taught independently with no integration of course material. For the purposes of this study, the learning outcomes of each course were aligned, and the schedules were coordinated to allow flexibility for students to work between the two courses. A control group was identified to include a section of students not in aligned courses. Post-course surveys of students were conducted and analyzed to compare perceived skills levels amongst students in integrated courses versus those in nonintegrated courses, student perspectives on the relationship between lecture and studio courses, and the perceived benefits and challenges of aligned course projects in advancing student learning. Project alignment promoted advanced learning outcomes and increased the rigor and sophistication of design solutions by increasing efficiency in research, analysis, and project deliverables. Challenges included synchronization of course schedules and the need for effective faculty collaboration, which requires time, planning, and interpersonal cooperation. Overall, integrating course projects in landscape architecture education fosters an enriched learning environment, enhancing educational and practical experiences for students.

409 Designing Technical Design Coursework: A Cognitive Load Perspective

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Keywords: Technical design education; Technical site grading; Technical curriculum design; Designing design problems

Technical design subjects are complex and require considerable prior knowledge, making the development of technical expertise within a higher education setting a difficult task for students and instructors alike. A large body of research has shown that prior knowledge plays a critical role in how students learn and how instructors should design their coursework (Cooper et al., 2001; Renkl & Atkinson, 2003). For example, instruction consisting of studying worked (i.e. already completed) examples has been shown to be more effective and efficient than instruction consisting of problem solving (Spanjers et al., 2012). How, then, do we teach novice learners highly technical design skills when learning through problem solving is inefficient yet precisely the skill they need to develop, especially when it must be developed concurrently with the required precedent expertise? Cognitive Load Theory (CLT) is based on an understanding of the limitations of human cognitive architecture, specifically those of working memory, and hypothesizes that when learning is focused on cognitive loads germane to the targeted learning task, learning will be more successful and efficient (Sweller et al., 1998). Therefore, one way to enhance learning is to decrease the non-germane cognitive loads associated with developing technical design skills. Unfortunately, within the literature, CLT is commonly applied to discreet skills within the domains of mathematics and science (such as algebra problems) and may not seem readily applicable to the complex skillsets needed to master the components of technical design tasks. This study was undertaken to analyze the learning of one technical design task (site grading) and to situate the activities of knowledge and skill development necessary for that task within the CLT framework. The study analyzed delivery modes within a technical design studio offered midway through a 5-year landscape architecture program over the preceding five years of course delivery (2019-2024). As additional CLT-oriented research suggests that helping students develop the ability to recognize, create and categorize skill goals and subgoals aids in learning effectiveness and efficiency (Catrambone, 1998), the study breaks down the primary learning goal into subgoals which are then categorized in terms of their primary cognitive load type (intrinsic, germane or extraneous) and both intended and observed impacts on that load type. Challenges in knowledge acquisition, incremental skill development, design problem scope and definition, and other difficulties discovered while attempting to apply the CLT framework to a technical design studio consisting of still-novice learners are identified and discussed. Revised Abstract Instructors of technical design skills are faced with a difficult paradox. Technical design subjects, in the context of real-world design problems, are complex and require considerable prior expertise from the student. The design studio, which is where such expertise is necessarily developed, frequently expects students to learn through explorative problem-solving (to learn by doing). Frequently, the technical problems addressed in student coursework are simplified in order to mitigate this lack of expertise. However, a body of research suggests this problem-solving approach is an inefficient strategy that may impair learning by introducing unnecessary complexity and challenge into the process (Cooper et al., 2001; Renkl & Atkinson, 2003; Spanjers et al., 2012). How, then, do we help novice learners develop the required technical expertise if the educational process traditionally used is poorly suited to that purpose? This study explores this question of efficiency to make a case for adjusting the process of technical design education

rather than merely simplifying the technical design problems encountered by students. Cognitive Load Theory (CLT) is based on an understanding of the limitations of human cognitive architecture and hypothesizes that when learning is focused on cognitive loads germane to the targeted learning task(s), learning will be more successful (Sweller et al., 1998). This study explores increasing germane cognitive loading through changes to the learning process while maintaining real-world complexity within the design problem(s) addressed by students. CLT-oriented research suggests that helping students develop the ability to recognize, create and categorize skill goals and subgoals aids in learning effectiveness and efficiency (Catrambone, 1998). Accordingly, the study analyzed the primary learning objectives described in the syllabus and task statements of a technical design studio over the preceding five years of course delivery (2019-2024) and translated them into skill-focused goals and subgoals which were then categorized in terms of their primary cognitive load type (intrinsic, germane or extraneous). The analysis identified the goals and subgoals necessary for development of the intended technical expertise so that non-germane activities could be mitigated within course delivery and student effort focused more intentionally on germane cognitive tasks. Results of the analysis reveal primary challenges in knowledge acquisition and application, expertise gaps impacting incremental skill development, and as expected, issues with the definition and scope of the design problem. Changes made to the learning process to address the identified challenges, as well as preliminary results in terms of student achievement will be discussed.

414 Retention of First-year Landscape Architecture Students at a Land-Grant University

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Keywords: Student retention; first year; design education; studio; undergraduate

Students completing accredited bachelor's programs in landscape architecture (BSLA or BLA) averaged salaries of $56,500 with $17,625 in student debt (Copulsky, 2024, p. 77, p. 51) – lower debt than the $29,400 average owed by all U.S. bachelor's students (College Board, 2024). Retaining bachelor's students in landscape architecture programs at land-grant universities can prove challenging. "College attainment is unequally distributed… Student persistence through college and borrowing also varies by generation status" (Redford, Hoyer & Ralph, 2017, p. 1). According to Walker (2019): "some design programs experience high attrition rates during year one…. professional design programs located in rural locations, where design professions are less prevalent, can contribute to a misunderstanding of career opportunities." At Virginia Tech, just 54% of incoming students completed their BLA (Virginia Tech, 2024). Retention from first- to second-year for Mississippi State's BLA students was about 52% before a targeted first-year seminar increased retention to 70% (Walker, 2019). This case study looks at strategies for increasing first-year BSLA student retention at West Virginia University (WVU), examining both quantitative data (studio enrollments, grades, financial aid status, retention/graduation rates) and qualitative (feedback from students transferring out of the major, in-class surveys, and exit surveys of recent graduates). From 2003 to 2011, retention from first- to second-year studios was 70%; retention increased to 76% after course revisions (2012 to 2019). However, retention decreased to 53% during the COVID-19 pandemic (2020 to 2023). In all, only 64% of 834 enrolled in the intro studio (2003 to 2023) were retained to the second year. More earning As (76%) and Bs (77%) were retained than Cs (60%), but more earning Bs in the intro studio graduated (73%) than As (67%) or Cs (53%). Additional changes are needed to increase retention and graduation of high-performing students. Of WVU BSLA students in 2024, 60% were transfer students; 65% qualified for federal aid. To maintain financial aid eligibility into their fifth year of study, transfers were advised to pursue minors. After their first year, 77% of financial aid-eligible students now declare minors or second majors. Student expenses were reduced through alumni support for first-year supplies and the program's foundation funding support of the fourth-year class trip. These trends and developments, plus a faculty planning retreat, shaped strategies for increasing recruitment and retention of first-year BSLA students. Increasing persistence in the first year is important for rebuilding program enrollments post-pandemic. Revised Abstract Students completing accredited bachelor's programs in landscape architecture (BSLA or BLA) averaged salaries of $56,500 with $17,625 in student debt (Copulsky, 2024, p. 77, p. 51), less than the $29,400 average debt of U.S. bachelor's students (College Board, 2024). However, retaining landscape architecture students at land-grant universities can prove challenging. "College attainment is unequally distributed… persistence through college and borrowing also varies by generation status" (Redford, Hoyer & Ralph, 2017, p. 1). According to Walker (2019): "some design programs experience high attrition rates during year one…. rural locations, where design professions are less prevalent, can contribute to a misunderstanding of career opportunities." At Virginia Tech, just 54% of incoming students completed their BLA (Virginia Tech, 2024).

Retention from first- to second-year for Mississippi State's BLA students was about 52% before a targeted first-year seminar increased retention to 70% (Walker, 2019). This case study presents strategies for increasing first-year BSLA student retention at West Virginia University (WVU), examining both quantitative data (studio enrollments, grades, financial aid status, retention/graduation rates) and qualitative feedback (from students and alumni). Studio enrollment data revealed that from 2003 to 2011 retention from first- to second-year studios was 70%; retention increased to 76% after course revisions (2012 to 2019). Retention decreased to 53% during the COVID-19 pandemic (2020 to 2023). More earning As (76%) and Bs (77%) were retained than Cs (60%), but more earning Bs in the intro studio graduated (73%) than As (67%) or Cs (53%). From 2020 to 2024, 45 upperclassmen detailed their first-year experiences in a classroom survey; 70% admitted to having experienced doubts about their major. The most commonly cited concerns were workload and feeling their work was inferior to classmates'. Additional changes are needed to improve retention and graduation of high-performing students. Of WVU BSLA students in 2024, 60% were transfer students; 65% qualified for federal aid. To maintain financial aid eligibility into their fifth year of study, transfers were advised to pursue minors. A shift towards assigning incoming BSLA students professional advisors began in 2022. After their first year, 77% of financial aid-eligible students now declare minors or second majors. Student expenses were further reduced through alumni support for drafting supplies and travel. These trends and developments, plus a faculty planning retreat, shaped WVU's strategies for increasing recruitment and retention of first-year BSLA students. Increasing persistence in the first year is important for rebuilding program enrollments post-pandemic.

420 Transdisciplinary Collaborative Design - A 15-year Retrospective of Penn State's CoLab Studio

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Keywords: Transdisplinary collaboration; Studio pedagogy; Architectural design; Integrated Project Design/Delivery; Collaborative Design

For 15 years, The Collaborative Design Studio (CoLab) at Penn State has provided a unique experience for students in landscape architecture, architecture, and architectural engineering. This course is designed to simulate professional work environments, helping students collaborate on real-world building challenges across disciplines. This paper reflects on the studio's evolution and explores its impacts on student learning and the role of transdisciplinary interaction with professional consultants in shaping studio pedagogy. The CoLab's interdisciplinary approach requires students to work as teams, similar to design firms, to develop schematic designs for actual building and landscape design challenges. Guided by resiliency, biophilia, wellness, and sustainability theories, students optimize building and landscape systems. The collaboration structure, which follows the Integrated Project Design/Delivery (IPD) framework, ensures that each discipline shares responsibility; all team members play an active role in shaping the design, with no discipline acting as a sub-consultant to the other. A major strength of CoLab is its connection to design professionals. The studio uses real-world projects whose requests for proposals (RFP) are being developed or are in the preliminary design phase in the professional offices. We ask representatives from these firms to volunteer as consultants to the academic teams. Through regular consultant sessions, students receive expert advice from practitioners, helping students understand current industry standards and how to apply theoretical knowledge to practical situations. This guidance brings valuable realism to their design explorations. Transdisciplinary collaboration benefits both student teams and practicing professionals. In a few instances, student ideas have shaped components of professional designs. However, it's important to acknowledge that professional consultant feedback poses pedagogical challenges. One issue is that students may not explore novel or experimental approaches to their design – opting to only follow the proven approaches directed by the consultants. Another challenge is that studio pedagogy asks students to explore multiple strategies (e.g., materials), but the academic exercise may unceremoniously be abbreviated through consultant feedback. Despite these challenges, the CoLab studio has proven to be an effective way for students to gain real-world experience in the academy. Defined as a "bridge studio," the CoLab mimics the professional workplace to provide students with a clearer insight into the expectations and challenges of practice. Future opportunities to enhance the studio include offering iterative feedback and finding better ways to support interdisciplinary teamwork. This reflection on CoLab's 15-year history offers valuable insights into how transdisciplinary learning can impact landscape architecture education.

433 Park(ing) Day as A Catalyst for Transformative Learning in Landscape Architecture in the United States: A Recent History (2005-2024)

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Keywords: Park(ing) Day; Transformative Learning; Design pedagogy; Civic engagement; Student club

Park(ing) Day, a global initiative launched in San Francisco in 2005, has been challenging the dominant use of urban space for automobiles by temporarily transforming parking spaces into public parks. This study investigates the profound impact of Park(ing) Day on landscape architecture education in the United States. Through a comprehensive analysis of 35 landscape architecture programs across the United States, 210 student/faculty-led Park(ing) Day projects, 25 interviews with faculty, students, and community members, and a review of 80 relevant newspaper articles, this study reveals Park(ing) Day's effects on student design skills, civic engagement, and public awareness. By experimenting with temporary urban interventions, students develop critical thinking, problem-solving, creativity, implementation, and communication skills. Moreover, Park(ing) Day fosters a sense of civic responsibility and environmental stewardship, as students actively engage with their communities and advocate for sustainable urban design. However, while Park(ing) Day has demonstrated significant benefits, it is important to acknowledge that not all installations are equally successful. Many Park(ing) Day events are poorly prepared, lacking a clear mission or purpose, which often resemble temporary booths rather than engaging public spaces, failing to effectively communicate the event's goals or inspire meaningful interaction. Despite these challenges, Park(ing) Day remains a valuable tool for landscape architecture education. By providing students with opportunities to experiment with innovative design ideas and engage with diverse stakeholders, Park(ing) Day creates a fertile ground for learning and growth. The event's experiential nature allows students to connect theoretical knowledge with practical application, leading to a deeper understanding of landscape architecture's role in shaping urban environments. In terms of pedagogical implications, Park(ing) Day offers educators a valuable tool for fostering interdisciplinary collaboration, critical thinking, and problem-solving skills. By incorporating Park(ing) Day into the curriculum, educators can create engaging and relevant learning experiences that prepare students for the challenges and opportunities of contemporary urban design. In conclusion, Park(ing) Day has emerged as a powerful catalyst for transformative learning in landscape architecture education. While the quality of installations can vary, the event's potential to enhance student design skills, foster civic engagement, and raise public awareness remains significant. By addressing the challenges associated with under-prepared installations and promoting best practices, educators and practitioners can ensure that Park(ing) Day continues to be a valuable tool for inspiring innovation and driving positive pedagogical and design change in the field.

443 Assessing cultural competencies about the unhoused within studio pedagogy: How do alternative qualitative research methods facilitate student understanding?

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Keywords: Unhoused; Cultural competencies; Qualitative research methods

The diversity, complexity, and potential of the present city requires our students to learn frameworks of situating, grounding, performing, distributing, and enduring, With the CELA theme of “Processes & Impacts” in mind, we assess the effectiveness of an actor-network theory-based research process and evaluate students’ cultural competencies in houselessness. At the request of the unhoused community and their advocates in Syracuse, NY, our upper-level undergraduate studio focuses on unhoused memorials. Unhoused are often rendered invisible, making it nearly impossible to participate as peers with those in a more dominant social status (Bourgois, 2019). Within this dynamic, typical approaches to community outreach bring questions of extractivism, positionality blindness, and power imbalances that should not be reified in a studio context. Due to the vulnerability of the community, our studio’s research module employs qualitative research methods and training to prepare students for trauma-informed, sensitive, and appropriate research techniques and design. Through close reading, content analysis, and document review, students engage with new narratives of the unhoused both as preparation for co-design work and as a means to increase their own reflexivity as researchers and designers. Inspired by Bruno Latour's Actor network theory, students understand the situation from different perspectives: 1) unhoused individuals, 2) supportive nonprofit and religious organizations, 3) public agencies, and 4) the general public. Throughout, students are asked to remove intention from agency and look at the human-environment assemblage as an interactive network of human and non-human actants. To assess the effectiveness of this research approach, we use a Cultural Competencies Self-Assessment Questionnaire (CCSAQ) that assesses the ability to meet the needs of homeless people of other cultures, ethnicities or social classes. The questionnaire was developed by the Los Angeles Christian Health Centers’ Joshua House Clinic and informed by the New York Center of Excellence in Cultural Competence, the National Center for Cultural Competence, and Cultural Competency for Homeless Populations. Students and friends of the class (advisors and guest speakers from government agencies, nonprofit organizations, design firms, and the general public) are asked to take the questionnaire. Results will be compared between and among the students and professionals. We expect slight differences among the students based on their assigned actor group. We also expect professionals working in these spaces to have higher cultural competencies with the unhoused. Results are intended to inform studio instructors and professionals working with the unhoused and other vulnerable populations.

447 AI-aided Methods for Landscape Design Education: Promoting Reflective Learning and Design Creativity

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Keywords: AI-aided methods; Landscape education; Reflective learning; Landscape representation; Iterative design

This study examines the integration of artificial intelligence (AI) in landscape architecture education to enhance critical reflection, equip students with innovative tools, and navigate AI applications and challenges. Conducted over two years in the International Studio of the MLA programme at the University of Hong Kong (HKU), it involved students in iterative exercises using AI tools such as Midjourney, DALL-E, and LookX. In the first exercise, students envisioned speculative futures based on existing imaginaries (Baudrillard and Evans, 1991). They used AI to create digital collages, translating narratives into visuals. This process, characterized by revisions and critiques, fostered deep discussions and critical reflections, forcing students to continuously (re)interpret their proposals. In the second exercise, students proposed design interventions engaging the social dynamics and public space grounded in the site genius loci (Qian, 2014). Collaborating with peers from a local university, they focused on physical model-making. Photographs of these models were fed into AI, with prompts based on their research. The AI-images were evaluated for proportion, scale, and spatial qualities, and contextualized through the drawing of plans, and sections (Jensen and van Dooren, 2012). Finally, they used AI to speculate on extreme future conditions. The study reveals that AI bridges conceptual abstractions and pragmatic design outcomes. The non-linear process often required students to reformulate their methods, emphasizing the iterative nature of design (Allen, 1999). Since the methodology forced students to use different types of representations, the process acknowledged the use of representation as a performative tool (Corner, 1992). AI-assisted methodologies reduced information processing time and consolidated diverse textual sources into visuals. Establishing procedural frameworks was crucial for maintaining consistency and focus, ensuring a reflective approach to design teaching. The study underscores AI's transformative potential in landscape architecture education, highlighting the need to explore how AI can bridge conceptual and practical design. AI offers new pathways for rapid exploration and visualization of complex ideas. However, varied student responses indicate that while some embrace these tools readily, others require more guidance or are reluctant to use them. The study advocates for a balanced approach, integrating AI with traditional methods. It calls for further experimentation to refine these methodologies, ensuring their relevance in an evolving technological landscape (Oxman, 2006). By fostering continuous learning and adaptation, educators can better navigate the opportunities and challenges of AI in landscape architecture, paving the way for innovative and effective educational practices. Revised Abstract This case study examines the integration of artificial intelligence (AI) in landscape architecture education to enhance critical reflection, equip students with innovative tools, and navigate AI applications and challenges. Conducted over two years in the MLA International Studio at the University of Hong Kong (HKU), it involved students in iterative exercises using AI tools such as Midjourney, DALL-E, and LookX. In the first exercise, students envisioned speculative fictional futures based

on existing imaginaries (Baudrillard and Evans, 1991; Malakuczi, 2024). They used AI to create digital collages, translating narratives into visuals. This process, characterized by revisions and critiques, fostered discussions and critical reflections, forcing students to continuously (re)interpret their proposals. In the second exercise, students proposed design interventions engaging the social dynamics and public space grounded in the site genius loci (Qian, 2014). Collaborating with peers from a local university, they focused on physical model-making. Photographs of these models were fed into AI, with prompts based on their research. The AI-images were evaluated for proportion, scale, and spatial qualities, and contextualized through the drawing of plans, and sections (Jensen and van Dooren, 2012). Finally, they used AI to speculate on extreme future conditions. The post-teaching analysis reveals that AI bridges conceptual abstractions and pragmatic design outcomes. The non-linear process often required students to reformulate their methods, amplifying the iterative nature of design (Allen, 1999; Sreenivasan and Suresh, 2024; Zhou et al., 2023). Since the methodology demanded students to use different types of representations, the process acknowledged the use of representation as a performative tool (Corner, 1992). AI-assisted methodologies reduced information processing time and consolidated diverse textual sources into visuals. Establishing procedural frameworks was crucial for maintaining consistency and focus, ensuring a reflective approach to design teaching. The experience underscores AI's transformative potential in landscape architecture education, highlighting the need to explore how AI bridge conceptual and practical design. AI offers new pathways for rapid exploration and visualization of complex ideas. However, varied student responses indicate that while some embrace these tools readily, others require more guidance or are reluctant to use them. The study advocates for a balanced approach, integrating AI with traditional methods. It calls for further experimentation to refine these methodologies, ensuring their relevance in an evolving technological landscape (Oxman, 2006; Qiu, 2024). By fostering continuous learning and adaptation, educators can better navigate the opportunities and challenges of AI, paving the way for innovative and effective educational practices.

449 Hybrid Collages: Immersive analog representations in virtual reality

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Keywords: Virtual reality; design methods; design process; collage; sketching

Digital visualization in landscape architecture education often elicits strong opinions on how it should be appropriately deployed as part of a student's workflow. The "rendered look" found in digital representation can be potentially misleading by appearing too real when many design decisions are still in development. And beyond the stylistic comparisons of analog or digital representation, the discussion often probes whether digital tools have unintended consequences in the early stages of the design process (Bilbao, 2019). Furthering this debate is the growth and adoption of virtual reality technology within the landscape of technology in landscape architecture (Shen et al., 2024). Virtual reality (VR) has been well-defined by others and provides the benefit of immersion and spatial awareness within a digitally simulated environment (Hill et al., 2019). Despite its benefits, VR integration in the design process can be limited in part by the digital skill level of the student, favoring advanced users familiar with 3D modeling over beginners. This learning curve impacts an ongoing area of exploration in landscape architecture education, that being virtual reality's role in the early stages of the design process (George et al., 2022; Ha et al., 2024). This paper builds on existing research in pedagogical methods by examining whether a hybrid approach to VR—combining hand-drawn design artifacts with simple digital modeling—can facilitate the use of VR for quick design ideation, by following in the tradition of architectural collages. This question was explored recently at Auburn University's landscape architecture program within a digital representation seminar. The seminar project introduced the concept of virtual collages, where students were asked to design a small landscape project using a hybrid of analog and digital techniques and using virtual reality headsets (Meta Quest Pro) to experience and evaluate the design throughout the process. This project aimed to bridge several gaps in understanding how virtual reality can be effectively integrated in the design process: How can virtual reality be integrated in the design process for students possessing beginner level proficiency in 3D digital modeling? Would a design process using traditional analog techniques translate effectively into an immersive virtual digital environment? Could virtual collages provide a representational medium that subverts the "rendered look" in VR, as a form of design-in-progress representation?

472 The Process of Student Learning Assessment: A Comparative Analysis of Three University Approaches

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Keywords: Assessment; Learning Outcomes; Liberal Learning

LAAB and many universities require an assessment of student learning and skill outcomes. These two bodies often define different outcomes for assessment and acceptable methods of measurements for success. Utah State University, SUNY ESF, and South Dakota State University faculty compare and contrast their approaches, successes, and areas of future growth for Landscape Architecture student assessment. USU - To assess the effectiveness of its curriculum, LAEP employs a multi-pronged approach including internal and external data points. These include continued self-assessments required for maintaining LAAB accreditation, completion of institutionally mandatory assessment of learning outcomes within key courses, and job placement and salary data for the program's graduates. Additionally, pre-matriculation portfolios and letters of interest, studio products, theses, internship placement, design and research jury awards, student teaching evaluations, as well as peer teaching evaluations provide assessment data. However, informal assessment data gleaned from alumni advancement board members and colleague feedback are of particular value for ongoing assessment of progress. SUNY ESF - SUNY ESF recently implemented a comprehensive, structured program assessment plan for the BLA and MLA programs. This plan operates on a three-year cycle, focusing on different core areas of our curriculum. The assessment focuses on multiple measures across course sequences, tracking Program Learning Outcomes (PLOs) as they are introduced, developed, and mastered. This approach moves away from previous models that relied heavily on final student products like portfolios and instead focuses on assessing PLOs at various stages. By using assignments that exemplify specific PLOs, we conduct detailed assessments involving faculty working groups, refining rubrics to improve alignment between student performance and program goals. This iterative process aims to ensure that assessment remains responsive and helps guide curriculum adjustments to strengthen the program over time. SDSU - SDSU is assessing students across their School of Design, which includes three built environment and two fine arts majors. Using definitions from the AAC&U Values Rubrics (2009), we identified learning outcomes applicable to the majors: Critical Thinking, Creative Thinking, and Teamwork. Students in the common core courses for Freshman and Seniors engaged in tests and surveys regarding Perry's Scheme of Development, Torrance Test for Creative Thinking, and Tuckman's Theory of Small Group Development. Preliminary findings indicate student self-inflation and their need for guidance to evaluate process and products across continuums. This comparative analysis of assessment approaches provides programs with an analytical framework to assess their effectiveness in preparing the next generation of landscape architecture practitioners.

479 The Future of Alberta's Promise of Abundance in a Land of Scarcity

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Keywords: Regional landscapes; Regional infrastructure; Life cycles; Phenomenology; Scarcity vs abundance

The prairie landscape of Southern Alberta is one of both abundance and scarcity—a region shaped by speculative visions and unlocked by technologies that have harnessed its water resources. Over the last century, an endless array of irrigation systems, canals, and reservoirs has transformed the landscape, shaped small towns and agricultural districts, and created a geography that stretches farther than the eye can see (Hester, 1990). In landscape architecture education, the vastness of such geographies poses a pedagogical problem: how can we create teaching approaches that foster embodied engagement with landscapes that exceed humans' sensory abilities? As two landscape architecture professors with different academic and professional backgrounds—one rooted in technical construction and phenomenological traditions, and the other in political ecology and political economy—we discuss our active and ongoing attempts to synthesize our approaches through studio and lecture-based teaching. In a post-Covid teaching environment, where students continue to depend on digital tools for site analysis, the nuances of place—its sounds, textures, and atmospheres—are often lost (Robb et al., 2021). Conventional site analysis techniques, reliant on digital modes of observation such as satellite photography and AR/VR, are limited in their ability to convey the relational and phenomenological qualities of regional landscapes (Jacobs, 2019). This paper proposes an alternative pedagogical framework grounded in immersive field study that seeks to reconnect students to the sensory dimensions of place. Our paper is framed through a series of vignettes tracing the flow of water from the glaciers of the Rocky Mountains to the agricultural pivot heads of Alberta's irrigation districts. This movement, passing through glaciers, rivers, reservoirs, canals, and ultimately to farmland, serves as both a literal and figurative line, anchoring our investigation in specific sites (Wolff, 2021). Drawing on our interdisciplinary teaching methodologies, we synthesize our past work in these sites to consider how our future teaching might enable students to experience the land at different scales. At its core, this article is about pedagogy. Our goal is to equip students with a deeper, embodied understanding of the landscapes they study and design, grounding place-based learning with the critical reflection necessary to engage with dynamic and ever-changing landscapes. By critically reflecting on our respective teaching practices, we seek to promote dialogue on the challenges of engaging with large regional landscapes and to advocate for pedagogical approaches that immerse students in the embodied relationships between the land and its inhabitants.

487 Educational Benefits of Real-World Service Projects: Landscape Architecture Students Designing State Parks for Practical Experience and Social Impact

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Keywords: Service-Based Learning; Public Space; Real-World Experiences; State Parks; Hands-On Experience

Landscape architecture students participating in service-learning projects, particularly in the planning and designing of Colorado's newest State Park, Fishers Peak, provide invaluable benefits that extend beyond the typical classroom and studio experience. Students benefit from in-field site visits, meetings with interdisciplinary teams of park rangers, civil engineers, professional park planners, and National Park Service (NPS) River, Trails, and Conservation Assistance (RTCA) program landscape architects. These experiences allow students to apply theoretical knowledge to practical challenges, fostering a deeper understanding of environmental stewardship, design principles, and tribal and community engagement. This paper explores the educational advantages of involving landscape architecture students in service-based projects, focusing on the multifaceted benefits such initiatives offer students and the communities they serve. While working on this project, students develop practical problem-solving skills. Designing state parks often involves addressing complex environmental, social, and regulatory issues, requiring students to balance ecological sustainability with public use and enjoyment. Through hands-on experience, students learn to navigate these challenges, gaining a comprehensive understanding of site analysis, master planning, ecological restoration, and landscape design. These project types expose students to real-world constraints, like financial budgets, necessary accessibility requirements, and client needs and requests. Supporting landscape surveys provide baseline site data that students are typically not exposed to. The survey allows students to practice grading for accessibility at a more detailed scale than rough grading. Furthermore, real-world service projects cultivate students' strong sense of social responsibility and environmental ethics. By contributing to the design of public spaces such as state parks, students gain a firsthand appreciation of how their work impacts communities, historic tribes, and the environment. They learn the importance of creating spaces that are accessible, sustainable, and inclusive, fostering a commitment to public service and environmental stewardship. These projects also allow students to engage directly with the public, soliciting input and feedback, which enhances their ability to design spaces that meet the needs of diverse user groups. These real-world experiences prepare students for professional success while contributing to the design of sustainable, community-focused public spaces.

492 Collaborative Practice Along the Margins of Science and Place: The Burke Meadow

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Keywords: native meadow; living exhibit; co-production of knowledge; collective design and management; integrative practices

The Burke Meadow (the meadow) located at the Burke Museum of Natural History and Culture (the Burke) on the University of Washington (UW)- Seattle campus is a 10,000 ft2 native meadow composed of a plant community rich in endemic species which are important food and medicinal plants for the Indigenous tribes of the Coast Salish region and all of Washington State. As part of the 'living exhibits' hosted by the Burke our project represents a collaborative effort to purposefully advance the co-production and sharing of knowledge (Escobar, 2018 and Haraway, 2016) among a diverse team of stakeholders that includes UW students and faculty, Tribal elders, the Burke and Herbarium staff, UW Grounds, Oxbow Farms, and GGN (a landscape architecture firm). Since its initiation in 2020, our learning project has advanced an overall educational goal of building interdisciplinary and cross-generational knowledge (Hansen, 2024) about the importance of Puget Lowland meadows as a specialized habitat type and source of nourishment and health for all communities. We learn and teach through a collective management approach that prioritizes building and supporting lasting relationships among stakeholders and with the meadow while integrating practices of traditional ecological knowledges (weaving fencing baskets to protect our food from herbivory, for example) and methods of Western science (evaluating changes in plant community composition) through storytelling (Martin et al., 2021). Our presentation provides an overview of our work, explores the trials and tribulations of collective and integrative design and management practices, and highlights the potential of such work for deeply connecting landscape architecture education to land and community.

493 The Role of Artificial Intelligence in Landscape Architecture Education: Challenges and Opportunities

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Keywords: Artificial Intelligence; Landscape Architecture Education; Design Process; Technology Integration; Technology Integration

The rapid advancement and integration of Artificial Intelligence (AI) in landscape architecture practice necessitates a critical examination of its role in landscape architecture education. This study explores the current state of AI adoption in landscape architecture curricula and proposes strategies for its effective integration. Recent literature indicates a tenfold increase in AI-related publications in landscape architecture over the past 15 years, highlighting its growing importance in the field. AI applications in landscape architecture span various domains, including design generation and evaluation, climate change sustainability and resilience evaluation, ecosystem simulation, visualization, and landscape performance analysis. However, research on AI's integration into landscape architecture studio projects remains limited. This study addresses the following key questions: 1. How and where should AI be integrated into existing design and planning processes in landscape architecture education? 2. To what extent do these processes fundamentally change due to AI integration? 3. What is the appropriate balance between teaching traditional design skills and incorporating AI tools in landscape architecture curricula? Through a comprehensive literature review and analysis of current educational practices, we identify challenges and opportunities in incorporating AI into landscape architecture education. We argue that while AI offers powerful tools for design optimization, visualization, and analysis, it should complement rather than replace human creativity and professional judgment. Our findings suggest a phased approach to introducing AI in landscape architecture education, starting with basic applications in site analysis and progressing to more complex uses in design generation and evaluation. We emphasize the importance of cultivating critical thinking skills among students to effectively leverage AI tools while maintaining the core principles of landscape architecture. This research contributes to the ongoing dialogue about the future of landscape architecture education in an increasingly digital and AI-driven world. It provides educators with insights and recommendations for preparing future landscape architects to harness the potential of AI while preserving the essential human elements of design and creativity.

502 Charting the Role of AI in Landscape Architecture Education: A Mini Review

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Keywords: AI; Landscape Pedagogy; Review; Landscape Architecture Education; Landscape Architecture Educational Framework; Japan; Mirei Shigemori; exhibition; Oregon; 1957

The rapid integration of Artificial Intelligence (AI) into design education is transforming both design processes and pedagogical frameworks. AI technologies such as machine learning, computer vision, and optimization have enabled landscape architects to streamline workflows, enhance design precision, and engage with complex environmental datasets (Fernberg & Chamberlain, 2023; Larsen et al., 2022). AI-driven innovations, including generative design and ecological simulations, are increasingly used to develop sustainability-focused landscape solutions (Xiao, 2021). These tools not only assist in automating design tasks but also provide landscape architecture students with powerful decision-making aids, enabling them to tackle complex, site-specific design challenges (Shen et al., 2024; Pedersen et al., 2023). This mini-review aims to explore the trajectory of AI in reshaping design thinking and practice, with a focus on landscape architecture education. Current research highlights how AI tools have begun to influence the creative process, shifting the educational focus toward more data-driven, iterative design approaches (Xue & Chen, 2023). However, a critical gap remains in understanding the long-term implications of these tools for both pedagogy and professional practice, particularly concerning the balance between automation and critical design thinking (Fernberg & Chamberlain, 2023). As AI systems take on more significant roles in generating design outcomes, questions about creative autonomy, AI-human collaboration, and the ethics of such technologies come to the forefront (McNeal & Briggs, 2023). Furthermore, this review identifies that while AI's potential to enhance landscape architecture education is vast, its application has thus far been limited to visualization and basic design processes. Areas such as ecological literacy and adaptive systems modeling are underexplored, representing promising avenues for future research (Kowarik et al., 2022; Xue & Chen, 2023). Along with this, adapting the curricula to prepare students to collaborate in an AI-driven design environment will be critical. In this environment, the next generation of landscape architects must take full advantage of AI, while balancing efficiency and ethics(Shen et al., 2024). This review aims to address these gaps while focusing on the ethical, collaborative, and pedagogical implications of AI to chart a sustainable path forward for landscape architecture education. On April 5, 1957, the exhibition Japanese Gardens opened at the Museum of Art at the University of Oregon (UO) in Eugene, Oregon. The exhibition—understood by the UO Museum of Art Director Wallace Baldinger as "the first of its kind ever to be held in the United States" (Baldinger, 1957)—was produced by the renowned garden designer Mirei Shigemori, with models made by Shyuji Suezawa and photographs by Osamu Hayakawa (Japanese Gardens: Catalogue of an Exhibition from Japan, 1957; the catalogue's introduction was written by Loraine Kuck (Kuck, 1957), a leading American scholar of Japanese gardens). The exhibition included 130 black-and-white photographs and 4 models documenting 55 different Japanese gardens (including some of Shigemori's gardens) and their associated garden elements, whose dates span from the 7th to the 20th centuries CE. The exhibition traveled to another 13 museums, galleries, and universities across the US over the next 17 years before returning to storage at the UO. While the models no longer exist, almost all of the exhibited photograph prints remain in their exhibited format—

adhered to colored Masonite boards, which were hung on the gallery walls. Recent efforts to explore preservation of the photographs has led museum staff and landscape architectural students and faculty at the UO to reengage with the exhibition nearly 70 years after its initial showing. Mirei Shigemori (1896-1975) was a leading Japanese garden designer in the 20th century, and supported by recent English-language scholarship (Tschumi, 2005, 2007), is arguably the most recognized 20th century Japanese designer in the Global West. Originally trained in flower arrangement, painting, and the tea ceremony, he later established himself as a prolific scholar of Japanese gardens, writing 81 books on the subject (his most expansive work being Shigemori, 1936). His celebrated garden design career, which began in 1914 and included residential, temple, shrine, castle, and civic landscapes, aimed at reimagining the traditional Japanese garden for the 20th century. The presentation will document the history of the exhibition, discuss the figures instrumental in its creation, contextualize the exhibition within Shigemori's career (for example, in the same month that Japanese Gardens opened, Shigemori helped Isamu Noguchi locate stones in Japan for the UNESCO Garden in Paris; see Treib, 2002, p. 299, 2003, p. 54, 2024, pp. 110, 257), and reflect on the role this exhibition had on the US reception of Japanese gardens generally and of Shigemori specifically.

506 Texas ASLA Awards Winners Website 2.0: Archiving for Education, Research, and Outreach, and Legacy

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Keywords: Award-Winner Projects; Education and Research; Professional Practice; Archive; Legacy and Texas

Since the 1990s, archiving the largest ASLA chapter's award winners has been a dream (Woodfin & Ozdil 1998). An online tool, the first of its kind in landscape architecture even before the National ASLA website (ASLA 2024), was south after motivated by the understanding of landscape architecture students' and academics' preferred learning styles (Myers & Myers 1980, Nasar & Johnson 1990, Brown, 1991, Huang & Woodfin 1998). With the notion of equal and open access to reliable content, the goals were to support education, research, and service missions of academics and students, and increase the visibility and impact of award-winning projects, landscapes architects, and firms, and the state chapter while creating a legacy and lasting impact. After preparing over ten years' worth of (189) hard copy projects' slides, descriptions, and documentation, the prototype website with 12 Award of Excellence winners was launched on the college website in 1998. The idea was to draw interest and advocacy while securing funds for the research. Although funding was scarce, in-kind support and genuine volunteer efforts by dedicated students, academics, and professionals brought the archives 250 projects (out of 360) fully viable in 2005. Monthly webpage hits averaged 20,000 in the project's 20th year (Woodfin & Ozdil 2006). While the researchers moved to different institutions in the late 2000s (Woodfin & Ozdil 2010), data collection continued by the researcher staying in Texas. About 30 projects with an average of ten images, and three-page descriptions per project continued to be collected annually while the early website became absolute around 2010. In 2015, the research was brought back to life in a new institution with the support of leadership, and a dedicated technology group that believed in the mission and the meaning. Especially, the COVID-19 period, made us cognizant and re-charged in such research. In 2024, the Texas ASLA Awards Winners Website 2.0, an online database, education, and research portal, was launched as the test site by now listing roughly 1000 award-winning projects judged as the best since 1986 (Ozdil 2024). Over 10,000 images and 20,000 pages of documents, in addition to miscellaneous documents, are still being uploaded the site daily, mostly by volunteer efforts. The purpose of this presentation is to share lessons learned from this grassroots research journey with a mission and review its generational progress and impact while sharing its new trajectory in documentation, education, pedagogy, research, outreach, and legacy in the archive's 40th anniversary. Revised Abstract Since 1990, archiving the Texas ASLA chapter's award winners has been a dream project for education, research, outreach, and legacy (Woodfin & Ozdil 1998). A website, the first in landscape architecture in the US, was created even before the National ASLA awards website (ASLA 2024). It is motivated by the needs of landscape architecture students' and academics' preferred learning styles (Myers & Myers 1980, Nasar & Johnson 1990, Brown 1991, Huang & Woodfin 1998). With the notion of providing open access to reliable content, the goals were to support the education, research, and service missions of academics and students, increase the visibility and impact of award-winning projects, landscape architects, firms, and the state chapter, and build a legacy and lasting impact. After processing over ten years' worth of (189) hard copy project slides, descriptions, and documentation, the

prototype website, with 12 Award of Excellence winners, was launched on the college website in 1998. The idea was to draw interest and advocacy while securing funds. Although funding was scarce, in-kind support and genuine volunteer efforts by dedicated students, academics, and professionals brought the archives 250 projects (out of 360) fully viable in 2005. Monthly website hits averaged 20,000 in the projects' 20th year (Woodfin & Ozdil 2006). The first website became obsolete due to institutional changes around 2010, while data collection continued by the researcher staying in another Texas institution (Woodfin & Ozdil 2010). About 30 projects with an average of ten images and three-page descriptions per project continued to be processed annually. In 2015, the project was day-lighted at UT Arlington with the support of leadership and a dedicated technology group that believed in the mission and the meaning. Specifically, the COVID-19 period made parties cognizant and recharged in such research. In 2024, the 2.0 beta version of the website as an education, research, and outreach portal was launched, listing roughly 1000 award-winning projects judged as the best since 1986 (Ozdil 2024). Over 10,000 images and 20,000 pages of documents are still being uploaded to the site weekly by volunteer efforts. The website is used for case studies and example projects by students and academics. While the full potential of this project remains to be explored the purpose of this presentation is to share insights from this grassroots research and review its generational progress and impact while sharing its new trajectory in documentation, education, pedagogy, research, outreach, and legacy in the archive's 40th anniversary.

524 Ecological literacy for designers: perspectives from ecologists reflecting on their collaborations in the design, construction, and management of designed landscapes

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Keywords: landscape education; ecological design; knowledge tranfer; interdisciplinary practices; case studies

The landscape architecture discipline is partly founded on knowledge established within the earth sciences, though these borrowed epistemologies maintain imperfect links to their source. The field of ecology has been particularly important in landscape architecture and has played a key role in framing new theoretical models of the city and the territory; supporting richer understandings of site and process; opening up new scopes and typologies for the practicing landscape architect, and underwriting a host of technical aspects of site design, planning, and restoration. Landscape has found its “ecological turn” and is increasingly expected to wield a strong command of ecology. Of course, landscape and ecology have long been linked in a holistic or experiential sense and designers and ecologist have collaborated together in practice for many years. But in the last two decades, narratives of climate change, biodiversity loss, and land degradation have driven an increase in expectations for evidence-based, reliable ecological outcomes on projects that are more multidisciplinary and more consequential (Nisbet et al. 2010). Despite the shared values, common interests, and overlapping language, interdisciplinary engagement between landscape architecture and ecology is still uncommon and often marked by misunderstanding (Grose 2014). This results in slow and inaccurate knowledge transfer between the two disciplines, relying on a limited set of cross-disciplinary texts and favoring simplified theoretical or methodological concepts over detailed, applied research. In essence, the crucial connection between landscape architecture and ecology needs strengthening. Ecological Literacy for Landscape Architects is a project that aims to reconnect the epistemologies of landscape and ecology through a close investigation of their project-based collaborations. The resulting case studies will explore the gaps and misalignments in ecological knowledge between these fields and help to create a framework for reconciling difference to enhance the education and practice of landscape architecture. The primary methodology for this research involves expert interviews with the key project professionals involved in these constructed ecological projects. Field observation and case study analysis will provide the material for conducting deep, reflective interviews, in which themes, conflicts, and reflections are actively drawn out from the conversations. This paper presents the project and the main findings of the research, with a discussion on 'contested' terms and the ontological gaps together with a discussion on their origins in landscape architecture education. The paper concludes with a set of recommendations for teaching ecology in the landscape studio, and a framework for approaching constructive collaboration.

530 People Matter: Exploring creative teaching and assessment strategies for addressing the needs of humans in landscape design

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Keywords: Human factors; landscape design; teaching methodology

Engaging with potential users and considering human factors are crucial in the design process (Marcus & Francis, 1997). Designers who know how to address uses and needs of targeted groups further study how spaces could function after they are built. Such proactive approaches foster creating places that are not only functional but also foster social connection and a sense of community (Francis, 2003). However, integrating the consideration of human factors into a rigorous landscape architecture curriculum presents various challenges. Many academic programs are limited in their capacity to accommodate a stand-alone course dedicated to human factors. Additionally, resources to teach human factors are often sparsely distributed making instructors face challenges accessing them. In this study, three landscape architecture instructors from diverse geographic regions and academic programs incorporated human factors into elective courses, design studios, and independent studies. We used a textbook (Owens et al., 2023) in our instructions to encourage students to creatively consider human factors throughout the design processes. Depending on the type of courses and projects or activities that were undertaken, instruction, feedback, and applications related to human factors were adapted. Concurrently, the instructors employed overlapping evaluation assessment to cross-analyze student feedback on various teaching methodologies and activities that conveyed the importance of human factors in landscape architecture designs. Preliminary results show that students are able to achieve different levels of comprehension and competence of human factors, across different types of courses and with varying design related activities. Students engaged in class discussions, reading reflections, and applications to designs. While select students described the course topics as “incredibly enlightening,” others shared comparatively less enthusiasm. Among human factors topics, the life cycle and design (age factors), gender factors, and the concept of inclusivity (and disability) were the three most influential and mentioned topics in students’ self reflections. Students also claimed that the knowledge has helped them critically examine different design strategies, and led them to extend their design journey and build spaces for inclusivity and diversity. In this presentation, the authors will share the proposed activities, quiz questions related to human factors, different evaluation frameworks, as well as students’ reflections. Finally, authors invite colleagues to contribute to a human factors teaching platform to share various resources and precedent examples for integrating human factors into landscape design instruction. Revised Abstract Engaging with potential users and considering human factors are crucial in the design process (Marcus & Francis, 1997). Human factors include the needs and wants of individuals, groups, or communities and the unspoken influences of an environment on behavior. Designers who know how to address the uses and needs of targeted groups may also better understand how spaces may function after they are built. Such proactive approaches foster creating places that are functional and foster social connections and a sense of community (Francis, 2003). However,

integrating the consideration of human factors into a rigorous landscape architecture curriculum presents various challenges. Many academic programs are limited in their capacity to accommodate a stand-alone course dedicated to addressing human factors in design decisions. Additionally, instructors face challenges accessing the resources needed to teach human factors. In this study, three landscape architecture instructors from diverse geographic regions and academic programs incorporated content focused on human factors into elective courses, design studios, and independent studies. The textbook, Outdoor Environments for People (Owens et al., 2023), was used to encourage students to creatively consider human factors throughout their design process. Depending on the type of course and projects or activities that were undertaken, the educators adapted various human factors focused instruction, feedback, and applications. Concurrently, the instructors employed overlapping evaluation assessment to cross-analyze student feedback on various teaching methodologies and activities that conveyed the importance of human factors in landscape architecture designs. Preliminary results show that students are able to achieve different levels of comprehension and competence of human factors across different types of courses and with varying design-related activities. Students engaged in class discussions, reading reflections, and applications to designs. While select students described the course topics as “incredibly enlightening,” others shared comparatively less enthusiasm. Among human factors topics, the life cycle (age factors), gender factors, and the concept of inclusivity (and disability) were the three most influential and mentioned topics in students’ self-reflections. Students also claimed that the knowledge has helped them critically examine different design strategies, and led them to extend their design journey and build spaces for inclusivity and diversity. In this presentation, the authors will share the proposed activities, quiz questions related to human factors, different evaluation frameworks, as well as students’ reflections. Finally, the authors invite colleagues to contribute to a human factors teaching platform to share various resources and precedent examples for integrating human factors into landscape design instruction.

544 Aligning Neurodiversity Teaching Strategies within the Studio

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Keywords: Neurodiversity; pedagogy

The term “neurodiversity” was coined by Judy Singer in the late 1990’s. This definition has come to include a wide variety of atypical behaviors, including Asperger’s Syndrome and all autism spectrum disorders (ASDs). Neurodivergent students think, interact, learn and behave in distinctive ways which can affect their problem-solving and communication skills. The Center for Disease Control data from 2016 states that, one in 54 children aged 8 years have been identified with autism (Maenner et al., 2016). Instructors likely already have neurodivergent students in their classrooms of whom they are unaware (Shatuck et al., 2012). Some of these students may not even know themselves. Females particularly often remain undiagnosed and therefore would benefit from education practices responsive to their specific needs (Goldman, 2013). Literature in secondary education for neurodivergent students centers on success in generic university courses (Littlefield 2010, Lorain et al. 2009, Hughes 2009). However, design education is altogether different and Environmental Design is especially unique. This evokes the question: How do I/we teach neurodivergent design students to train them in the skills they will use for success? We need to organize a particular set of tools to guide design educators in cultivating neurodivergent students. This presentation specifically focuses on Hume’s Structured Teaching Strategies for Students with Autism Spectrum Disorder (2018) and the Danielson Framework for Teaching (1996) discovered during a previous literature review on teaching neurodivergent students in post-secondary design education (Merrill 2021). This paper specifically seeks to align these frameworks with current Landscape Architecture “studio” pedagogy.

553 Growing Plants People: Discoveries from a study of students in their first planting class

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Keywords: plants; planting design; advocacy; teaching; learning

Introduction: University students entering classrooms for the first time arrive with diverse prior knowledge, experience, interest, and level of interest. Students entering a program of landscape architecture and studying plants and their role in landscape design are also, similarly, diverse in these areas. Some students approach the topic of plants and ecological planting design within landscape architecture with ambivalence, others approach the topic from a technical perspective, while others dive in with great passion for plants and the design process. Is it possible to nudge them into the category of plants and planting advocacy? The importance of this topic is clear: with the various tools at their disposal, landscape architects have an important role in climate change mitigation. Plants and planting design is key among them. How can we produce more professionals fully engaged with plants and design? The literature is relatively silent on teaching students to become advocates of plants and planting practitioners. Insight was sought from the body of teaching and learning scholarship and from disciplines that required advocate practitioners. Method: The current study reports on a first step in a larger research question investigating the use, efficacy, and outcomes of teaching and learning techniques in a course entitled Ecological Design: Plant Communities. The instructor and collaborators constructed an in-class survey to discover students' knowledge and experience with plants. The survey was conducted pre- and post-course. The study cohort consisted of 15 students in their fourth semester. A control group of non-landscape architecture students participated in the study for comparison. Questions were included in the post-course survey that evaluated teaching and learning techniques and the exercises associated with them. Results: Differences were shown between the landscape students and the control group. Changes from pre- to post-course responses were also found, with some challenging the author's expectations and assumptions. For example, at the end of the course there was some decline in interest in being a plants expert within a firm, perhaps due to increased knowledge of the complexities involved. Student evaluation teaching and learning activities and exercises provided valuable insight into those which encouraged their interests in plants and planting design. Conclusions: Planting courses can potentially create advocates for plants and planting design. Understanding incoming students' prior knowledge, experience, and interests is important in formulating approaches to creating more advocates of plants and planting design. Further study in this area will reveal the effectiveness of classroom techniques.

557 Drones in Landscape Architecture Education

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Keywords: Drones; LA Curriculum; Data Analysis; Educational Assessment

The use of drones in landscape architecture and related professions is increasing, along with the advancement of student training in this technology (Kullmann 2017; George and Park 2020; Cureton et al 2022; Kleinschroth 2022). However, drone technology is very often inaccessible to students due to the expense of the equipment, and lack of training opportunities. At the University of Connecticut, a year-long pilot study was initiated on the establishment of a college-wide fleet of drones for instructional purposes in the undergraduate landscape architecture program. This research is situated within an overview of the current use of drones in LA teaching and practice, and reports on the advancement of student training that differentiates between the motivational, performative and cognitive aspects of learning in this context. We will discuss the set-up of the drone fleet, with a specific focus on the integration of drones in undergraduate landscape architecture graphics and site analysis curriculum. During the pilot year, students gained hands-on experience with this technology, advancing their flying skills, as well as their data analysis and representational capabilities. This case study contributes to scholarship informed by participant observation and student self-assessment surveys to provide a roadmap that highlights lessons learnt from this initial phase of drone integration into LA teaching and learning, and the establishment of a college-wide teaching resource.

574 Learning to Lead the Future: The Deans' Equity and Inclusion Initiative at Dumbarton Oaks

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Keywords: Equity, Diversity, and Inclusion; Scholarship; Teaching; Academia

The Deans' Equity and Inclusion Initiative at Dumbarton Oaks nurtures diverse population of emerging scholars teaching and researching the built environment to advance socio-ecological and spatial justice, equity, and inclusion. With the support of 40 Deans and Directors, the initiative supports early career faculty from a diverse spectrum of backgrounds and experiences with attention to BIPOC and other under-represented faculty. To date the initiative has had four cohorts supporting 49 Fellows, 14 of whom work in the discipline of landscape architecture. As participants, the Fellows are challenged them to expand, enrich and develop novel approaches to planning, design, construction, and stewardship of the built environment. With the support of academic leadership, the that the Fellows ae exposed to academic issue they may not know how to address. Ultimately the goal is to nurture a diverse population of emerging scholars teaching and researching the built environment to advance socio-ecological and spatial justice, equity, and inclusion. This panel is being presented with the support of CELA equity, diversity, inclusion and recruiting efforts, recognizing the need to increase the diversity among scholars in addition to student cohorts. We invite people to attend this panel to find out more about how the Deans' Equity and Inclusion Initiative is supporting scholars in landscape architecture, the next steps planned for the Initiative, and how they may engage the program.

583 Learner-Centered and Learner-Led Immersive Learning: Two Classroom Studies

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Keywords: Learner-centered pedagogy; Learner-led learning; Immersive learning; Student-driven projects; Landscape architecture education

The shift in higher education from a traditional instructor-centered approach to both student-centered and student-led learning continues to gain momentum. (Herranen, 2018; Kumar Shah, 2020, USAID, 2023) The underlying assumption is that learners have a more positive experience, and instructors find more satisfaction when learners have a say in what, how, and when they are learning. Pedagogical literature supports this perspective (USAID, 2023; Brenner, et al., 2022). However, challenges to implementing this pedagogy include, among other things, students who are skeptical or unsure of such an approach, and instructors who are unsure of how or struggle to "let go" of the traditional teacher-centered model, where they control what and how content is to be learned (Herranen, 2018; Iverson, et al, 2015; Wright, 2011). This presentation aims to inspire educators to adopt learner-centered and learner-led pedagogy through successful classroom examples. Two landscape architecture courses, in which students from various year levels took the lead in their learning, serve as case studies. In the first course, students designed and built a monarch waystation and developed educational materials and equipment for a local library, its after-school youth program, and the surrounding community. In the second course, students collaborated with a local community to cultivate an empathy-driven ethos, defining the semester long project's scope and deliverables. In both cases, students were responsible for driving the project's direction and stakeholder engagement. This presentation will highlight the methodologies and organization of these courses, demonstrating how each successfully fostered a learner-centered and learner-led approach, along with the outcomes achieved.

585 Where do we learn climate science? A curricular case study

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Keywords: climate science; education; curriculum; design

Climate science as an integral part of the landscape architecture curriculum is evident in the most recent Landscape Architecture Accreditation Board (LAAB) standards which names climate science as a realm within Standard 3: Professional Curriculum, and in the American Society of Landscape Architects (ASLA) Climate Action Plan which calls for achieving zero embodied and operational emissions, and increased carbon sequestration design by 2040. Climate science, and by extension climate responsive design, overlaps with issues from sustainability and resilience, but is a discrete area of knowledge and practice. In addition, climate science is not necessarily a core landscape architecture learning outcome, but may be covered in general education courses in chemistry, biology and geology. This paper focuses on to what extent students in landscape architecture prepared to participate in climate responsive practice, and what knowledge areas do they will need to do so effectively. This paper describes the course design and outcomes for an undergraduate design studio at California Polytechnic State University, San Luis Obispo, that focused on climate responsive design, using the ASLA Climate Action Field Guide as a primary resource. The studio embedded lectures on climate science and introduced students to resources to measure and analyze climate impacts of design. Student projects were presented at midterm, and then re-designed to reduce embodied carbon. Students were surveyed at the end of the course to collect perceptions on their own preparedness for climate responsive design, and to identify knowledge gaps. Survey results are mixed, and indicate the need for attention to how and where climate science is learned in the landscape architecture curriculum. In addition, the survey points to the value of a more robust assessment across landscape architecture programs to inform curricular design.

588 Expanding Environmental Literacy Through Applied Observations in Urban Ecology

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Keywords: environmental literacy; pedagogy; landscape performance; urban ecology

In 2023, Landscape Architecture was officially designated a STEM discipline (ASLA, 2023). Supporting this, LAAB Accreditation Standards in 2016 and 2021 called for a more rigorous professional curriculum with expanded knowledge in environmental sciences and skills related to sustainable design, green infrastructure, and measuring landscape performance. While there is an urgent need to address compounding environmental and climate-related challenges (LAF 2017), most students in MLA programs do not have a previous degree or technical experience in environmental sciences (Lewis & Clark, 2013-2023). This presentation shares how core curriculum focused on urban ecology and landscape performance was structured and refined over six years, highlighting the challenges and positive learning outcomes in expanding the knowledge and skills of MLA students to address the growing need for landscape-based solutions. Initially designed around the instructor's professional workflow, the course draws upon components of Environmental Assessment methodologies and insights gained from collaboration with a spectrum of environmental consultants. Readings, lecture content, field sessions, and assignments are organized around seven interrelated modules covering landscape ecology, climate/microclimate, geology & soils, hydrology, vegetation, wildlife, and ecosystem dynamics. Each module is divided into three (3) areas of understanding: 1) identify contemporary urban challenges and why action is needed; 2) know what to observe, define, and measure (metrics) to establish a baseline for monitoring; and 3) discuss potential regenerative design solutions. For each module topic, students are guided through the process (above) and then investigate an urban landscape of their choice for the assignment. The seven assignments are then compiled into an Urban Ecology Field Guide, bookended by an overview statement where students describe their learning experience and conclude with five regenerative design principles expressing how the concepts can integrate into their future work. Student response to the cumulative approach, discussions, and fieldwork has been overwhelmingly positive. Content is enhanced by observations, case studies, and design explorations, which have led to an engaging and collaborative learning environment. From an instructor perspective, feedback has been beneficial in refining methods for measuring landscape performance and tailoring content that engages beginner, intermediate, and advanced skill sets. While the skills emphasized encompass qualitative and quantitative approaches, the goal is not to create scientists, but rather to develop observation skills. It aims to spark curiosity, promote self-learning, and ask thoughtful yet critical questions – highlighting how landscape architects can complement scientific understanding through storytelling and compelling design ideas to address today's most pressing environmental challenges.

605 Lithium Laterals: An Oracle for the Green Energy Transition

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Keywords: Lithium; Green energy; Batteries; Extractivism; Mining

Lithium: primordial, featherlight, volatile, suspended in brine and nestled in seams of plutonic rock. It regulates endorphins in our central nervous systems, powers our iPhones, fuels our off-grid batteries, drives our Teslas, and now, more than ever, hovers as a green solution to our global addiction to oil and gas. The landscape of the green energy transition is marked by both abundance and depletion: child labor in cobalt mines, the dispossession of sacred lands for lithium extraction, and critical desert habitats covered by solar panels—all symbols of an industry we associate with progress and improvement. Under globalized capitalism, land becomes a framework for resource extraction and value accumulation. Natural resources like lithium are turned into commodities, and this process often destroys the landscapes they come from. The "Lithium Triangle" in Bolivia, Chile, and Argentina is one of the largest lithium sources in the world, but local activists argue that salt flats should not be treated as mines. This extraction disconnects us from the land, reducing unique ecosystems to industrial sites. Worse, these destructive operations often happen in remote places, hidden from public view. Lithium Laterals is a deck that uses cartomancy, the practice of using cards to gain insight through symbols and archetypes. As a tool of divination, it blends reality and imagination, opening up new ways to view the world. Lithium Laterals uses terms and concepts specific to lithium mining while suggesting that universal insights can be drawn from these particular situations. Each card offers a definition related to lithium and a design prompt encouraging users to think about the broader impact of global resource extraction on space, politics, and personal life. The deck is divided into four categories that encapsulate the three core aspects of landscape: matter, space, and time. Material cards explore the various agents and byproducts of lithium extraction, while Landform and Technical Land cards examine the spatial configurations required for sourcing and deploying lithium. Process cards look at the social and ecological dynamics over time. Inspired by the 1952 Eames' House of Cards, the cards are slotted to assemble into three-dimensional structures, which can be read from different angles and configurations, suggesting the multiple possibilities of the future. The randomness inherent in the act of drawing cards invites us to see new patterns and make unexpected connections; by subverting existing patterns, we create the opportunity to reorient toward more just futures. Revised Abstract Lithium: primordial, featherlight, volatile, suspended in brine and nestled in seams of plutonic rock. It regulates endorphins in our central nervous systems, powers our iPhones, fuels our off-grid batteries, drives our Teslas, and now, more than ever, hovers as a green solution to our global addiction to oil and gas. Under globalized capitalism, land becomes a framework for resource extraction and value accumulation. Natural resources like lithium are turned into commodities, and this process often destroys the landscapes they come from. Lithium Laterals is a deck that uses cartomancy, the practice of using cards to gain insight through symbols and archetypes. As a tool of divination, it invites both contemplation and action, prompting users to explore new design and policy possibilities rooted in anthropogenic entanglement. Lithium Laterals uses terms and concepts specific to lithium mining while suggesting that universal insights can be drawn from these particular situations. Each card offers a definition related to lithium and a design prompt encouraging users to think about the broader impact of global resource extraction on ecology,

politics, and personhood. The deck is divided into four categories that encapsulate the three core aspects of landscape: matter, space, and time. “Material” cards explore the various agents and byproducts of lithium extraction, while “Landform” and “Technical Land” cards examine the spatial configurations required for sourcing and deploying lithium. "Process” cards look at the social and ecological dynamics over time. Inspired by the 1952 Eames’ House" of Cards, the cards are slotted to assemble into three-dimensional structures, which can be read from different angles and configurations, inviting multiple narratives to unfold in parallel – or even in opposition. The randomness inherent in the act of drawing cards invites us to make unexpected connections in service of generating approaches for intractable environmental challenges. The deck has been used in workshops with both high school and college students, in which participants moved from exercises in research and thematic connection to narrative building and diagrammatic illustration. The outcome of these workshops suggests that card-based resources are useful to communicate complex socio-ecological issues to non-specialist audiences, fostering dialogue and action around sustainability and resource justice. Lithium Laterals presents just one form that a justice-oriented tool might take to engage with extractive practices, offering researchers and practitioners a means to interrogate both ecological and human networks.

606 Reimagining Industrial Landscapes: Designing Sustainable, Resilient, and Ecological Futures through Interdisciplinary Collaboration

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Keywords: Industrial landscape; Environmental renewal; Sustainable development; Climate change resilience; Interdisciplinary design

In his landmark book of literary criticism of 1964, The Machine in the Garden, Leo Marx developed the idea that the industrial landscape had transformed the pastoral ideal of the romantic American landscape into one of values and meanings that were fundamentally opposed to a harmonious relationship with nature1. Given the outsize impacts of industry, whose effects can range from toxic byproducts, massive carbon footprints, ecological degradation associated with extraction, dehumanizing urban scales, and economies that often leave insurmoutable vacuums in their wake, the industrial typology is ripe for reinvention. The interdisciplinary design studio “The Machine in the Garden: Reimagining the Industrial Landscape as a Paradigm of Environmental and Civic Renewal,” explored innovative approaches to industrial landscape infrastructure by evaluating the topic through the lenses of resilience, urban development, and environmental stewardship. Beyond industrial production, the studio aimed to design a new factory typology that would respond to climate change and prioritize holistic social, economic, and environmentally sustainable possibilities within Miami's limestone quarry area known as the “Lake Belt.” The studio offered a collaborative platform for students from landscape architecture and architecture and leveraged partnerships with industry leaders. It incorporated a range of instructional methods including urban precedent research, digital and analog modeling, and studies of fabrication typologies2, supported by lectures on manufacturing sustainability, ecological performance, building systems, and the UN’s Sustainable Development Goals. An important pedagogical objective was to develop holistic strategies for the built and natural environments, turning industrial spaces into ecological and community assets threatened by sea level rise and development pressure. Students engaged in exercises, workshops, site analysis, and field visits to develop solutions that were responsive to their historic, natural, cultural, and ecological contexts. Projects tackled complex site challenges, integrated ecological principles, and presented multifaceted solutions that met functional needs while creating urban design strategies that promoted environmental and civic renewal. This endeavor explored a forward-thinking approach to industrial infrastructure within a framework for the region’s evolution in the face of development pressures and climate change. It provided a model for interdisciplinary collaboration encompassing urban design, architecture, and landscape architecture at multiple scales.

616 Back Page First: Reviewing Models of Assessment in Core Studios

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Keywords: Curriculum; Studio Review; Landscape Architecture; Design Studio Pedagogy; Assessment

Panelists: Rosalea Monacella, Harvard Graduate School of Design Kira Clingen, Harvard Graduate School of Design Curry Hackett, City College New York Sophie Weston Chien, Colorado University Boulder MK Smaby, UC Berkeley Others via zoom. This panel examines the enduring persistence of the design studio review model in postgraduate landscape architecture education. Despite significant societal changes and technological advancements, the pedagogical approach to design studio reviews in landscape architecture schools has remained remarkably consistent since its inception. Rooted in the Beaux Arts tradition, this model has been widely adopted across various design disciplines, including art, architecture, and landscape architecture. This mode of assessment is consistently transmitted from one generation to the next in landscape architecture design schools, often without critical examination. The expert panel, tasked with evaluating design projects in 'the review', brings a range of inherent biases and is often unaware of the nuanced assessment criteria of the course. Meanwhile, students anxiously await the panel's approval, highlighting the power dynamics inherent in this patriarchal model of assessment. Across institutions, the back page of studio syllabi describes the model of assessment for the studio. While the means of assessment, the format of final reviews, jury composition, and faculty deliberations differ, the final review and grading criteria are linked to the studio environment throughout the semester. Beginning at the end, a panel of design academics will examine through a survey current models from various schools through a series of questions around the structure and format of their studio review, from the number of guest critics to the layout of student work to the timing of presentations; to the criteria used to assess students. This panel will flip the script to foreground the final assessment in a studio, and to question how the final review is itself a form of assessment of the student, instructor, studio, and the institution. The aim of the panel is to identify alternative approaches to address the deeply entrenched challenges associated with the 'design review' assessment process. Revised Abstract This panel examines the enduring persistence of the design studio review model in postgraduate landscape architecture education. Despite significant societal changes and technological advancements, the pedagogical approach to design studio reviews in landscape architecture schools has remained remarkably consistent since its inception. Rooted in the Beaux Arts tradition, this model has been widely adopted across various design disciplines, including art, architecture, and landscape architecture. This mode of assessment is consistently transmitted from one generation to the next in landscape architecture design schools, often without critical examination. The expert panel, tasked with evaluating design projects in 'the review', brings a range of inherent biases and is often unaware of the nuanced assessment criteria of the course. Meanwhile, students anxiously await the panel's approval, highlighting the power dynamics inherent in this patriarchal model of assessment. Across institutions, the back page of studio syllabi describes the model of assessment for the studio. While the means of assessment, the format of final reviews, jury

composition, and faculty deliberations differ, the final review and grading criteria are linked to the studio environment throughout the semester. Beginning at the end, a panel of design academics will examine current assessment models from various schools through a survey, focusing on the final studio review. The survey will explore the structure and format of the studio review, including the number of guest critics, the layout of student work, and the timing of presentations and the criteria used to assess students. This panel will flip the script to foreground the final assessment in a studio, and to question how the final review is itself a form of assessment of the student, instructor, studio, and the institution. The aim of the panel is to identify alternative approaches to address the deeply entrenched challenges associated with the 'design review' assessment process.

621 Line and Field Factors: Manufacturing constraints for uncertain possibilities

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Keywords: Line; field; analog drafting; process; uncertainty

INTRODUCTION Design is not one line from start to end. Instead, especially for beginning design students, it's a line field, loosely organized and generative through experimentation. This condition is exemplified by drawing lessons that initiate the first two semesters of our restructured Bachelor of Landscape Architecture program. The two core projects described here challenge boundaries of disciplinary pedagogy, mixing random chance with algorithmic choice. METHODS For compositions in Line Factors, process eliminates pressures of "creativity." Students draw within a predictable frame but a dice roll determines density and orientation. This split focus on chance and choice emphasizes technical skill, generates spatial depth, and values constraints: Lines are not a rigid structure but a flexible framework, limiting scope without eliminating surprise. In a related project, compositions instead demand site-specific choice. From mark-making to place-making, students pair quick-then-slow observation with random-selection. Field Factors establishes then edits indirect landscape study as students survey and translate regional ecotypes, not as representational images but as individual and unique, if somewhat abstract, characters. Lines take on meaning past formal representation as fields that describe the quality, not just form, of space and, collected in series, represent a range of values, both graphic to site-specific. RESULTS Technical goals for these projects are density and practice: an explicitly manufactured process promotes craft and precision. A conceptual goal is disruption: students abandon a priori judgment about compositional quality in favor of iterative mark-making. Beauty emerges from control but also from a very specific lack of control. Creativity isn't wide-open or willful but limited and methodical. Refinement and re-application of linework lessons express specific landscape types and characters. DISCUSSION As landscape practice pushes toward nature-based solutions and process-focused design, our pedagogy pulls somewhat back to build compositional foundations for indeterminate outcomes. Across separate but related projects, students understand design as a push-and-pull, conceptually between expectation and reality, and practically between drawing tools and media. CONCLUSION By working progressively through limited constraints, students gain control of the range and expressiveness of mark-making, expanding possibilities for a precise palette. Collective creativity emerges from this linework lens: new drawing skills mean new analytical methods for understanding and communicating ecology and space. Against generic representations of smooth landscape surfaces, we argue for precisely measured but experientially messy layers, and the rigorous use of lines and fields as generative tools for spatial production.

623 Grounding Abstract Challenges in Landscape Architecture Education: The Rights and The Place (TRTP) Method for Open-Ended Studio Topics

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Keywords: Landscape architecture education; The Rights and The Place (TRTP); Urban design; Place-making; Abstract thinking

As the landscape architecture profession faces new and evolving challenges, it is imperative that students develop the ability to operate in these complex spaces, whether the focus is spatial justice or any other open-ended topic. While a traditional studio is valuable in delivering design skills to address a clearly defined brief, it often lacks the necessary guidance for addressing abstract and open-ended issues. Consequently, student responses to these challenges can remain vague, underdeveloped, or treated as an afterthought. To ensure that abstract concepts are translated into impactful design solutions, the inquiry must be thorough and the spatial response both holistic and precise, akin to how landscape architects specify tangible elements to guarantee their delivery. This paper proposes a method called "The Rights and The Place (TRTP)," which has evolved over five years in a third-year undergraduate studio to strengthen the delivery of open-ended topics in landscape urban design. The past iterations of the studio focused specifically on spatial justice, but the TRTP method can be applied to any abstract challenge requiring thoughtful exploration and elaboration. The TRTP method centers around continuous reflection on the connection between rational goals and objectives (referred to as "rights") and experienced design outcomes grounded in place. By channeling open-ended discussions toward "rights," the method provides students with a tangible way to anchor their abstract thinking, while "The Place" serves as a means to ground these rights through place-making. This approach fosters specificity and intention in design. This paper presents the TRTP method, the process of its application in the studio environment, and key findings from multiple years of teaching, showing observable improvement in student outcomes in target areas as they gain the capacity to thoughtfully address abstract, evolving topics within landscape architecture.

625 Empowering Educators to Introduce Landscape Architecture in K-12 Education through Schoolyard Design Activities

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Keywords: Landscape architecture education; Curriculum development; Landscape architectural design process; Schoolyard design

This presentation reports on the outcomes of the DREAM BIG with Design: Teacher's Edition workshop, held during the National Conference on Landscape Architecture in Washington, DC. The workshop engaged educators in the collaborative development of a "playbook" aimed at introducing landscape architecture to elementary students by reimagining their schools' outdoor environments. Interdisciplinary approaches to learning are increasingly recognized as essential, particularly those that integrate real-world problem-solving and environmental stewardship (Barth, 2013; Chawla, 2015; Kuo et al., 2019). In this context, the presentation addresses two key questions: (1) How does involving educators in the landscape architecture design process enhance their ability to develop curricula that foster creative problem-solving, environmental literacy, and landscape architecture? and (2) How does reimagining schoolyard environments through an interdisciplinary approach contribute to innovative educational practices that emphasize sustainability, wellness, STEM subjects, environmental literacy, and creativity in elementary students? During the workshop, educators applied core elements of the landscape architectural design process—goal setting, site analysis, and concept generation—to create lesson plans and activities that introduce students to foundational concepts in landscape architecture. Research indicates that active learning and design-thinking methodologies foster creativity, critical thinking, and interdisciplinary connections (Dym et al., 2005). The activities developed during the workshop encourage students to critically engage with their surroundings, exploring themes such as "Schoolyard as a Sustainable Laboratory," "Schoolyard as a Therapeutic Respite," "Schoolyard as a Physical Health and Wellness Lab," and "Schoolyard as an Art and Language Studio." Through active participation in the landscape architectural design process and recognizing parallels with their own lesson development, educators gained valuable tools to integrate landscape architecture into their curricula. These hands-on, place-based lessons and activities will provide students with meaningful learning experiences, strengthening their connection to their immediate environment while introducing them to the principles of landscape architecture.

628 The Role of Accreditation in Addressing Global Environmental Challenges

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Keywords: Landscape architecture; Accreditation; Sustainability; Environment; Educational Standards

Accreditation in landscape architecture plays a pivotal role in maintaining the standards and relevance of educational programs within the field. As global environmental and societal challenges continue to shift, the criteria for accreditation must similarly evolve to meet the demands of contemporary practice. For instance, the Landscape Architectural Accreditation Board (LAAB) in the United States has updated its Professional Curriculum Standards to include critical elements such as diversity and landscape performance within the Skills and Competencies section (LAAB, 2019). This study explores and compares current accreditation practices in landscape architecture between the United States and Germany, seeking to identify both similarities and distinctions. The primary objective is to investigate the role that accreditation can play in addressing global environmental challenges and to suggest strategies for fostering greater resilience and innovation in landscape architecture education. The research methodology consists of a thorough review of existing literature on accreditation processes and standards, followed by a comparative analysis between the two countries. The study also considers the broader implications of current accreditation practices on long-term environmental outcomes, the student experience, and professional success after graduation. Findings reveal significant insights into the effectiveness of each accreditation framework, the challenges faced, and potential areas for refinement. The analysis also considers the possibility of developing more globally consistent standards that better respond to emerging environmental crises. This study positions accreditation as a driving force for meaningful change within landscape architecture education and practice. Strengthening accreditation through international cooperation, shared knowledge, and advocacy is seen as a key strategy for ensuring that landscape architecture education is well-prepared to tackle future environmental challenges. In summary, landscape architecture accreditation holds substantial potential to guide the profession in confronting pressing global environmental issues. Through enhanced collaboration, accreditation can be leveraged as a tool to improve excellence, resilience, and sustainability in landscape architecture education and practice, ultimately contributing to a more adaptable and equitable global society.

632 Rethinking the Traditional Studio Model: Cost Efficiency, Modality, and Space Utilization

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Keywords: Studio Model; Design Education; Hybrid Teaching; Hot Desks; Accreditation

As design education continues to evolve, questions surrounding the sustainability and efficiency of the traditional studio model have grown increasingly pertinent. While the studio format has long been celebrated for its immersive, hands-on learning approach, the model's cost in terms of space, time, and labor remains a major challenge. With studio courses often requiring significant face-to-face contact hours, dedicated desks, and expansive physical space, educators and institutions are exploring alternative approaches to maintain educational quality while reducing expenses. This panel will examine key questions surrounding studio instruction in the post-pandemic era, reflecting on lessons learned from online and hybrid teaching modalities. We will delve into the credit-hour structure, with studios ranging from 4 to 6 credits and offering varying contact hours (from 8 to 15 hours per week), to evaluate whether this model is still the most effective. Additionally, we will explore the growing use of hot desks and flexible workspaces, as opposed to the traditional model of providing each student with a dedicated desk available 24/7. Some programs have shifted to hot desk models, offering up to 80% of desk spaces on a rotating basis, questioning the need for permanent workstations. Accreditation requirements often maintain that the studio model is integral to design education, but is it time to reconsider? Could hybrid or fully online studios better serve students and institutions alike, without compromising learning outcomes? This presentation will also highlight innovative strategies that have been adopted in various programs, including the shift to online or hybrid modalities and the reconfiguration of studio spaces to maximize efficiency. By sharing insights from our own experience, we aim to open a conversation about the future of design education and the potential for more cost-effective, flexible, and student-centered approaches. We invite participants to consider whether the traditional studio model is the only or the best way to teach design, or if new models—rooted in the lessons of the past few years—can provide viable alternatives.

635 Historic cemeteries as socio-cultural keystone ecosystems: place-lessons from two introductory landscape architecture studios

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Keywords: community design; service learning; reciprocity; restoration; ecology

This study presents lessons gained across two community service-learning studios focused on two historic cemeteries in Miami, Florida. The studio collaborations paralleled community-led restoration initiatives on both sites, which, over the years have experienced varying degrees of care and neglect, onto which an unintended secondary succession ecosystem has emerged. Both studios took place within the context of a first-semester design studio as part of a three-year MLA program. The studio topic provided an ideal lens through which to introduce students to the complex dynamics of landscapes across time via their social, cultural, and ecological systems. As a service-learning studio, it also provided authentic place-based learning experiences for students, the majority of whom do not possess deep ties to the region. Providing an early immersion into community participation on a real-world project helped students foster connection to place, belonging, and inspire community leadership initiatives. Moreover, as a cemetery typology, it provided an opportunity to introduce a spiritual dimension to the more commonly addressed material concerns of landscape architecture. The pedagogical approach of the studios builds on the democratic ideals of an integrated approach to education which positions learning within real-world settings and methods (Dewey, 1918), and engaged pedagogy, which cultivates a sense of community and social responsibility in tandem with student-teacher partnership on equal footing (hooks, 1994). Building on these educational precedents, the author goes a step further to present the concept of 'place-lessons;' lessons absorbed from the site itself as teacher, gained through direct experience and engagement, its principal actors and culture keepers, and study of its socio-cultural and ecological systems. The primary findings include the critical value of local culture keepers; the challenges of restoring a historic site within a complex urban context with limited stakeholder engagement and varying degrees of public support; balancing the community desire for a faithful restoration to an origin state while learning to communicate the value of what has emerged over time; and the importance of renewing community-place connections through ongoing stewardship and maintenance. Combined, these lessons parallel the concepts of reciprocal restoration (Kimmerer) in which restoration is mutually reinforcing such that ecological repair revitalizes culture and vice versa, while reinforcing an ethic of social and ecological responsibility; and "cultural keystone species," (Garibaldi and Turner), emphasizing material and nonmaterial aspects of culture. These metaphors provide a new framework for historic cemeteries as socio-cultural keystone ecosystems—sites with an outsize influence on the larger community.

Diversity, Equity, and Inclusion

21 How people with different ethnicities and backgrounds read post-industrial landscape

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Keywords: Post-Industrial Landscapes; Public Perception; Eye-tracking; Demographic Characteristics; Attitudes Towards Wildness

Landscape architects serve broad publics, ensuring our designs meet expectations of comfort, nature, and visual interest. Landscape can fade to background, which makes people's preferences for specific attributes difficult to discern. The post-industrial landscape is a multi-layered typology with a complex history. While industrial artifacts of an earlier era are often heralded by designers as creating a connection to a society's past, the communities impacted by their 'adaptive re-use' often have mixed feelings about the resulting transformations. Given that post-industrial sites are often located adjacent to low-income neighborhoods – the results of a century of unequal urban policy – the fact that these sites are being earmarked for redevelopment has created a sense of insecurity around the possibilities of gentrification and homogenization. It is critical to sharpen a public engagement process that clarifies how people perceive these spaces. The project seeks to create an additional layer on established public engagement methodologies around post-industrial landscapes, which we hope will provide landscape architects with a more robust toolkit to help design spaces that are loved and well-integrated into their surrounding neighborhoods. Eye-tracking technology, a potentially transformative new methodology to yield better responses, was used to map instinctual eye movements onto predefined landscape attributes. Having established a team across several different countries, we brought in over 500 participants of different ethnicities, genders, ages and backgrounds to create a large database of perceptual responses as they relate to six different post-industrial parks. Using eye-tracking platform, we ran a series of experiments to segment sample images and video into different areas of interest (AOI), defined by their degrees of 'natural' or 'industrial'.Visual attention metrics show how people interacted with the visual material. Landscape attributes of configuration, texture and materiality, plants, and degree of wildness were used to narrow the focus of participants' reactions and allow for more precise inferences to be made. After completing the eye movement experiment, participants were given a preference questionnaire with which we could cross-reference the results. New perspectives and insights regarding post-industrial landscape from this research can be found in the graphic materials. This research makes a breakthrough in applied public engagement research by isolating for subconscious preference determination, a powerful way that people read landscapes that is often unreported or is contradicted by questionnaires and surveys. The research concludes by offering strategies for designers to improve the legibility of landscapes.

47 From participation to performance: A cross-case analysis of equity, inclusion, and engagement in high-performing landscape projects

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Keywords: DEI; Community engagement; Landscape performance; Design process; Mixed-methods

Since 2010, the Landscape Architecture Foundation has systematically quantified the environmental, social, and economic benefits of exemplary landscape design projects in its Landscape Performance Series (LPS). This database of case studies offers valuable insights into the transformative outcomes quality green space can provide for communities. Such outcomes are especially impactful in vulnerable areas, where a lack of quality green space exacerbates socio-ecological challenges. However, while the LPS includes over two hundred projects celebrated for the diverse benefits they provide, few are located within significantly vulnerable communities. Thus, in the context of the LPS, the benefits of high-performing landscapes are not well-documented in communities where they are needed most. This gap in understanding raises concerns regarding equity in the distribution of high-performing projects and highlights the need for more intentional examination of landscape performance benefits in vulnerable communities. Additionally, as the LPS emphasizes assessment of post-construction landscape performance, the design processes and community engagement methods used to arrive at beneficial solutions are underexplored. To this end, unanswered questions exist as to whether or how engagement with communities, vulnerable or otherwise, occurs throughout design processes that result in high-performing projects. This research aims to address these gaps by investigating the role community engagement played in the decision-making processes undertaken during LPS project development. Three guiding questions inform these efforts: 1) What methods were used to engage communities in the design process? 2) How was information gathered through community engagement integrated into design outcomes? 3) What successes or challenges did practitioners experience when engaging communities, and how did those factors influence design outcomes? This research employs a mixed-methods approach, grounded by a cross-case analysis of select LPS projects. Inclusion criteria are based on project type, socio-demographic context, and the use of community engagement in the design process. Ongoing data collection methods include a web-based review of LPS projects, document analysis, online surveys, and semi-structured interviews with practitioners familiar with the design processes used in selected case studies. These data will be analyzed using descriptive statistics and thematic coding, and a cross-case study comparison will be conducted to synthesize the findings. In its totality, this research complements the rigorously quantified performance benefits documented in the LPS. By examining the community engagement methods and decision-making processes that influence design outcomes, this study provides qualitative insights that promote a more equitable and inclusive approach to the development and evaluation of high-performing landscape projects. Revised Abstract Since 2010, the Landscape Architecture Foundation (LAF) has systematically quantified the environmental, social, and economic benefits of exemplary landscape design projects in its Landscape Performance Series (LPS). This database of case studies offers valuable insights into the transformative outcomes quality green spaces can provide for communities. Such outcomes are especially impactful in vulnerable areas, where a lack of quality green space exacerbates socio-ecological challenges. However, as the LPS emphasizes assessment of post-construction

landscape performance, the design processes and community engagement methods used to arrive at beneficial solutions are underexplored. To this end, unanswered questions exist as to whether or how engagement with communities was integrated into the design processes that result in high-performing projects. This research aims to address these gaps by investigating the role community engagement played in the design processes undertaken during LPS project development. Three guiding questions inform this effort: 1) What methods were used to engage communities in the design process? 2) How was information gathered via community engagement integrated into design outcomes? 3) What successes or challenges did practitioners experience when engaging communities, and how did those factors influence design outcomes? The study is grounded by a cross-case analysis of select LPS projects. Inclusion criteria are based on correspondence with LAF staff, project type, socio-demographic context, and the documented use of community engagement in the design process. Completed data collection methods include online surveys and a web-based review of LPS projects. Ongoing collection methods include document analysis and semi-structured interviews with practitioners familiar with the design processes used in selected case studies. Survey data has been analyzed using descriptive statistics to identify community engagement practices employed by firms whose work is featured in the LPS. The ongoing thematic coding and synthesis of qualitative data will inform the cross-case analysis of selected cases. This research complements the rigorously quantified performance benefits already documented in the LPS. By examining the community engagement methods and decision-making processes that influence these design outcomes, this study provides insights that may promote a more equitable and inclusive approach to the development and holistic evaluation of high-performing landscape projects.

55 Urban Parks for Intergroup Contact: A Case Study of Community and Neighborhood Parks in Houston, Texas

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Keywords: Urban Park; Intergroup Contact; Big Data; Social Network Analysis

Background: Recent trends show a decline in social engagement among Americans, leading to increased isolation, segregation, and polarization. Although different social groups often live close together, they maintain distinct networks, deepening divisions by race/ethnicity, income, and immigration status (Camina & Wood, 2009; Lelévrier, 2013). In response, the 2023 U.S. Surgeon General's report, "Our Epidemic of Loneliness and Isolation," calls for improved urban social infrastructure. Urban parks, as open and accessible spaces, play a vital role in fostering social connections and inclusion. Scholars widely agree that parks are key venues for intergroup contact, which helps reduce prejudice and social tension (Allport et al., 1954; Peters et al., 2010; Powers et al., 2021). While many researchers have examined how parks promote social interaction and cohesion, fewer studies have focused on how parks encourage intergroup contact across diverse racial, ethnic, and income groups. This study addresses that gap by investigating how community and neighborhood parks foster intergroup exposure among different social groups. Specifically, it examines how park features affect visitor diversity and park popularity, both among people from the same neighborhood and across different neighborhoods, with the consideration of neighborhood characteristics. Methodology: This study measures intergroup exposure by analyzing visitor diversity and park popularity using mobile data from Dewey, which shows the travel information to points of interest. Visitor diversity is calculated through the Diversity Index ((DI=1-Σ Pi^2, where Pi means the proportion of element in category i), which reflects the likelihood that two randomly selected park visitors are from different racial or ethnic groups. Park popularity is assessed by the frequency of visits, determined by the number of connections in a visitor-park network. Data on race, ethnicity, and income is drawn from Census Block Groups, while park and neighborhood features (e.g., size, amenities, walkability) are collected from secondary datasets. Multiple Linear Regression (MLR) will be used to analyze how these factors influence intergroup exposure opportunities. Expected Outcomes: By highlighting how urban parks serve as neutral grounds for diverse social groups, this study aims to offer practical strategies for promoting inclusivity and community cohesion. The results will highlight the crucial role of parks in fostering intergroup engagement, extending their importance beyond traditional recreational and ecological functions to actively contribute to the creation of more inclusive communities. This research will guide urban planners, landscape architects, and community stakeholders in designing parks that attract and engage a broad range of visitors, fostering social inclusion across diverse communities. Revised Abstract Background: Recent trends show declining social engagement in America, leading to isolation, segregation, and polarization. Despite close proximity, social groups often maintain distinct networks, deepening divisions by race, income, and immigration status (Camina & Wood, 2009; Lelévrier, 2013). In response, the 2023 U.S. Surgeon General's report, "Our Epidemic of Loneliness and Isolation," calls for improved urban social infrastructure. Urban parks, as open

and accessible spaces, play a vital role in fostering social connections. Scholars widely agree that parks are key venues for intergroup contact, which helps reduce prejudice and social tension (Allport et al., 1954; Peters et al., 2010; Powers et al., 2021). While many researchers have examined how parks promote social interaction and cohesion, fewer studies have explored how parks facilitate intergroup contact across diverse racial, ethnic, and income groups. This study advances the field by leveraging big data to analyze intergroup exposure opportunity across all urban community and neighorhood parks in Houston under both citywide and neighborhood scales. Methodology: This study measures intergroup exposure by analyzing visitor diversity and park popularity using mobile data from Dewey, which shows the travel information to points of interest. Visitor diversity is calculated through the Diversity Index ((DI=1-Σ Pi^2, where Pi means the proportion of element in category i), which reflects the likelihood that two randomly selected park visitors are from different racial or ethnic groups. Park popularity is assessed by the frequency of visits, determined by the number of connections in a visitor-park network. Socioeconomic data is drawn from Census Block Groups, while park and neighborhood physical environment features are collected from secondary datasets. Multiple Linear Regression will be used to analyze how these factors influence intergroup exposure opportunities. This study has limitations. The mobile data, representing about 10% of smartphone users per census block group, may exclude vulnerable populations without smartphone access. Additionally, the data from Dewey cannot be directly validated. Future on-site observations at selected parks will help assess its validity by comparing intergroup exposure measurements with observational data. Expected Outcomes: By highlighting how urban parks serve as neutral grounds for diverse social groups, this study aims to offer practical strategies for promoting diversity, equity, and inclusivity at parks. The results will highlight the crucial role of parks in fostering intergroup engagement, extending their importance beyond traditional recreational and ecological functions to actively contribute to inclusive communities. The research results will inform practices for attracting diverse visitors and fostering social inclusion.

79 Assessing Placemaking and Community Capacity-Building in Two Asian American Communities in Seattle

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Keywords: Placemaking; community capacity-building; Asian American; Native Hawaiian and Pacific Islanders; Seattle

With support from grant-making programs at the national and local levels, placemaking initiatives have proliferated across cities in the United States, including Asian American, Native Hawaiian, and Pacific Islander (AANHPI) communities. Emerging during the Asian American movement of the 1970s, community development organizations have played an essential role in addressing structural barriers facing the AANHPI communities in the United States. As the placemaking initiatives have grown, more is needed to know about how these initiatives contribute to community development and how such impacts are measured (Zitcar, 2020; Crisman, 2021; Ganning, 2016). In minority communities, in particular, the tangible positive impacts of the projects remained understudied (Furtado & Payne, 2022). To better understand the impact of these initiatives, this study examines how community arts and creative placemaking practices build community capacity to address community challenges in AANHPI communities in the United States. Informed by the literature on community capacity-building in community development, education, and community health (e.g., Skinner, 1997; Beckley et al., 2008; Liberato et al., 2011), together with inputs from community arts leaders and practitioners, a framework for assessing community capacity was developed for this study. The framework identifies knowledge capacity, creative capacity, relational capacity, political capacity, affective capacity, and economic capacity as key domains for measuring community capacity. Data are collected through a national survey of community organizations that have carried out such initiatives. Six case studies are being carried out to gain an in-depth understanding of the processes and outcomes of capacity-building in different community and project contexts. This presentation will focus on the outcomes of two selected case studies in Seattle, where two community-based organizations in the Chinatown International District have each carried out several placemaking initiatives over the past decade. Through projects including alleyway activation, street murals, and community festivals, the two organizations have mobilized community resources to address similar and distinct neighborhood improvement and community development issues. The case studies examine how various community stakeholders are involved in the initiatives and how their engagement contributes to community capacity-building, as defined above. Findings from these case studies also provide a basis for critical reflections on community-engaged design and placemaking practices, including the role of landscape architecture educators and professionals in addressing issues of diversity, equity, and inclusion. Revised Abstract With support from grant-making programs at the national and local levels, placemaking initiatives have proliferated across cities in the United States, including Asian American, Native Hawaiian, and Pacific Islander (AANHPI) communities. Emerging during the Asian American movement of the 1970s, community development organizations have played an essential role in addressing structural barriers facing the AANHPI communities in the United States. As the placemaking initiatives have grown, more is needed to know about how

these initiatives contribute to community development and how such impacts are measured (Zitcar, 2020; Crisman, 2021; Ganning, 2016). In minority communities, in particular, the tangible positive impacts of the projects remained understudied (Furtado & Payne, 2022). To better understand the impact of these initiatives, this study examines how community arts and creative placemaking practices build community capacity to address community challenges in AANHPI communities in the United States. Informed by the literature on community capacity-building in community development, education, and community health (e.g., Skinner, 1997; Beckley et al., 2008; Liberato et al., 2011), together with inputs from community arts leaders and practitioners, a framework for assessing community capacity was developed for this study. The framework identifies knowledge capacity, creative capacity, relational capacity, political capacity, affective capacity, and economic capacity as key domains for measuring community capacity. Data are collected through a national survey of community organizations that have carried out such initiatives. Six case studies are being carried out to gain an in-depth understanding of the processes and outcomes of capacity-building in different community and project contexts. This presentation will focus on the outcomes of two selected case studies in Seattle, where two community-based organizations in the Chinatown International District have each carried out several placemaking initiatives over the past decade. Through projects including alleyway activation, street murals, and community festivals, the two organizations have mobilized community resources to address similar and distinct neighborhood improvement and community development issues. The case studies examine how various community stakeholders are involved in the initiatives and how their engagement contributes to community capacity-building, as defined above. Findings from these case studies also provide a basis for critical reflections on community-engaged design and placemaking practices, including the role of landscape architecture educators and professionals in addressing issues of diversity, equity, and inclusion.

108 Rooted in Equity: Landscape Architecture's Role in Addressing Community Needs and Spatial Tensions

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Keywords: Design Pedagogy; Community Engagement; Food Security; Environmental Justice; Climate Adaptation

Stories hold a fundamental place in the preservation and evolution of cultures. They offer valuable insights into language, history, and the environment, whether conveyed through written forms like maps and text or through oral traditions such as folklore and music. These narratives are deeply intertwined with our everyday lives, shaping personal identities to the structure of entire cities and local communities. However, historical planning and design practices have often marginalized communities of color, creating lasting impacts on their spatial, economic, and environmental landscapes. These inequitable practices have frequently manifested through conflict, discrimination, and displacement, which continue to challenge the survival and resilience of these communities today. At this pivotal time of social, political, and ecological upheaval, it is crucial for landscape architects to challenge and dismantle harmful practices. We must design with a deep awareness of the values and needs of marginalized communities, ensuring their voices are reflected in our work. By engaging in disruptive design strategies, we can actively contribute to the transformation of marginalized communities. This process involves reflecting on past injustices, articulating community desires, and projecting a future that fosters equity and inclusion. Through such engagements, landscape architecture has the potential to reshape spaces, empower communities, and define an equitable and resilient future. This presentation reflects ongoing graduate core studio pedagogy centered around topics of food security, environmental justice, and the humanitarian crisis. The work exposes the uneven contours of everyday life around the students and the power landscape education has to address these. The course structure introduces students to the interdisciplinary study of community, reflexive critical thinking, and leadership development necessary for effective service and citizenship. In landscape education, it’s crucial to recognize the value of engaging with communities to which we might not inherently belong —especially for students not typically from the University area. This practice empowers students to build relationships by exchanging lived experiences, integrating that into their analytical methods, planning strategies, design solutions, and world view. The presentation is structured around three key topics: (1) designing for and developing community relationships, (2) translating community input into multi-scalar analysis and localized design strategies, and (3) delivering the work back to community partners. By embracing community engagement, the work underscores the need for design pedagogy, specifically in the core curriculum, to ensure students are effective listeners, translators, and designers who are knowledgeable about perspectives of those who are within our outside of their daily spaces. Revised Abstract While the study of complex communities and their narratives is common practice in landscape pedagogy, the act and process of community engagement remains novel to curricula. This project highlights the role of landscape education to equip students with the skills to understand and engage with communities around them. The work showcases the design process with a deep awareness of the values and needs of marginalized communities during a crucial time of social, political, and ecological upheaval. This presentation reflects ongoing graduate core studio pedagogy centered around topics of food

security, environmental justice, and the humanitarian crisis. The work exposes the uneven contours of everyday life around the students and the power landscape education has to address these. The course structure introduces students to the interdisciplinary study of community, reflexive critical thinking, and leadership development necessary for effective service and citizenship. In landscape education, it's crucial to recognize the value of engaging with communities to which we might not inherently belong —especially for students not typically from the University area. This practice empowers students to build relationships by exchanging lived experiences, integrating that into their analytical methods, planning strategies, design solutions, and world view. Structured around three key topics: (1) designing for and developing community relationships, (2) translating community input into multi-scalar analysis and localized design strategies, and (3) delivering the work back to community partners, the presentation also offers insight into new methods of dynamics between student, faculty, and community. Within these topics, methods of community engagement through site visits, interviews, and public presentations are included to support the pedagogical objectives. The process brought students and community members directly into conversation with one another. Faculty served as touch point facilitators where students led exchanges with community members on site to develop leadership and communication skills. Students were then tasked with synthesizing their findings to generate a list of common concerns, needs, and wishes which they had to translate with their own design work and present back to the community. What results is a more empathetic student cohort ready and equipped to translate the work of landscape architecture from the community to the studio and vice versa. By embracing community engagement, the work underscores the need for design pedagogy, specifically in the core curriculum, to ensure students are effective listeners, translators, and designers who are knowledgeable about perspectives of those who are within or outside of their daily spaces.

122 Understanding Procedural Justice in Urban Green Space: Incorporating Civic Participation Data into Spatial Analysis through Qualitative Comparative Analysis

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Keywords: Environmental Justice; Qualitative Comparative Analysis (QCA); Longitudinal Study; Urban Green Space (UGS); Scale

Despite myriad community conversations that advocate for equitable urban green space (UGS) development over time, there is a lack of efficient ways to compile such fragmented information. Civic participation data is one of the most important pieces of information for understanding in-depth and various community inputs, which is, however, often stored and managed fragmentally on a data-by-data or case-by-case basis. Focusing on how procedural justice contributes to the current UGS distribution, this case study uses Austin, TX as an example and asks what civic participation's role is in UGS development longitudinally. We hypothesize that civic participation, in addition to commonly recognized sociodemographic and socioeconomic factors, would have a lingering impact on the distribution of UGS over time. The study used Qualitative Comparative Analysis (QCA) to account for bridging the gap between qualitative and quantitative analysis of the civic participation data, collected from the Austin Parks and Recreation Department (PARD) board meetings and then geocoded in accordance with census tracts. We constructed the 'census tract level UGS accessibility score' as the dependent variable. With civic participation as the key explanatory variable, other independent variables included the percentage of the White population; the percentage of the Black population; median household income; and, population density, collected from three decadal periods (2000, 2010, and 2020) to understand both spatial and longitudinal UGS changes. Multiple QCAs with different periods following decadal intervals were conducted, and the three sets of solution formulas for the three decades were subsequently compared using string analysis. The results show that a higher percentage of the White population and a higher Civic Participation remain the key factors for improved access to UGS across the three decades (2000, 2010, and 2020). The solutions become more complex, and the number of combined conditions has increased, reflecting a shift toward a more nuanced understanding of the factors influencing UGS accessibility. The role of density has become more pronounced, and the influence of socioeconomic factors showed broader urban and demographic changes. The results suggest that QCA complements spatial analysis for Landscape Architecture researchers to examine how political and institutional practices impact UGS development longitudinally.
Revised Abstract Many cities recognize civic participation as a standard institutional practice essential for promoting procedural justice and fostering more equitable park planning and decision-making. Despite myriad community conversations advocating for equitable urban green space (UGS) development over time, there is a lack of efficient ways to compile such fragmented qualitative information gathered through public meetings, events, and surveys. Civic participation data is crucial for understanding diverse community inputs but is often managed on a case-by-case basis. This case study explores the role of civic participation in the longitudinal development of UGS, focusing on how public input during Parks and Recreation Board Meetings, a participatory design and planning strategy by Austin's Department of Parks and Recreation (PARD), influences UGS development. We hypothesize that civic participation, in addition to

commonly recognized sociodemographic and socioeconomic factors, would have a lingering impact on the distribution of UGS over time. The study used qualitative comparative analysis (QCA) to bridge the gap between qualitative and quantitative analysis of the civic participation data collected from the Parks and Recreation Board's archived meeting documents, which were then geocoded by census tracts. We constructed the 'census tract level UGS accessibility score' as the dependent variable. With civic participation as the key explanatory variable, other independent variables included the percentage of the White population, the percentage of the Black population, median household income, and population density, collected from three decadal periods (2000, 2010, and 2020) to understand both spatial and longitudinal UGS changes. Multiple QCAs with different periods following decadal intervals were conducted, and the three sets of solution formulas for the three decades were subsequently compared using string analysis. The results show that a higher percentage of the White population and a higher Civic Participation remain the key factors for improved access to UGS across the three decades (2000, 2010, and 2020). The solutions become more complex, and the number of combined conditions has increased, reflecting a shift toward a more nuanced understanding of the factors influencing UGS accessibility. The role of density has become more pronounced, and the influence of socioeconomic factors showed broader urban and demographic changes. The results suggest that QCA complements spatial analysis for Landscape Architecture researchers to examine how political and institutional practices impact UGS development longitudinally.

182 After Pandemic, Should We Still Meet On Screen?

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Keywords: virtual engagement; participatory design; community design; design game

The COVID-19 pandemic made designers and community members hesitate to engage face-to-face for public participation. Social distancing policies made it more difficult for conventional participatory procedures to take place, which prompted many industries—including civic-minded designers and planners—to turn to virtual environments to empower populations who had not previously had a say in decisions (Blackford, 2020; Pasalar et al., 2021; Yi et al., 2021). Even in the post-pandemic era, the culture of virtual meetings persists due to the benefits of overcoming physical constraints. Industries such as events, education, and healthcare have adopted virtual communication tools widely (Grand View Research, n.d.; Shaver, 2022; Yung et al., 2022). However, virtual engagement presents challenges, including reduced focus, technical issues, and negative participant perceptions (Hollister et al., 2022; Plunk et al., 2022). These issues highlight the need for careful consideration when employing virtual platforms for community empowerment. This study examines several virtual Design Game cases, which were environmental design participatory strategies conducted during the pandemic and their long-term impacts on communities. By reviewing participatory methods and analyzing participant reflections on changes in their communities, the study proposes concepts for future virtual engagement strategies. The researchers introduce participation methods, graphic standards, and other adaptable strategies to enhance procedural equity and active engagement. Additionally, the study explores the potential for virtual engagement to empower communities in remote or otherwise distanced areas. Revised Abstract The COVID-19 pandemic made designers and community members hesitate to engage face-to-face for public participation. Social distancing policies made it more difficult for conventional participatory procedures to take place, which prompted many industries—including civic-minded designers and planners—to turn to virtual environments to empower populations who had not previously had a say in decisions (Blackford, 2020; Pasalar et al., 2021; Yi et al., 2021). Even in the post-pandemic era, the culture of virtual meetings persists due to the benefits of overcoming physical constraints. Many industries, such as entertainment, education, and healthcare, have widely adopted virtual communication tools (Grand View Research, n.d.; Shaver, 2022; Yung et al., 2022). However, virtual engagement presents challenges, including reduced focus, technical issues, and negative participant perceptions (Hollister et al., 2022; Plunk et al., 2022). These issues highlight the need for careful consideration when employing virtual platforms for community empowerment. This study examines two virtual participatory design cases conducted by the authors during the pandemic and their long-term impacts on communities and their surroundings. Both cases employed synchronous and asynchronous methods to capture community voices. The participatory strategies focused on: (1) adapting charrette and visual communication methods to virtual platforms and (2) ensuring these methods were accessible to communities that might face technical challenges. Recognizing that not all communities have easy access to digital technology or free online tools, the authors leveraged familiar concepts like “drag-and-drop” using free applications to foster inclusivity. Post-participation, these virtual engagements demonstrated positive impacts, including amplifying community voices in negotiations with governments and decision-makers to achieve equitable solutions. By reviewing the participatory

methods employed and analyzing participant reflections compared to other approaches, such as online surveys or virtual hearing sessions, the researchers introduce innovative methods, graphic standards, and adaptable strategies to enhance procedural equity and active engagement. The study highlights the critical role of visualization in virtual platforms—a feature not yet widely adopted in many online participatory tools. Furthermore, it explores the potential for virtual engagement to empower communities in remote or underserved areas.

183 Co-opting Arts-Based Initiatives in Historically Black Neighborhoods: Lessons from Chicago's South Side

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Keywords: Arts-Based Interventions; Creative Placemaking; Silencing; Neoliberal Urbanism; South Side Chicago

This paper contends that arts-based initiatives in historically Black neighborhoods are frequently co-opted as tools for placemaking and community revitalization, aligning with a neoliberal agenda. Despite claims to support Black representation and reparation, these projects often prioritize economic development, sidelining the actual needs of the community. Consequently, they can result in the silencing, exclusion, and displacement of everyday Black communities under the guise of repair and empowerment, ultimately benefiting a select elite and perpetuating the very structures they were intended to challenge. Grounded in the theoretical frameworks of placemaking and "silencing" within urban growth discourse, this paper explores how placemaking strategies are used for public space revitalization and economic development (Markusen & Gadwa, 2010). While advocates highlight their potential to create vibrant public spaces and attract investment, critics argue that these initiatives frequently lack genuine community input, impacting local economies, housing affordability, and racial dynamics (Montgomery, 2016; Bedoya, 2013). Of particular concern is the silencing of community voices. Drawing on Thiesmeyer's (2003) concept of silencing as a discursive practice, this study examines how growth coalitions—comprising city authorities, philanthropies, artists, developers, and media—employ the language of repair and representation to manage opposition (Mollenkopf, 1975; Molotch, 1976, 1993; Jonas & Wilson, 1999). This process reframes critical voices as "anti-progress" or "insignificant," thus reinforcing exclusionary narratives. The study focuses on Chicago's South Side, employing ethnographic methods such as participant observation, interviews, and archival research. It analyzes a prominent Black arts organization and the appropriation of its artistic endeavors by public administrators, media, and philanthropic entities. The research investigates the divide between the original goals of the projects and the narratives constructed by external actors, uncovering how growth machines reshape arts initiatives to support urban redevelopment at the expense of the local Black community (Jonas & Wilson, 1999; Molotch, 1993). The findings underscore the necessity of reevaluating placemaking and arts-based interventions to align with the needs of Black communities, challenging prevailing notions of Black excellence that frequently overshadow everyday experiences. This paper critiques the labeling of contemporary arts initiatives as community development and/or placemaking, which distorts their true intentions and places an undue burden on Black creatives. The study advocates for inclusive dialogue among stakeholders to prevent reinforcing exclusionary "white spatial imaginaries" and ensure that urban development genuinely benefits Black communities.

231 Emergent Design: Embodied methodologies celebrating diversity, authenticity and change

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Garden, Rebecca, Upstate Medical, Syracuse, NY, USA
Baba, Tameka, Knowlton School, Columbus, Ohio, USA
Garcia, M Elisandra, University of Oregon, Portland, OR, USA

Keywords: Participatory Active Research; Intersectionality; Knowing; Tactical Urbanism; Engagement

How can embodied processes generate new forms of knowledge and inspire innovative practices in Landscape Architecture? This presentation considers narrative, embodied, and craft-based approaches to community engagement and landscape design. Experiments in sense and subjectivity explore how methods rooted in physical engagement, sensory exploration, and participatory collaboration can shape both understanding and design outcomes. By examining approaches ranging from critical literary analysis to world-building techniques that foster community collaboration, the panel will explore diverse ways of 'coming to know' and of creating distinct landscape forms.

The panel will then provide perspectives from colleagues in professional practice, the academy and cultural landscape preservation. Elisandra Garcia, Director of Engagement and Project Designer at El Dorado Architects, will explain the narrative techniques used in her engagement with marginalized populations. Referencing her work on Parrott Creek, a retreat for troubled youth, Garcia will share embodied engagement methods that helped the youth reflect on experiences, document issues, promote dialogue and empowerment.

Finally, Jean Yang, Assistant Professor SUNY ESF, will explore the role of community speculation, sensory experience and deep reading in cultural landscape preservation. Yang will share her work with the National Park Service on the Women's Rights National Park. To supplement the archaeological and structural analysis, Yang's work explored the subjective experience of the space through different periods of time. Her presentation will discuss the methodology, client reception and variations from traditional approaches.

Rebecca Garden PhD, Associate Professor, Public Health & Preventive Medicine, Upstate Medical University, starts with discussion of embodied place-, home- and community-making practices. Through examples of literature and the cultural work done by Deaf refugee/New Americans on their farm outside of Syracuse, NY, Garden will describe how these Deaf New Americans, displaced by ethnic cleansing, created home and place for themselves through traditional forms of growing food and through social practices of narration. Thus the community was able to reimagine their traditions in new places with new materialities.

Tameka Baba, Assistant Professor at The Ohio State University's Knowlton School, employs traditional crafting techniques to create immersive and material-rich urban sites. She will share how her process aided in the design and fabrication of Pipe Up!, a collaborative site installation featured in the 2023 Exhibit Columbus program. Her work showcases how accessible materials can be innovatively used to prioritize participant engagement, understanding, and creativity in the process of site design.

305 Invisible Gardeners Behind the Garden: Immigrant Labor and Singapore's Green City

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Keywords: Landscape Maintenance; Immigrant Worker; Invisible Labor

Urban landscapes are often celebrated for their ecological and aesthetic contributions to cities, but the labor that sustains them frequently goes unnoticed in academic and professional discourse, particularly in discussions of equity. This paper aims to foreground the hidden labor involved in the maintenance of urban green infrastructures, with a focus on a case where such work is outsourced to marginalized or immigrant populations. Despite the growing emphasis on sustainable urban development and equitable cities, the social inequalities underlying the creation and maintenance of green spaces are not as highlighted. The case of Singapore's Garden City policy offers a striking example of this disconnect. While the policy has garnered global acclaim for transforming Singapore into a lush urban oasis, less attention has been paid to the labor that makes this possible. The maintenance of Singapore's extensive green infrastructure and clean environment relies heavily on low-wage immigrant workers, predominantly from neighboring countries like Malaysia and Bangladesh. These workers perform the physically demanding and dangerous tasks necessary to keep the city's green spaces clean and vibrant, but their contributions are largely invisible in the city's environmental success. This raises critical questions about who benefits from urban greening policies and who bears the burden of their upkeep. This paper primarily analyzes government documents, NGO reports, media articles, and industry briefs regarding Singapore's landscape maintenance and immigration policy, scrutinizing the role of immigrant labor within its Garden City initiative. In detail, it provides a historical overview of the intersection between urban landscape maintenance and immigration policies in Singapore, highlighting how the two sections have adjusted to each other to cater to the nation's needs. Photographic documentation will serve as supplemental data to enrich the analysis by offering concrete visual and contextual insights into the daily labor practices that sustain the city's green infrastructure. By examining the Garden City initiative through the lens of equity, this paper argues that sustainable and equitable urban landscapes cannot be fully realized without acknowledging the hidden workforce that sustains them. Drawing on the example of Singapore, it explores how labor dynamics, often along lines of race and class, are integral to the maintenance of urban green infrastructure, yet remain overlooked in policy and academic discourse. This criticism calls for a rethinking of urban landscape policies to ensure that the social and economic dimensions of labor are included in the discussions of urban sustainability and equity. Revised Abstract Green urban landscapes are often celebrated for their ecological and aesthetic contributions to cities, but the labor that sustains them often goes unnoticed in academic and professional discourses. This paper aims to bring forth the hidden labor involved in maintaining urban green infrastructure focusing on a case where such work is often outsourced to migrant workers. Despite the growing emphasis on sustainable development and environmentally friendly cities, the social inequalities underlying the creation and maintenance of green spaces are not as highlighted. The case of Singapore's Garden City policy offers a notable example of this disconnect. While the policy has been

acknowledged globally for transforming the city into a lush urban oasis, less attention has been paid to the labor that makes this possible. The maintenance of Singapore's extensive green infrastructure and clean environment relies heavily on low-wage immigrant workers, predominantly from neighboring countries like Malaysia, Bangladesh, and India. These workers perform the physically demanding and sometimes dangerous tasks necessary to keep the city clean and green, but their contributions are largely invisible in the city's environmental success. This calls into question who benefits from urban greening policies and who bears the burden of their upkeep. This paper primarily analyzes government documents, NGO reports, media articles, and industry briefs regarding Singapore's landscape maintenance and immigration policy, looking into the role of immigrant labor within its Garden City initiative. In detail, it provides an overview of the intersection between urban landscape maintenance and immigration policies in Singapore, highlighting how the two domains have adjusted to each other to cater to the nation's needs. Photographic documentation will serve as supplemental data to enrich the analysis by offering concrete visual and contextual insights into the daily labor practices that sustain the city's green infrastructure. By examining the Garden City initiative through the lens of equity, this paper argues that sustainable and equitable urban landscapes cannot be fully realized without acknowledging the labor that sustains them. Drawing on the example of Singapore, it explores how labor dynamics, often along lines of race, class, and/or gender, are integral to the maintenance of urban green infrastructure yet remain overlooked in policy and academic discourse. This criticism calls for a rethinking of urban landscape policies and practices to ensure that the social and economic dimensions of labor are included in the discussions of urban sustainability and equity.

348 Trail Planning to Meet Demand and Promote Inclusivity: Preferences Among Mountain Bikers in the United States

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Keywords: amenities; inclusivity; mountain biking; recreation management; underrepresented groups

Mountain-biking is a growing sport with the number of American participants reaching 9.29 million in 2023 (Statista, 2024). However, only half of American youth (ages 3-17) rode a bicycle in 2022 (PeopleForBikes, 2023, p. 11). Several demographic groups remain under-represented among mountain biking participants. Mountain biking is strongly perceived as a male-dominated sport (Irvin, 2019); 90% of mountain bikers are male (Buning, Cole and Lamont, 2019). Minority groups are also under-represented: 96.5% of mountain bikers were white (Bowker & English, 2002). When fewer women and minorities participate in mountain biking, it reduces total participation in the sport and mountain biking tourism (Buning, Cole and Lamont, 2019, p. 522), with "destinations… missing out on lucrative opportunities through a lack of understanding around how latent demand among female mountain bikers is not being converted into participation." A 2018 survey of 13,623 mountain bikers in the United States provided an opportunity to examine preferences among mountain bikers at the national scale. The survey included 79 questions and was distributed through the International Mountain Bicycling Association (IMBA), reaching respondents in all 50 states. When asked "Rank your three top reasons for mountain biking," most respondents prioritized exercise (70.8%) and fun (68.8%). When asked to rank trail amenities, respondents ranked lowest some of the most expensive to build: restrooms, playgrounds, pavilions, skills parks, and bike parks. Top-ranked amenities included quality trail design, more miles in trail systems, trails at a range of skill levels, and proper trail signage. Almost a third (31.1%) indicated interest in taking multi-day mountain biking vacations. While 73.9% of respondents were white males, participants included 2,458 women and 921 people representing racial and ethnic minorities. Friends and family play a key role in recruiting under-represented groups to mountain biking. Younger and female riders were less likely to try mountain biking on their own. Minorities were more involved in mountain biking groups than whites, particularly national ones (62.6% vs. 47.0%). Minority respondents were more likely to describe their skill level as beginner or intermediate, suggesting inclusivity is on the rise in mountain biking and more effort is needed to retain beginners and under-represented groups. These findings can help decisionmakers prioritize trail amenities that mountain bikers care most about: more miles and more variety in trail difficulty level, to promote skills development. Seasoned riders play an important role in recruiting friends and family to the sport (IMBA, 2023). Revised Abstract Mountain-biking is a growing sport, with 9.29 million American participants in 2023 (Statista, 2024). However, only half of American youth (ages 3-17) rode a bicycle in 2022 (PeopleForBikes, 2023, p. 11). Seasoned riders often recruit friends and family to the sport (IMBA, 2023) but several demographic groups remain under-

represented in mountain biking. Mountain biking is strongly perceived as male-dominated (Irvin, 2019). Previous research found 90% of mountain bikers were male (Buning, Cole and Lamont, 2019) and 96.5% of mountain bikers were white (Bowker & English, 2002). A 2018 survey of 13,623 mountain bikers in the United States, with 79 questions, was shaped by two of the authors and various stakeholders. The survey was distributed through the International Mountain Bicycling Association (IMBA) and partners, and reached respondents in all 50 states. While 73.9% of survey respondents were white males, participants included 2,458 women and 921 people representing racial and ethnic minorities, providing insights. Friends and family played a key role in recruiting under-represented groups; younger and female riders were less likely to try mountain biking on their own. Minorities were more involved in mountain biking groups than whites, particularly national ones (62.6% vs. 47.0%). Minorities were more likely to describe their skill level as beginner or intermediate, suggesting inclusivity is increasing. When asked “Please indicate the importance of the following features when determining where to ride,” respondents preferred quality trail design, more miles, trails at a range of skill levels, and proper signage. Least preferred amenities included: restrooms, playgrounds, pavilions, skills parks, and bike parks. The most common reasons for mountain biking were exercise (70.8%) and fun (68.8%). Multi-day mountain biking vacations interested 31.1% of survey respondents. Mountain biking tourism is reduced when fewer women and minorities participate in the sport: with "destinations… missing out on lucrative opportunities through a lack of understanding around how latent demand among female mountain bikers is not being converted into participation” (Buning, Cole and Lamont, 2019, p. 522). This study can help designers and decisionmakers prioritize trail amenities that mountain bikers care most about: quality, distance, skills development, and signage. Building trail systems that encourage beginners is key to recruiting new riders and increasing participation and inclusivity in mountain biking.

406 “I didn’t see you there”: Perception, Disability, and Urban Design

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Keywords: visual perception; environmental psychology; universal design; accessibility; film studies

In the award-winning documentary “I didn’t see you there,” filmmaker Reid Davenport (2022) gives viewers a glimpse into how he navigates his city and his life. Shot from his physical perspective with hand-held and wheelchair-mounted cameras, the film also serves as an excellent illustration of key theories from J.J. Gibson’s The Ecological Approach to Visual Perception (1979/2015). Together, this book and film provide us with insights into how we perceive our urban environments. The film illustrates three key theories of Gibson’s. First, scenes from the film demonstrate how our bodies are a fundamental part of our perception. Even though the filmmaker is not directly visible in the scenes, one senses his body through how he turns his head and how he moves through space. Second, Gibson’s theory of affordances comes to life through Davenport’s daily trips through downtown Oakland. The environment is not neutral; it affords Davenport some actions while not allowing others. And, third, the film contains aesthetically-captivating moments that remind us that perception is an active system “an achievement of the individual” (Gibson, 2015, p. 228). Gibson argues that perception involves skill and knowledge, and Davenport is highly-skilled at perception, as evidenced in how he captures moments of interest and beauty in the rhythm, colors, and patterns of daily life. What can urban designers take away from Gibson’s theories and Davenport’s film? First, they both call us to pay closer attention to how we are in the world. Designers skilled at paying attention can highlight these experiences in their work. Second, they remind us that accessibility is an interaction between an environment and humans; the same environments can afford different experiences depending on one’s abilities. And, finally, they point to a key dilemma within Universal Design, as summarized by Rob Imrie, “UD [Universal Design] cannot be universal unless it is embedded into the specificities of corporeality, and the differences that different bodies make in their everyday interactions with designed artefacts” (2012, p. 880). One way to address the universal design dilemma is to shift emphasis from what we design to how we design (Imrie & Kullman, 2016). Examples from the author’s urban design studio, the Socio-spatial Urbanism Unit at the University of Sheffield (Thwaites et al., 2023; Twaites et al., 2013; Mather, 2008), as well as others (Sarmiento-Pelayo, 2015; Roehr, 2022), illustrate ways people’s embodied experience can become starting points for design. Revised Abstract In the award-winning documentary “I didn’t see you there,” filmmaker Reid Davenport (2022) gives viewers a glimpse into how he navigates his city and his life. Shot from his physical perspective with hand-held and wheelchair-mounted cameras, the film also serves as an excellent illustration of key theories from J.J. Gibson’s The Ecological Approach to Visual Perception (1979/2015). Together, this book and film can provide urban designers with insights into how humans perceive their environments. The film illustrates three key theories of Gibson’s. First, scenes from the film demonstrate how our bodies are a fundamental part of our perception. Even though the filmmaker is not directly visible in the scenes, one senses his body through how he turns his head and how he moves through space. Second, Gibson’s theory of affordances comes to life through Davenport’s daily trips through downtown Oakland. The environment is not neutral; it affords Davenport some actions while not allowing others. And, third, the film contains aesthetically-captivating moments that remind us that perception is an

active system “an achievement of the individual” (Gibson, 2015, p. 228). Gibson argues that perception involves skill and knowledge, and Davenport is highly-skilled at perception, as evidenced in how he captures moments of interest and beauty in the rhythm, colors, and patterns of daily life. What can urban designers take away from Gibson’s theories and Davenport’s film? First, they both call us to pay closer attention to how humans experience the world. Designers skilled at paying attention can highlight these experiences in their work. Second, they remind designers that accessibility is an interaction between an environment and humans; the same environments can afford different experiences depending on one’s abilities. And, finally, they point to a key dilemma within Universal Design, as summarized by Rob Imrie, “UD [Universal Design] cannot be universal unless it is embedded into the specificities of corporeality, and the differences that different bodies make in their everyday interactions with designed artefacts” (2012, p. 880). One way to address the universal design dilemma is to shift emphasis from what we design to how we design (Imrie & Kullman, 2016). Examples from the author’s urban design studio, the Socio-spatial Urbanism Unit at the University of Sheffield (Thwaites et al., 2023; Twaites et al., 2013; Mather, 2008), as well as others (Sarmiento-Pelayo, 2015; Roehr, 2022), illustrate ways people’s embodied experience can become starting points for design.

425 Co-Design: Processes and Impacts toward Climate Justice in Practice

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Keywords: climate justice, community engagement, service learning, practice, community resilience

Investments in climate resilience such as nature-based solutions have occurred worldwide yet climate injustice could be perpetuated without accounting. Climate justice at the local scale considers the systemic vulnerability of a community in coping with climate change-associated hazards and applies the intersectionality of vulnerability, resilience, and sustainability to understand community resilience(Cheng 2022). However, landscape architecture education and practice have actively asked questions pertaining to justice goals in the design processes and outcomes and account for justice impacts. Drawing from justice theory, an integrated justice design framework is proposed to integrate four dimensions of justice—procedural, distributive, restorative, and generational—into five stages of design processes—project formation, design development, implementation, management, and evaluation plus learning. Co-Design serves as a method for meaningful collaboration that includes the people affected by climate injustice in research, plans, and actions to support sustainability and stewardship. The research question is how to operationalize the framework through designed education, action-based research, and service learning. The panel begins with theoretical frameworks and implications in practice, then presents a case study, and ends with discussions on tools for evaluations.

The case study co-designs data and art activism actions to support traditional floating communities in the urban Peruvian Amazon Rainforest who, despite existing for millennia yet lacking investment and inclusion in city planning, are under threat of government relocation and eradication as a result of the United Nations's initiative of a $200 billion floating community to combat climate impacts(UN-Habitat, 2022). The project includes a series of engagements to co-design solutions with local communities. This project demonstrates how distributive, procedural, and generational justice are incorporated into design and advocacy processes.

The community engagement toolkit offers a methodology for co-design processes based on principles rooted in environmental psychology (Kaplan and Basu, 2015). How justice design could be integrated into the evaluation and assessment of a project after the implementation phase (evaluation and learning)using this toolkit will be highlighted.

The proposed framework is crucial to achieving justice in sustainable development to ensure no further investment would perpetuate persistent systemic injustice through each project. The key contribution to the landscape architecture field from this panel is to bring awareness and provoke discussions to advance the field to achieve justice goals. Ultimately, the lessons learned will inform the next project through embedded justice dimensions and transform landscape architecture education and practices to address climate injustice in communities from local to global.

450 Montgomery's Peacock Tract: Unearthing a Spatial History through Interactive City Models

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Keywords: spatial justice; city models; LIDAR; mapping; historic narrative

This paper discusses a collaborative project between Auburn University's College of Architecture, Design, and Construction (CADC) and Mt. Zion A.M.E. Zion Church in Montgomery, Alabama. Focusing on a neighborhood in Montgomery, Alabama known as the "Peacock Tract", this project proposes the use of 3D-printed topographic city models as a medium for telling the story of the neighborhood's complex history. Before becoming Montgomery's first African American neighborhood, the Peacock Tract was initially a plantation reliant on enslaved labor. After emancipation, the area transitioned into a thriving African American community and would eventually become a significant site during the Civil Rights Movement, most notably as part of the Selma to Montgomery march (U.S. National Park Service, n.d.). Later, the neighborhood would be detrimentally segmented by the construction of the Interstate highway system, a result of urban planning decisions that historians recognize now as having racist motivations (Bullard et al., 2004; Karas, 2015; Retzlaff & Zanzot, 2023). The history of the neighborhood is intimately tied to its urban development, changes in neighborhood fabric, and geographical context. As such, an interactive 3D-printed topographic city model was developed to be used as a projection "screen", where the spatial history could be visualized as an interconnected timeline of events, resulting in today's disconnected city fabric of Montgomery. The model is intended to be displayed within Mt. Zion AME Zion Church after its historic chapel is converted into a museum. City models have been shown to enhance the engagement and understanding of geographies (Oswald et al., 2019). By employing the model as both a medium for educating and storytelling, the project aims to revitalize the history of the Peacock Tract in a manner that is accessible yet not oversimplifying the geographic complexity. This paper will discuss strategies for spatializing history through models, mappings, and animation. Physical disruptions, such as the construction of interstate, are illustrated to enhance awareness of the long-term consequences of urban planning decisions on marginalized communities. The cultural memory of the community is preserved through historical mappings projected over the existing context. This approach could also serve as a replicable model for other historic urban neighborhoods similarly affected by socio-political forces, offering a platform for these communities to engage with their historical heritage. Revised Abstract This paper discusses a collaboration between Auburn University's College of Architecture, Design, and Construction (CADC) and Mt. Zion A.M.E. Zion Church in Montgomery, Alabama. Focusing on a neighborhood in Montgomery, Alabama known as the "Peacock Tract", this project proposes the use of 3D-printed topographic city models as a medium for telling the story of the neighborhood's complex history. Before becoming Montgomery's first African American neighborhood, the Peacock Tract was initially a plantation reliant on enslaved labor. After emancipation, the area transitioned into a thriving African American community and would eventually become a significant site during the Civil Rights Movement, most notably as part of the Selma to Montgomery march (U.S. National Park Service, n.d.). Later, the neighborhood would be detrimentally segmented by the construction of the Interstate highway system, a result of urban planning decisions that historians recognize now as having racist motivations (Bullard et al.,

2004; Karas, 2015; Retzlaff & Zanzot, 2023). The history of the neighborhood is intimately tied to its urban development, changes in neighborhood fabric, and geographical context. As such, an interactive 3D-printed topographic city model was developed to be used as a projection "screen", where the spatial history could be visualized as an interconnected timeline of events, resulting in today's disconnected city fabric of Montgomery. The model is intended to be displayed within Mt. Zion AME Zion Church after its historic chapel is converted into a museum. City models have been shown to enhance the engagement and understanding of geographies (Oswald et al., 2019). Advancements in the technology and process of rapid prototyping (such as 3D printing) have made the fabrication and updating of large scale city models a viable endeavor (Jefferson, 2011). To set up the model for 3D printing, the research team utilized LIDAR elevation data, georeferenced point-cloud datasets of the earth's surface captured via aircraft-mounted laser scanners and GPS (U.S. Geological Survey, n.d.). This paper will discuss strategies for spatializing history through models, mappings, and animation. Physical disruptions, such as the construction of interstate, are illustrated to enhance awareness of the long-term consequences of urban planning decisions on marginalized communities. The cultural memory of the community is preserved through historical mappings projected over the existing context. This approach could also serve as a replicable model for other historic urban neighborhoods similarly affected by socio-political forces, offering a platform for these communities to engage with their historical heritage.

559 Auto-Ethnography as a Reflective Approach to Landscape Architecture Co-Design in the Village of Khotale, India

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Keywords: Co-design; Indigenous stewardship; Eco-feminism; Auto-ethnography

Strategically located along the Konkan coastal region of Maharashtra in India, are biologically and culturally diverse sites of petroglyphs, roughly 10,000 years old from the Neolithic Period (Dalvi, 1990). The sites are situated in distinct laterite plateaus called 'Sada' which hold a unique rock outcrop habitat. Khotale is one such remote village in Sindhudurg that stands as a model for the complexity that capitalism, colonialism and climate change conflicts have brought about. It is inhabited by ephemeral wetlands (Watve, 2008) and goat herders (Dhangars), who are the guardians of the ecosystem. One of the major findings from my fieldwork in 2022 is that since land use here is historically classified as a 'wasteland', the residents of the plateau face a very real threat of eviction and destruction of livelihood and important ancestral knowledge because of laterite mining. By placing a decolonial lense on the land-use policy in Khotale, I begin questioning the role and relevance of landscape architecture in this village. What does it mean to prepare oneself for the act of designing on a site? How does the designer, who very often finds themselves amongst the contradictions of conflict and competing interests, find a stance for a landscape design philosophy? Rangoli, a cultural practice of the Dhangar women serves as an art medium to explore these inquiries. The kolam/rangoli, an everyday practice of many Indian women [such as myself], is an ephemeral way of drawing and is an offering to Bhudevi or Mother Earth (Nagarajan, 2019). This everyday culture and the material reality of it is a part of autonomy. It is in these spaces where political formation is central because the political becomes inseparable from acts of [land-based] living (Mora, 2017). Women gatherings to draw rangoli, to do social work, to practice farming, to practice herding, to cook, to perform care work, to run household and to run economies are all sites of political formation because it is where important discussions of the everyday and more converse and converge. In this context, rangoli is oriented to support indigenous stewardship (Ross et al., 2016) for Anganwadi, a feminist organization in Khotale. A landscape architecture co-design philosophy thus emerges bringing together participatory action research, interdisciplinary methods of landscape architecture enquiry, the role of art and meaning-making in archaeology and positionality as feminist auto-ethnography (Denshire, 2013) in decolonial methods. Revised Abstract Strategically located along the Konkan coastal region of Maharashtra in India, are biologically and culturally diverse sites of petroglyphs, roughly 10,000 years old from the Neolithic Period (Dalvi, 1990). The sites are situated in distinct laterite plateaus called 'Sada' which hold a unique rock outcrop habitat. Khotale is one such remote village in Sindhudurg district that stands as a model for the complexity that capitalism, colonialism, and climate change conflicts have brought about. It is inhabited by ephemeral wetlands (Watve, 2008) and goat herders (Dhangars), who are the guardians of the ecosystem. One of the major findings from my fieldwork in 2022 is that since land use here is historically classified as a 'wasteland', the residents of the plateau face a very real threat of eviction and destruction of livelihood and important ancestral knowledge because of laterite mining. By placing a decolonial lense on the land-use policy in Khotale, I begin questioning the role and relevance of landscape architecture in this village. What does it mean to prepare oneself for the act of designing on a site? How does the designer, who very

often finds themselves amongst the contradictions of conflict and competing interests, find a stance for a landscape design philosophy? Rangoli, a cultural practice of the Dhangar women, serves as an art medium to explore these inquiries. The kolam/rangoli, an everyday practice of many Indian women [including myself], is an ephemeral way of drawing and an offering to Bhudevi or Mother Earth (Nagarajan, 2019). This everyday culture and the material reality of it are both parts of autonomy. It is in these spaces that political formation is central because the politicalbecomes inseparable from the acts of [land-based] living (Mora, 2017). Women gatherings to draw rangoli, to do social work, to practice farming, to practice herding, to cook, to perform care work, to run a household and to run economies are all sites of political formation because it is where important discussions of the everyday and more converge. In this context, rangoli is oriented to support indigenous stewardship (Ross et al., 2016) for Anganwadi, a feminist organization in Khotale. A landscape architecture co-design philosophy thus emerges bringing together participatory action research, interdisciplinary methods of landscape architecture inquiry, the role of art and meaning-making in archaeology, and positionality as feminist auto-ethnography (Denshire, 2013) in decolonial methods.

611 Flood Control in Jackson, Mississippi: A Missed Opportunity to Reduce Inequitable Flooding Impacts?

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Keywords: Flood risk management; Equity; US Army Corps of Engineers; Jackson, Mississippi; Pearl River

The city of Jackson, on the banks of the Pearl River in central Mississippi, has experienced frequent, devastating floods, notably in 1979 (Platt 1981), and more recently in 1983 and 2020. The most severe and frequent flooding occurs along tributaries of the Pearl that cross the city, disproportionately affecting low-income neighborhoods. In a collaboration between Jackson State University and UC Berkeley (Kondolf et al 2023), we reviewed the history of flood management and public access along the Pearl River, conducted community meetings with flood-affected residents, visited tributaries affected by frequent flooding, assessed options to reduce flood risk on Town Creek (a tributary traversing the city center), and reviewed the Draft Environmental Impact Statement (DEIS) released by the US Army Corps in summer 2024 for a flood risk management project. The DEIS describes a proposal to enlarge the river channel adjacent to the city by excavating up to 20 million cubic yards of material from the floodplains. The designated "National Economic Development" (NED) alternative (the so-called "One-Lake" plan) would include a 12-ft high dam to create a 1,700-acre lake for recreation and residential development. As described in the DEIS, this alternative would also require rebuilding or reinforcing seven bridges, potential erosion or inundation of hazardous waste sites, destruction of 1,374 acres of wetlands and degradation of habitats for three threatened or endangered species. The DEIS underestimates costs, or simply postpones engineering and economic analyses of issues with major economic and environmental relevance, such as hazardous and toxic waste sites, habitat mitigation requirements, erosion and sedimentation, potable water supply and some water quality issues. Most important, the One-Lake plan would not reduce - and might exacerbate - flooding along tributaries. Instead, the DEIS refers vaguely to efforts underway on tributaries by other agencies, but these are minor, uncoordinated, and will not solve the tributary flooding problem. The DEIS also ignores potential benefits to local communities from enhancements and improved public access to tributary channels. Thanks to a congressional appropriation for a flood risk management project in Jackson, there is a unique opportunity now to address flooding and its inequitable burden on poor neighborhoods in Jackson. It is disappointing that the DEIS fails to address these long-standing flooding impacts and inequities. This case study illustrates the limitations faced by planners (time, budget, geographic scope, and political pressure), and highlights fundamental problems in the planning and design processes required for federal water resources projects. Revised Abstract The city of Jackson, on the Pearl River in central Mississippi, has experienced frequent, devastating floods, notably in 1979 (Platt 1981), and more recently in 1983 and 2020. The most widespread flooding occurs along tributaries of the Pearl that cross the city, disproportionately affecting low-income neighborhoods. In a collaboration between Jackson State University and UC

Berkeley (Kondolf et al 2023), we reviewed the history of flood management and public access along the Pearl River, conducted community meetings with flood-affected residents, visited tributaries affected by frequent flooding, assessed options to reduce flood risk on Town Creek (a tributary traversing the city center), and reviewed the Draft Environmental Impact Statement (DEIS) released by the US Army Corps (USACE) in 2024 for a proposed flood risk management project. Our community meetings, site visits, and interviews with residents highlighted frequent flooding of low-income neighborhoods along Pearl River tributaries. Thus, a key criterion for any flood risk reduction project should be how well the plan addresses tributary flooding. In our review of the DEIS, we applied criteria from the National Environmental Protection Act that environmental impact statements should provide a complete identification and description of environmental impact. The DEIS describes a proposal to excavate 20 million cubic yards from the floodplains and build a 12-ft high dam downstream of the city center to create a 1,700-acre lake for lakefront real-estate development (the "One-Lake plan). The DEIS underestimates costs and postpones engineering and economic analyses of major economic and environmental issues such as toxic waste sites, habitat mitigation requirements, and water quality issues. Most important, the One-Lake plan would not reduce - and in some cases would exacerbate - flooding along tributaries. Instead, the DEIS refers vaguely to efforts underway on tributaries by other agencies, but these are minor, uncoordinated, and will not solve the tributary flooding problem. The DEIS also ignores potential benefits to local communities from enhancements to tributary channels. Thus, the DEIS does not meet the standard of providing a complete identification of environmental impacts. Thanks to a congressional appropriation, there is a unique opportunity now to address flooding and its burden on poor neighborhoods in Jackson. It is disappointing that the DEIS fails to address these long-standing flooding impacts and inequities. This case study illustrates the limitations faced by USACE planners (time, budget, geographic scope, and political pressure), and highlights fundamental problems in the planning process required for federal water resources projects.

618 Nurturing a Latino/a/x Focus in Landscape Architecture Design Studios: Three Case Studies in Urban Design Contexts

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Keywords: Latino/a/x design studies; Landscape Architecture diversity; Latino/a/x Pedagogy; Ethnic diversity; Latino studies

1.0 Description of the topic Lee Bebout, an American Studies professor, suggests Latinos must "forge self-definition and dismantle the legacies of colonization and other forms of subjugation..." (Lee Bebout, 2011, p. 35) The panel will present three Latino/a/x based studios as discourse of higher education landscape architecture programs. The Latino instructors undertook three separate Latino/a/x based studios in Puerto Rico, Washington, DC., and Los Angeles. They will offer their reflections for "Latinizing" the pedagogy of design studios. 2.0 The rationale for undertaking the studio and projects Latino communities want to be consciously identified and shape their environments in the production of urban space. Latino urban spaces are created by their culture with respect "to time, family, and space," (Herzog, 1999), "a place emerges when space is provided with a particular name," (Nuñez, et. al.), exists as a place for "social events like "fiestas and bailes" (Gutiérrez Nájera, 2010), or is "not alien but different from the overarching hegemony of white America," (Gaspar de Alba, 2003). The traditional education models use conventional Western/European models. (H.A. Giroux, 1997). These instructors selected sites with Latino populations or Latino history in framing a complex cultural study involving multi-disciplinary exploration and discussion. The studio in Puerto Rico, entitled PR 1493-2093: La Cuenca del rio Piedras, structured historical analysis with readings and studio discussions on imperialism, capitalism, colonialism and democracy. The discussions were represented graphically through diagrams and collages and shared with local professionals. The studio in Washington DC, entitled Latino Museum and Barrio, centered on designing a museum site and its relationship to a Latino barrio. The student work was shaped by museum and barrio precedent, theory and observation of Latino spaces. The studio in Los Angeles, entitled the Great Wall of Los Angeles Park, focused on creating amenities around a Latino landmark mural to encourage more visibility and recognition for the mural. 3.0 Presentation structure The presenters will present images of processes and methods applied in teaching the studio and share outcomes for their respective projects. The audience is encouraged to activate the session with questions. 4.0 The names of Latino/a/x speakers involved Richard Alomar, FASLA, RLA. Rutgers University. Chair, Dept. of Landscape Architecture. Associate Professor Landscape Architecture + Environmental and Urban Design. Steven E. Chavez. ASLA, PLA. UCLA Extension. Department of Landscape Architecture. Fernando Magallanes, ASLA, RLA. NC State University. Associate Professor Emeritus in Landscape Architecture.

Film + New Media

363 Tree Multiplicities & Human-Beyond-Human Landscapes

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Keywords: Multispecies; Urban ecology; Film as method; public parks; colonization; Canada; urban change; historical analysis

Human relationships and stories are intertwined with beyond-human worlds. Throughout history, fig trees have played a prominent role in human societies. In South Asia, a great deal of reverence has been given to two specific species of fig, the Bhorr or Banyan (Ficus benghalensis, L.) and the Peepal (Ficus religiosa, L.), since the time of the Indus Valley civilization (3300 BCE to 1300 BCE). Tree Multiplicities is a visual investigation of urban ecologies. Using film as my method, I explore the socio-ecological assemblages of Bhorr and Peepal trees in three locations across Lahore, Pakistan. Once known as the 'city of gardens' now one of the most polluted megacities on Earth. By focusing on the act of noticing, drawing attention to the small and the large, the sights and sounds, the film visualizes how enmeshed human relationships and stories are with the beyond-human realm through an intricate web of interaction in urban landscapes. From the weather and elements to plants and animals, all are agents in worldmaking. Tsing (2017) relates notions of sympoiesis, as discussed by Haraway (2016), to landscapes. Human-disturbed and undisturbed landscapes manifest very differently, but that is not to say one is better than the other. They simply give rise to different species. This is similar to ideas explored by Del Tredici (2014) and Gandy (2016), both of whom explore conceptions of urban industrial landscapes and how these perceptions of urban nature are rooted in socio-cultural values of modernity, inextricable from the cyclical nature of capitalist development and ruin. Each discuss the regenerative capacity of nature after its destruction, however different it is from the original. A rebirth, rather than a restoration. However, Kimmerer (2023) notes, “It is not the land that is broken, but our relationship with it. Thus, the work of ecological restoration must be to restore the human-land relationship.” (Kimmerer, 2011, p. 272). If we pause to contemplate approaches to conservation, restoration, and care—how might these differ given one’s onto-epistemology, culture, relationships, and memories of a landscape? Note on Setup: The installation will require 3 screens to play the 3 chapters concurrently. The individual screens will each play one chapter (runtime ~2-3 minutes to loop concurrently). Along with the screens, a space to hang a short narrative will be needed. A first draft can be viewed at (Password: CELA2025submission!) Additional filming and editing will be conducted between December 2024 - February 2025. Revised Abstract This presentation draws attention to multispecies interactions in landscapes often overlooked in practice, as they require an engaged presence over time. Using the medium of film, I investigate how a more holistic understanding of landscape can occur during site analysis and design that gives visibility to multispecies world-making. The short film Tree Multiplicities is a visual investigation of human relationships intertwined with beyond-human worlds, guided by the question: How might we account for biocultural and beyond-human interactions and the broader implications of the removal/alterations of existing landscapes when conceiving new landscapes? Utilizing film as my method, I explore the socio-ecological assemblages of two strangler fig tree species, the Bhorr or Banyan (Ficus benghalensis, L.) and the Peepal (Ficus religiosa, L.) in Lahore, Pakistan. Strangler figs are epiphytic keystone species that grow on, around, and through other trees or manmade objects, encircling hosts with their roots growing downwards to form new trunks. Depending on the species, they may grow over an acre with hundreds of trunks. Stranglers have

a deep history in Asia, entwined with religion, medicine, ritual, biodiversity, and landscape aesthetics dating back millennia. In emphasizing these human/beyond-human intersections, the film draws attention to multi-scalar ecological processes, visualizing an intricate web of interaction in urban landscapes. This filmic investigation draws from scholars working at the nexus of political ecology and landscape design, where perceptions of urban nature are rooted in socio-cultural values of modernity that are inextricable from the cyclical nature of capitalist development, destruction, and regeneration (Del Tredici, 2014; Gandy, 2016). It also takes seriously our relationship with land and notions of sympoiesis 'making with', as discussed by Haraway (2016) and Tsing (2017). An outcome of this mode of investigation is the centering of "noticing" (Tsing, 2017) paired with "slowing down" (Shahjahan, 2015) to build "attentiveness" (Van Dooren et al., 2016)—all essential to observe beyond-human interactions and contemplate approaches to landscape conservation, restoration, and care. Some of the strangler figs in the film had been cut back significantly to make way for hardscapes. What saved these centuries-old trees from being erased from the landscape was their biocultural significance as sites of shrines. Providing shade to graves, engaging in ritual, and having stories of their own to tell. By asking us to pause to observe the beyond-human interactions, the film gives insight into the role of onto-epistemology, culture, relationships, and memories in the shaping of these spaces. This paper examines the City of Vancouver's historical acquisition of parks and their evolution to challenge the idea that the government establishes parks for environmental and recreational benefits. Instead, the research reveals that parks often have their genesis in a shifting political milieu that has continually prioritized a colonial notion of growth. In 1886, the Canadian federal government granted the Vancouver Park Board 1000 acres of unceded Indigenous land along the First Narrows–the site of a military reserve and strategic shipping channel adjacent to the city's emerging downtown–to establish Stanley Park, the city's first and largest public park. Thus, from this beginning, any claims of the park land's environmental or cultural value was subservient to the militarized protection of an economic imperative. As with Stanley Park, despite their popular image as ecological oases or equitable open spaces, the locations of public parks in Vancouver have often emerged from the purposeful displacement of Indigenous communities, the continuity of infrastructural logic, and the divesting of land unfavourable to building or development. While the Vancouver Park Board's mission is to "provide, preserve, and advocate for parks and recreation services to benefit all people, communities, and the environment," historical analysis of Vancouver's parks reveals that these landscapes share a greater affinity to perpetuating colonial urbanistic, economic, and military practices. Through archival and cartographic analysis, this research considers trends within park creation, their alignment with significant historical events, and their evolution in relation to economic and political change to reveal why the City of Vancouver established its parks where it did. The paper documents and illustrates the neighbourhood context, size, and establishment of over 200 parks the City of Vancouver oversees. Drawing on timelines and temporal mappings, the research then traces the political and economic transformations that resulted in the establishment and development of 160 of those parks since the late 19th century. In illustrating how parks came to be where they did, the research highlights how various periods of colonial urban change, rather than environmental drivers, catalyzed park creation in Vancouver. Our findings suggest that despite the City's recent initiatives to address inequity in public parks, these landscapes have consistently overlooked and displaced marginalized communities, promoted a narrow view of ecological sustainability, and been influenced by periods of economic reform, resource extraction, and clearing of undesired land.

613 Land/Motion: A Regrounding of Practice

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Keywords: Processual Landscape; New Media; Landscapes in Motion; Modern Dance; Immersive Installation

Landscapes are dynamic systems despite our best efforts to solidify them as static objects, constantly in motion modulating amidst uncertainty. Landscape movement is easily perceptible as cultural and economic shifts influence how the land is shaped and who is allowed to inhabit it. Concurrently, the effects of climate inaction and extractive practices present themselves at temporal and spatial scales oftentimes imperceptible to the naked eye or more commonly deliberately obfuscated. (Nesbit & Waldheim, 2022) As a result, climate apathy and ecological blindness is systemic resulting in a population untethered from the ground beneath their feet. Data driven climate and environmental research has brought awareness but has yet to yield widescale transformative action. Therefore, a method of choreographing landscape empathy can be an equally powerful partner when collaborating with analytical approaches and disciplines. Through the study of modern dance, sympathetic kinesthesia that challenges the audience performer relationship (Hoffmann, 2020), a range of notational precedents from multiple media sources, the work of Ann and Lawrence Halprin in landscape scoring, novel motion capture workflows, and immersive representational strategies, a system of choreographing landscape empathy will be developed setting in motion impassioned relationships with landscapes in motion. In the spirit of Ann and Lawrence Halprin's 1969 book The RSVP Cycles: Creative Processes in the Human Environment, (Halprin, 1969) the project will collaborate with members of Momentum Modern Dance in Knoxville, TN to create a dialogue between rigorous site-based research, landscape scoring, technology, performance, and immersive representation. As Melanie Kloetzel writes in their 2014 paper, Bodies in Place: Location as Collaborator in Dance Film, 'When we watch dance…our bodies sense what it means to relate to a site; we can feel the roughness of the rock, the give of the sand under our feet, or the buoyancy of water supporting our physicality. As such, the surroundings become 'not merely settings' ,..but partners in dialogue with a responsive, phenomenal body.' (Kloetzel, 2014) Through this dialogue the project aims to create intimate experiences with oftentimes overlooked and underserved spaces subjected to climactic, social, and environmental impact. Can there be complexities of landscape that can only be communicated through live performance and immersive experiences? Is our current approach to static drawings ill-equipped to represent the complexities of landscapes in perpetual motion? The project looks to explore these questions further and remains open to what results may materialize. Film/VR examples from previous project: Password: Delmoro_CELA Revised Abstract Landscapes are dynamic systems despite our efforts to solidify them as static objects, constantly in motion modulating amidst uncertainty. Landscape movement is easily perceptible as cultural and economic shifts influence how the land is shaped and who is allowed to inhabit it. Concurrently, the effects of climate inaction and extractive practices present themselves at temporal and spatial scales oftentimes imperceptible to the naked eye or more commonly deliberately obfuscated. (Nesbit & Waldheim, 2022) As a result, climate apathy and ecological blindness is systemic resulting in a population and discipline untethered from the ground beneath their feet. While landscape architecture's current practice of quantitative analysis through digital

workflows has brought a level of scientific rigor to the discipline never seen before, other more experiential, qualitative, and emotional readings of landscape have unfortunately been lost due to remote analysis and unilateral use of toolsets. LAND/MOTION seeks to reground landscape design, the designer themself, and ultimately the intervention within dynamic landscapes and systems. Building upon the idea of the processual landscape (Menatti and Rocha, 2016) in which the body is no longer an observer but immersed in the processes and affordances of living systems, a methodology for scoring and designing landscape will be developed that is based in both scientific rigor and grounded by a body in motion through space. As a result, the embedded body will be the catalyst for thoughtful and meaningful design intervention that can be an equally powerful partner when collaborating with analytical approaches and disciplines. In the spirit of Ann and Lawrence Halprin's book The RSVP Cycles: Creative Processes in the Human Environment, (Halprin, 1969) the project is collaborating with Momentum Dance Lab in Knoxville, TN. Melanie Kloetzel writes, 'When we watch dance…our bodies sense what it means to relate to a site…As such, the surroundings become 'not merely settings',…but partners in dialogue with a responsive, phenomenal body.' (Kloetzel, 2014) Through this partnership, the project will utilize novel representation including film, sympathetic kinesthesia (Hoffmann, 2020), augmented reality, motion capture techniques, hybridized digital and physical modeling, live performance, and tactile sensory experiences to create immersive representation that is adaptive and responsive. The project aims to choreograph landscape empathy in participants and ground design methodology by embedding a moving body within landscapes in motion. As a result, a reconnection to the physicality of place can occur catalyzing a more present population and practice. Example: Password: Delmoro_CELA

Geo-Spatial and Digital Analytics

14 How to optimize urban ecological networks from a multi-scale nesting perspective? A Circuit theory-based method

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Keywords: Multi-scale nesting; Circuit theory; ecological sources; landscape fragmentation

Rapid urbanization has led to the fragmentation of landscape patterns, thereby threatening the functional integrity of regional ecosystem services[1]. Ecological networks(ENs) can restore landscape connectivity to guarantee the ecosystem process[2][3][4]. The characteristics of landscape phenomena, the mechanisms of ecological processes, and the overall structure of the pattern usually change with the scale[5]. Multi-scale nested methods are an effective approach for constructing ecological networks (ENs) because they account for the impact of scale differences on efficacy. The traditional single-scale approach may neglect these differences and fail to identify and integrate smaller ecological sources, which are pivotal for sustaining ecological connectivity in fragmented landscapes. Our study aims to explore the approach of identifying and characterizing ecological sources and modeling urban ENs from a multi-scale nested perspective, using Xiangyang City in Hubei Province as a case study. We used the multivariate models to identify the ecological sources[6], construct the ENs[7][8], and nest the regional scale, urban scale, and district scale. The following four questions will be mainly investigated: ① How to construct, optimize, and nest multi-scale ENs?② How to evaluate the efficacy of the optimized ENs? ③ the implication for strategy-making of ecological restoration and regional planning. The results show that a multi-scale nested approach was applied to optimize urban ENs in Xiangyang City, leading to the identification of 63 ecological sources and the establishment of 204 ecological corridors, totaling 2051.85 km. This approach outperforms the traditional single-scale method, which identified 35 ecological sources, 73 ecological corridors, and a total length of 1163.89 km, showcasing a substantial improvement in ecological connectivity. Utilizing the Ecological Network Analysis comprehensive index, the multi-scale nested method significantly increased the number and area of ecological sources, greatly enhancing network connectivity and creating more closed-loop paths to strengthen interconnectivity between sources, thus optimizing urban ENs in Xiangyang City. Constructing the ENs from a multi-scale nesting perspective can not only identify large, high-quality ecological sources but also preserve important small ecological sources effectively. Meanwhile, it can effectively enhance regional ecological connectivity and habitat integrity. Our research will provide scientific references for other similar areas. Revised Abstract Rapid urbanization has led to the fragmentation of landscape patterns, thereby threatening the functional integrity of regional ecosystem services[1]. Ecological networks(ENs) can restore landscape connectivity to guarantee the ecosystem process[2][3][4]. Recognition of the characteristics of landscape phenomena, the mechanisms of ecological processes, and the overall structure of the pattern usually changes with the scale.[5]. Multi-scale nested methods are an effective approach for constructing ENs because they consider the impact of scale differences on efficacy. The traditional single-scale approach may neglect these differences and fail to identify and integrate smaller ecological sources, which are pivotal for sustaining ecological connectivity in fragmented landscapes. Our study aims to explore

the approach of identifying and characterizing ecological sources and modeling urban ENs from a multi-scale nested perspective, using Xiangyang City in Hubei Province as a case study. Based on multi-source data and multi-dimensional technology models, including ecological sensitivity, ecosystem services[6], the MSPA model, Conefor landscape connectivity assessment, the MaxEnt model, and Linkage Mapper, this study optimized the ENs[7][8] with data precision at “30 m - 5 m - 1 m” for “municipal area - central urban area - district”. It conducted multi-scale nesting analysis and network efficacy evaluation using overlay analysis . The following three questions will be mainly investigated: ① How to construct, optimize, and nest multi-scale ENs?② How to evaluate the efficacy of the optimized ENs? ③What are the implications of ENs mapping for strategy-making of ecological restoration and regional planning?. The results show that a multi-scale nested approach was applied to optimize urban ENs in Xiangyang City, leading to the identification of 63 ecological sources and the establishment of 204 ecological corridors, totaling 2051.85 km. This approach outperforms the traditional single-scale method, which identified 35 ecological sources, 73 ecological corridors, and a total length of 1163.89 km, showcasing a substantial improvement in recognizing ecological connectivity. Utilizing the Ecological Network Analysis comprehensive index, the multi-scale nested method significantly increased the number and area of identified ecological sources, greatly enhancing network connectivity and creating more closed-loop paths to strengthen interconnectivity between sources, thus optimizing urban ENs in Xiangyang City. Constructing ENs with a multi-scale nested approach not only identifies high-quality large ecological sources but also effectively preserves smaller, crucial ones.Meanwhile, it can effectively enhance regional ecological connectivity and habitat integrity. Our research will provide scientific references for other similar areas.

84 Usability of Low-cost Smart Sensors for Monitoring Visitor Volumes and Movements in Urban Parks

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Keywords: Urban Green Space; Visitor Monitoring; Sensor Technology; Bluetooth Low Energy; Raspberry Pi

Urban green spaces such as parks and trails provide numerous benefits, including enhanced physical activity, social engagement, and psychological well-being. Effective monitoring of these spaces is crucial for understanding and optimizing their usage. Traditional methods like direct observation carried cameras, and GPS devices have been employed for this purpose, but they present challenges in scalability, cost, and real-time data accuracy. This study explores the usability of Raspberry Pi devices equipped with Bluetooth Low Energy (BLE) technology for tracking visitor volumes and movements in urban parks. We designed a sensor prototype that captures the MAC address, timestamp, and RSSI of visitors' smartphones, enabling a cost-effective and flexible approach to data collection. The research involved deploying Raspberry Pi devices in two study sites: Trail 6 in Pacific Spirit Regional Park and Jericho Beach in Vancouver, Canada. These sites were chosen to represent diverse urban natural environments. A reliability test using Intraclass Correlation Coefficients (ICCs) assessed the consistency of measurements across different devices and conditions. A validity test compared the sensor data against manual observations to determine the accuracy of the Raspberry Pi devices. Multiple Linear Regression (MLR) was used to analyze the impact of visitor age, activities, and environmental factors on the devices' accuracy. Results indicated that Raspberry Pi devices are reliable and valid tools for monitoring visitor volumes and movements, with ICC values ranging from moderate to excellent under varying conditions. The devices demonstrated higher accuracy in monitoring slower-moving and stationary visitors compared to fast-moving activities like cycling or running. The MLR analysis revealed that children and fast-moving visitors contributed more to counting errors. This study shows the potential of low-cost sensor networks for real-time monitoring of urban green spaces, providing valuable data for urban planners and park managers. Future research should explore the applicability of these methods in different settings and with larger sample sizes to validate the technology further. Revised Abstract Urban green spaces such as parks and trails provide numerous benefits, including enhanced physical activity, social engagement, and psychological well-being. Effective monitoring of these spaces is crucial for understanding and optimizing their usage. Traditional methods like direct observation carried cameras, and GPS devices have been employed for this purpose, but they present challenges in scalability, cost, and real-time data accuracy. This study explores the usability of Raspberry Pi (a low-cost mini computer) equipped with Bluetooth Low Energy (BLE) technology for tracking visitor volumes and movements by collecting smartphone information in urban parks. We designed a sensor prototype that captures the Media Access Control (MAC) address, timestamp, and Received Signal Strength Indicator (RSSI) of visitors' smartphones, enabling a cost-effective and flexible approach to data collection. The research involved deploying Raspberry Pi devices in two study sites: Trail 6 in Pacific Spirit Regional Park and Jericho Beach in Vancouver, Canada. These sites were chosen to represent diverse urban natural environments. A reliability test using

Intraclass Correlation Coefficients (ICCs) assessed the consistency of measurements across different devices and conditions. A validity test compared the sensor data against manual observations to determine the accuracy of the Raspberry Pi devices. Linear regression was used to analyze the impact of visitor age, activities, and environmental factors (collected by the on-the-ground observation) on the devices' accuracy. Results indicated that Raspberry Pi devices are reliable and valid tools for monitoring visitor volumes and movements, with ICC values ranging from moderate to excellent under varying conditions. The devices demonstrated higher accuracy in monitoring slower-moving and stationary visitors than fast-moving activities like cycling or running. The regression analysis revealed that children and fast-moving visitors contributed more to counting errors. This study shows the potential of low-cost sensor networks for real-time monitoring of urban green spaces, providing valuable data for urban planners and park managers. The tool can assist park managers in understanding visitor patterns, optimizing resource allocation, and enhancing visitor experiences through targeted interventions such as visitor volume control and amenities improvement. It can also inform strategic decisions on park design and expansion to accommodate diverse user groups. Future research should also explore the applicability of these methods in different settings and with larger sample sizes to validate the technology further.

107 Hybridizing Indigenous Study and Digital Spatial Analysis as Tools for Socio-environmental Negotiation

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Keywords: Ground truthing; Remote sensing; Interdisciplinary; Digital spatial technology; Geographic information system

In this data-drenched era, various spatial technologies, such as remote sensing, are widely used for design and policy decisions in a "business as usual" manner (Kelly & Lu, 2021). It is a double-edged sword: while it allows us to see the globe in high resolution, it also forces us to step back to a zoomed-out overview. It may be a time for us to pause and reflect on our definition of truth and how these algorithms should be manipulated to translate reality through representation (Kurgan, 2013). This paper aims to raise conversations, through two design research projects, about how geospatial and remote sensing data can be used ethically in speculating sites. The first project, "Ground Truthing Compensation: A Livelihood-Based Landscape Impact Assessment for Namtha Basin," demonstrates an ethical workflow in using remote sensing images for land assessment. Laos, a landlocked country, leverages its natural resources, such as hydropower, as a major revenue source and poverty reduction strategy. To mitigate social impacts and ensure that affected communities are fairly compensated, social impact assessments (SIA) are required. However, current SIA methods are highly reductive and generic, often lacking consideration of the cultural practices and the intimate relations to place of the displaced communities (Kirsch, 2006). This project proposes a new framework for SIA, integrating both on-ground Indigenous studies and remote data analysis through satellite images over time for a more comprehensive and ethical valuation process. The second project "Coastal Assemblages: Anchoring Material and Memories in the City of Crisfield" highlights a design solution method guided by speculative digital elevation models (DEM) and the synthesis of the community's historical and cultural background. The project advocates for a transformative approach, turning the vulnerable city into a flood-adaptive landscape while leveraging its cultural heritage to mitigate environmental risks. Emphasizing the importance of both temporal processes (past, present, future) and the specific socio-cultural background of the community, both projects demonstrate how ground-truthing techniques and remote sensing data can be synthesized to lead to more suitable and ethical design solutions. The entanglement of scientific analysis through tracing spatial changes over time with remote sensing data, combined with on-the-ground human discoveries, offers strong and effective evidence for negotiating a resilient and equitable future. Revised Abstract
In an era dominated by geospatial technologies, tools like remote sensing and digital elevation models are often used in design and policymaking without adequate attention to their limitations or socio-cultural implications (Kelly & Lu, 2021). While such tools enable precise mapping and predictive modeling, they risk oversimplifying complex human-environment relationships. This paper proposes a hybridized approach integrating Indigenous studies and digital spatial analysis to reconcile technological precision with cultural nuance, fostering equitable and ethical design strategies, through two design projects. The first project, "Ground Truthing Compensation: A Livelihood-Based Landscape Impact Assessment for Namtha Basin," critiques reductive social impact assessments used in hydropower development in Laos. By combining longitudinal satellite image analysis with ground-based ethnographic methods, the project redefines livelihood valuation using five considerations: time capital, scale of extent,

land quality, cultural capital, and social capital. The framework integrates community narratives with digital data to produce more ethical assessments, empowering displaced communities to negotiate their futures. For instance, the project incorporates Indigenous agricultural practices, such as shifting cultivation cycles, to analyze livelihood patterns across spatial and temporal scales. Then, remote geospatial analysis would be built upon these cultural calendars on a larger scale. By grounding digital analyses in cultural knowledge, the framework offers a comprehensive approach to valuing community assets and mitigating development impacts. The second project, “Coastal Assemblages: Anchoring Material and Memories in the City of Crisfield”, addresses climate adaptation for a coastal city under threat of sea-level rise. The project envisions a future where Crisfield transitions into a resilient archipelago by synthesizing speculative DEM models with ground-truthed cultural and historical data. Acknowledging their history of building ground with oyster shells, the proposal reclaims inundated materials analyzed digitally and integrates them into new flood-adaptive infrastructures while preserving cultural heritage. Through three key phases – disassembly, reassembly, and grounding, the project underscores how tangible and intangible cultural values can inform adaptive design, turning vulnerability into an opportunity for regeneration. These projects illustrate the potential of hybrid methodologies synthesizing geospatial data with community-specific knowledge systems. The framework advances theoretical and practical approaches to socio-environmental negotiation, demonstrating how scientific analysis, cultural heritage, and participatory design can converge to foster resilient futures. By embedding temporal and spatial processes into site design, this research offers tools for addressing global challenges with ethical and place-sensitive solutions.

138 From Streets to Skylines: Multi-Scale Simulation and Analysis of Urban Heat for Livable and Climate-Resilient Cities

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Keywords: Urban Heat Island; Thermal Comfort; Geographically Weighted Regression; Machine Learning; Simulation

By mid-century, global temperatures could increase by approximately 2°C to 3°C under a high-emissions scenario (SSP5-8.5) (Lee et al. (2021). Rising temperatures characterize global climate change and significantly threaten ecological and social sustainability (He et al., 2024). This presentation illustrates a series of multi-scale simulations that integrate practice-based design projects with academic research to capture the complex dynamics of urban heat, aiming to develop a holistic understanding of urban thermal environments and inform effective heat mitigation strategies accordingly. Starting at the site scale, simulation tools like Ladybug (Roudsari, Pak, & Smith, 2013) are employed to simulate solar radiation and outdoor thermal comfort for specific urban spaces. These detailed micro-scale analyses provide crucial insights into how design interventions—such as shading, vegetation placement, and material choices—can optimize outdoor comfort and reduce localized heat stress for pedestrians. By applying site-specific models, practitioners can identify design strategies that contribute to mitigating the urban heat island effect. Several real-world projects will be showcased to demonstrate how these analyses inform design decisions and contribute to creating cooler, more comfortable urban spaces. At neighborhood and district scales, Geographically Weighted Regression (GWR) is utilized to assess spatial variations in land surface temperatures and identify key factors driving thermal disparities. This method captures localized spatial heterogeneity and reveals how features like impervious surfaces, vegetation cover, and building density influence temperature patterns at a finer spatial resolution. Recent studies using GWR and Morphological Spatial Pattern Analysis (MSPA) have explored the relationship between green infrastructure and urban thermal environments, underscoring the value of multi-scale analysis in understanding complex heat dynamics(Hong et al., 2023). For city-wide analysis, a Spatiotemporal Integrated Prediction Network (STIP-Net) is introduced, combining Convolutional Neural Networks (CNN) and Convolutional Long Short-term Memory (ConvLSTM) models to predict long-term temperature changes across the urban morphology (Zhang et al., 2024). Using Xiamen, China, as a case study, STIP-Net integrates multi-year remote sensing and urban morphology data to simulate future temperature patterns. The model identifies three areas with significant predicted temperature changes, providing a powerful tool for assessing thermal risk zones. This modeling approach not only captures broad spatial patterns but also enables scenario analysis to evaluate the effectiveness of potential planning strategies. The findings bridge practice-based design and data-driven research, offering a comprehensive framework for developing resilient and climate-adaptive cities and shaping more livable and sustainable environments that prioritize human health and comfort. Revised Abstract By mid-century, global temperatures are projected to rise by 2°C to 3°C under a high-emissions scenario (SSP5-8.5) (Lee et al. (2021), posing significant threats to ecological and social sustainability (He et al., 2024). This research introduces a multi-scale framework integrating computational modeling with evidence-based design processes to

capture the complex dynamics of urban heat, aiming to develop a holistic understanding of urban thermal environments and inform effective heat mitigation strategies accordingly. Addressing urban heat across site, neighborhood, and city scales, the study captures the complexities of heat dynamics while highlighting interdependencies between scales. At the site scale, Ladybug tools simulate solar radiation and thermal comfort based on buildings and planting modeling in Rhino (Roudsari, Pak, & Smith, 2013). Shading, vegetation, and material selection are evaluated to reduce heat stress, with simulations incorporating pedestrian movement patterns to link design decisions with environmental impacts. Real-built case studies demonstrate the practical application of this approach. At neighborhood scales, GIS methods like Geographically Weighted Regression (GWR) are utilized to assess spatial variations in land surface temperatures and identify key factors driving thermal disparities. This technique captures localized spatial heterogeneity and reveals how features like impervious surfaces, vegetation cover, and building density influence temperature patterns at a finer spatial resolution. Morphological Spatial Pattern Analysis (MSPA) is then applied to evaluate green infrastructure connectivity, further elucidating the role of ecological networks in moderating neighborhood-scale heat dynamics (Hong et al., 2023). For city-wide analysis, the Spatiotemporal Integrated Prediction Network (STIP-Net) combines Convolutional Neural Networks (CNN) and Convolutional Long Short-term Memory (ConvLSTM) models to predict long-term temperature changes across the urban morphology (Zhang et al., 2024). Using historical remote sensing and selected urban morphology data, STIP-Net forecasts long-term temperature changes through 2050 in Xiamen, China. The model identifies three areas with significant predicted temperature changes up to 2.5°C, providing a powerful tool for assessing heat hazard zones. The machine learning approach not only captures broad spatial patterns but also enables scenario analysis to evaluate the effectiveness of potential planning strategies. Urban heat dynamics operate across multiple interconnected scales, from streets to skyline, requiring a comprehensive approach that captures these interdependencies. This cross-scale framework ensures that localized interventions are informed by larger urban systems, fostering coherence in resilience strategies. By aligning site-specific design strategies with neighborhood-level analyses and city-wide predictions, this study offers robust methodologies to understand urban heat dynamics and foster future livable and climate-resilient cities.

157 Urban Wildlife Coexistence Mapping: Spatial analysis methods to investigate the impacts of urban design on human-wildlife interactions

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Keywords: Urban wildlife; coexistence research; ecological history mapping; urban design; spatial analysis

Natural environmental factors are key drivers for wildlife and human health. In semi-arid urban environments water constrains humans and animals to contend or coexist in shared space, increasing instances of human-wildlife interactions. This research seeks improved understanding of built environment factors that may improve coexistence and limit conflict between humans and wildlife in urban areas. An increased understanding of urban human-wildlife relations that study both positive and negative interactions may improve our ability to decrease conflict and improve human-wildlife health. This research uses current and historical GIS data, along with spatial analysis tools to identify correlations between human-wildlife interactions, hydro ecological patterns, and urban development history. This work is situated within increased scholarship on urban wildlife design and planning. Much of the current work for urban wildlife planning focuses on regional, watershed, or city scales and does not focus on site (parcel and city block) scales of design. This project furthers these efforts by developing higher resolution spatial analysis methods that can inform these smaller scale sites that make up the vast majority of urban development projects. Hydro ecological factors are fundamental to wildlife habitat. Urban fluvial patterns driven by topography (natural and constructed) and springs fed by groundwater both provide critical water sources to wildlife. However, urban development history and anthropogenic factors have the greatest influence on wildlife habitat quality and quantity. Understanding how urban areas have expanded over time, highlighting patterns of growth and the evolution of city layouts as well as insights into how land use has changed finds transitions from higher quality wildlife habitat of undeveloped land or agricultural land to residential, commercial, or industrial use. This project seeks correlations between the built environment and human-wildlife interactions at a site scale resolution to classify relationships, typologies, and configurations that may improve or deteriorate healthy urban human-wildlife coexistence. Using the Santa Cruz River in the Sonoran region within the city of Tucson as a case study for spatial analysis methods that overlay representative datasets including: (1) relative elevation models (REMs) of river corridor (natural environment); (2) springs (natural environment); (3) outfalls and regulatory discharge points (human constructed environment); (4) flood zones; (5) building footprints by decade (human constructed environment); (6) police calls regarding wild animal nuisance (conflict based interaction); (7) vehicle collisions with wildlife (conflict based interaction); and (8) wildlife (mammal species specific) occurrence and sampling (coexistence based interaction). Revised Abstract Natural environmental factors are key drivers for wildlife and human health. In semi-arid urban environments, water constrains humans and animals to contend or coexist in shared space, increasing instances of human-wildlife interactions. This research seeks to identify built environment factors that influence coexistence and conflict between humans and wildlife in urban areas, with the broader ambition of informing urban design practices that reduce conflict and support resilient and healthy urban ecosystems. Understanding urban human-wildlife relationships, both positive and negative, is critical to addressing human-wildlife conflict while fostering coexistence. This research situates

itself within the growing body of scholarship on urban wildlife design and planning and advances the field by focusing on site-scale resolution (parcel and city block) rather than the more commonly studied regional, watershed, or city-wide scales. By bridging this knowledge gap, the study provides tools for urban planners, landscape architects, and policymakers to design urban spaces that better support wildlife habitat and reduce human-wildlife conflicts. This project integrates current and historical GIS data with spatial analysis tools to identify correlations between human-wildlife interactions, hydro-ecological patterns, and urban development history. Hydro-ecological factors, such as fluvial patterns driven by natural and constructed topography and groundwater-fed springs, are fundamental to wildlife habitat. However, urban development patterns and anthropogenic influences often play a greater role in determining habitat quality, quantity, and connectivity. By analyzing how urban areas have expanded and land uses have shifted over time—for instance, from undeveloped or agricultural land to residential, commercial, or industrial uses—this research identifies critical urban design patterns that influence wildlife behavior and human interactions. Using the Santa Cruz River in the Sonoran region within the city of Tucson as a case study, this project develops a replicable spatial analysis framework applicable to other urban contexts. Representative datasets include: (1) relative elevation models (REMs) of river corridor (natural environment); (2) springs (natural environment); (3) outfalls and regulatory discharge points (human constructed environment); (4) flood zones; (5) building footprints by decade (human constructed environment); (6) police calls regarding wild animal nuisance (conflict based interaction); (7) vehicle collisions with wildlife (conflict based interaction); and (8) wildlife (mammal species specific) occurrence and sampling (coexistence based interaction). By identifying spatial patterns, typologies, and configurations that promote or hinder coexistence, this research contributes to disciplinary conversations on sustainable urban design and advances methods for mapping human-wildlife interactions at actionable scales.

195 Understanding the carbon sequestration potential in urban landscapes: the case study of IL counties

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Keywords: carbon sequestration; net primary productivity; urban landscape productivity; land use intensity

The terms "net zero emissions" and "carbon neutrality" are widely used in climate policies aimed at offsetting carbon emissions through energy efficiency, renewable energy, and biomass capture (Fankhauser et al., 2022). In the US, the state of Illinois is committed to achieving carbon neutrality by 2050. As a part of this effort, the Illinois Department of Natural Resources is working to reduce emissions and capturing CO2 with nature-based, sequestration strategies (Illinois Department of Natural Resources, 2022). Key questions include how much sequestration is possible and where it can be implemented. Using USGS NLCD data helps assess this potential (Liu et al., 2014), but the method often averages data, limiting its effectiveness in addressing diverse local land use and socio-economic needs (Zeng, 2024). This study evaluates the spatial implications of the carbon sequestration potential in urban landscapes at fine scale with more precise data inputs that can capture the nuances needed for landscape planning and design purposes. We use selected counties in the state of Illinois as a test case for examining the use a combination of data sets including net primary productivity (NPP), digital maps, and satellite imagery to more precisely determine sequestration potential in developed areas. The case study will be conducted with three types of counties based on land use intensity: (1) urban, (2) suburban, (3) and rural. Social economic factors, selected from the literature, are used to perform statistical analysis to assess the correlation between socioeconomic factors and carbon sequestration in developed areas. Our outcomes describe a more robust method for determining carbon sequestration in urbanized areas. We show how the carbon sequestration process in human settlements is affected by social norms and lifestyle differences, in context of different development intensities. For example, housing vacancy rates shows an unexpected positive effect for carbon capture because of overgrowth of abandon properties, while housing cost burden appears to be a significant predictor among financial variables. Renter rates and marriage status, which indicates stability of residency, show significant positive correlation with carbon capture, especially for highly-developed areas indicating perhaps that social stability is good for landscape stability. This study emphasizes the importance of urban vegetation in carbon sequestration across Illinois counties. It also shows how social and economic factors impact these processes. The findings provide valuable insights for local planners and landscape designers to develop more informed and effective climate action strategies at county and neighborhood scales. Revised Abstract The terms "net zero emissions" and "carbon neutrality" are widely used in climate policies aimed at offsetting carbon emissions through energy efficiency, renewable energy, and biomass capture (Fankhauser et al., 2022). In the US, the state of Illinois is committed to achieving carbon neutrality by 2050. As a part of this effort, the Illinois Department of Natural Resources is working to reduce emissions and capturing CO2 with nature-based, sequestration strategies (Illinois Department of Natural Resources, 2022). Key research questions include (1) how much sequestration is possible and where it can be implemented; (2) how social and economic factors influence carbon sequestration potential in

urban landscapes Using USGS NLCD data helps assess this potential (Liu et al., 2014), but the method often averages data, limiting its effectiveness in addressing diverse local land use and socio-economic needs (Zeng, 2024). This study evaluates the relationship between carbon sequestration potential and socioeconomic factors in urban landscapes at fine scale through a combination of net primary productivity (NPP), digital maps, and satellite imagery data. Using Illinois counties as test cases, we examine sequestration potential across different development intensities (urban, suburban, rural) through Spearman's correlation analysis and multi-variable linear regression. Based on previous literature, we analyzed socioeconomic variables from the 2021 American Community Survey 5-year US Census data, including housing cost burden, vacancy rates, educational achievement, poverty, and median household income, to assess their correlation with carbon sequestration across different urban intensities. Our outcomes describe a more robust method for determining carbon sequestration in urbanized areas. We show how the carbon sequestration process in human settlements is affected by social norms and lifestyle differences, in context of different development intensities. For example, housing vacancy rates show an unexpected positive effect for carbon capture because of overgrowth of abandon properties, while housing cost burden appears to be a significant predictor among financial variables. Renter rates and marriage status, which indicates stability of residency, show significant positive correlation with carbon capture, especially for highly developed areas indicating perhaps that social stability is good for landscape stability. This study emphasizes the importance of understanding how social and economic conditions influence urban vegetation management and subsequent carbon sequestration potential across Illinois counties. The findings provide valuable insights for local planners and landscape designers to develop more informed and effective climate action strategies at county and neighborhood scales.

220 Exploring the Path of Industrial Heritage Landscape Digitization in the Context of Urban Renewal: A Case Study of Beijing

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Keywords: industrial heritage; digital landscape; sustainable development; digital interactive platform; value realization

With globalization and urbanization accelerating, cities are grappling with such challenges as land scarcity and the erosion of cultural heritage. As an important carrier of urban history and culture, the protection and utilization of industrial heritage has become a key issue in urban planning and heritage protection. With the help of digital technologies like 3D scanning, VR, AR, and GIS, the design of industrial heritage landscape enables people to better document, manage, and showcase physical spaces, historical details, and cultural significance(Abad, 2019; Nishanbaev et al., 2021). More importantly, this approach comes with new opportunities and challenges for conservation. This study delves into methods and strategies for preserving and utilizing industrial heritage landscapes through digital technologies, within the context of urban renewal and sustainable development. In addition, the research emphasizes the importance to make heritage more accessible and engaging for the public while promoting digital applications in heritage conservation, reuse, and landscape management. Beijing, as the capital of China and a famous historical and cultural city, is rich in industrial heritage resources. This study takes Beijing's industrial heritage landscape as the research object and adopts the research framework of “identification-analysis-construction”. In this way, it seeks to explore the integration of the physical space, social space and digital space of Beijing's industrial heritage landscape(Liu et al., 2022). Specifically, mixed methods such as literature review, geospatial analysis and public perception survey are combined to achieve the research objectives(Schenk et al., 2019; Trepal et al., 2021). Key findings include a detailed database of Beijing's industrial heritage landscapes, which clarifies their locations and current conditions. The study also provides comprehensive analysis of these heritage sites in relation to land use, transportation, and public involvement(Gao & Tian, 2020). Digital construction methods tailored to both managers and the public are proposed. Besides, a user-friendly digital platform is developed for Beijing’s industrial heritage landscapes. On this platform, users can explore the history, engage in interactive activities, and strengthen their connection with the heritage sites(Miao & Yichen, 2023). In conclusion, this study offers a scientific foundation for the protection, utilization, and inheritance of industrial heritage landscapes. It promotes innovation and revitalization through digital technologies, which helps enhance the accessibility, perception, and sustainability of these sites. However, limitations remain in terms of data completeness and level of public participation. Future research can build on these findings to develop proper strategies for heritage conservation and public engagement. Revised Abstract With the inscription of cultural landscapes on the World Heritage List, industrial heritage has become a vital part of World Heritage. Driven by new technologies such as 3D scanning, VR, AR and GIS, the digital preservation of World Heritage has been widely used in the identification, protection, presentation and restoration of heritage under the Convention Concerning the Protection of the World Cultural and Natural Heritage (Abad, 2019; Nishanbaev et al., 2021). In this context, a key focus remains on how to leverage digital solutions to enhance the communication and

dissemination of industrial heritage values. This aims to both advance the management, preservation, interpretation, and presentation efforts by heritage administrators and scholars, while attracting greater public attention. Beijing's industrial heritage represents a significant aspect of its industrialization process and broader cultural identity (Meng et al., 2024). While Beijing has achieved remarkable economic and environmental progress, preservation efforts and public engagement still need strengthening compared to Western countries to ensure comprehensive protection of these industrial heritage assets (Li, 2023; Wang et al., 2023). This study takes Beijing's industrial heritage landscapes as the research object and adopts the research framework of “identification-analysis-construction”. In this way, it seeks to explore the integration of the physical space, social space and digital space of Beijing's industrial heritage landscapes. Specifically, mixed methods such as literature review, geospatial analysis and public perception survey are combined to achieve the research objectives (Schenk et al., 2019; Trepal et al., 2021). Key findings include a detailed database of Beijing's industrial heritage landscapes, which clarifies their locations and current conditions. The study also provides comprehensive analysis of these heritage sites in relation to land use, transportation, and public involvement (Gao & Tian, 2020). Digital construction methods tailored to both managers and the public are proposed. Besides, a user-friendly digital platform is developed for Beijing’s industrial heritage landscapes. On this platform, users can explore the history, engage in interactive activities, and strengthen their connection with the heritage sites (Miao & Yichen, 2023). In conclusion, this study offers a scientific foundation for the protection, utilization, and inheritance of industrial heritage landscapes. It promotes innovation and revitalization through digital technologies, which helps enhance the accessibility, perception, and sustainability of these sites. Despite limitations in data completeness and public participation, future research can still build on these findings to develop effective strategies for heritage conservation and public engagement.

372 Lost wetlands of Illinois: using historic data to uncover landscape change

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Keywords: Historic landscapes; Public land surveys; Geo-spatial analysis; Wetlands

The Public Land Surveys of the 19th century created a record of landscapes in Illinois in the mid-1800's (Illinois Department of Natural Resources and Illinois Natural History Survey, 2003). After the surveys, most of the wetlands in Illinois were destroyed to establish cropland and towns that cover most of the state today. While the historic maps provide an important record for understanding the historic landscape of Illinois, the maps are not always easy to interpret. Changes in technology and terminology can make it difficult to align the historic maps with modern maps. In this presentation, I will share the results of geospatial analysis to identify the extent of wetland loss in Illinois. In addition, I will discuss how historic maps can be used to identify previous wetland sites. Revised Abstract The federal Public Land Surveys created a record of landscapes in Illinois in the early- to mid-1800's (Illinois Department of Natural Resources and Illinois Natural History Survey, 2003). These historic Survey maps provide an important dataset for understanding the historic landscape and natural communities of Illinois (Hutchison, 1988). When compared to contemporary data, these records reveal the transformation of the landscape since the mid-19th century. For example, by 1980, 85% of all wetlands in Illinois had been destroyed to establish the towns and cropland that dominated the state (Dahl, 1990). To identify the lost wetlands in Illinois, and to map how they changed over time, I compare historic records with contemporary data, using change detection techniques adapted from Peterson et al.'s (2004) study of land cover change in Kansas. I analyze the extent and location of historic and contemporary wetlands in ArcGIS Pro (3.4.0), using the historic Public Land Surveys and notes from 1804 – 1856 as a baseline for historic land cover before European-Americans became the dominant force on the landscape (Illinois Department of Natural Resources and Illinois Natural History Survey, 2003). I supplement the Public Land Survey data with archival material, following the model of Grossinger et al. (2007) and Beller at al. (2020) in their analyses of historic landscapes in Silicon Valley. I compare the extent and location of historic wetlands with more recent data from the National Land Cover Database, National Hydrography Dataset and National Cooperative Soil Survey, using methods adapted from Peterson et al. (2004), Grossinger et al. (2007), Beller et al. (2020), and Pasterski et al.'s (2020) analysis of aquatic landscapes in the Chicago region. In addition, I include wetlands identified in the 1980's by the National Wetlands Inventory. In ArcGIS Pro, I compare the location, extent and categorization of wetland sites for each dataset, using standard geostatisical methods described by Pasterski et al. (2020). When necessary, I digitize the archival data, convert vector files to raster files at 30 meter resolution and recode data. In this presentation, I will share the results of geospatial analysis to identify wetland destruction and fragmentation in Illinois. In addition, I will discuss how historic data can be used to identify lost wetland sites. These results can guide further analysis of historic changes in biodiversity and ecosystem services associated with wetlands. Moreover, these results can inform conservation goals, such as 30x30, to protect landscapes and biodiversity into the future.

441 Twining cities in GIS: examining Canada's open geo-data landscape and its urban digital twin future

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Keywords: Geo data landscape; Open source; Urban digital twin; City model

Recently, the application of digital twins in urban design and policymaking has emerged as a rapidly advancing area of study. Several cities, as documented by (Jones et al., 2020) currently utilize this technology for such practices and they have all become successful in developing their own version of an Urban Digital Twin (UDT). The concept of digital twins, which has long been recognized for its utility in modeling and simulation across various industries, allows for the creation of digital replicas of physical entities. Despite the success of digital twins in multiple sectors, there remains a notable gap in the development of digital twins implemented on an urban scale compared to those used in general industry applications. (Hamalainen 2021; Batty 2018). In addition, while most UDT cases are international, there are a few recent Canadian examples in the cities of Ottawa and Calgary (Ghaith et al., 2021). These examples provide optimism for future Canadian UDT's. However, Canadian cities still face many challenges when attempting to construct UDT's, especially open-source UDT's. The behind-the-scenes process of constructing a digital replica is also not well-documented (HosseiniHaghighi et al., 2022), further hindering the adoption and implementation of this technology in city design and planning. Given the growth of recent open data development, and to leverage the success of existing UDT development for Canadians cities, it is therefore imperative to 1). understand the current open data landscape in Canadian cities, and 2). explore the potential of building a UDT using such open data and software. In this project, we first review and compare the open data landscape of major Canadian cities against world-leading cities with well-established UDTs. This is critical because the function and accuracy of UDT's rely largely on the quality and quantify of accessible geo-datasets. We then demonstrate the process and result of creating a spatially explicit, city-wide UDT for Winnipeg, Canada using purely open-source datasets. The Winnipeg UDT is also converted into a game-engine based desktop application to facilitate interdisciplinary dialogues and co-design activities. Revised Abstract Recently, the application of digital twins in urban design and policymaking has emerged as a rapidly advancing area of study. Several cities, as documented by (Jones et al., 2020) currently utilize this technology for such practices and they have all become successful in developing their own version of an Urban Digital Twin (UDT). The concept of digital twins, which has long been recognized for its utility in modeling and simulation across various industries, allows for the creation of digital replicas of physical entities. Despite the success of digital twins in multiple sectors, there remains a notable gap in the development of digital twins implemented on an urban scale compared to those used in general industry applications (Hamalainen, 2021; Batty, 2018). In addition, while most UDT cases are international, there are a few recent Canadian examples in the cities of Ottawa and

Calgary (Ghaith et al., 2021). These examples provide optimism for future Canadian UDT models. However, Canadian cities still face many challenges when attempting to construct a UDT, especially using open-source datasets. The behind-the-scenes process of constructing a digital replica is also not well-documented (HosseiniHaghighi et al., 2022), further hindering the adoption and implementation of this technology in city design and planning. Given the growth of recent open data development, and to leverage the success of existing UDT development for Canadian cities, it is therefore imperative to 1) understand the current open data landscape in Canadian cities, and 2) explore the potential of building a UDT using such open data and software. In this project, we first review and compare the open data landscape of major Canadian cities against world-leading cities with well-established UDT models. This is critical because the function and accuracy of a UDT relies largely on the quantity and quality of accessible data. We then demonstrate the process and result of creating a spatially explicit, city-wide UDT for Winnipeg, Canada using purely open-source datasets. The Winnipeg UDT is also converted into a game-engine-based desktop application to facilitate interdisciplinary dialogues and co-design activities.

458 Designing personality – artificial intelligence and digital simulation

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Keywords: site simulation; NPC; digital twin; artificial intelligence; performance based design

In an era where data and performance-based design metrics are increasingly important to clients and designers alike, one leg of the triple-bottom-line stool has been neglected. Economic and environmental impacts are quantifiable and able to directly influence design decision making, yet socio-cultural factors are difficult to measure or predict. If landscape architects are to propose and build equitable and inclusive spaces for the populations of today and tomorrow, we must better understand how people, in all their diversity, might use spaces in the built environment. This project has been working to develop site simulation software that can evaluate design proposals for human and environmental use through artificial intelligence and game development software. Work to date has generated a workable model, but each of the non-player character (NPC) actors in a simulation think, feel, and react the same. Recent efforts have begun developing unique personality (spatial or environmental preference, social and environmental comfort levels, differing goals, etc) and physical perception traits (sight, smell, walking speed, height, etc) in an attempt towards creating randomly generated true digital twin actors to perform in site simulations. Understanding that the eventual users of these simulation systems, the research team is working towards designer input variables to act as “average” traits for NPCs to embed into their personalities. From there, randomly generated multipliers (both positive and negative) following standard deviation bell curves and user-set extremes allow for unique traits in each NPC actor. Additionally, semi-randomized prioritization and expression filters are being developed so similar inputs can foster different responses, even in two identical NPCs. Presentation content will focus on discussion on methods of individual and socio-cultural traits and norms into NPC personalities, along with demonstrations of simulation progress to date. Revised Abstract

489 A Trail for the Masses

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Keywords: forest management; GIS; 3D Visualization; Climate change; Thinning

In the Pacific Northwest, climate change and mismanaged forests have led to more frequent and intense wildfires. Researchers and forest management professionals are actively seeking solutions to develop healthy, resilient, and sustainable forests. Key strategies include reducing fuel loads through thinning, prescribed burns, pruning, and mechanical treatments, which enhance forest health by reducing surface fuels, increasing tree spacing, and promoting fire-adapted landscapes. Despite the clear need for these treatments, the high costs and lack of revenue generation have hindered widespread implementation. However, advances in timber harvesting equipment and the growing mass timber industry in the Pacific Northwest offer promising opportunities. Smaller-diameter logs, traditionally seen as low-value, could be repurposed into engineered wood products like mass timber, providing economic incentives for forest thinning operations. This research explores the application of forest stand-level data and 3D visualization tools to assist land managers in selecting specific trees for thinning. For this project, we obtained detailed forest stand-level data from researchers at Oregon State University for the Elliot State Forest in Oregon's Coast Range. Located just north of Coos Bay, The Elliot State Forest is 83,000 acres in size and has a complex and complicated history with competing interests of state, Tribal, industry, environmentalists, and community interests, highlighting the need for increased education and understanding of forest stewardship practices. Using dendrometric variables such as tree diameter and height, we visualized forest stands in 3D and applied algorithmic design tools (McNeel Rhinoceros and Grasshopper) to identify smaller-diameter trees for removal. This approach enabled us to simulate forest stands before and after thinning operations. This type of visualization could be helpful in many applications, from helping forest managers plan the strategic movement and staging areas of forestry machinery that limits soil disturbance and compaction to creating fuel breaks for prescribed burns. In this project, the visualization of thinning operations facilitated the design of a hypothetical trail system that integrates both educational and recreational opportunities in areas cleared by tree removal, including raised boardwalks, mass timber cabins, overlook towers, and educational signage. Our study highlights how 3D modeling software can be tailored to varying site conditions and management goals, offering forest managers and researchers more precise and data-driven tools for forest planning and conservation. This computational methodology can potentially enhance forest management practices by improving decision-making processes and contribute to creating sustainable, fire-resilient landscapes.

542 Evaluating the Use of Structure-from-Motion Photogrammetry to Monitor Eroding Riverbanks of the Black Vermillion River

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Keywords: Remote Sensing; River Restoration; Reservoir Sedimentation

Remote sensing techniques can be used to survey the three-dimensional complexity of large areas of riverbanks, such as terrestrial laser scanner (TSL), airborne light detection and ranging (LiDAR), and Structure-from-Motion Photogrammetry (SfM). This research focuses on SfM, which has lower costs, shorter data collection times, and comparable accuracies to LiDAR and TLS. Historically, SfM has been used to monitor river geomorphology on montane, gravel-bed rivers with low bank heights and little bank face vegetation. This study assesses the effectiveness of SfM to monitor selected banks of the Black Vermillion River (BVR), a degraded agriculture river in Northeast Kansas typified by clay soils, seasonally varying amounts of herbaceous bank vegetation and high, vertical banks. SfM was used to volumetrically model BVR riverbank changes characterized by erosion or deposition. These changes were primarily assessed by comparing overlapping sequential models, indicated by the percentage of matching cells (.03m x .03m) derived from before and after point clouds. A comprehensive methodology for using SfM data that accommodates steep banks and varying herbaceous vegetation was developed. Data was collected six times over a 19-month period at nine banks beginning in December of 2020, with all banks being initially void of herbaceous vegetation. Herbaceous vegetation that grew between data collection dates was removed from the SfM point clouds using tools in Quick Terrain Modeler leaving voids. Bank volume change was calculated with empty and interpolated voids using CloudCompare. A semi-novel technique used a horizontal projection rather than the traditional vertical projection when comparing point clouds to increase both the percentage of overlapping cells and amount of change detected. The average percentage of matching cells for all banks was higher from leaf-off to leaf-off conditions (86%) compared to the entire study period, 12/2020-07/2022 (71%). All banks (822 m) experienced an estimated -1,630 m3 of net erosion over the 19-month study period. However, one study bank (16) experienced net deposition of 10.74 m3. Study banks 19, 31, and 30 had the highest amounts of net erosion of -724 m, -409 m3, and -233 m3, respectively. Study bank 30 with a drainage area (DA) of only 115 km2 had a similar rate of erosion per m2 bank face as study bank 31 with a DA of 1,129 km2. The data suggest SfM is better at monitoring erosion than deposition along the BVR banks, as areas of deposition established vegetation resulting in the overestimation of deposition when voids were interpolated. Revised Abstract Remote sensing techniques can survey the three-dimensional complexity of large areas of riverbank, such as terrestrial laser scanner (TSL), airborne light detection and ranging (LiDAR), and Structure-from-Motion Photogrammetry (SfM). This research focuses on SfM, which has comparable accuracies to LiDAR and TLS but with much lower costs and significantly shorter data collection times. Historically, studies that utilized SfM to monitor river geomorphology have been conducted on montane, gravel-bed rivers with low bank heights and little bank face vegetation. This study assesses the use of drone-based SfM to monitor selected banks of the Black Vermillion River (BVR), a degraded agriculture river in Northeast Kansas typified by seasonally varying amounts of herbaceous bank vegetation and high, vertical banks. The use of SfM was assess primarily by the ability to produce overlapping sequential models, indicated by

the percentage of matching cells (.03m x .03m) where cells have a valid value for both point clouds. A comprehensive, semi-novel methodology for using SfM data that accommodates steep banks and varying herbaceous vegetation was developed. Data was collected six times over a 19-month period at nine banks beginning in December of 2020. When herbaceous vegetation established between data collection dates, it was removed from the SfM point clouds using tools in Quick Terrain Modeler leaving voids. Volume change was calculated with empty and interpolated voids using CloudCompare. Using a horizontal projection rather than the traditional vertical projection when comparing point clouds increased both the percentage of overlapping cells and amount of change detected. The average percentage of matching cells for all banks was higher from leaf-off to leaf-off conditions (86%) compared to the entire study period, 12/2020-07/2022 (71%). All banks (822 m) experienced an estimated -1,630 m3 of net erosion over the 19-month study period. However, one study bank (16) experienced net deposition of 10.74 m3. Study banks 19, 31, and 30 had the highest amounts of net erosion of -724 m, -409 m3, and -233 m3, respectively. The data suggest SfM is better at monitoring actively eroding banks where vegetation did not establish. The establishment of vegetation on some banks led to inaccurate surface models and overestimation of deposition. Understanding rates of sediment production along BVR banks will inform the management of Tuttle Creek Reservoir, which is downstream of the BVR and has lost approximately 50% of its capacity to sedimentation. Currently, the USACE is using injection dredging to flush sediment downstream with unknown consequences.

604 Building Adaptive Capacity Through Conservation: Evaluating storm water management benefits provided by conservation lands in the Des Plaines watershed

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Keywords: Stormwater management; Habitat restoration; climate adaptation; Conservation planning

The Upper Des Plaines watershed is an area historically prone to periodic disastrous flooding in the highly urbanized greater metropolitan Chicago region. Urbanization in the region continues to increase impervious cover, exacerbating potential flood risk in the watershed. However, the portion of the watershed lying in Lake County, IL presents an opportunity to better understand the contributions that open space planning, conservation and habitat restoration make in reducing overall flood risk. The area has benefited from over 60 years of habitat protection and restoration under the management of the Lake County Forest Preserve District and local conservation authorities. In recent years, efforts by other regional authorities have contributed to preservation and restoration of additional areas of critical ecological significance, such as prairie wetlands, wet savannah, and lakeshore ravines. This study utilizes a GIS-based regional assessment of current conservation lands to understand the relative contribution these lands make to overall watershed flood control. The watershed was divided into HUC 12 basins and in some cases, smaller urban basins, to better understand local stormwater inputs during 2-year, 10-year, 25-year and 100-year storm events. Storm events for the basins were modeled using the EPA's Stormwater Management Model (SWMM). Land cover for each sub-basin was modeled, with conservation lands categorized into wetland, forest/woodland and prairie/savannah cover types. Impervious cover and relative densities of urban cover areas were also modeled. The location and age of large engineered stormwater management facilities was also mapped for each basin, to identify particular stormwater interception points, and compared to the location and date of acquisition or restoration of conservation lands. A key finding is that restored prairie and woodland areas contribute significantly to managing flood risk in the low- to medium density urbanized areas. The study also suggests that even distribution of the conservation lands throughout the basins, particularly in the middle and lower reaches, provides highly effective flood control and may reduce the need for large engineered flood-control structures. This finding is supported in part by comparison of a recent major flood event (2017) with earlier major flood events (1953, 1959) in a portion of the watershed. Finally, the study provides support for the need for long-range conservation planning as a critically important tool in building climate adaptive capacity in highly urbanized areas.

History, Theory, and Culture

10 Preservation Paradox: Recalibrating Landscape History in the Face of Unprecedented Change

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Keywords: Landscape preservation; Cultural landscapes; Stewardship; Landscape management; Restoration

In the summer of 1935, the United States Congress passed the Historic Sites, Buildings and Antiquities Act (Historic Sites Act), making it official federal policy to, under the purview of the National Park Service (NPS), "preserve for public use historic sites, buildings and objects of national significance for the inspiration and benefit of the people of the United States" (National Park Service, 1935). This legislation coincided with an emerging public interest in American history that accelerated into the 1970s amidst the patriotic fervor surrounding the country's Bicentennial. Designed landscapes, which had not been specifically addressed in the Historic Sites Act, emerged during this time as targets of preservation (Fitch, 1976). As saving threatened landscapes became prioritized within the profession of landscape architecture, restoring a site to its assigned period of significance as closely as possible became paramount (Birnbaum and Peters, 1996). Over time, even as the challenges associated with managing cultural landscapes became better understood, relying on limited and subjective criteria for identifying a site's most significant era remained accepted practice. Despite inevitable and accelerating ecological, cultural, and climatic change, passionate cries to salvage, recreate, and preserve the artistic integrity and design heritage of certain cultural landscapes persist. In the new book Design through Time: Evolving Landscapes, from Alcatraz to Prospect Park, I examine the paradox that exists between an ingrained desire to preserve historic landscapes and the inherent realties that challenge the efficacy of that aim. Through a series of carefully researched case studies focused on various landscape types, along with interviews with numerous stewards and managers, I put forth the fundamental argument that due to their ephemerality, designed landscapes are more accurately understood and effectively studied as products of inevitable evolution than purely as works of design (Hough, 2024). Putting forth a novel process that evaluates the ongoing life of maturing landscapes, I propose considering a site's recognized period of significance as one stop along a constant temporal continuum rather than an end in itself. Doing this fosters a more complete understanding of both the common and unique issues that landscapes are exposed to as they age. In addition to providing a new methodology for teaching and understanding landscape history, this research enables scholars, practitioners, and the public to appreciate a site's extended history while helping to ensure that the quality and relevance of cultural landscapes are more successfully managed and perpetuated into the future. Revised Abstract In 1935, the United States Congress passed the Historic Sites, Buildings and Antiquities Act with an aim to "preserve for public use historic sites, buildings and objects of national significance" (National Park Service, 2023). As this legislation did not specifically address designed landscapes, the practice of identifying parks, gardens and other related places as targets of preservation did not emerge in a meaningful way until the 1970s, when patriotic fervor over America's Bicentennial stoked interest in the country's history (Fitch, 1976). The National Park Service took a leadership role in the preservation of public landscapes and established standards and procedures for returning historic places as closely as possible to their assigned period of significance (Birnbaum and Peters, 1996). Over time, as preservation became integrated into the field of landscape architecture, relying on subjective criteria for identifying a site's most

significant era remained accepted practice. “Rescued” places became celebrated success stories, even as the challenges associated with managing designed landscapes to a degree of historic authenticity became better understood. Even today, as inevitable and accelerating ecological, cultural and climatic change continue to threaten the established look and condition of cultural landscapes, passionate cries to salvage, recreate and preserve their artistic integrity persist. This presentation will share published research examining this process of change, and convey the paradox that exists between an ingrained desire to preserve historic landscapes and the inherent realities challenging the efficacy of that goal. Through interviews with institutional, municipal and organizational stewards in conjunction with a series of case studies focused on American gardens, parks, campuses, cultural sites and communities, a fundamental argument emerges: Because designed landscapes are inherently ephemeral, they are more accurately understood and effectively studied as products of evolution than purely as works of design. This research has led to a novel way of defining the impacts of inevitable change by tracking the ongoing evolution of designed landscapes and evaluating recognized periods of significance as stops along a perpetual temporal continuum rather than ends in themselves. This new process will help foster a comprehensive understanding of the forces that landscapes are exposed to as they age, along with the subsequent decisions made and actions taken in response to that change. Ultimately, a new methodology for teaching and understanding landscape history will enable educators, practitioners and the public to appreciate a landscape’s extended history while ensuring its quality and relevance are successfully managed into the future.

30 From Silence to Accountability: Indigenous History Representation in the 21 California Mission Museums

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Keywords: Indigenous history; Spanish colonialism; Thematic coding; California mission museums; Historical trauma

This study asks to what extent the 21 California mission museums present the Indigenous lived experience at the missions from 1769 to 1833 (the mission era). Past scholarship utilizes non-quantitative based methods of visiting museums to report on Indigenous cultural erasure motifs (Dartt-Newton, 2011; Helmbrecht, 2019). This study builds on previous analyses of California mission museums by quantifying each of the 21 museums' focus areas through thematic word coding. Scholars describe the impacts of mission operations on Native people and their territories: ecocide, land theft, forced labor, corporal punishment, and coerced acculturation (Gómez, 2023; Reed, 2020). Telling accurate stories of historical abuse aids in mental-emotional healing of generational trauma for Native Californians (Santa Cruz Mission State Historic Park, 2024). For environmental design instructors and practitioners, understanding site histories allows for culturally and environmentally appropriate designs (Jojola & Shirley, 2020). From July 17-August 12, 2024, the author visited the 21 California mission museums. Museums offer written expositions of mission history in wall mountings, displays, and artifact descriptions. Optical character recognition (OCR) was used on photos of written content to create transcripts for each museum. Additionally, 10 museums display videos and four include audio guides. Transcripts were created from both video and audio sources, with permission. Transcripts were thematically coded to quantify word counts used in discussion of select topics. Coding categorized word counts of Non-Indigenous versus Indigenous themes. Indigenous-related content was further delineated into four areas: (1) pre-contact Native culture, (2) daily Indigenous mission life, (2) abuses against Native mission residents, and (4) societal effects of mission operations on Native people and lands. Only six of the 21 missions discussed Indigenous-related topics for at least half (50%) of all museum content, with a median percentage of 35% across all museums. Historically, Native people comprised >95% of total mission residents (Haas, 2014). Within the Indigenous topics category, museums stressed pre-contact Native history (47%) and de-emphasized abuse of Native people at missions (6%) and societal effects of missions on Indigenous communities (14%). Thus, when mission museums discuss Indigenous topics, many emphasize cultural information entirely unrelated to mission era history and omit the missions' impact on Native communities. Additionally, this study performed case studies of exhibitions to reveal contrasting approaches: museums which narrate from Indigenous perspectives and those with Eurocentric positions. Data for each museum allow communication between researchers, Indigenous community members, and museum staff and directors to increase mission-related Indigenous history representation. Revised Abstract This study asks to what extent the 21 California mission museums present the Indigenous lived experience at the missions from 1769 to 1833 (the mission era). Past scholarship utilizes non-quantitative-based methods of visiting museums for subjective analysis of Indigenous cultural erasure (Dartt-Newton, 2011; Helmbrecht, 2019). In contrast, this study quantifies each of the 21 museums' exhibitions through thematic word coding. Quantitative reporting of social issues influences systematic change above pure qualitative speculation (Fassinger & Morrow, 2013).

From San Diego to Sonoma, hundreds of thousands to up to one million acres per mission were cleared for agriculture, and ecologically-healthy plant communities were supplanted by invasive species (Reddy, 2014). Since missions controlled one-sixth of California and current population centers coincide with previously-mission controlled territory, most California landscape architects work on mission-affected land (Cherny et al., 2021). Scholars describe the impacts of mission operations on Native communities: ecocide, land theft, forced labor, corporal punishment, and coerced acculturation (Gómez, 2023; Reed, 2020). Telling accurate histories of abuse aids in mental-emotional healing of generational trauma for Native Californians (Santa Cruz Mission State Historic Park, 2024). From July 17-August 12, 2024, the author visited the 21 California mission museums. Museums offer written expositions of history in wall mountings, displays, and artifact descriptions. Optical character recognition (OCR) used on photos of written content and dictation of video/audio guides created transcripts for each museum. Transcripts were coded to quantify word counts of select topics. Coding categorized Non-Indigenous versus Indigenous themes. Indigenous-related content was further delineated into four areas: (1) pre-contact Native culture, (2) daily Indigenous mission life, (2) abuses against Native mission residents, and (4) societal effects of mission operations on Native communities. Only six of the 21 missions discussed Indigenous-related topics for at least half (50%) of all museum content, with a median percentage of 35% across all museums. Historically, Native people comprised >95% of total mission residents (Haas, 2014). Within the Indigenous topics category, museums stressed pre-contact Native history (47%) and de-emphasized abuse of Native people at missions (6%) and societal effects of missions on Indigenous people (14%). Thus, when museums discuss Indigenous topics, many emphasize information unrelated to mission era history and omit the missions' impact on Native communities. Additionally, case studies of exhibitions reveal contrasting approaches: museums which narrate from Indigenous versus Eurocentric positions. Data for each museum allow communication between researchers, Indigenous community members, and museum directors to increase mission-related Indigenous history representation.

39 Reorganizing Paradise: Hawaii National Park and American Fantasy-Making

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Keywords: Paradise; New Deal; American Studies; Hawaiian Studies

Can you preserve paradise? Design with it, for it, or even against it? What even is paradise? For the United States, its expansive natural identity has been integral to creating its national identity. Throughout this process, American enterprise and annexation of Hawaii was an opportunity of creating a constructed paradise to maintain in the periphery of the country — a remote dream for privileged few to experience and exploit. However, maintaining the idea of paradise is easier said than done. In the proliferation of plantations and early ranching came some of the first signs of environmental exhaustion. Freshwater was being depleted as forests were logged, species like sandalwood were lost due to overharvesting, and fenceless ranches saw livestock eating their way through the forest. America's investment in Hawaii throughout the 19th century was a time of environmental exploit predicated on reaping the bounty associated with recovering paradise. This very relationship abundance and exhaustion is fundamental to the expansion of the American landscape and ideology. This project places the creation of Hawaii National Park (1916) and its construction as a product of environmental reorganization and metabolism of the Hawaiian landscape in three key phases: (1) early forestry practices and botanical imperialism, (2) American obsession with recovering paradise and fantastical utopias, and (3) the designed responses of Hawaii National Park by two landscape architects. Thus, Hawaii National Park highlights the continuation of fantasy-making for the US and the role landscape architects have played in supporting it and even challenging it. Archival imagery including photography, brochures, postcards, and construction drawings are brought in to showcase the responses to Hawaii's visual depletion with a particular focus on two landscape architects: Thomas Vint and Merel Sager. Their early work in park road planning ties directly to Romantic forms popularized by Frederick Law Olmsted and the construction was also space not only of environmental impact, but a concerted effort to remove invasive species to maintain and frame what they considered to be the Park's original character. Together, the project offers a unique environmental history of the National Park System and the fantastical imaginary constructed for Hawaii National Park. Further, the Park is an opportunity to highlight the capacities of early American landscape architects in their role in both impacting and preserving the landscape. Revised Abstract The recovery of paradise has been a divisive and violent practice projected onto the landscape by the West as a means of justifying settler colonialism and capital enterprise. For the United States, its expansive natural identity has been integral to creating its national identity. Throughout this process, American enterprise and annexation of Hawaii leveraged ideas of paradise to maintain in the periphery of the country — a remote dream for privileged few to experience and exploit. Engendering this colonial practice through biblical means frayed extant Kanaka Maoli human-nature relationships like that of Malama 'Aina. However, maintaining the idea of paradise is easier said than done. In the proliferation of plantations and early ranching came some of the first signs of environmental exhaustion. Freshwater was depleted as forests were logged, species like sandalwood were lost due to overharvesting, and fenceless ranches saw livestock eating their way through the forest. America's investment in Hawaii throughout the 19th century was a time of environmental exploit predicated on reaping the bounty associated with recovering paradise. This very

relationship of abundance and exhaustion is fundamental to the expansion of the American landscape and ideology. This project places the creation and construction of Hawaii National Park (1916) as a product of environmental reorganization and metabolism of the Hawaiian landscape in three key phases: (1) early forestry practices and botanical imperialism, (2) American obsession with recovering paradise and fantastical utopias, and (3) the designed responses of Hawaii National Park by two landscape architects. Hawaii National Park highlights the continuation of fantasy-making for the US and the role landscape architects have played in supporting it and even challenging it. Yet this work sometimes quietly supported Native Hawaiian wisdom and often publicly disregarded it. Archival imagery including photography, brochures, postcards, and construction drawings are brought in to showcase the responses to Hawaii's visual depletion with a focus on two landscape architects: Thomas Vint and Merel Sager. Their early work in park road planning ties to Romantic forms popularized by Olmsted but construction practices championed invasive species removal and the protection of native plants. Native Hawaiian proverbs and writing around forests and the landscape are included to offer a critique of settler colonial practices and competing ideas of paradise in the landscape. The project thus offers insight into the violence of American expansion and how landscape architects have constructed divisive notions of paradise, actively supporting settler colonialism and fraying indigenous stewardship.

90 “Island” As a Socio-Spatial Theory: The Study of the Coupling Phenomenon of Ignored Urban Spaces, Culture and People

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Keywords: Island; Urban Space; Heterotopias; Ignored Urban Phenomena; Social-spatial Theory

By providing a reflexive perspective on the current process-oriented urban theories and analyzing the inadequate discussion of the characters of the combined phenomenon of ignored urban spaces and population, this essay introduces an alternative socio-spatial theory Island, as a new lens to examine the urban realities ignored in a planetary age. These heterogeneities can appear in spatial forms and cultural forms, with specific scales yet variegated conditions, calling for a systematic understanding and a new theoretical tool to describe and explain the related and coupling phenomena. After reviewing the inadequacy of the existing concepts, such as Foucault’s Heterotopias and Deleuze and Guattari’s Minoritarian in explaining current urban realities, the commonly perceived, formless and scale-less geographical term Island is redefined and theorized in this essay, as an imaginative tool and a tool for imagination to understand the identity, border and aesthetics of the ignored urban realities. The essay investigates the space-human twinning case of the urban district Akihabara and its related sub-culture fan group Otaku to examine the capability of Island as a theory tool for studying unique urban forms, dissimilated culture and repelled people. It concludes that Island theory can be an alternative lens in process-oriented and scale-up urban research, filling the theoretical gap in studying the ignored urban realities. Revised Abstract Echoing the ever-growing cities and the homogenizing rural landscape, there was an overarching theoretical trend for the last two decades to imagine the world as interconnected and open-ended assemblages of energy and resources. Since then, this fascination with smooth connectivity and flows has reigned over architecture schools and continues influencing design professions. From Landscape Urbanism and ecological Urbanism to Planetary Urbanization, process-oriented theories privilege the fluidity of flows over the solidity of forms, delineating cities as formless and boundless processes of collected matters and materials on a global scale, resonating with Deleuze and Guattari's philosophical concept of the world as a place without beginning or end but remaining forever open with an endless series of "ands." However, plenty of "buts" find no way to fit into this everything-is-connected, global-scale apparatus. While these "buts" with specific scales yet variegated conditions have been discussed separately by different scholars, a systematic and holistic understanding is missing: we do not have a theory for the "buts." By providing a reflexive perspective on the current process-oriented urban theories and analyzing the inadequate discussion of the characters of the combined phenomenon of ignored urban spaces and population, this essay introduces an alternative socio-spatial theory, Island, as a new lens to examine these heterogeneities with unique spatial forms and cultural forms. This essay suggests a new understanding of Island: an imaginative tool and a tool for imagination. While applying the term Island in research is not new in the urban study field, a more in-depth investigation of its philosophical and metaphorical possibilities in interpreting the ignored urban phenomena in the planetary urbanization age is not yet done. As a new concept, it starts the conversation by exploring three questions of Island with broader meanings: the identity question (what it is), the border question (where is the boundary), and the aesthetics question (how to appreciate it). This essay explores the possibilities of using Island as a new theoretical concept for understanding and analyzing the "buts" in the framework of planetary urbanization. The essay ends with an investigation of

space-human twinning cases to examine the capability of Island as a theory tool for studying unique urban forms, dissimilated culture, and repelled groups of people. It concludes that the Island theory shows vital criticality in the global age and that the continued study of ignored urban phenomena is necessary.

124 Sectional Pasts: 'Denaturalizing' Simplified Site Histories in Cultural Landscape Preservation

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Keywords: cultural landscapes; preservation; integrity; significance; process

Landscape architectural practice widely conceptualizes sites as "activity," being made and unmade by dynamic, multi-scalar ecological, geological, or climatological systems (Mitchell, 2008, p. 31). However, preservation practices in cultural landscapes have failed to adapt this framework for equally dynamic cultural processes. While often well-intentioned, the result of these practices can project that time has stood still at a given site, reinforcing the impression that places are perfectly unchanged since the era that their present state reflects, regardless of what the actual historical experience may have been. Visitors are encouraged to assume they are having an "authentic" experience of the site's history through seemingly objective interpretive armatures. Yet signage and exhibitions in on-site museums often "naturalize" a particular conception of a landscape for the public, asserting the political neutrality of a distant past, while overwriting site histories that diverge from the institutional narrative (Olwig, 1993, p. 307). Environmental historian Laura Alice Watt asserts that cultural landscapes should instead be read as "dynamic social expressions," reflections of ongoing struggles for control or power over the land, its meaning, and its uses (Watts, 2017, pp. 21-22). Yet the most prevalent form of heritage preservation fixates on objects, in which any use or action that has not taken or retained material form can be omitted from a site's official presentation. Thus, using Alabama's Florence Indian Mound as a case study, this paper will demonstrate a method for beginning to account for overwritten site histories and ongoing conflict within historic cultural landscapes. Through sequential section drawings, the researchers document both the material changes to the site and its surroundings, framing each modification as a register of a particular set of values. Museums and institutional site managers have an ethical mandate to not only be stewards of a site but to also be transparent with the public about its present condition. Drawings such as these can challenge notions of material permanence and political neutrality at historic sites, pointing instead toward the "constant, day-to-day manipulation, negotiation, and contestation" of site meanings and presentations (Watts, 2001, p. 4). By visualizing the processes and outcomes of landscape change, preservationists, site managers, and communities might begin to reflect on their own role in the production of historic sites, and how those sites, in turn, shape conceptions of the particular past they represent.

145 Contributing to the Local Cultural Landscape: The Elements and Value of Traditional Food Processing Landscapes

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Keywords: Cultural Landscape; Traditional Food Processing; Pickle Production; Local Identity; Food Culture

Traditional food cultures, once vital to human daily life and cultural identity, face significant challenges due to industrial restructuring, regional policy orientations, and lifestyle changes. However, this issue has not received sufficient attention, especially in Asian countries, due to a lack of awareness of the cultural value of food, agriculture, and traditional practices, as well as limited governmental interest in the concept of cultural landscapes. This study explores the significance and value of cultural landscapes rooted in traditional food processing practices, focusing on their role in local revitalization and the development of effective conservation strategies. To this end, we have selected traditional pickle-making practices in Yamagata Prefecture, Japan as a case study, due to its long and unique history and cultural landscapes. We aim to explore the components, characteristics, and value for local identity of this typical cultural landscape, with the goal of clarifying the impact of a cultural landscape based on food production practices on the daily lives of residents. We conducted 17 in-depth semi-structured interviews with various stakeholders, including producers (vegetable farmers, pickle-making factory employees, restaurant chefs, producers and distributors of related raw materials) and consumers (residents, tourists). Additionally, we analyzed historical maps and gray literature. Through thematic analysis, we found that the cultural landscape of traditional pickle production encompasses six scenes: planting, processing, selling, cooking, eating, and specific festival scenes. In addition to these tangible landscapes, intangible elements such as local knowledge, production practices, and taste preferences also influence and characterize this cultural landscape. However, this cultural landscape is fragile and vulnerable to local policy orientations and industrial restructuring. Yet, it also demonstrates continuity in the sense that the cessation of pickle production does not lead to the disappearance of the tangible landscape, and related elements remain in the area as new functional carriers, continuing to embody local cultural characteristics. This cultural landscape is closely related to the dietary well-being and lifestyle behaviors of residents. Building upon previous studies that have established food as an important carrier closely related to agricultural and cultural heritage, this study takes a step further by using pickle production as a specific case to reveal the internal mechanisms and its contribution to the shaping of cultural landscapes. The aim is to provide meaningful references for the implementation of related design projects and policies that emphasize the value of cultural landscapes to local identities. Revised Abstract Traditional food cultures, as essential components of cultural landscapes (Taylor, 2008), face increasing threats from industrial restructuring and evolving lifestyles. Food-related landscapes are deeply intertwined with processes of memory, identity construction, and social relationships (Graham et al., 2016), and are undergoing significant transformations due to urbanization, market changes, and environmental pressures (Sayer et al., 2013). While UNESCO has recognized numerous food-related cultural landscapes, research has largely concentrated on beverage production landscapes and European contexts (Silva et al., 2022), leaving traditional food processing landscapes in Asia significantly understudied (Brumann & Gfeller, 2022). This oversight is critical,

as food processing landscapes , serve as essential reservoirs for local landscape identity and the continuation of landscape design traditions (Barthel et al., 2013). This research aims to identify the components, characteristics, and values of the cultural landscape shaped by pickle-making practices in Yamagata Prefecture, Japan, focusing on its contributions to local identity and residents' daily lives. Extensive fieldwork was conducted across Yamagata Prefecture's districts in 11 cities and towns. Data collection included 57 in-depth semi-structured interviews with diverse stakeholders, including vegetable farmers, pickle factory employees, restaurant chefs, distributors, residents, and tourists. Historical documents—such as folklore records, cultural histories, and prefectural agricultural archives—were systematically analyzed. We found that pickle-making practices consist of six scenarios: growing, processing, selling, cooking, eating, and specific festival scenes, each contributing to the value of the local cultural landscape. On one hand, this process of shaping tangible scenes reflects the actions of local people adapting to the cold climate in their daily lives, creating unique landscape imagery with local identity. On the other hand, it strengthens community identity and cohesion through social interactions and knowledge transfer facilitated by activities. Our research integrates intangible cultural heritage, tangible and intangible cultural properties, and selected preservation technologies within a cultural landscape framework. We clarified the impacts of the pickle-making cultural landscape on local agriculture, traditional architecture, and settlement patterns. This research provides a foundation for further landscape design, value promotion, and renewal optimization. We propose a landscape conservation strategy centered on pickle-making culture, emphasizing active local stakeholder participation. This strategy fosters sustainable cultural landscapes that balance tradition and modern needs, highlighting landscapes as cultural symbols of environmental wisdom and community cohesion, with a focus on traditional food production behaviors.

147 Landscape patterns of post-Byzantine monastery towers' settlements in Naxos, Greece. Defense, Spirituality and Synesthetic Atmosphere

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Keywords: Venetian occupation; courtyard; sacred space; agricultural fields; landscape phenomenology

This paper traces the architectural patterns and landscape setting of Monastery Towers in Naxos, the largest island of the Cyclades in the Aegean Sea in Greece. These monasteries form a significant body of architectural cultural heritage as expressions of past values, inextricably inscribed in society and culture of Greece and its Greek Orthodox religion as the formal representation of religious practice for many centuries. Naxos is known since mythical times, and it played a leading role in every historical period. The period that made a deep impression on the architectural identity of Naxos, and clearly characterizes its configuration to the present day, is the High Medieval Crusader or Frankish occupation phase, from 1204 to 1453. Venetian architecture constitutes an important and interesting chapter of Greece's recent architectural history. In this period, a handful of monastery towers were established, most of which are still in operation. These architectural monuments form intricate environmental complexes which are representative examples of a valuable link between Greek and Western architecture. The Venetian architectural vocabulary was successfully adapted by Greek skilled builders to the local architectural tradition and cultural context of that time resulting into unique space syntax, morphology and environmental concerns. However, research on this subject is scarce and not systematic. A great number of historic buildings of Venetian origin or inspiration remain undocumented, unknown, and neglected. This study analyzes four Monastery Towers of Naxos, the Monastery of Ipsilis, the Monastery of Timios Stavros, the Monastery of Faneromenis, and the Monastery of Fotodotis. It records their patterns via field investigations and thorough literature review. A series of drawings, diagrammatic analysis and photographs aim to produce a valuable document illustrating their space syntax, morphology, and landscape aesthetics. These tower-monasteries managed to not only adapt to the unique environment of Naxos, that is, to the climate, the configuration of the terrain, the functional requirements of the inhabitants, the available materials, and construction techniques of the time but also become religious centers of the Greek Orthodox Church. The dialogue of the monastic structures and the landscape reveal a particular deep sense of nature in a way to convey a strong effect on human psychology. The majesty of the landscape, the austere stone facades, and the humility in the layout composition of these monasteries had a catalytic effect on the psychology of the pilgrim, facilitating a series of emotions associated with the religion such as fear, hope and ignorance. Revised Abstract This paper studies the landscape patterns of monastery towers' settlements in Naxos, the largest island of the Cyclades in the Aegean Sea in Greece. Monastic environments are an integral part of Greek landscape and are inextricably inscribed in Greek Orthodox religion as the formal representation of religious practice for many centuries. These post-Byzantine monastic settings form a body of cultural heritage representative of the patterns on the landscape of Naxos established during the Venetian occupation phase of Naxos (1204-1536), and the subsequent Ottoman domination phase that still allowed Venetians to remain in control of the island (1536-1821). Research on these monastic landscape patterns as examples of expanding the existing vernacular patterns into newly introduced landscape patterns in the countryside remains scarce. This study documents three monastic complexes, the Monastery of

Ipsilis (1660), the Monastery of Timios Stavros (1679), and the Monastery of Fotodotis (1227) via field investigations and thorough literature review. A series of measured drawings, diagrammatic analysis and photographs aim to illustrate their landscape syntax, morphology, narrative and aesthetics. These monastic ensembles are isolated, ascetic, contemplative, and include both communal and individual outdoor lifestyles. A strong dialogue between the monastery towers' settlements, their natural surrounding sites, and the unfolding of a well-orchestrated series of outdoor spaces in the form of a central courtyard and various smaller sizes of open and semi-open courtyards, panoramic viewing terraces, and inner courtyards is observed. This reveals a deep understanding of the different roles of nature both at a macro-scale, forming a unique landscape pattern blended into the surrounding nature, and at a micro-scale, displaying a rich variety of enclosed outdoor arrangements and features. The intertwined synesthetic experience of indoor and outdoor spaces conveys a catalytic effect on the psychology of the pilgrim, facilitating a series of alternating emotions of awe, hope, stillness, pause, serenity, surprise, safety, vulnerability, mystery, and visual-audible pleasures. The diverse typologies of monastic landscape arrangements and their subsequent sensual qualities activate the divine feeling of submission to a Higher Power enhancing spirituality and introversion. The decoding of the intricate complexity of their landscape systems, the humility in their layout configuration and the austerity of their morphology totally immersed into the vastness of their natural landscapes of earth, rocks and sky also unveils a parallel focus on an interweaving of the monastic complexes with the surrounding extensive agricultural system of terraces ensuring holistic environments.

154 Can care scale? Reforestation and the carbon afterlives of fire-impacted landscapes

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Keywords: Care; Scalability; Carbon; Wildfires; Reforestation

The summer of 2023 was an unprecedented wildfire season for Canada's forests. By autumn, approximately 186,000km2 of land had burned, or roughly 5.5% of the country's total forested lands. Accompanying these fires were countless news reports that relied heavily on visual images to communicate the global scale and extent of their impacts. These dramatic images are visually captivating, yet they can also obscure the structural causes of forest fires, reducing complex environmental crises to abstract and placeless events. Yet perhaps the most significant consequence of the wildfires were their carbon dioxide equivalent emissions—more than double the total emissions produced by all sectors of the Canadian economy in 2021. In response to these emissions, the Government of Canada has sought out scalable nature-based solutions to achieve the goal of net-zero decarbonization by the year 2050. Drawing on one such initiative—Canada's 2 Billion Trees program (a pan-Canadian reforestation initiative)—our paper investigates how scale and care intersect in the afterlives of fire-impacted landscapes and the landscape strategies deployed to address those effects. Reforestation is a place-based project, embedded in landscapes shaped by the technical, historical, and ecological dimensions of carbon. 2 Billion Trees appears to offer a strategy of environmental repair caused by wildfires, yet this type of mass-reforestation often neglects the social and relational dimensions of forests. Care offers a framework to ground abstract climate agendas in material landscapes, and suggests alternative possibilities to the dominant practices currently used in mass-reforestation projects. But concepts of care do not provide simple solutions to complex problems; as a political tactic, care can be used to legitimize scalable and often paternalistic interventions in burned landscapes. Hence, this paper asks: can care scale? How can care, as a situated and relational ethos resistant to technological and economic imperatives for global scalability, inform a project of embedded landscape repair? Drawing on queer and feminist literature, we contextualize 2 Billion Trees within the visual discourse surrounding wildfires to reveal how nature-based climate solutions instrumentalize and exploit more-than-human life. Through our examination of visual representations of reforested landscapes, we demonstrate how situated practices of care can be co-opted and re-scaled into technocratic nature-based solutions for arboreal carbon sequestration, often diminishing both biodiversity and local expertise. By querying the scalability of care, we argue for a more explicitly care-based framework for reforestation situated in the mutual and relational dimensions of forest dynamics. Revised Abstract The summer of 2023 was an unprecedented wildfire season for Canada's forests. By autumn 186,000km2 had burned, or 5.5% of the country's total forested lands. Accompanying these fires were countless news reports that relied on photographs and visualizations to communicate the scale and extent of their impacts. These dramatic images are visually captivating, yet they also obscure the structural causes of forest fires, reducing complex environmental crises to abstract and placeless events. Yet perhaps the most significant consequence of the wildfires were their carbon emissions—more than double the total emissions produced by all sectors of the Canadian economy in 2021. In response, the Government of Canada has sought out scalable nature-based solutions to advance the goal of

net-zero decarbonization by 2050. Drawing on one such initiative—2 Billion Trees (2BT; a pan-Canadian reforestation program)—our paper investigates how scale and care intersect in the afterlives of post-burn reforestation initiatives. Reforestation is a place-based project, embedded in the technical, historical, and ecological dimensions of landscape, yet mass-reforestation programs like 2BT can also neglect the social and relational dimensions of forests (Braun 2002). In contrast to these programs, practices of care (defined through situated social and ecological obligations) offer a framework to ground abstract climate agendas in material landscapes, and suggest alternative possibilities to the dominant practices currently used in 2BT (Puig de la Bellacasa 2017; Jacobs 2019; Jacobs and Wiens 2023). But concepts of care do not provide simple solutions to complex problems; as a political tactic, care can be used to legitimize scalable and often paternalistic interventions in burned landscapes. Hence, this paper asks: can care scale? How can care, as a situated and relational ethos resistant to technological scalability, inform projects of landscape design and repair? Through critical visual discourse analysis, we examine how representations of reforestation can co-opt and re-scale practices of care into technocratic nature-based solutions, often diminishing both biodiversity and local expertise. These trends mirror challenges also observed in contemporary landscape architectural representation (Amoroso 2024). By critically examining how care is scaled in the context of 2BT, we argue for a more explicitly care-based framework situated in the mutual and relational dimensions of forest dynamics. This approach offers valuable lessons for both restorationists and landscape architects, emphasizing the importance of nature-based solutions that are grounded in the specificities of place and interdependence of living systems.

221 Sustainable Soil Management: Lessons from Traditional Agricultural Practices on Three Mediterranean Islands

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Keywords: traditional agricultural practices; soil management; climate adaptation; Mediterranean islands

Soil deterioration is a critical environmental challenge in the Mediterranean region, particularly impacting its most vulnerable territories, such as islands and coastal zones(Yaalon, 1997; Vogiatzakis et al., 2008). Soil erosion, salinization, aridification, compaction, sealing, and exhaustion are increasingly prevalent, posing significant threats to soil productivity, ecological resilience, and food security (Vogiatzakis et al., 2008). Human activity is widely recognized as a dominant driver of these processes (Dudal, 2004; Richter &Yaalon, 2012). While traditional soil management practices in the region prioritized erosion control and moisture retention, recent changes—such as land abandonment—have accelerated soil degradation (Stanchi et al., 2012; Sakellariou et al., 2021). This research aims to analyze traditional agricultural practices (TAPs) for soil management on three Mediterranean islands—Minorca, Pantelleria, and Andros—to identify techniques and strategies that can inform improved approaches to soil creation, use, and preservation in landscape architecture.

The research builds on an interdisciplinary study on the Mediterranean region involving multiple universities and diverse projects (Ricci, 2022). The first completed phase of the study examined seven islands selected for their diversity and representativeness. An extensive literature review on Mediterranean islands, soils, and TAPs informed the selection of three islands where TAPs are still actively practiced, observable, or innovated upon. The current investigation combines desk-based research–particularly a comparative analysis–with on-site observations and field visits to explore the relationship between land cultivation and soil systems.

Findings reveal that traditional farming prioritizes efficiency, adaptability, and resource conservation, particularly in relation to soil. For instance, terraces constructed using stones collected from fields were designed to control soil erosion, increase water retention, and minimize evapotranspiration. Similarly, vegetated or constructed windbreaks and microtopographic depressions were implemented to reduce soil loss, enhance water retention, mitigate evapotranspiration, and optimize dew condensation and local microclimates. These practices demonstrate how human agency actively contributes to soil formation and preservation, particularly in semi-arid and fragile ecosystems.

The study underscores the relevance of TAPs as efficient, low-input, and ecologically adaptive strategies for contemporary soil management. For landscape architects, these findings provide actionable insights into designing and building resilient landscapes by integrating proven traditional techniques with modern practices. By revisiting these methods, we can promote sustainable solutions for soil health, particularly in vulnerable regions facing climate change and resource scarcity.

246 Detroit's Island Park: How Belle Isle Fulfilled and Defied Olmsted's Hopes and Visions

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Keywords: olmsted; detroit; civic; park; drainage

Belle Isle, an improbable 982-acre landmass in the Detroit River, is arguably one of Frederick Law Olmsted's most enigmatic – and successful – parks. Its ecological dynamism is characterized by complex native habitats and seasonal flooding, when reflections of sky scatter across its low-lying plains and a walk across the great meadow recalls pacing on a sponge. 200 acres of wet-mesic flatwood forest forms a particularly valuable local ecology – Michigan's largest, and one of only a handful left nationwide (Michigan Department of Natural Resources, 2018). Its social dynamism is rooted in its role as a civic heart for Detroiters for over a century: a place to see and be seen, to host family reunions and cookouts, to cruise on a perfect Detroit summer day. This paper argues that Belle Isle's success as a highly dynamic public space – as the quintessential Olmstedian park – both embodies and defies Olmsted's vision for the park. In 1881, when the City of Detroit commissioned Olmsted to transform Belle Isle into a park, he documented his site visits extensively – from the stagnant pools he found "discolored, and covered by bubbles and a green scum" to the mesic forests displaying "elements of sylvan scenery of a far nobler type and character" than Central Park's (Olmsted, 1882). He rightly understood that an extensive drainage operation was to be a priority, and overlaid program with a planned system of canals to marry form and function. He advocated vigorously for the preservation of the forests, identifying them as uniquely valuable. Yet Olmsted also argued that "the essential merit of the park will lie in the purity, congruity, and unsophisticated quality" of its natural features, warning against letting human program take an outsized role (Olmsted, 1884). He saw, in Belle Isle, a chance to correct the missteps of Central Park. Despite Olmsted's commitment to the project, disagreements over funding led to his resignation, and his full design was never realized. By delving into Olmsted's written and photographic documentation of Belle Isle, in addition to his preliminary designs, this paper will shed light on his full vision for the park. Further, this paper will analyze Belle Isle's development over the decades and its contemporary function, illuminating where and how the park embodied and defied Olmsted's imagination. Ultimately, this paper will argue that Belle Isle became a quintessential Olmstedian park in large part because it wholeheartedly embraces the very human aspects that Olmsted warned against.

262 The Introduction of American Lawns to Korea, 1882–1905

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Keywords: grass; sod; Horace N. Allen; seed exchange; transnational landscape

Lawns are now a common feature in landscapes worldwide, but in traditional Korean contexts, the term “lawn” primarily referred to grass used for erosion control around graveyards and fortifications. It was not until the late 19th century that ornamental lawns began to appear in Korea, notably at the residences and workspaces of American missionaries and diplomats. Interestingly, this shift coincided with the growing popularity of lawns in middle-class American homes, marking a significant moment of socio-cultural exchange between Korea and the United States. This paper examines the introduction of the American lawn to Korea, focusing on two early examples: the lawns at the U.S. Legation and the villa of U.S. Ambassador Horace N. Allen. Key objectives include analyzing the terminology used to describe lawns, identifying key figures involved in bringing lawn concepts and grass seeds to Korea, exploring the motivations behind lawn establishment, and investigating the usage and cultivation of these lawns. The research draws on primary sources such as the Horace N. Allen Papers from the New York Public Library, which document Allen’s over 20-year residency in Korea, as well as photographs of the U.S. Legation in Korea from the American Geographical Society Library Digital Photo Archive and Allen’s 1908 book, Things Korean. Allen’s records provide insights into lawn care practices, aesthetics, grass seed collection, and the lawn market. The findings reveal that terms such as “grass,” “sod,” and “lawn” were used to describe green spaces, which were valued for their visual, aesthetic, sensory, and environmental aspects. In the early 1880s, the U.S. Legation established a lawn tennis court and a front yard lawn, while Allen began cultivating a lawn at his villa near Seoul around 1900. Allen was instrumental in the exchange of grass seeds, sourcing seeds from the U.S. and sending Korean varieties to the U.S. Department of Agriculture and seed companies, including Peter Henderson & Co. and Cox Seed & Plant Co. This paper argues that Allen and the U.S. Legation played a crucial role in introducing the American lawn—symbolic of a velvety green carpet—to Korea, transforming the Korean perception of lawns from utilitarian erosion control to spaces for recreation and aesthetics. By shedding light on the global influence of American lawn culture, this study contributes to transnational history of landscape design. It also invites reflection on contemporary issues, such as the global “anti-lawn” movement and the ongoing "turf war," promoting sustainable environmental practices.

265 From Vernacular Infrastructures to Resilient Futures: Disruption and restoration in the settled landscapes of rural Hong Kong.

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Keywords: vernacular infrastructure; landscape heritage; cultural landscapes; rewilding; Hong Kong/South China

Hong Kong's transformation from a colonial trading outpost to an urban phenomenon paralleled a reorganization of the city's hinterland and the decline of traditional agriculture. This paper investigates how the applied expertise of engineers and planners disrupted the city's physical landscape and the practices rooted within it. Recalling the traditionally managed landscapes, tracing their loss, and speculating on their recovery offers the city a notion of conservation and design that is linked to traditional concepts of heritage, nature, and culture. We explore two significant periods of landscape disruption. The first, from the 1950s to the 1980s, saw physical changes driven by trained specialists and multinational experts who reshaped the landscape in response to population growth, soci0-economic stress, and the end of a colonial legacy. The second period is more recent and involves imperceptible disruptions of value, classification, and meaning by bureaucrats and government planners in response to political and environmental pressure. Historically, Hong Kong's alluvial valleys, like much of southern China and Southeast Asia, featured rice paddies and terraced agriculture with intricate irrigation systems. However, social movements and poor housing conditions spurred outward expansion policies. To support this growth, new reservoirs, large-scale flood-control measures, and new highway networks were built. This new infrastructure isolated villages, while expansive water diversion projects redirected far-away streams that fed remote agricultural areas. This disruption changed the structure of Hong Kong's natural watersheds and their ways of life. With economic opportunity available in new urban cores, the villages and their fields were abandoned within a generation. After half a decade of rewilding, industrial pollution, and declining village representation, the few rural landscapes that remain in Hong Kong are at the centre of a renewed strategic focus. Village environs have been recently incorporated into territory-wide municipal zoning codes and environmental protection ordinances. Remote villages face the burden of compensating for the city's ecological degradation elsewhere. With remotely assessed land-use and land-cover classifications now a determining land rights, and a complete lack of compensation for past disruption, the villagers have made their own strategic interventions. New and aggressive land-management practices, such as cutting down mangroves or wetland filling, have garnered the label of 'vandalism' and 'poaching'. We conclude with a set of speculations on bridging these twice-disrupted landscapes to engage in a set of renewed traditions in rural Hong Kong. Revised Abstract Hong Kong's transformation from colonial outpost to urban phenomenon paralleled a reorganization of the city's hinterland and the decline of traditional agriculture. This paper investigates how the expertise of engineers and planners disrupted the city's physical landscape and the practices rooted therein across a series of villages on Lantau Island. By documenting the heritage of these traditional landscapes, tracing their loss, and speculating on their recovery, this study offers the city an alternative model for conservation and landscape planning that embeds links to nature and community. Lantau's alluvial valleys, like much of rural Hong Kong

and southern China, once featured rice paddies and terraced agriculture. But social movements and poor housing conditions in the early-20th century spurred a policy of expansion. To support this development, new reservoirs, flood control systems, and road networks were constructed across the periphery. This new infrastructure isolated villages, while water-diversion projects restructured the territory's watersheds, changing traditional ways of life and practices of land-management. With economic opportunities available in new urban cores, the villages were abandoned within a generation. We explore two significant periods of landscape disruption in this study. The first, from 1950 to 1980, saw physical changes driven by specialists and multinational experts who reshaped the landscape in response to population growth, socioeconomic stress, and colonial legacy. Our methods here include archival research and map analysis of historical cartographic data to trace periods of physical intervention and reveal the consequences for land-cover/land-use change. The second period of disruption begins in 2010 and involves the divergence of land value, classification, and management between government experts, villagers, and the public in response to political and environmental pressure. The few rural landscapes that remain in Lantau are at the centre of a renewed strategic focus. Village environs have been recently incorporated into government zoning codes and environmental protection ordinances. Remote villages face the burden of compensating for the city's ecological degradation. We use multiple methods to narrate these conflicts, including GIS-based map analysis to trace land classification and use, villager interviews, and field-work methods including documentation of historic structures and soil and ecological inventory. We ultimately find a community and landscape that has weathered disruptions of multiple origins—climatic, geological, infrastructural, and bureaucratic—and that has responded with flexibility, protest, and innovation. We conclude with a set of speculations to bridge these disrupted landscapes to engage in a set of renewed traditions in Hong Kong.

293 Landscape Architecture in Israel (1970s-2000s): A Unique Professional Institutionalization

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Keywords: Landscape architecture; Professionalization; Israel; Institutionalization; mid 20th century

By the 1970s, the landscape architecture profession in Israel was poised for significant growth. Nearly 50 years had passed since the first landscape gardeners arrived in Palestine (1920s), and nearly 25 years since the establishment of the State of Israel (1948). During this time, landscape architecture evolved from a niche occupation into a prestigious profession. The 1998 awarding of the esteemed Israel Prize to landscape architects Lippa Yahalom and Dan Zur was not only a recognition of their creative achievements but also an acknowledgment of the entire profession. This paper examines the institutionalization of Israeli landscape architecture as a case study of how a profession can emerge from a practical occupation (Baird and Szczygiel, 2007). It highlights the steps taken by the professional community and their organization (established in 1952) to elevate the profession's status and expand its scope of activities. The research draws on a critical review of the landscape architects' organization's archives, including meeting minutes, correspondence, and various documents. It also incorporates interviews with stakeholders, community members, and state authorities' representatives. Given Israel's unique political, economic, and social circumstances—coupled with rapid development and the need for landscape preservation—the landscape architecture community recognized its crucial role in shaping the nation's environment. Alongside designing iconic landscapes of national significance, such as parks, urban open spaces, and national infrastructure, professionals worked to achieve legal recognition and national approval. They secured international and local recognition through membership in the International Federation of Landscape Architects (IFLA) and participation in state committees and planning councils. The profession's focus shifted from a gardening orientation to one cantered on architecture, culminating in the legal right to solely perform specialized tasks and the establishment of minimum planning rates by various state's Bureau. This process of defining and securing their unique profession took place through interplays and negotiations with other professional organizations and bodies. The creation of an academic program at the Technion, Israel's leading technological institute, in the late 1970s, marked the final phase of the profession's institutionalization. Despite, and perhaps because of, the absence of a local tradition in landscape planning, the profession's leaders, driven by vision and determination, successfully navigated the political and social landscape to elevate their field.

303 The Spatial Design Wisdom of the Ming Dynasty Military Defense System Under the Wei-Suo System

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Keywords: Landscape Architecture; Wei-suo System; Military Settlements; Space Creation; Research Review

This paper starts with the wisdom of military settlement space construction in the Ming Dynasty, mainly through literature analysis and ArcGIS-assisted analysis, analyzes the garrison system in the coastal defense system, the Great Wall system and the fortress system of the Ming Dynasty, and reveals the distribution, structure and function of military settlements. Relying on the natural geographical environment, the military settlements in the Ming Dynasty formed a diversified spatial pattern, reflecting the profound regional culture and strategic defense thought. Through the comparative analysis of different settlement systems, the mechanism and spatial construction strategy of military settlements in national defense and local stability are understood, which provides an important theoretical basis for the protection and utilization of these historical settlements. Revised Abstract The geopolitical landscape during the Ming Dynasty was complex, with external threats and fluctuating internal regional powers. To counter diverse military risks, the Dynasty established a unified and comprehensive defense spatial system. This study examines the northern Great Wall defense line, coastal defense systems, and inland fortress networks as case studies, systematically reviewing historical documents, geographical records, and archaeological evidence. Utilizing ArcGIS for spatial density analysis and visualization, the study explores the structure of military defense patterns, the spatial characteristics of settlements, and the principles of spatial design in defense construction. The northern Great Wall defense line, with its undulating terrain and strategic pass locations, formed a segmented military control system of "Zhencheng— Lucheng— Weicheng— Suocheng— Fortress." This system successfully repelled northern nomadic invasions. Taking Datong as a case study, the spatial pattern of "adapting to the terrain and situating near water" is analyzed, illustrating how the defense system capitalized on natural features to optimize strategic positioning. The Ming coastal defense system, leveraging coastlines, islands, and harbors, created a layered defense network of "Weicheng— Suocheng (thousand-households, hundred-households) —Fortress— Fortified villages— Beacon towers." This multi-layered system balanced maritime and terrestrial defense needs, addressing threats from sea invasions and trade fluctuations. The Shandong Peninsula serves as a prime example, with its defense strategy of "choosing high ground to control strategic passes," which enabled effective control over key maritime and terrestrial routes. The inland fortress system utilized mountainous and hilly barriers, along with dense water networks, to create a regional

defense space of "Du-si— Weicheng— Suocheng— Fortress." This system played a key role in stabilizing local military and civilian life. By examining the Guizhou Tunbao system, the spatial pattern of "situating by rivers with mountains at the back, and facing strategic vantage points" reveals how these fortresses were placed to maximize defense and control. By comparing these three types of military defense spaces, the study identifies essential principles of spatial design, including "adapting to terrain," "controlling strategic vantage points," and "choosing high ground for defense." These insights provide valuable guidance for the construction of the Great Wall National Cultural Park, the preservation of historical heritage, and the protection of globally significant defensive settlements.

308 Stakeholder Opinions on Design and Management of the Pharr Mounds Site

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Keywords: Stakeholder; Cultural Landscape; Historic Site; Conservation; Heritage

The Pharr Mounds site along the Natchez Trace Parkway is a culturally significant burial location that is visited by thousands each year. This site is home to the remains of an ancient group of individuals that the current Chickasaw Nation are descended from. The eight mounds hold human remains and artifacts present from the Middle Woodland Period (200 BC to AD 500). In the picturesque landscape, the contrast of agriculture stood present over the 90-acre site. Due to an agricultural lease, grasses were mowed and baled into round hay bales which often stood in the sea of grass on the mound site. To improve visitor experience and to analyze the perspectives of others on design solutions, this question was presented to stakeholders: How do the opinions of the Chickasaw Nation, the National Park Service, and the visiting public affect decisions on programmed design elements at the Pharr Mounds site? Stakeholder groups were split into three major categories: the Chickasaw Nation, the National Park Service, and the public. The public had the opportunity to complete a web-based survey which was accessed through a QR code on site. Members from the Chickasaw Nation and the National Park Service were given a list of questions for the programmed design and management methods for the Pharr Mounds site. Members from the National Park Service participated in individual interviews while the members of the Chickasaw Nation felt more comfortable submitting responses via email after a group review took place within their organization. Questions addressed the effects of agriculture on site, burning for management intentions, interpretation of elements on the site and an increased trail network for other views of the site. Overwhelmingly, hay bales on site were seen as a distraction from the views of the mounds and were seen as negative. The public and the National Park Service were more interested in trail systems than the Chickasaw Nation. There was a large push for more interpretive elements within the landscape from all groups. The Chickasaw Nation and the National Park Service were both supportive of burning for management purposes, while the public showed more of a push against it based on their knowledge of fire in a landscape context. This information gives a better understanding in how site design and management could incorporate the opinions of different stakeholder groups to better understand and respect the sacred site.

309 The Pioneering Legacy of South Carolina's Landscape: elucidating the American Experiment

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Keywords: Emancipatory research; Novel typologies; Cultural Landscapes; American Experiment; Nation-building

The purpose of this original research is to fill a significant knowledge gap on understanding South Carolina's (SC) multivalent landscape legacy as a contributing "actor" to nation-building in America. On a fundamental level this research is qualitative and interpretive. However, in the synthesis of SC's landscape as cultural by-products of society, aspects of this research can be construed within the "emancipatory research paradigm" – challenging the conventions of the normative "gaze" and literature on cultural landscapes. In this light, research findings reveal the various actors or past and current occupants of SC's landscapes as marginalized or dominated by the conventions of America's broader post-colonial, capitalist, industrial and agricultural complex. This work traverses beyond the normative classification of cultural landscapes as places touched by human impact and interpreted by the trained and discerning gaze (Sauer 1925; Lewis 1979; Jackson 1979, 1984). Aspects of this research follow the scholarly trajectory by Cosgrove (1984), Schein (1997), Cresswell (2003) and Merriman, et al (2008) as a social, cultural, political, and spatial construct. It also draws from Black Geographies, Black Landscapes (McKittrick & Woods 2006; Boone 2020; Hood 2020), and related emancipatory research literature (Noel 2016). This research intentionally innovates novel typologies – traversing SC temporally and across terrestrial space to reveal the First Nations contributions to the state's contemporary road network. It critically analyzes 20th century phenomena like the American artists' romantic portrayal of Black workers in SC's agricultural landscapes in the1930s-40s murals commissioned for the US Treasury's Department' Section of Painting and Sculpture. Jim Crow experiments represented in the landscapes of Public Works Administration 1940s and1950s housing projects including the "separate but equal" school sites, and the contributions by African Americans to nation-building like the 1960s civil rights era combined with the 21st emerging typology of reconciliatory landscapes are considered. It interprets SC's everyday landscape and ways contemporary evangelical billboards are an evolution of SC's 18th and 19th century religious revival landscapes as both a social and religious practice. It considers SC's pioneering productive landscapes – from the colonial experiments of indigo, rice, and tobacco to the current "sustainable" practices that cultivate heirloom produce for consumption by the internationally reputed Charleston culinary scene. This work reveals the material significance of SC's "extraction landscapes" and SC's quarries to the built environment, particularly the bluestone granite as a major building material deployed in the construction of the nation's iconic buildings like the Flat Iron Building in New York. Revised Abstract The purpose of this study is to introduce South Carolina's (SC) pioneering and multivalent landscape legacy by synthesizing novel landscape typologies for the 20th and 21st centuries. It contributes to filling a broader knowledge gap for understanding SC's contributions to nation-building and the American Experiment. As one of the USA's original thirteen colonies, SC's plantation economy was colonial America's primary financial driver; and its related agricultural experiments, plantation garden form and Charleston garden genre, heritage of slavery and emergence of the Gullah culture and their impact, were recognized for its pioneering attributes but are not this study's focus. This preliminary synthesis of SC's 20th and 21st century novel landscape

typologies as pioneering cultural by-products of society are construed within the “emancipatory research paradigm” – challenging the conventions of the normative “gaze” and literature on cultural landscapes and traverses beyond the normative classification of cultural landscapes as places touched by human impact and interpreted by the trained and discerning gaze (Sauer 1925; Lewis 1979; Jackson 1979, 1984). This study’s scholarly trajectory aligns with the multivalent social, cultural, political, and spatial construct (Cosgrove 1984; Schein 1997; Cresswell 2003; and Merriman, et al 2008). It also draws from Black Geographies, Black Landscapes and related emancipatory research literature (McKittrick & Woods 2006; Noel 2016; Boone 2020; Hood 2020; Padua 2023). In this light, it reveals the various marginalized actors or past and current occupants of SC’s landscapes that were dominated by America’s broader post-colonial, capitalist, industrial and agricultural complex. In addition to archival and ethnographic methods, and literature review, this study considered materialization and representation. This study reveals and emancipates the “hidden” and little known material heritage like: the First Nation tribes’ influence on SC’s 20th century road infrastructure; Black Landscapes in American Realism depicted in the 1930s & 1940 US Post Office murals of SC’s everyday rural lands commissioned for the US Treasury’s Department’ Section of Painting and Sculpture for public consumption; the 1940s & 1950s “separate but equal” SC landscapes in housing projects and school sites, part of Jim Crow experiments; and emerging 21st century reconciliatory landscapes that considers retrospective justice for SC’s 1960 first civil rights sit-in at a segregated lunch counter by 9 Black students as represented in Rock Hill’s Freedom Walkway, and the Emanuel Nine Memorial that commemorates the Black clergy and parishioners who were murdered by a white supremacist in the South’s oldest African Methodist Episcopal Church in Charleston.

328 Procedural Trajectories: Analyzing Hubbard and Kimball's Introduction to the Study of Landscape Design

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Keywords: procedural theory; Hubbard & Kimball; cognitive skill sets; landscape architecture

ABSTRACT. The body of theory extant today in landscape design is commonly divided into three categories—substantive theory, knowledge used to make decisions; normative theory, norms and values describing what ought to be' and procedural theory which answers methodological questions focused on "how" we design (Swaffield, 2002). Both the substantive and normative theory originate from the overlapping categories of the environmental and social sciences and aesthetics (Thompson, 2000). Procedural theory, the subject of this paper, addresses the methodological issues originating in design practice and the processes or activities of designing (Swaffield, 2002; Cross, 2023). In Swaffield's 2002 publication which collects the most influential writings in theory in the last half of the 20th century, procedural theory was mainly characterized by staged process models. However, if we look further back in time we find that the origins of our procedures had more than one trajectory. This research analyzes the content of the Henry Vincent Hubbard and Theodora Kimball's Introduction to the Study of Landscape Design (1917) to explore how procedural theory was viewed as the profession was "intellectualized" in the academy at the beginning g of the 20th century (Hohmann, 2008, p.189). This research found that Hubbard and Kimball used two general approaches to procedures— one more explicit categorized here as the documentation approach and another more implicit as the cognitive approach. The first is contained in a thorough description of a hypothetical project in a professional office, from client interviews and site visits to construction documentation, implementation, and subsequent management. Located in the Appendix Part II: Notes on Procedure in Design, the steps are laid out in the logical sequence much like the more abbreviated staged process models that began to appear at the end of WWI (Sasaki, 1951; Newton, 1951). Through the 20th century the goal of this documentation approach was the production of legally-binding construction documents. The cognitive approach looks inward to actual thinking skill sets used in the act of designing. Evidence of this approach primarily appears in Chapter 1. It attempts to capture based on what was known about the cognitive sciences and educational psychology at the time, how we are thinking throughout the design process. The research will analyze in detail the kinds of cognitive skill sets called out in the text and explore how they approached embodied cognition, so important in body, dimensional, and sensorial thinking (Root-Bernstein & Root-Bernstein,1999; Roehr, 2022). Revised Abstract The body of theory in landscape design is commonly divided into three categories—substantive theory, knowledge used to inform decisions; normative theory, norms and values describing what 'ought to be;' and procedural theory, knowledge applied to solve problems with a focus on how we design (Swaffield, 2002). Procedural theory, the subject of this paper, addresses the methodological issues originating in design practice including the processes or activities of designing (Swaffield, 2002; Cross, 2023). In Swaffield's 2002 publication which collects what he considers the most influential writings in theory in the last half of the 20th century, procedural theory was in part represented by a range staged process models codifying various procedural approaches. However, if we look further back in time we find that the origins of our procedures had more than one trajectory. This research analyzes the content of the Henry Vincent Hubbard and Theodora Kimball's Introduction to the Study of Landscape Design (1917) to explore how

procedural theory was viewed as the profession was “intellectualized” in the academy at the beginning g of the 20th century (Hohmann, 2008, p.189). In the textbook, Hubbard and Kimball used two general approaches to procedures— one more explicit categorized here as the documentation approach and another more implicit as the cognitive approach. The first is contained in a thorough description of a hypothetical project in a professional office, from client interviews and site visits to construction documentation, implementation, and subsequent management. Located in the Appendix Part II: Notes on Procedure in Design, the steps are laid out in the logical sequence much like the more abbreviated staged process models that began to appear at the end of WWI (Sasaki, 1951; Newton, 1951). Through the 20th century the goal of this documentation approach was the production of legally-binding construction documents. The cognitive approach is an attempt to describe the actual thinking skill sets and ways of thinking used in the act of designing. Evidence of this approach primarily appears in Chapter 1. It attempts to capture based on what was known about the cognitive sciences and educational psychology at the time, how we are thinking throughout the design process. The research will analyze cognitive skill sets discussed in the text and explore their approach to cognition and its embodiment, so important in body, dimensional, and sensorial thinking (Root-Bernstein & Root-Bernstein,1999; Roehr, 2022) when designing.

336 Modern Landscape Architecture in the American South

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Keywords: Modernism; American South; Draper; Martini; Henderson

The American South shares a long history with the profession of landscape architecture. Frederick Law Olmsted bookended his career here, beginning with his infamous travels through the region and ending with his magnum opus at Biltmore Estate. The region also has a conspicuous tradition of landscape from the elaborate plantation grounds flanking the Mississippi River, the innovative city plan for Savannah, and the many coastal resorts that branded the region as vacationland. The South is also home to many firsts that are still prominent in professional discourse. Historic preservation essentially started at Mt. Vernon, expanded to the urban scale with the Vieux Carré Commission, and developed into a popular tourist industry at Williamsburg. Cape Hatteras became the nation's first National Seashore in 1937, and the environmental racism movement started in Warren County, NC. Despite its historical prominence, the South does not command a conspicuous role in the larger history of modern landscape architecture. Aside from Atlanta or Florida—which until recently were considered geographical and cultural aberrations by many southerners—the South featured comparatively little, and far later, urban development. This paper seeks to fill a gap in the literature on the history of modern landscape architecture in the American South. It will do so by interweaving the stories of Earle Sumner Draper, NC State University, Edith Harrison Henderson, and Eugene Martini. Draper was a protégé of John Nolen who began his career in Charlotte and went on to hold prominent roles in the Tennessee Valley Authority and the Federal Housing Administration. NC State was one of the first programs to teach landscape architecture in the region and exemplifies the role of professional training to modernizing the building culture. Henderson was one of the first women to practicing professionally in the South, and she was the first women elected as an officer of the ASLA. Martini's career essentially mirrors Drapers, beginning in the FHA and ending with prominent work on land planning. Together these four stories provide a beginning history to how landscape architecture developed professionally in the American South.

346 What's in a name? Toronto's Dundas Street Controversy.

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Keywords: Colonialism; Structural Racism; Urban Design & History; Henry Dundas; Toronto, Ontario

In December 2023, Toronto City Council abruptly concluded a contentious three-year debate on renaming city assets tied to a problematic historical figure. This decision ignored recommendations from a specially formed Community Action Committee and highlights the complexities of addressing historical legacies in urban spaces. The controversy centered on Dundas Street, a major traffic corridor named after Henry Dundas (1742-1811), whose role in delaying abolition throughout the British Empire has come under scrutiny. This paper argues that the renaming of Yonge-Dundas Square exemplifies the many challenges cities face when reconciling historical commemoration with contemporary values. The controversy surrounding the renaming reveals deep-seated tensions between historical preservation, public opinion, and efforts to address systemic racism within the urban fabric. By examining this recent case in Toronto, we can trace the intricate dynamics of urban identity, historical memory, and social justice in modern cities. The paper employs a range of historical research methods to provide a comprehensive analysis of the renaming process and its implications. These include detailed examination of historic maps to trace the evolution of Dundas Street, analysis of newspapers and city council agendas to track the public discourse and political decision-making process, and review of municipal and provincial policy legislation to understand the legal framework governing such changes. It illuminates the evolving nature of commemorative practices in the 21st century, as cities worldwide grapple with their historical legacies in an era of increased awareness of social injustices. This work underscores the critical role of public engagement in decision-making processes, particularly when addressing sensitive cultural issues, and questions the effectiveness of current models of community consultation when facing contemporary social and environmental threats. At the same time, it explores the challenges inherent in reinterpreting historical figures for contemporary audiences, balancing historical accuracy with current social values and the desire for more inclusive public spaces. The presentation concludes with a series of theoretical considerations that the audience may find useful in applying to their own urban centers that are struggling with similar problematic historical figures.

359 “Before the Apocalypse: The Necessity of Utopias, or Some Notes on the Afterlife of Manifestos”

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Keywords: Utopia; Manifesto; Social and Environmental Justice; Resilience; Sustainability

Compared to other fields concerned with imagining better places, landscapes and lives, landscape architecture has had a comparative dearth of manifestos. The few that exist appear to be largely reactive and conservative, concerned with preventing a worsening, often focusing on environmental issues, threatening apocalyptic scenarios, and presenting a field that appears to be in constant crisis response mode (and outright crisis itself). This paper cuts a transect through manifestos and manifesto-like documents related to landscape architecture from the last 100 years, revealing relationships between manifestos and the actual, perceived and supposed identities of the field, discipline and profession. Taking the “New Landscape Declaration” (2017) and “Design and the Green New Deal” (2019) as points of departure, it attempts an archaeology of landscape architectural thought, contextualizing the ways the field imagined itself and its impacts in the larger cultural, political, aesthetic, economic and ecological debates. Against this background, four prevalent points of critique will be investigated: Considering the relatively small size of the profession compared to e.g. architecture or engineering, there has been, at least since McHarg, an oversized ambition and attendant overestimation of the role landscape architects can play. With notable exceptions, landscape architecture as a profession has not been participating in the more contested political debates that challenge growth-based capitalist ideologies anathematic to resilience, sustainability and other values. Most, if not all of the insights and ideas that changed the way landscape architecture thought of itself were not coming from within the field, but from neighboring disciplines, e.g. ecology. Recent debates show a wide range of positions within landscape architecture – while this could be the basis for an inclusive, critical and constructive debate about its identity and future it appears more as an indicator of a latent and ongoing identity crisis and a desperate attempt at relevance in a changing world. Considering landscape architecture’s claims to leadership in responding to the challenges of climate change and environmental justice the paper suggests the need for alternative approaches: well-considered, provocative and radical utopias that may serve as effective and inspiring counterclaims to the contemporary rhetoric of sustainability and resilience. Such “manifestos” might effectively confront the uncritical acceptance of concepts that reduce human culture to mere survival, and end landscape architectures inadvertent complicity in not just the very political and economic systems responsible for the environmental degradation it professes to combat, but also in social injustice and, ultimately in its own irrelevance.

370 New Lenses on Landscape in the Anthropocene

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Keywords: Landscape definition; Assemblages; Anthropocene; Indigenous ontologies; sympoiesis

What lenses do we miss when considering the term landscape? Scholars such as Jackson (1984) and Cosgrove (1984) are fundamental to scholarship in landscape, but their respective definitions of landscape only encompass concepts of land and human action. More recent scholarship of Tsing (2015) and Matthews (2022) on cultivated landscapes thriving only with both human and fungal actions, and Arènes (2022) in understanding the non-living processes and relations that construct landscape illustrate the shortcomings of limiting landscape to only human-centered land practices. By following the work of Brain (2018) and Gan and Tsing (2018) on incorporating the concept of assemblage into landscape studies, the work of Kimmerer (2017) and Kite (2023) on Indigenous worldviews of human and non-human kinship, and Arènes (2023) and Haraway (2017) on the centrality of scientific observation and sympoietic scientific approaches in understanding landscape, we can begin to broaden our definitions of landscape and what these alternative lenses mean for the future of landscape studies.

377 Building ecological knowledge through small moves

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Keywords: traditional ecological knowledge (TEK); building ecological knowledge; landscape care; farming

In the twenty-first century, an era marked by climate change and social instability, people need practical ecological knowledge to design and care for landscapes. One significant source is traditional ecological knowledge (TEK). TEK is the collective knowledge and beliefs that a people have developed interacting with an environment over generations. Julia Watson (2020) rightly argues that TEK may be used to inform landscape architecture, however TEK is not so easy to pass on or to apply across cultures. Moreover, TEK from one culture may not fit the structure, function, and associated beliefs of another people in their place. In some socio-ecological situations, new ecological knowledge, the seeds of future TEK, is needed. How does one establish new lifeways and build ecological knowledge from the ground up? It can happen through adaptive management, starting with small moves by hand, as TEK developed historically, entangled with cultural beliefs. This paper reflects on nascent ecological knowledge developed in the first three years of the author's tending to a small farm (5-acres) in central New Jersey. At the core of this practice-based research is a rudimentary belief system based on an aesthetics of thrift (Dee, 2010), work as a form of meditation, and timefulness (Bjornerud, 2018). The diverse tending practices discussed range from raking to planting, run to raising goats and scavenging for free materials. These practices reveal that it is ecologically beneficial to 1) use slower, less efficient methods rather than faster broad-sweeping techniques; 2) allow time for natural processes to unfold instead of pushing for quicker results and 3) embrace found objects as building materials instead of bringing new materials into being with higher embodied energy. The humble lesson learned is that ecological knowledge may emerge from practices that are part of an individual or a community's lifeways whether across generations, as in TEK, or in the budding situation described here in the peri-urban culture of the Mid-Atlantic. The practices discussed are outside the norm for landscape maintenance and care in this context, which typically relies on low-wage laborers and seeks a sanitized suburban aesthetic. This case reveals that much work lies ahead for building robust ecological knowledge even simply to inform landscape architecture, which only recently has begun to realign with gardening practice (Raxworthy, 2018) and to honor those who labor in the care of landscapes (Franco, 2024).

386 Dior's Ode to Scotland: Exploring the Intersection of Fashion and Landscape

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Keywords: Dior; Drummond Castle Gardens; fashion

On June 3, 2024 the French luxury fashion house, Dior, introduced their 2025 cruise collection in a show at Drummond Castle Gardens in Perthshire, Scotland. As the Scottish countryside and its history were inspirations for this collection, it was befitting for Dior's artistic director, Maria Grazia Chiuri, to introduce the new line in this garden, which has a complex history reflecting European landscape architecture spanning multiple traditions over more than 500 years (Drummond Castle Gardens, 2024). The show is a striking example of the intersection of the material cultures of fashion and landscape wherein memory and landscape are infused within the garments. Featuring a battalion of serious faced models, clad in tweed, tartans, leather, lace, and velvet, traversing through the garden paths like a procession of weary soldiers returning from the fray, the show paid homage to the place and its history in several ways: photographic references to Christian Dior's 1955 show, also located in Perthshire, sewn directly onto garments; maps of Scotland adorning models, referring to the centuries of relationships between France and Scotland; and central to the show is tartan—fabric that is directly linked to the vegetation and colors of Scotland's landscapes. According to a review of the show in Women's Wear Daily, the collection had many sources of inspiration including Clare Hunter's Embroidering her truth: Mary Queen of Scots and the language of power and Justine Picardie's Miss Dior: A wartime story of courage and couture, which explores Christian Dior's connection to Scotland. Methods supporting this presentation will include: reviewing the show's documentation; studying the garden history through literature, archival material, and maps; understanding the artistic director's inspirations; and examining the history of Dior's relationship with Scotland. This study is an important first step in placing the material culture of both clothing and the landscape in a larger historical context, where themes such as palimpsest and memory can be manifested across different cultural expressions. With few exceptions, very little has been written about the intersection of landscape and fashion. Analysis of this Dior show allows us to develop and test a methodology to explore the interconnectedness of landscape and fashion and the implications of their shared trajectories and influences. Though this study features a luxury fashion show at an exclusive estate, it can likewise serve as a model for studies of both vernacular landscapes and ordinary attire. Revised Abstract On June 3, 2024, the French luxury fashion house, Dior, previewed their 2025 cruise collection in a show at Drummond Castle Gardens in Perthshire, Scotland. As the Scottish countryside and its history were inspirations for this collection, it was befitting for Dior's artistic director, Maria Grazia Chiuri, to introduce the new line in a Scottish garden. This particular Scottish garden reflects European landscape architecture spanning multiple traditions over more than 500 years. The show is a striking example of the intersection of the material cultures of fashion and landscape wherein multiple histories are infused within both garments and gardens over the course of five centuries. Featuring a battalion of serious-faced models, clad in tweed, tartan, leather, lace, and velvet, traversing through a network of historic garden paths like a procession of weary soldiers returning from the fray, the show paid homage to Scottish landscapes and political histories in several ways. Models were, unsurprisingly, attired in tartan, which is directly linked to the

vegetation, colors, and clans of Scotland's historic landscapes. Their garments were also adorned by maps, which refer to centuries of powerful linkages between France, Scotland and England. These countries' shared histories are also reflected in costumes imbued with subversive messages about female power and their governance of lands, which, of course nods to the coded, subversive, loving, and sometimes scornful messages Mary Queen of Scots stitched into tapestries and garments over 400 years ago while imprisoned in England under Queen Elizabeth's orders. Methods supporting this presentation will include examining the history of Drummond Castle's garden and analyzing Dior's inspirations, especially Tudor embroidery and its relationship to gardens and Mary Queen of Scots (Hunter 2022). While there exists some scholarship about the nexus of architecture and fashion, very little has been written about the intersection of landscape and fashion. This study is an important first step in establishing the nexus of the material cultures of both fashion and the landscape in a larger historical context. Analysis of this Dior show allows us to develop and test a methodology to explore the interconnectedness of landscape and fashion and the repercussions of their shared trajectories and influences. Though this study features a luxury fashion show at a once-exclusive estate, it can serve as a model for studies of both vernacular landscapes and ordinary attire, which likewise convey meaning through materiality.

390 Diasporic Design: Renewed Relationality in Landscape Architecture

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Keywords: Diaspora; Jewish Design; Cultural Memory; Adaptation

Climate crises, economic migrations, and war profiteering are accelerating human and other-than-human dislocations. Landscape architecture must advance theory and methods for engaging with these profound changes. The social production of landscape architecture is firmly couched in artist-patron models, public-private funding schemes, belated community engagement, liability-driven relationships. Our current vocabularies (climate adaptation, managed retreat, invasive species, e.g.) seek to redress immediate harms, but they cannot not conceive of liberatory outcomes. Rarely do our landscape paradigms account for compounding inequalities or articulate the uneven ways in which these dislocations are experienced. Diasporic cultures offer alternative paradigms to landscape architecture's social fixity– cultural syncretism, remittance practices, informal economies, imaginations of home. Diaspora, or dispersal, scatters seeds of culture across varied geographies. The germinations and adaptations that result express essential qualities of the seed, the soil, and their mutual relationship. Thus diasporic design asks of new grounds: Who and what do we bring with us? Who and what do we leave behind? How and with whom do we build when we get there? The proposed presentation will detail an approach to diasporic placemaking. Through the design of a wandering summer camp of the Jewish diaspora, we speculate on a form of landscape practice in which participatory processes produce both the program and the form. The project imagines the book as a diasporic technology, a portable and negotiable germ, and manual for deconstructing the site's history and the physical environment. The camp is made and unmade every year, each time leaving a trace on the site already dense with memory. The project is located within the Catskills region of New York, where 19th century Jewish agricultural settlements gave way to 20th century vacation towns and a constellation of Jewish leisure enclaves known as the Borscht Belt. Today, this region has been transformed yet again, as New York's Hasidic communities are taking root in and among the neglected summer camps and bungalow colonies. The proposed project examines the negotiations across difference between diasporic communities, the shared stewardship of land and memory, and the processes and physical forms that cultivate diasporic belonging.

402 Knowing about Know-How: building design knowledge

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Keywords: procedural theory; professional knowledge; reflective practice; epistemology; design theory

Procedural knowledge, knowing-how to plan, design, and manage landscapes, is central to landscape architecture practice and education (Langley et al., 2018; Murphy, 2016). However, research in the discipline tends to focus more on knowing about specific topics (substantive knowledge). One reason for this focus might be the lack of understanding of how the personal, tacit know-how of individual practitioners can develop into collective, disciplinary-wide procedural knowledge. This presentation draws from knowledge creation theories from professional practice disciplines, such as health care (Higgs et al., 2004), education (Eraut, 1994), and business (Nonaka & Takeuchi, 1995) to propose a model for how procedural knowledge develops in landscape architecture. Experiential learning involves a cyclical process between knowledge creation (knowledge developing out of practice) and knowledge use (how knowledge is integrated into practice) (Kolb, 1976). Theorists, including, Nonaka and Takeuchi (1995), Eraut (1994), and Schon (1983), have observed that expressive language, such as metaphors, maxims, and models, act as important 'carriers of theoretical ideas' between knowledge creation and use (Eraut, 1994 p. 49-50). These expressions have what Schon calls an "optimal fuzziness," meaning that they provide suggestions, inspiration, and a path forward without being fully directive (1983, p. 319). Examples of expressive language in landscape architecture theory include: design process models, Halprin's (1970) metaphor of design being like a score, and Nassauer's (1995) maxim "cues to care". I propose that these metaphors, maxims, and models are important tools for sharing "know-how" between landscape architects. Studying these tools more closely - identifying, describing, classifying, and critically evaluating them – is key for building landscape architecture's procedural knowledge and, thereby, strengthening the profession and discipline. Procedural knowledge differs from other forms of academic knowledge because its validity is not realized until it is put into use, and, as each situation of use is unique, the knowledge is always incomplete and in-the-making (Eraut, 1994). Because of the future-oriented yet open-ended purpose of procedural theory, I propose that it does not fit neatly into the traditional purposes of predictive, interpretive, or normative/critical theories (Swaffield, 2006): but, instead, functions as a suggestive theory, as models that suggest to future practices something that might be useful but whose success can never be fully predicted.

445 Cross-cultural diffusion of nineteenth-century public parks and Korean modernization during the Open Port Period (1876-1910)

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Keywords: 19th-century public parks; cross-cultural diffusion; Korean modernization

The research examines the diffusion of nineteenth-century public parks to Korea, exploring their evolution beyond their Western origins through a cross-cultural lens. Public parks in the nineteenth century became a powerful international phenomenon, influencing the design of urban landscapes across major cities in Europe and North America. These parks, with designs rooted in eighteenth-century English pastoral landscapes and picturesque aesthetics, not only introduced a new type of public space but also promoted a distinct view of nature as an essential counterpart to rapidly industrializing urban areas (Duempelmann 2013; Schenker 2009; Evelev 2014; Miller 2022; Nadenicek 1993). This paper expands the predominantly Western-focused scholarship by investigating the circulation of related knowledge and technology in late nineteenth-century Korea and the complex East-West cultural exchange. In particular, the study traces the unique diffusion path shaped by Korean progressive reformists who spearheaded efforts to modernize the country during the Open Port Period (1876-1910). Unlike the conservative political leaders and the broader Korean population grappling with the sudden opening of the nation to foreign powers following the Treaty of Amity with Japan in 1876, these reformists focused on Japan's rapid transition from a feudal society to a modern nation-state through the successful adoption of Western knowledge and technology, advocating for radical modernization as a model for Korea's transformation. This paper focuses on two key archival sources- Observation on a Journey to the West (1895) by Yu Gil-Jun and articles from The Independent, a newspaper founded by Seo Jae-Pil in 1896. By analyzing these texts, alongside public lectures, and the development of Independence Park in Seoul, this research uncovers a unique historiography that highlights the contributions of local actors and indigenous contexts in the cross-cultural diffusion process. The findings reveal how Western ideas of public parks and related ideologies of nature were adapted and integrated into Korea's national modernization initiatives during the late nineteenth century, demonstrating the broader role of public parks in shaping urban and cultural transformation beyond the Western world.

462 Trans Species Landscapes: Sentient Worlds

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Keywords: sentience; ways of knowing; ontology; feral; collaboration

"Architecture is a thinking profession that materializes itself in the form of buildings that carry symbolic loads." (Ingraham, 2024). This paper posits landscape architecture as a thinking profession that materializes itself in the form of building sentient worlds. Ingraham goes on "... ontologies (relations of human to self and nature) govern what we see and make, and relations between architectures, environments and life." (Ingraham, 2024). In On Trees and Beasts, Denise Hoffman Brandt challenges, "They (landscape architects) could start by framing conceptual tools that are ontological, that respect a fundamental collaborative status of being as opposed to just taking charge, either as stewards or by setting all living things against each other in some false survivalist narrative. " (Brandt, 2024). This project explores these ontological tools in light of the sentient nature of the material world landscape architects build. Methods:This paper forms ontological tools from neo-materialist, feral, and indigenous world views. Navajo writer Renae Watchman (narrative and landscape), Robin Wall Kimmerer (reciprocity), and Tede Jojola (placeknowing) are placed into conversation with Tsing (feral entanglement and pollution), Manuel Delanda (destratification) and David Wengrow's Nebelivka story. The study outlines the evidence for plant sentience from Zoe Schlanger's Eaters of Light and the archive from 2016-2023 of the peer reviewed journal, "Animal Sentience" where authors publish articles on non-human sentience. The paper then derives specific ontological responses possible to these evidences by landscape architecture in two realms: conceptual and physical using the frameworks of indigenous and non-indigenous ontological theories. Conclusions: The findings of this study are that landscape architecture world knowing can create new paradigms of practice – local, feral, collaborative – based on observed sentience in non-human materiality. Human collaboration with the non-human world bends the actions of human based landscape architecture to the needs of the sentient landscape. Discussion:In twentieth century theory, Derrida (1997 lecture delivered, 2008 translated) and Gertrude Stein (Stein, 1936) posited their selves' existence depending on the gaze and regard of their companion animals (Derrida, cat, Stein, dog). In the twenty-first, this research recognizes societal human existence as constituted by relationship with (sentient) place. Our ontologies are woven into the places we know and with reciprocity, our places see us, smell us, and hear us (Kimmerer in Solnit, 2024). The ontological tools developed in this paper seek to offer landscape architecture a new space of relationship and collaboration – feral, local, and reciprocal. Revised Abstract Research question: How does recent biological research into the communicative abilities of plants, animals, and arthropods affect the ethical underpinnings of landscape architecture? What are the intellectual underpinnings of landscape architecture as a discipline? As a proxy for ethical underpinnings of landscape architecture, this paper refers to the ASLA's current code of ethics. "The health and well-being of biological systems and their integrity are essential to sustain human well-being. Future generations have a right to the same environmental assets and ecological aesthetics. Long-term economic survival has a dependence upon the natural environment. Environmental stewardship is essential to maintain a healthy environment and a quality of life for the earth." The paper responds with the following question: how does plant/animal/arthropod communication affect these guidelines? Should human well-being be the arbiter for the value of the health and well-being of biological systems? Is the value of

environmental and ecological assets that future generations have rights to them? Is economic survival the correct measuring stick for “natural environment?” Is stewardship the appropriate relationship to life on earth? In On Trees and Beasts, Denise Hoffman Brandt challenges, “They (landscape architects) could start by framing conceptual tools that are ontological, that respect a fundamental collaborative status of being as opposed to just taking charge, either as stewards or by setting all living things against each other in some false survivalist narrative.” (Brandt, 2024). This paper proposes to investigate alternatives to stewardship as a relationship. The study outlines the evidence for plant/animal/arthropod sentience from Zoe Schlanger’s Eaters of Light. This paper then proposes ontological tools from neo-materialist, (Manuel Delanda) feral, (Anna Tsing) and indigenous (Hunt and de Leeuw) world views. This project explores these ontological tools considering the sentient nature of the material world landscape architects build.

477 Securing Yellowstone: The Hayden Survey and the Roles of William Henry Jackson and Thomas Moran in America's First National Park

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Keywords: Hayden Survey; Yellowstone; Moran; Jackson; landscape conservation

The Hayden Geological Survey of 1871 was a landmark expedition that led to the landscape conservation movement and established Yellowstone as the first National Park in 1872. This first government-sponsored United States Geological Survey, led by geologist Ferdinand V. Hayden, mapped and documented the uncharted mysterious landscape of the northwest Wyoming territory. The survey resulted in a collection of scientific, photographic, and artistic evidence that guided Congress to delineate and preserve this landscape as a national park. This paper explores the historical significance of the survey, focusing on the crucial roles played by photographer William Henry Jackson and painter Thomas Moran. Jackson, a skilled photographer, provided photographic visual evidence of the unknown iconic landscapes of Yellowstone, including the unique geothermal features, geysers, and hot springs. The historic volcanic landscape's visual evidence and topographical record are seen within the caldera, geological forms, and the creation of the Grand Canyon of Yellowstone. While Jackson's photographs provided documentary evidence, Thomas Moran's evocative landscape paintings elevated Yellowstone's beauty and grandeur to an almost mythical status. Moran created sketches and kept a journal while on the Hayden expedition. His romantic watercolor and grand oil paintings emphasized nature's emotional and spiritual aspects, providing an interpretation of this western unknown landscape. By analyzing the roles of Jackson and Moran, this study illustrates how their contributions went beyond the scientific and artistic fields, directly shaping public opinion and legislative action. Furthermore, the paper examines the broader implications of the Hayden Survey in the context of 19th-century American values, including manifest destiny, the concept of wilderness, and the emerging conservation principle.

504 George E. Waring, Jr.: Health, Sewerage, and the Social Statistics of Cities

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Keywords: Social statistics; Sanitary city; Sewerage; Miasma

George E. Waring, Jr. (1833-1898) was trained as an agricultural engineer and appointed by Frederick Law Olmsted as superintendent of drainage for New York's Central Park in 1857. Waring supported the long-held miasma theory, positing that the source of disease was connected to the environment. He remained a lifelong foe of the contagionist theory of the germ, despite its broad acceptance by the 1880s. Specifically, he sought to improve public health through a radical modification of the physical urban landscape. Though Waring conducted his work on scientifically unsound precepts, his principles of landscape modification were unexpectedly successful. With his emphasis on the physical environment—and refusal to accept the contagion theory—he failed brilliantly. Waring was dispatched to Memphis, Tennessee, by President Rutherford B. Hayes after the deadly yellow fever epidemic of 1878 to review the city's sewerage. Waring championed and installed a separated sewage system of his own design. Within a year, he claimed that his "Memphis" system had banished yellow fever from the city—in fact, yellow fever was not spread by inadequate sanitation or the earth's miasma, but by the Aedes species mosquito, which breeds in stagnant water. After his perceived success in Memphis, Waring was appointed in 1879 as a special agent of social statistics by the National Board of Health, embarking on a massive sanitary survey of every major city in the United States for the Tenth Census of 1880. Published in 1886, the two-volume Social Statistics of Cities included over 200 extensive city portraits. Each city's report began with population, gender, and race. Waring would then describe geography, topography, and climate; streets, waterworks, and public parks; drainage, sewerage, municipal cleansing, and general health. Maps and illustrations are provided for each city, along with sewerage details where available. Waring's voice appears in strong critiques of various cities' sewerage plans. Memphis, with its sewerage system designed by Waring, of course, is held up as model. Waring connected these social statistics and critical assessments to environmental and landscape conditions. This paper examines a selection of key cities in Waring's report in which he highlights the successes or failures of sewerage and street cleaning with the health of the populace, launching the sanitary city movement's new health paradigms. Atlanta and Philadelphia are given special attention in this paper, as they foreshadow the work of W. E. B Dubois' brilliant data portraits executed just 13 years later, in 1899.

515 Discordant Paradigms: A Comparative Framework for Situating the Digital Turn in Landscape Architecture

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Keywords: Digital Turn; Landscape Representation; Computation; Digitalization; Theoretical Framework

This article examines the epistemological and ontological implications of the digitalization of landscape architecture representation from 1990 through the early 2000s. Although landscape architecture was among the first of the design fields to substantively engage with computation, the influence of digital technology in landscape architecture has been observed to be less paradigmatic than in other design disciplines (Picon, 2013, p. 124). This is especially surprising given the prevalence of landscape metaphors invoked by architects Greg Lynn, Jesse Reiser, and Stan Allen to describe architectural computation during this time. Notably, key concepts in the digital turn, like Stan Allen's 1997 definition of the "field" as "part-to-part relationships that maintain an overall coherence," did not surface in landscape discourse until at least 2001, despite their inherent relevance to the discipline (Fricker & Kotnik, 2023, p. 21). While architectural discourse codified the notion of a "digital turn" with a robust theoretical foundation for integrating digital technologies, landscape architecture adopted a more conciliatory approach, deploying digital technologies within a weak theoretical framework that sought to diminish their influence in the design process. This article aims to clarify the conceptual and technical distinctions that lead to these divergent approaches to digital discourse between architecture and landscape architecture. A comparative literature analysis of seminal architectural and landscape architectural texts and extra-disciplinary developments in computation, ecology, and posthuman theory establishes a framework for further understanding disciplinary differences in relation to the digital turn. While landscape architecture was initially enthusiastic about the generative capacity of digital representational practices—particularly computer mapping—this enthusiasm was later diminished by an emerging postmodern critical view that framed these tools as authoritarian, alienating, and prone to synoptic objectification (Corner, 1999, p. 155). In contrast, architecture's early digitalization, which initially replicated pre-digital representational practices, began to embrace the generative potential of digital tools, emphasizing their anti-industrial and inherently postmodern properties (Carpo, 2012, p. 11). This article suggests that these divergent conceptual agendas have significantly impacted how digital technologies are situated within the field of landscape architecture. While architecture has embraced the generative capacities of digital technologies, landscape architecture has framed them as purely technical or methodological concerns. This article suggests that clarifying the origins of these discordant approaches to conceptualizing practices of digitalization can help lay the groundwork for situating digital technologies as generative, conceptually rich tools in the design process. Revised Abstract Digital technologies were adopted in landscape architecture earlier than in architecture, yet their influence has been less dramatic (Picon, 2013). While landscape architecture initially embraced an ambitious conceptual framework for digital technologies, the discipline's more recent tendency to adopt "the status quo to comprehend the new" has reinforced a distinction between conceptual and technical concerns (Walliss, 2018). In contrast, early applications of digital technologies in landscape architecture, such as SYMAP and later GIS, emerged from the military-industrial complex and aligned with mid-20th-century optimization

discourse (Coppock and Rhind, 1991). These tools foregrounded modernist principles through cartographic description and empirical analysis. However, early digital technologies—and their associated conceptual frameworks—were particularly vulnerable to postmodern critique, which cast them as authoritarian, alienating, and prone to synoptic objectification (Corner, 1999). Critics of synoptic mapping advocated for montage as an alternative representational paradigm, which despite being an analog technique's was readily reproduced by digital tools like Photoshop (Belanger and Urton, 2014). In contrast, architecture's comparatively late adoption of digital technologies in the 1990s embraced antimodern notions of non-linearity, emergent complexity, and formal diversity (Carpo, 2012). Architectural discourse notably relied landscape metaphors to describe topological qualities of smooth, continuous digital surfaces. Stan Allen's 1997 definition of the "field" as "part-to-part relationships that maintain an overall coherence," did not surface in landscape discourse until at least 2001, despite its inherent relevance to the discipline (Fricker & Kotnik, 2023). Through comparative analysis with architecture's digital discourse, this article suggests that postmodern cultural critique—while the "favourable environment" for architecture's digitalization—had the opposite effect on landscape architecture's modernist digital framework (Carpo, 2012). It argues that landscape architecture's tendency to distinguish between technical and conceptual concerns reflects this critical, rather than productive, postmodern framework. This critical stance reduces digitalization to an inevitable process and neglects its technical and conceptual contingencies. By tracing the origins of this discordant digital discourse, this article seeks to establish a new framework for landscape architecture to move beyond reflexive adoption or superficial critique of emerging digital technologies.

518 HWS Cleveland and Warren H. Manning in Conversation with 19th and early 20th Century Climate Science

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Keywords: Climate; Race; HWS Cleveland; Warren H. Manning

This paper situates the continental scale work of the 19th and early 20th-century landscape architects HWS Cleveland and Warren Manning within the broader scientific discourse around climate and race occurring at the time. During their careers, both men produced design visions that sought to radically expand Landscape Architecture's boundaries to a continental scale. Cleveland's plan for Forest Planting on the Great Plains–published in the first edition of his celebrated book Landscape Architecture as Applied to the Wants of the West--took the complete climatic terraforming of the American West through the process of afforestation as its scope. Almost fifty years later, Manning's unpublished National Plan undertook a rationalized project of continental land use planning based on early resource mapping and analysis methods. However, as both men undertook these radical visions, they were influenced by a highly racialized understanding of climatic science that influenced their work. Both men's references and correspondence during these projects reflect their engagement with broader ideas about climate coming from prominent naturalists, scientists, and boosters like Louis Agassiz, George Perkins Marsh, Ferdinand Vandeveer Hayden, Richard Smith Elliott, and Ellsworth Huntington. This paper sheds light on Cleveland and Manning's engagement with this broader discourse by analyzing archival and primary source materials.

526 Site-Responsive Public Art on Overlooked Places of Urban Fringes- Revisiting Places and People after 20 years

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Keywords: Transformative art; Photo elicitation; Sense of place; Discovery tour; Urban wilderness

This paper focuses on revisiting places of a public art project that transformed underused areas of the port of Hamburg (GER) as short-time, two-to-three-week summer festivals from 2003 to 2009. The artwork consisted of temporary art installations and performances that intended to discover the various facets of overlooked urban space on the fringes of the core metropolitan center. An essential characteristic of the project was the execution of guided tours along the temporary site-responsive art objects. The art projects coincided with three major and correlated projects of urban development and revitalization in the city of Hamburg; the HafenCity, “Europe's largest inner-city urban development project ion the water”, the International Building Exhibition Hamburg (IBA) 2006-2013, and the International Garden Show (IGS) 2013. The projects targeted to see places before the “drastic changes“ in the port area as one catalogue explained in 2007. In this context, the initiators of the project, one urban planner and three landscape architects, anticipated an intriguing dialogue between conventionally planned or revitalized areas and random, interstitial spaces close by. A general mission was to explore a broad range of facets of place through multiple forms of creative and intellectual engagement including visual arts, performances, music, poetry but also talks about specific topics such as history and plant ecology. The pioneering project received national and international recognition. Each of the six projects was well documented an exhibition catalogue with the route of the art tour, descriptions of the artwork, and photos in relation to the site. This paper investigates how the six fringe areas transformed over the last 20 years. How have the interstitial spaces of the past been transformed? Are they still considered urban fringe areas that convey an unplanned “wilderness” or are they significantly altered through development? This study is a start to examine the art project through revisiting the places and providing new narratives through photos and interviews with individuals that were involved; founders of the projects, artists, and individuals that were involved as property owners or permitting agents. The interviews will be conducted through open-ended photo elicitation along historic and recent photos documenting the change. It is anticipated to gain more new knowledge about the places, themes and questions through this examination. Research questions around perception of placed and impact of transformative art in urban environments will be substantiated as the results of the investigation will progress. Revised Abstract This paper focuses on revisiting places of a public art project that transformed underused areas of the port of Hamburg (GER) as short-time, two-to-three-week summer festivals from 2003 to 2009. The artwork consisted of temporary art installations and performances that intended to discover the various facets of overlooked urban space on the fringes of the core metropolitan center. An essential characteristic of the project was the execution of guided tours along the temporary site-responsive art objects. The art projects coincided with three major and correlated projects of urban development and revitalization in the city of Hamburg; the HafenCity, “Europe's largest inner-city urban development project on the water”, the International Building Exhibition Hamburg (IBA) 2006-2013, and the International Garden Show (IGS) 2013. The projects targeted to see places before the “drastic changes“ in the port area as one catalogue explained in 2007.

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531 The “Utility” of Utilities: Using Handbills, Stickers, and Graffiti to Map Consumption, Conflict, and Loss in Urban Streets

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Keywords: Right to the city; Streets; Urban infrastructure; Public space; Decolonization; Public space; Monuments; Memorials; Activism

Despite dramatic shifts in socio-spatial relations from public spaces to the virtual realm in the past several decades, meaningful analog interactions persist in the streets of cities like Seattle, Washington with the placement of handbills, stickers, and graffiti on utility poles. Analysis of both contemporary and historic instantiations of such regulated or unsanctioned forms of expression in public right of ways comprise critical forms of physical and social urban infrastructure. Examining roadways, their design, and regulation affords insights into what JB Jackson deemed neglected landscapes, whose ordinariness belies their importance as places rich with notable cultural practices, social relations, and environmental histories. Historically, street postings have been variously construed as indispensable business tools, expressions of free speech, unsightly nuisances, vandalism, or even signs of moral decay. Yet as aesthetic objects and political rhetoric, these cultural documents have transformed the shape and experience of urban streetscapes. As Elizabeth Guffey observes in her study of 19th-century posters, these objects not only disrupted social norms and urban planning, posters also brought attention to the neglected spaces they adorned such as rail corridors and derelict buildings. During the throes of COVID lockdowns in 2020-2021, the proliferation of such street communiqués attested to restricted mobilities necessitated by governmental directives and epidemiological realities. Local efforts to increase opportunities for exercise and safe interactions prompted municipally instigated programs like Safe Streets Seattle, which afforded the closure of streets and attendant safe occupation and activity. Concomitantly, these utilitarian spaces became inhabited once again as spaces of collaboration and sometimes anarchic exuberance. Seemingly banal infrastructures served as sites of unsigned encouragements and solidarity in the face of crisis. Anonymous individuals and local organizations posted poignant, occasionally striking, and often-makeshift dispatches that included the personal and the communal, a space of lonely hearts, local events, and lost dogs. At the same time, political division, social protest, anxiety, and personal loss fomented more provocative postings on trees, electrical poles, crosswalk buttons, and sidewalks in contradiction to social norms and legal mandates. Billboards and branded corporate headquarters constitute the norm along American arterials. Yet utilities such as light poles, hydrants and signal boxes remain undervalued yet revealing canvases of everyday urbanism that witness both personal expression and political resistance. As such, street furnishings constitute vital spaces onto which to map the sometimes-invisible terrain of historic and contemporary patterns of consumption, conflict, and loss. This study asks how debates over public art and monuments in New Mexico illustrate the significance of space to provide for and respond to social movements, especially the contemporary Indigenous rights/anticolonial/landback activists (re)inspired by the Black Lives Matter protests of 2020. BLM pressured local politicians into removing some confederate statues. Similarly, anticolonial activists and allies in New Mexico have staged actions asserting their right to the city and protesting the myths and symbolic meanings of colonized urban spaces, even in the face of violent reaction. The tendentious stone-and-metal materiality of memorials assumes societal quiescence and discourages the generational revisions of spatial

forms. Such materiality suggests that the installations' champions—politicians, donors, and artists who fund, commission and create these memorials—expected them to remain uncontested and unchanged. It is true that they provide a continuity of specific narratives in history. However, memorials and monuments, which assume shared knowledge and a certain agreement about such knowledge, may provoke cultural conflicts in a heterogeneous society and indicate a need for removal or, at the very least, recontextualization. In recent years, public debate exploded around five public art monuments in central and northern New Mexico, which had been installed in the midst of traditional Puebloan homelands. These monuments were statues of conquistadores Juan de Oñate and Diego de Vargas, a monument to Kit Carson, and a Civil/American-Indian War memorial. Using cultural and discourse analysis and archive-based historical analysis, I explore how these battles fit into a larger conversation about the reclamation of public memory through acts of civil disobedience. As of August 2024, four of the five works had been removed to storage. Discussions about how to treat shared/shattered histories in physical public space have occurred sporadically and reactively. Municipal governments' responses were nugatory and incomplete. However, the unfinished narrative does not preclude opportunities for learning and imagining alternative futures for the production of space. Examining the co-evolutionary, multi-faceted processes through which citizens claim roles in and shape their urban environments can inform a critical design practice that includes a plurality of subjectivities. By incorporating these subjectivities in their designs, landscape architects can make thoughtful and sensitive contributions to the evolution of public space, opening up questions about memory, social justice, and our shared landscapes.

533 Lawrence Halprin Designing the Productive Forest

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Keywords: Lawrence Halprin; Sea Ranch; forestry; ecological forestry

This paper proposes a framework for understanding forests and forestry within the material ecosystem of design through an analysis of the mid-twentieth-century work of landscape architect Lawrence Halprin, in particular the designs for the development of Sea Ranch, California (1962-66). The essay reveals the integration of ecological forestry at Sea Ranch and the deep understanding of forestry that informed his institutional and urban design work. The forest analysis, restoration, and management at Sea Ranch, primarily proposed by forest engineer George Ran and landscape architect Richard Reynolds, and informed by millennia of forest management by the Kashaya and Pomo tribes, was an important aspect of the overall layout and aesthetic of the development. Understanding the role of forestry in the design of Sea Ranch provides a new understanding of the design, and of Halprin's work more broadly, as enmeshed in materially and formally productive ecosystems. At Sea Ranch and elsewhere, Halprin's team designed the forest not only as a view or a place, but as a material source, a source of form, and an ecosystem. In their designs, the forest was one element in the choreographed production and exchange of timber, plants, nutrients, and animals. Using archival research, forest analysis, and forest mapping, this paper reveals Halprin's forest management plans as a particularly material approach in the Modern era, rooted in both the long history of forestry in landscape architecture, from Manwood's Treatise of the Forest Laws (1717) to Frederick Law Olmsted and Gifford Pinchot's eco-forestry experiments at Biltmore Estate (1892-8), and the then-emerging science of landscape ecology and forest succession.

536 Including Animals: Co-creating with our more-than-human neighbors

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Keywords: Animal-aided design; Interspecies design; Biophilia; Biodiversity

Adapting our environments to a new climate normal is going to take “all hands on deck” and inter-species creativity. How can landscape architects change our design education and our professional practices to engage the creativity and productivity of our non-human community members? What do we need to know and do to imagine animals’ world-making capacities and design with their environmental agency? This essay presents the results of a series of theory seminars, design studios, field work, and analytical research exploring the current state and future potential of landscape design that engages non-human species’ worldbuilding capacity. The goal of the project is threefold: to understand the role of animal agency in contemporary landscape architectural design practice; to develop a visual and verbal language for landscape architects to discuss collaborations with our more-than-human neighbors; and to develop a design pedagogy and toolkit for incorporating animal ecosystem engineers into environmental design. Phase one is an analysis of ten years of ASLA award winners, representing a data set of what the profession considers to be their best work, through the lens of animal agency in design. This provides a framework for understanding the values and agents typically embedded in normative landscape architectural design practice, and sets goals for shifting practice towards greater multi-species inclusion. Phase two hypothesizes six themes and theories to include in an animal-aided design theory. The framework was tested and refined in Phase three through an iterative series of design studios and field work, to generate a pedagogic model that is grounded in robust theory and science. Attendees will leave with an implementable pedagogic model that has the goal of educating a generation of landscape architects who can: see the world as full of others, with robust lives, agency and purpose; engage those others in, in Donna Haraway’s phrase, “multispecies getting on together;” understand design as a limited spatial and temporal event in the evolution of a community-place; and engage all community members, human and more-than-human, in stewarding the health of communities-in-place.

598 Radburn, Wildwood Park, and Kitimat: Landscape Adaptations

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Keywords: Radburn model; Wildwood Park; Kitimat; New towns; Clarence Stein

The early 1950s design for the planned new town of Kitimat in British Columbia, Canada was a late-career project for Clarence Stein, who had designed the revolutionary Radburn community in Fair Lawn, New Jersey about twenty-five years earlier. In Radburn, Stein had rejected the premise that houses should "address" a street with a formal architectural or landscape gesture; instead, homes faced an inner pedestrian commons. Only a fragment of Radburn was built before the stock market crash of 1929 stymied further development. At Kitimat, many years later, Stein was able to finally build his "Radburnian" scheme on a community scale. The author will describe how the neighborhood landscapes of Stein's Kitimat new town have evolved over about 70 years to reflect the social dynamics and preferences of the community's residents. The designer's intentions are well-understood, with regard to the utilization of open spaces and the landscape relationships among private, semi-private and public realms. The residents however have made their own choices in structuring neighborhood space—sometimes in a manner that suggests a different set of landscape priorities than Stein may have assumed. The purpose of this presentation is to explain how and why residents have made their adaptations to the original scheme, toward a greater understanding of principles of effective neighborhood/community design. The presentation also compares Kitimat to its predecessors, as a study of similarities and differences among the prototypes, each of which features unique spatial relationships and street patterns. Previous studies of two forerunners of Kitimat: Radburn (Fair Lawn, New Jersey, circa 1928) and the non-Stein (but Stein-influenced) Wildwood Park (Winnipeg, Manitoba, circa 1947) indicate that resident adaptations to the planned landscape have created in each place distinctive fine-scale spatial character that reflects resident preferences for control of public/semi-public/private spaces within the respective neighborhoods. This study contributes to the understanding of how the innovative "Radburn model" fares over decades of residents' adjustments, building on scholarship established by Stein (and his planning partner, Henry Wright) and continued through research focused on other postwar communities inspired by Radburn including case studies by Wright (1971), Martin (2001a, 2001b), and Francis (2003).

639 Interrogating the Landscape: The Role of Military Intelligence Training in J. B. Jackson's Career

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Keywords: Cultural landscapes; Military; Vernacular; Pedagogy; Geospatial

Landscapes, like people, possess secrets. Unearthing what lies hidden can require interrogation. John Brinckerhoff Jackson knew this because he was trained for it. His iconoclastic career is credited for having founded the field of cultural landscape studies (Wilson & Groth, 2003), and his writings and lectures about vernacular landscapes gave everyday places relevance in the built environment. The significance of Jackson's work led to numerous books (e.g., Horowitz), articles and documentaries (e.g., Marino & Mendelsohn, 1988), with scholars and practitioners (e.g., Olin, 2020) alike crediting him for having shaped how they read the landscape. Yet ironically, of the two forces that Jackson (1984) said taught him the most about studying the landscape—geographers and the US military—only the prior have seen careful study. Neither he nor others have written at length about his motivation for joining the Army, the instruction he then received, his combat experience, or the subsequent ways the military shaped his career (Adams, 2020). Much of the mystery surrounding the topic is due to the classified nature of Jackson's assignment (Aughinbaugh, 2018). Jackson was a member of the first graduating class of the War Department's secret Military Intelligence Training Center (MITC) at Camp Ritchie, MD, the existence of which was not declassified until shortly before his death in 1996. Operated from 1942 to 1945, the MITC utilized a new, complex, theatrical pedagogy of indoor and outdoor classrooms that simulated battlefront conditions using actors, stage sets, and role playing to prepare trainees (Eddy, 2021). Classes prepared them to conduct critical military roles, including landscape reconnaissance and POW interrogation (Melchoir, 1993). Jackson was among the 29 officers selected from over 500 applicants who were first trained for G-2 intelligence positions. Known as "Ritchie Boys", the 11,637 soldiers who completed the 8-week training constituted a remarkably diverse mix of cultures (Kollander, 2016). Like Jackson, almost half had been born outside the US or were foreign refugees or émigrés. Camp Ritchie was America's attempt to systematically train the first, modern intelligence corps. This paper examines Jackson's experience there, focusing on the instruction that he received, followed by his battlefield duties, and finally how his service influenced his peacetime career. Drawing from War Department training manuals, historical research into MITC curricula, military personnel records, and contemporary sources, Jackson's efforts to study, teach about, and report on the landscape are given greater context through understanding techniques he gained as a military intelligence officer. Revised Abstract Landscapes, like people, possess secrets. Unearthing what lies hidden can require interrogation. John Brinckerhoff Jackson knew this because he was trained for it. His iconoclastic career is credited for having founded the field of cultural landscape studies (Wilson & Groth, 2003), and his writings and lectures about vernacular landscapes gave everyday places relevance in the built environment. The significance of Jackson's work led to numerous books (e.g., Horowitz), articles and documentaries (e.g., Marino & Mendelsohn, 1988), with scholars and practitioners (e.g., Olin, 2020) alike crediting him for having shaped how they read the landscape. Of the two forces that Jackson (1984) said taught him the most about studying the landscape—geographers and the US military—only the prior have seen careful study. Neither he nor others have written at length about his motivation for joining, the instruction he received, his combat experience, or the subsequent ways the military

shaped his career (Adams, 2020). Much of the mystery surrounding the topic is due to the classified nature of Jackson's assignment (Aughinbaugh, 2018). Jackson was a member of the first graduating class of the War Department's secret Military Intelligence Training Center (MITC) at Camp Ritchie, MD, the existence of which was not declassified until shortly before his death in 1996. Operated from 1942 to 1945, the MITC utilized a new, complex, theatrical pedagogy of indoor and outdoor classrooms that simulated battlefront conditions using actors, stage sets, and role playing to prepare trainees (Eddy, 2021). Classes prepared them to conduct critical military roles, including landscape reconnaissance and POW interrogation (Melchoir, 1993). Jackson was among the 29 officers selected from over 500 applicants who were first trained for G-2 intelligence positions. Known as "Ritchie Boys", the 11,637 soldiers who completed the 8-week training constituted a remarkably diverse mix of cultures (Kollander, 2016). Like Jackson, almost half had been born outside the US or were foreign refugees or émigrés. Historic documents were analyzed to retrace Jackson's military career, the specialized training he received, and its influence on his well-known, post-war efforts in cultural landscape studies. Key sources for this study included declassified War Department training manuals and MITC curricula, the United States Holocaust Memorial Museum, the network of dedicated Camp Ritchie historians, Jackson's military personnel records from the National Archives, the University of New Mexico's Center for Southwest Research, and contemporary sources including interviews with Jackson's former students. Camp Ritchie was America's attempt to systematically train the first, modern intelligence corps. This paper examines Jackson's experience therein, focusing on the instruction that he received, along with his battlefield duties, and how his service influenced his peacetime career. In addition to providing long overdue recognition of Jackson's heroic and fascinating military service, this research demonstrates the significant role that military training played in skills and techniques incorporated by some of landscape architecture's 20th century pioneers. In the process, it both gives greater context to Jackson's work through understanding techniques he gained as a military intelligence officer, and gives credence to study of how the present-day military influences landscape architecture, geospatial intelligence and their interrelatedness.

Landscape Architecture for Health

36 Physical, Physiological, and Psychological Differences in Thermal Comfort and Regulation Among Older Adults: A Systematic Review

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Keywords: Thermal comfort; Older Adults; Physiological parameters; Systematic Review; Psychological Differences

Introduction: Thermal comfort is a critical consideration in microclimate design, especially for older adults who may experience different thermal sensitivities compared to younger adults. Understanding these differences is essential for creating environments that support the health and well-being of aging populations. This study systematically reviews existing literature to examine the physical, physiological, and psychological factors influencing thermal comfort in older adults compared to younger adults. Methods: This review analyzes 141 peer-reviewed studies that investigate thermal comfort across different age groups, with a focus on comparing older adults to younger adults. The review explores key differences in physical aspects such as metabolic rate and core temperature, physiological responses like sweat production and cardiovascular function, and psychological factors including thermal sensitivity and adaptive behaviors. Both quantitative and qualitative data are synthesized to provide a comprehensive understanding of these age-related differences. Results: The findings reveal significant differences in the thermal comfort experiences of older adults compared to younger adults. Older adults typically exhibit lower metabolic rates, higher core temperatures in certain conditions, and altered sweat responses, which together contribute to distinct challenges in maintaining thermal comfort. Additionally, older adults demonstrate different thermal sensitivities and preferences, underscoring the need for tailored environmental designs. Discussion: The results emphasize the importance of incorporating age-specific considerations into the design of microclimates, particularly in landscape architecture. Designing outdoor environments that accommodate the thermal comfort needs of older adults can significantly enhance their quality of life. This review provides practical guidance for landscape architects, highlighting the necessity of creating thermally comfortable and health-promoting spaces for older adults. Further research is recommended to deepen the understanding of these differences and refine design strategies accordingly. Conclusion: This review contributes to the field by offering a detailed analysis of the differences in thermal comfort between older and younger adults. The insights gained are crucial for guiding the development of microclimate designs that effectively cater to the needs of vulnerable populations, particularly older adults, ensuring their comfort and well-being in outdoor environments.

46 A multisensory approach to perceived biodiversity and restorative environments

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Keywords: Biodiverity; Restorative environments; Urban green space; Perceived biodiversity; Mental Health

There is much interest in investigating the relationship between biodiversity and mental restoration. Landscape biodiversity plays a significant role in restorative effects (Carrus et al., 2015; Wood et al., 2018). However, few attempts have explored how humans perceive biodiversity in natural environments and how it affects restorative outcomes. More work is thus needed better to understand the mechanisms of perceived biodiversity and restorative effects. Furthermore, these mechanisms should be explained with not only through visual cues but also through auditory cues, as multisensory cues may play a major role in shaping perception and psychological impacts. This study aims to examine how combinations of visual and auditory influence psychological impact, including perceived biodiversity, preference, and restorative effect. In particular, we seek to answer the following two research questions in this study: 1) Which visual elements of the landscape, such as plant evenness, height, and color, impact perceived biodiversity? 2) How does the combination of visual and auditory stimuli affect psychological impacts (e.g., mental restoration, preference) compared to visual or auditory stimuli alone? To assess these research questions, we conducted a posttest-only randomized experiment with college students. An animation of hypothetical landscape sites was created to test variables for answering research questions. A total of 64 students were assigned to eight different environments, each combining “plant evenness” (2 levels), “height” (2 levels), and “color” (2 levels) in both sound and no-sound environments using Virtual Reality. Participants spent 1 minute in each environment and were asked to complete a self-reported question about their psychological responses, including perceived biodiversity, mental restoration, and preference. A repeated measures ANOVA was conducted to verify the mean difference between the environments. The results indicated that perceived biodiversity was higher in environments with taller trees and more colorful planting design. In terms of mental restoration and preference, only tree height has a significant mean difference with taller trees being a greater mental restoration effect and more preferred. The results of the t-test revealed that auditory cues with visual cues in landscape environments were more likely to have a higher perceived biodiversity, mental restoration, and preference. This study illustrates how visual and auditory cues in landscape environments affect human psychological responses and provides important landscape design implications that maximize the restorative benefits of nature beyond just the provision of urban green space.

58 Nature's shield: Uncovering the association between environmental factors and police shootings across social deprivation levels

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Keywords: police violence; built environment; green spaces; social deprivation; environmental intervention

Introduction: Fatal police shootings represent one of the most detrimental forms of violence, exacerbating social and racial disparities and causing acute and chronic health issues, particularly in disadvantaged areas. It is critical to find an accessible and economical approach to mitigate the issue. Recent studies have increasingly explored the relationship between environmental factors and police-involved violence, yet the findings remain preliminary and conflicted. We lack an understanding of how associations between environmental factors and police shootings vary by levels of social disadvantage. Methods: We designed a three-layer study structure to answer our three research questions. First, we ran the multi-layer Besag-York-Mollié (BYM) model for all 3,108 counties to evaluate the associations between environmental factors and fatal police shootings. First, we only controlled for socioeconomic and demographic factors. We then added law enforcement factors, and again continued to add the environmental factors to compare model's explanatory power using AIC, BIC, and adjusted R2. Second, we analyzed the regression effects of the model to identify the most prominent contributor. Third, we applied the BYM model and covariates with the moderators to identify how the association between green spaces and fatal police shootings varies across five social deprivation levels. Results: By utilizing the BYM regression model within our three-layer study design, we addressed our research questions. Our findings revealed that environmental factors significantly and independently associate with police shootings, enhancing the model's explanatory power by 233%. Specifically, the regression results identified three key environmental factors: green spaces, racial segregation, and low-intensity development areas, with green spaces having the most pronounced effect. Moreover, when applying the same BYM models across five social deprivation (SDI) levels, we found that green space is the only variable that significantly associated with police shootings at all SDI levels, demonstrating stronger effects in more deprived areas. Conclusion: These findings underscore the need for urban planning and environmental interventions that associate with less police shootings and further alleviate socioeconomic disparities. Our study revealed distinct green space types significantly linked to fatal police shootings, offering guidance for designers, planners, and environmental researchers seeking effective place-based interventions. This is particularly important for resource-constrained areas. In crafting future green space strategies, the aim is to ensure both ecological and social sustainability. Revised Abstract Introduction: Fatal police shootings represent one of the most detrimental forms of violence, exacerbating social and racial disparities, particularly in disadvantaged areas. It is critical to find an accessible and economical approach to mitigate the issue. Recent studies have increasingly explored the relationship between environmental factors and police-involved violence, yet the findings remain preliminary and conflicted. We lack an understanding of how associations between environmental factors and police shootings vary by levels of social disadvantage. Methods: The study examined the relationship between

environment and police shooting cases over a five-year period across all 3108 counties (excluded Hawaii & Alaska & Portal Rico) in the United States at the county level. First, we ran the multi-layer BYM model for all 3,108 counties to evaluate the associations between environmental factors and fatal police shootings. We first only controlled for socioeconomic and demographic factors. Then, we added the law enforcement factors, including violent crimes rate, firearm restriction law, firearm ownership, law enforcement complains, police funding ratio, officers per 10k, percentage of white officers, and percentage of black officers. Then we continued to add the environmental factors including the urbanicity level, development area intensity level, racial segregation index, ratio of developed open space, ration of forest, and ratio of shrubs. Second, we analyzed the regression effects of the model to identify the most prominent contributor. Third, we applied the BYM model and covariates with the moderator of social deprivation index (SDI) to identify how the association between green spaces and fatal police shootings varies across five social deprivation levels. Results: By utilizing the BYM regression model within our three-layer study design, our findings revealed that environmental factors significantly and independently associate with police shootings, enhancing the model's explanatory power by 233%. Specifically, the regression results identified three key environmental factors: green spaces, racial segregation, and low-intensity development areas, with green spaces having the most pronounced effect. Moreover, when applying the same BYM models across five social deprivation (SDI) levels, we found that green space (developed open space) is the only variable that significantly associated with police shootings at all SDI levels, demonstrating stronger effects in more deprived areas. Conclusion: Our study revealed distinct green space types significantly linked to fatal police shootings, offering guidance for designers, planners, and environmental researchers seeking effective place-based interventions. This is particularly important for resource-constrained areas. In crafting future green space strategies, we need to ensure both ecological and social sustainability.

62 Simulation study on the characteristics of spring pollen scattering in typical shallow street canyon layout and plant configuration mode

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Keywords: Shallow street canyon; Plant configuration; Pollen; Scatering characteristics; CFD simulation

Urban airborne pollen is an important spring allergen, and the study of pollen dispersion characteristics under typical building layouts and their plant configuration patterns can provide data support for rationally optimizing the health configuration of urban green spaces to enhance health and well-being. In this study, the Durham pollen collector was used to collect spring pollen observation data from the campus green space in Haidian District, Beijing, from April to May 2021, and extracted plant parameters such as community structure, crown width, clear length and street canyon layout of the three sample sites, and then constructed 15 parameterized scenarios of typical shallow street canyon layouts and their plant configuration modes with the help of the CFD platform, to investigate pollen dispersion characteristics and dispersion distances of pollen in different scenarios. The parameters of pollen dispersal and dispersal distance thresholds were investigated in different scenarios.The results of the study showed that: ①Areas of high pollen concentration are located in areas with low wind speeds and poor air mobility, and areas of low pollen concentration are located in areas with high wind speeds and good air mobility. ②Back-shaped layout and rowed layout pollen tends to gather on the sides of street valleys and in building depressions; staggered layout pollen tends to gather inside the center plant community.The pollen dispersion characteristics of four plant configuration patterns are shown as street tree type＞scattered＞street tree+group planting＞grouped type, and the pollen deposition characteristics are shown as grouped type＞street tree+group planting＞street tree type＞scattered.③The highest pollen concentration reduction rate of 24.89% was achieved by staggered layout combined with street tree type planting configuration, and the dispersal effect is relatively better. The back-shaped layout combined with group planting configuration has the lowest pollen concentration reduction rate of 7.31%, and the aggregation effect is relatively better. ④Influenced by different buildings, plants and wind fields, the pollen dispersion distances of three types of building layout is in the order of rowed > back-shaped > staggered, rowed need about 35-75m dispersion distance, back-shaped need about 28-60m dispersion distance, staggered need about 20-53m dispersion distance. In the future, the focus of green space renewal optimization can be judged based on pollen dispersal and accumulation characteristics, and plant configuration patterns that reduce pollen concentration can be selected based on the health application scenarios of green space renewal in order to reduce environmental health risks. Revised Abstract As a representative of mega-city with temperate monsoon climate, the study of pollen dispersal characteristics under typical building layouts and their plant configuration patterns in Beijing can provide data support for rationally optimizing the healthy configuration of urban green spaces. In this study, the Durham pollen collector was used to collect the spherical pollen observation data from the Haidian campus green space in Beijing from April to May 2021, and the parameters of the street valley layout and community structure, under-branching and other plant characteristics were extracted from the three research sample sites, and 15 parameterized scenarios were

constructed with the help of the CFD platform for the layout of the typical shallow street canyons and their plant configuration patterns to investigate the pollen dispersal characteristics under different scenarios. We constructed 15 parameterized scenarios of typical shallow street canyon layout and plant configuration patterns with the help of CFD platform to investigate the pollen dispersal characteristics and dispersal distance thresholds under different scenarios.The results of the study showed that: ①Areas of high pollen concentration are located in areas with low wind speeds and poor air mobility, and areas of low pollen concentration are located in areas with high wind speeds and good air mobility. ②Back-shaped layout and rowed layout pollen tends to gather on the sides of street valleys and in building depressions; staggered layout pollen tends to gather inside the center plant community.The pollen dispersion characteristics of four plant configuration patterns are shown as street tree type＞scattered＞street tree+group planting＞grouped type, and the pollen deposition characteristics are shown as grouped type＞street tree+group planting＞street tree type＞scattered.③The highest pollen concentration reduction rate of 24.89% was achieved by staggered layout combined with street tree type planting configuration, and the dispersal effect is relatively better. The back-shaped layout combined with group planting configuration has the lowest pollen concentration reduction rate of 7.31%, and the aggregation effect is relatively better. ④Influenced by different buildings, plants and wind fields, the pollen dispersion distances of three types of building layout is in the order of rowed > back-shaped > staggered, rowed need about 35-75m dispersion distance, back-shaped need about 28-60m dispersion distance, staggered need about 20-53m dispersion distance. In the future, the focus of green space regeneration optimization and building health risk reduction can be determined based on pollen dispersal and accumulation characteristics.

89 Urban Tree Hole Plan: Landscape Approach Tackling Urban Mental Disorder

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Keywords: Mental Health; Spiritual Infrastructure; Tree Hole; Urban Loneliness; Niche Space

The professions of building environment (Architecture/Landscape Architecture and Urban Design) are committed to organizing not only the space we live in but also the system operated behind. As design professionals, we realize the order in our cities regarding space or system has a strong relationship with public health, which brings up the issue of order/disorder as a recent concern within the design disciplines. Unlike physical health, which has been fully discussed, mental health issues that aggregate the disorderliness in the urban milieu have long been neglected. The growing disconnection between people's mental demands and the living environment in our communities is calling for the engagement of design disciplines to mitigate the problem. Our research investigates the possibility of inserting a new layer of "spiritual infrastructure", after the grey infrastructure and the green infrastructure, as an urban strategy to tackle mental issues with a systematic approach and establishes a comprehensive sharing structure. A scenario-based model will be mentioned as a research method for coping with identified mental issues in different cities. The presentation will introduce a research project in which the presenters selected Tokyo to discuss how urban loneliness as a mental disorder has caused social problems in the city. To tackle urban disorder, a spiritual infrastructure network of "Urban Tree Hole" is designed to provide small places in the city for lonely individuals to stay. These niche spaces are created by either reinvigorating redundant stores on the street, re-purposing pedestrian corridors between buildings, or re-imagining underground space. Landscape elements – trees, sky, and water – are also included to be the "companions" layer in the spaces. In the final part, the presenters will share precedents that have successfully improved public mental health through spatial intervention. The presentation will be concluded by discussing the study results and public feedback, which demonstrate the significance and potential of improving mental health by urban and landscape designers.

110 Association between Chronic Health Conditions and Land Use in Fifth Ward, Houston, Texas

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Keywords: Land use; Public health; Urbanization; Environmental Justice; Environmental Health

In recent years, the emphasis on public health outcomes has become a central focus across various professions within the built environment, including urban planning and landscape architecture. Despite increasing awareness of how urban design and land use impact human well-being, the direct relationships between specific land use patterns and chronic health conditions remain largely underexplored. This research seeks to address this gap by examining the association between land use and public health outcomes in Fifth Ward, a historically underserved neighborhood in the greater Houston, TX area. Texas has experienced rapid urbanization and significant changes in land use over the past few decades. In particular, the Fifth Ward's proximity to industrial sites, such as a railyard and a former wood treatment plant (creosote) with known soil pollution, makes the super-neighborhood a compelling case study for exploring environmental impacts on public health. The area's history of contamination and its predominantly lower-income population provide critical context for understanding the intersection of land use and health disparities. This research integrates environmental data, such as soil sampling and pollution levels, with human health data documenting chronic conditions such as certain types of cancer prevalent among residents. The study compares health outcomes in Fifth Ward to those of other similar neighborhoods in the greater Houston area. Through statistical analysis, the research develops a quantitative model that links land use conditions with public health outcomes, identifying specific land use patterns that show significant associations with chronic conditions among residents. . The findings contribute to the development of a pilot simulation model that could guide future urban planning and landscape architecture efforts, focusing on optimizing land use patterns for improved health outcomes. This model will serve as a tool for professionals and academics in the built environment and public health sectors, offering evidence-based insights to inform policy development, zoning regulations, and community-based interventions. Ultimately, the goal is to advance public welfare by integrating health considerations into land use planning and urban design processes. Revised Abstract In recent years, public health outcomes have become a central focus across various professions within the built environment, including urban planning and landscape architecture. Despite increasing awareness of how urban design and land use impact human well-being, the direct relationships between specific land use patterns and chronic health conditions remain largely underexplored. This research seeks to address this gap by examining the association between land use and public health outcomes in Fifth Ward, a historically underserved neighborhood in the greater Houston, TX area. Texas has experienced rapid urbanization and significant changes in land use over the past few decades. In particular, the Fifth Ward's proximity to industrial sites, such as a railyard and a former wood treatment plant (creosote) with known soil pollution, makes the super-neighborhood a compelling case study for exploring environmental impacts on public health. The area's history of contamination and its predominantly lower-income population provide critical context for understanding the intersection of land use and health disparities. This research integrates environmental data, such as soil sampling and pollution levels, alongside air and water quality data, with human

health data documenting chronic conditions such as certain types of cancer and respiratory illness prevalent among residents. The study compares the role of environmental inequities, exploring how historical housing policies and proximity to industrial sites have shaped the health outcomes in Fifth Ward to those of other similar neighborhoods in the greater Houston area. Additionally, it examines whether pollution limits opportunities for community gardening and access to uncontaminated food. Through statistical analysis, the research develops a quantitative model that links land use conditions with public health outcomes, identifying specific land use patterns significantly associated with chronic conditions among residents. A diagram will illustrate recommended buffers between industrial and residential areas to mitigate impacts. The findings contribute to the development of a pilot simulation model that could guide both cleanup strategies for existing communities and land use policies for future developments. This model will serve as a tool for professionals and academics in the built environment and public health sectors, offering evidence-based insights to inform policy development, zoning regulations, and community-based interventions. By addressing both the causes and consequences of environmental inequities, this study seeks to advance public welfare through health-focused urban planning and design processes.

133 Developing an Undergraduate Community Design Studio that Serves Older Adults through University and Community Partner Engagement

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Keywords: Experiential Learning; Aging Population; Environmental Psychology; Community Design; Community Partnerships

As the proportion of older adults in society increases, it is critical that professionals across disciplines are aware of the challenges and opportunities associated with an aging population (Hancock & Newsham, 2023). One critical need facing individuals of all ages—but especially older adults—is that of maintained quality of life and well-being, which can be supported by landscape architects through enhanced access to nature (Jimenez et al., 2021; Kaplan, 1995; Kaplan & Kaplan, 1989; van Heezik et al., 2020). In an effort to prepare landscape architects-in-training to consider the impact of an aging population on their professional work, this presentation addresses an applied, community design studio for undergraduate students in landscape architecture. In this presentation, we share two perspectives. First, the organization and development of the community design studio is explained, including the incorporation of several university and community partners. Second, the findings of a mixed methods study that explores the influence of the experiential, community design studio projects on a pilot sample of second-year landscape architecture undergraduate students' (n=10) (a) perceptions of aging, (b) nature exposure importance, and (c) the role of their future career in meeting societal challenges are detailed. From the perspective of the faculty member and associated partners, the design of the studio was able to be implemented feasibly and could be sustained given interest from the various partners involved. Additionally, identifying and recruiting interested collaborative partners across the university and community was effective, leading to a richer experience for students with more viewpoints offered and broader expertise from which to draw, thereby enabling their designs to actually be implemented at partner sites. Based on pre- and post-semester survey results and focus group discussions with the participating undergraduate students, there was no statistically significant change in students' perceptions of aging or perceived nature exposure importance. However, students' first-hand accounts suggest this experience was meaningful in advancing their understanding of landscape architecture and the ways in which landscape architects play a critical role in shaping more nature-rich environments that lead to greater quality of life and well-being for older adults. Taken together, this work's findings and reflections demonstrate that the community design studio experience was valuable for students and able to be implemented within a semester. Recommendations are provided for future research and advice for educators seeking to incorporate similar projects within or beyond their studio offerings.

185 Environmental Factors Influencing Intergenerational Interactions in Residential Communities: A US Nationwide Survey of Built Environment Experts

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Keywords: Intergenerational Communities; Intergenerational Interactions; Residential and Community Environments; Aging in Place

Introduction: In 2023, the US Surgeon General declared an “epidemic of loneliness and isolation” (Department of Health and Human Services, 2023). Loneliness and social isolation are prevalent among older adults, leading to many serious health problems including depression, cognitive impairment, and premature mortality (Holt-Lunstad et al., 2015; Valtorta et al., 2016). Intergenerational interactions are increasingly recognized as being important for fighting against loneliness, social isolation, and ageism (Burnes et al., 2019; Zhong et al., 2020). However, evidence is limited regarding the potential roles of the community environment in promoting or hindering intergenerational interactions. This US-based nationwide expert survey explores community environmental factors affecting intergenerational interactions. Methods: Based on relevant literature and instruments (Nelischer & Loukaitou-Sideris, 2022; Warner & Zhang, 2019; Zhong & Lee, 2022), we developed a 30-minute Qualtrics survey, covering questions related to (1) area of expertise, (2) facilitators and barriers of in-person social interactions between older adults and children, (3) intergenerational vs. age-targeted communities, and (4) basic demographics. After cleaning the survey data collected from November 2022 to January 2024, we analyzed the data from 377 built environment experts. These experts were primarily from the architecture (n=139, 36.9%), landscape architecture (n=124, 32.9%), and urban planning (n=102, 27.1%) fields. Results: Built environment experts report parks and open spaces, especially intergenerational parks, and neighborhood walkability are the most important physical environmental features, while a sense of community, safety from crime, and parent’s attitudes toward older adults are the most influential social factors. Furthermore, there are significant current and increasing future demands for multigenerational homes and intergenerational communities. Most expert respondents in our study believed intergenerational communities can support aging in place better than age-targeted communities. Discussion/Conclusion: Policymakers and professionals should actively explore opportunities to incorporate intergenerational parks and playgrounds with diverse physical features and amenities into the community to accommodate people of all ages and abilities. Promoting intergenerational communities requires collaborations among housing, planning, transportation, parks and recreation, and public work departments, to address both physical and social infrastructure needed to cultivate a community culture that nurtures social engagements across all generations. More efforts are needed to investigate how experts' opinions compare to those of community members, and how these desirable features can be implemented across diverse communities and settings.

241 A green infrastructure approach to studying urban-greenspace health effects: Insights from a study of 87 Chinese Cities

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Keywords: Urban Greenspaces; Landscape Morphology; Public Health; Healthy Cities

Urban greenspaces (UGs), including urban forests, parks, gardens, and street landscapes, are valuable assets for cities. When well-planned and managed, UGs provide significant health benefits to urban residents. They offer opportunities for recreation, access to nature, social interaction, and education, contributing to physical, psychological, and spiritual well-being (WHO, 2017). During the COVID-19 pandemic, UGs have gained increased attention as a vital means of coping with stress from lockdowns and isolation. Beyond these benefits, UGs improve air quality, reduce stormwater runoff, enhance water quality, and help control microclimates (Mears et al., 2019). While research on the health impacts of greenspaces is growing, most studies focus on the quantity and immediate accessibility of greenspaces in urban areas (WHO, 2017). A common measure is proximity to residences and other urban services, treating greenspaces as discrete features that provide health benefits independently. However, these studies often overlook many vegetated surfaces in cities, as the greenspaces considered in typical public health research represent only a small fraction. Many elements, such as greenspace patches, corridors, and remote areas, are often excluded because they may not support recreational activities or be easily accessible. Yet, these elements are essential for forming an interconnected green infrastructure network that can offer significant direct and indirect health benefits to urban populations. To fully understand their health impacts, it is essential to recognize that the health benefits of UGs depend on their functioning as an interconnected green infrastructure system, delivering a range of ecosystem services (see Nieuwenhuijsen, 2021). This paper broadly defines urban greenspaces (UGs) to include parks and recognizable green patches (see WHO 2016) and examines their direct and indirect health effects through both quantity and spatial patterns. It presents a city-level ecological study of 87 Chinese cities, aiming to identify desirable spatial characteristics of UGs that promote health. Using factor and structural equation regression analysis, the study identifies four latent dimensions of UG systems and explores how UG provision and morphology impact urban adults' outdoor exercise and obesity rates. The findings highlight significant direct and indirect health effects from UG morphology, while UG provision shows no clear association with healthy behaviors. Achieving an optimal UG spatial pattern requires careful planning and design to balance both human and ecological needs.

270 From mental health to spiritual health: Using subjective and objective measures to investigate the impacts of sublime nature

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Keywords: spiritual health; mental health; sublime nature; ordinary nature; virtual reality environment

The health benefits of exposure to nature are widely acknowledged across academic disciplines. While much of the existing research focuses on the mental health benefits of ordinary nature, there is growing interest in the impact of "sublime nature," which can induce profound spiritual health and evoke "sublime emotions." However, studies comparing the mental and spiritual health effects of different types of sublime nature are limited. The study aims to identify how various types of sublime nature, in contrast to ordinary nature, impact individuals' mental health and spiritual health. We conducted a laboratory-based experiment utilizing virtual reality (VR) technology. A total of 253 participants were recruited via bulk email in the Univerisity of Hong Kong, all of whom were (1) right-handed, (2)aged 18-55, (3) with at least secondary school education, (4) normal or corrected-to-normal vision and hearing, and (5) no color blindness. Participants were randomly assigned to one of seven conditions: four sublime nature conditions (Antarctic glaciers, deserts, mountains, and deep oceans), one ordinary nature condition (urban parks), and two control conditions (urban streets and a blank screen). Monoscopic 360° videos with accompanying audio were presented to participants using a head-mounted display (HMD). Subjective and oobjective measurements were employed to assess changes in mental and spiritual health, respectively. The results indicated that there was no correlation between psychological and physiological indicators of mental health, but a positive relationship was observed between mental and spiritual health. We found that both sublime and ordinary nature provided significant mental health benefits compared to control conditions. Specifically, sublime nature had a significantly stronger impact on emotional promotion, while ordinary nature was most effective in stress reduction and attention restoration. Exposure to sublime nature notably enhanced spiritual health more than ordinary nature or control conditions, but their effects varied considerably. The integration of sublime nature into urban landscapes offers promising pathways to enhance both environmental sustainability and residents' well-being. Several strategic approaches can facilitate this integration: preserving and maximizing the impact of existing sublime nature features, incorporating nature-inspired design principles into architectural layouts, leveraging immersive technologies to create connections between urban residents and sublime nature, and developing targeted "nature prescriptions" that address specific mental and spiritual health outcomes. The findings provide insights into how sublime versus ordinary natural environments distinctly affect well-being, offering implications for urban design and public health. Revised Abstract The health benefits of exposure to nature are widely acknowledged across academic disciplines. While much of the existing research focuses on the mental health benefits of ordinary nature, there is growing interest in the impact of "sublime nature," which can induce profound spiritual health and evoke "sublime emotions" (Keltner & Haidt, 2003). However, studies comparing the mental and spiritual health effects of different types of sublime nature are limited (Bethelmy& Corraliza, 2019; Fisher, 2011). The study aims to identify how various types of sublime nature, in contrast to ordinary nature, impact individuals' mental health and spiritual health. We conducted a laboratory-based experiment utilizing virtual

reality (VR) technology (Chirico et al., 2017). A total of 253 participants were recruited via bulk email at the University of Hong Kong, all of whom were (1) right-handed, (2) aged 18-55, (3) with at least secondary school education, (4) normal or corrected-to-normal vision and hearing, and (5) no color blindness. Participants were randomly assigned to one of seven conditions: four sublime nature conditions (glaciers, deserts, mountains, and deep oceans), one ordinary nature condition (urban parks), and two control conditions (urban streets and a blank screen; Tuan, 2013). Monoscopic 360° videos with accompanying audio were presented to participants. Subjective and oobjective measurements were employed to assess changes in mental and spiritual health, respectively (Gordon et al., 2017). The results indicated that there was no correlation between psychological and physiological indicators of mental health, but a positive relationship was observed between mental and spiritual health. We found that both sublime and ordinary nature provided significant mental health benefits compared to control conditions. Specifically, sublime nature had a significantly stronger impact on emotional promotion, while ordinary nature was most effective in stress reduction and attention restoration. Exposure to sublime nature notably enhanced spiritual health more than ordinary nature or control conditions, but their effects varied considerably. The integration of sublime nature into urban landscapes offers promising pathways to enhance both environmental sustainability and residents' well-being (Li et al., 2023). Several strategic approaches can facilitate this integration: preserving and maximizing the impact of existing sublime nature, incorporating nature-inspired design principles into architectural layouts, leveraging immersive technologies to create connections between urban residents and sublime nature, and developing targeted "nature prescriptions" that address specific mental and spiritual health outcomes. The findings provide insights into how sublime versus ordinary natural environments distinctly affect well-being, offering implications for urban design and public health.

274 Consistent and regular contact with nature can help cope with drug use disorder

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Keywords: Drug use disorder; nature therapy; field experiment; physiological symptom; psychological symptom

Drug use disorder is a global crisis, impacting millions of lives annually. Prolonged drug use can severely affect an individual's physical and mental health, leading to a loss of control over drug use and the development of disorders. Concurrently, numerous studies highlight the psychological and physiological benefits of nature exposure, suggesting it may aid in the recovery from the drug use disorder. However, previous studies have primarily examined the effects of short-term nature exposure on healthy individuals, neglecting its potential role in the context of drug use disorders. Recovery from drug use disorders is often a lengthy process characterized by relaxation of brain stress system, reduced levels of drug cravings, stress, and rumination. These psychological and physiological challenges are critical factors in both the onset and persistence of these disorders. Addressing these issues is essential for effective recovery. Thus, this study aims to explore whether or to what extent regular contact with nature influences drug use disorder indicated by associated symptoms. We carried out an eight-week randomized controlled onsite experiment to examine how regular contact with nature affects the physiological and psychological symptoms associated with drug use disorder. A total of 65 patients participated and were randomly divided into a nature group and a control group. Participants in the nature group engaged in one hour of nature contact intervention each week for eight weeks, whereas participants in the control group did not receive any nature contact intervention during the study period. We measured the activity of brain stress system by testing salivary cortisol levels, and measured drug cravings, stress, and rumination via recognized standard scales. Data collections were taken at three intervals, before the experiment, . Additionally, socio-economic and demographic data, along with daily nature contact conditions, were collected as covariates. Results showed that both four-week and eight-week nature contact significantly lowered cortisol levels within the group and between two groups, suggesting a relaxation of brain stress system. Furthermore, four weeks of nature contact reduced drug craving and stress levels within the group. After eight weeks, reductions in cravings, stress, and rumination were observed in both within the group and between two groups. Therefore, we propose that regular contact with nature may serve as an effective treatment for supporting recovery from the drug use disorder.

287 Impact of Environmental Exposure on Children's Skin Microbiome: A Randomized Controlled Trial

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Keywords: Green spaces; Skin microbiome; Human health; Microbial composition; Microbial diversity

Greenspaces are recognized for promoting human health, and recent research has identified the microbiome as an emerging pathway in this relationship. Environmental exposures, particularly to natural elements, can alter the human microbiome (Roslund et al., 2022; Roslund et al., 2021), which in turn is closely linked to health outcomes such as immune function, inflammation, and the risk of chronic diseases (Rook, 2013). By fostering diverse and beneficial microbial communities, greenspaces may play a critical role in enhancing public health. However, gaps remain in understanding how specific environmental settings influence the microbiome. To address this gap, we conducted a randomized controlled trial aimed to examine how different environmental exposures influence children's skin microbiome. A total of 242 primary school students were randomly assigned to one of four environments: an indoor classroom, an outdoor paved area, an outdoor grass field, or an outdoor forest. Two different finger microbiome samples were collected using cotton-flocked swabs, before and after a two-hour exposure to the assigned environment. Microbiome analysis was conducted using 16S rRNA sequencing on the Illumina NextSeq platform to assess both alpha and beta diversity. Before exposure, there were no significant differences between the groups in terms of alpha diversity (Shannon index, Chao1, SOBS, ACE) or beta diversity, confirming a similar baseline microbiome composition across all participants. Post-exposure, the outdoor grass field had significantly higher diversity compared to the other three environments ($p < 0.05$). The microbiome beta diversity, illustrated using Principal Coordinates Analysis (PCoA), revealed that the grass field microbial structure and composition were significantly different from that of the other three sites. In addition to these diversity metrics, specific changes in microbiome taxa before and after exposure were observed. Staphylococcus, a pathogen genus with species associated with skin infections and other diseases (Otto, 2010), was significantly reduced after exposure to the grass field, indicating a potential health benefit of such environments. These findings underscore the significant health benefits of microbiome diversity and composition, particularly the role of greenspaces in reducing pathogen presence. Increased microbiome diversity, as observed in the grass field, is associated with a more resilient immune system and lower susceptibility to inflammatory and infectious diseases. This research highlights the need for urban planning to prioritize greenspaces, such as grass fields, to promote public health by fostering a healthier microbiome, especially in children. By reducing pathogens and supporting microbiome diversity, such environments can have long-term, positive impacts on health and well-being.

289 Healthy Landscape and Healthy Community Landscape: Theoretical Framework and Quantitative Evaluation System

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Keywords: public health; urban nature; theoretical pathways; health outcomes; digital technology

The multidimensional health crisis has been ignited by widespread and rapid urbanization. A healthy community environment can help residents maintain good mental, physical, and social health from the outset, thereby preventing and reducing the occurrence of mental and physical diseases. Currently, at the level of theoretical research, a systematic theoretical framework and related impact mechanisms of residential landscapes have not been fully established. At the level of methodological research, a comprehensive evaluation toolkit for healthy community landscapes has yet to be developed. This study is an initial effort to address these problems. First, it develops a systematic landscape-health theoretical framework through the analysis and synthesis of theoretical and empirical literature in related fields. The framework includes 10 theoretical pathways through which landscapes can promote mental, physical, and social health. Based on this framework, and considering the landscape conditions of urban communities as well as the availability of digital techniques, a digital evaluation system for healthy community landscapes is proposed. This study aims to provide strong support for the development of healthy urban landscapes and healthy residential landscapes. Revised Abstract The public health crisis in urban areas has become increasingly severe, highlighting the critical need to leverage landscape design to promote community-scale public health. This study systematically reviews theories and scientific evidence to establish a comprehensive theoretical framework that connects three major aspects of human health (mental, physical, and social health) with seven mechanisms, various types of health status changes, and specific effects on health problems. Furthermore, based on a thorough literature review of measurable health outcomes, we developed an evaluation protocol to quantitatively assess seven aspects of urban landscapes: infrastructure and facilities supporting healthcare and healthy lifestyles (4 measures), climate and micro-climate conditions (4 measures), visual quality (6 measures), acoustic quality (4 measures), support for physical activity (4 measures), crime and incident prevention (3 measures), and communicable disease prevention (5 measures). The weight of measures is suggested to be decided by experts, stakeholders, and residents' representatives to match the socio-economic context, site conditions, and needs of specific communities. This evaluation can be applied at different stages—before urban planning, before landscape design, and after landscape design—to inform and improve practice.

302 Tree Canopy Disparities and Educational Inequities in Higher Education

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Keywords: Tree canopy disparities; Educational inequalities; graduation rate; campus; college students

Background: Research consistently demonstrates that tree canopy distribution varies significantly by neighborhood income, ethnicity, and race, with racial and ethnic minority neighborhoods often having less tree canopy (Zhou, 2013). Additionally, tree canopy density around high schools has been positively associated with improved academic outcomes, such as ACT scores and college readiness (Li, 2019). However, research focusing on tree canopy disparities and their effects on educational outcomes and graduate rates in higher education remains limited. Aims: This study aims to (1) understand disparities in tree canopy coverage across college campuses based on the racial/ethnic composition of the student population, and (2) examine the relationship between tree canopy coverage and educational outcomes, specifically focusing on graduation rates. Methods: To analyze tree canopy disparities, we used spatial data from the Integrated Postsecondary Education Data System to capture colleges and universities. Tree canopy data was derived from multi-resolution satellite images (30m resolution) for 2019. Attendance status and graduation rates (measured as 150% of the normal time to complete a degree) were obtained for the same year and were categorized by race/ethnicity and gender. The study focuses on undergraduate programs in U.S. universities and colleges, yielding a final sample size of 3,762 institutions from an initial pool of 5,888. To examine disparities in tree canopy coverage, we performed ANOVA by race/ethnicity and conducted a multivariate regression analysis to explore relationships between graduation rates and tree canopy, controlling for campus demographics and socioeconomic status. Results: Our findings reveal significant disparities in tree canopy coverage by race/ethnicity enrollment. Specifically, campuses with higher percentages of racial/ethnic minority students, such as Hispanic and Black populations, exhibited lower tree canopy coverage. Moreover, tree canopy coverage was positively associated with higher graduation rates among White students but was negatively associated with graduation rates among Hispanic students. We also found a positive association between tree canopy and graduate rate after controlling for the control variables. Discussion: The results support the hypothesis that greater tree canopy coverage is linked to better educational outcomes, as measured by graduation rates. The study underscores the importance of equity and inclusion in campus planning, suggesting that addressing disparities in tree canopy distribution could foster more equitable and supportive learning environments. These findings have implications for environmental justice, as they highlight the need to rectify historical injustices in campus landscaping and planning to promote inclusive, healthy, and academically supportive spaces for all students. Revised Abstract Background: Research consistently demonstrates that tree canopy distribution varies significantly by neighborhood income, ethnicity, and race, with minority neighborhoods often having less tree canopy (Zhou,

2013). Minority-serving schools also tend to have lower tree canopy cover (Williams & Diven, 2024). Furthermore, tree canopy density around high schools has been positively associated with improved academic outcomes, such as ACT scores and college readiness (Li, 2019). However, limited research has explored how tree canopy disparities on college campuses impact educational outcomes in higher education. Aims: This study aims to (1) understand disparities in tree canopy coverage across college campuses based on the racial/ethnic composition of the student population, and (2) examine the relationship between tree canopy coverage and educational outcomes, specifically focusing on graduation rates while exploring underlying mechanisms and controlled factors. Methods: We analyzed tree canopy disparities on campus using spatial data from the Integrated Postsecondary Education Data System for 3,762 four- and five-year undergraduate institutions, selected from an initial pool of 5,888. Tree canopy data were derived from 2019 satellite imagery (30m resolution), and institutional demographic and graduation rate data were obtained for the same year. ANOVA was performed to assess disparities in tree canopy coverage by race/ethnicity. Multivariate regression analysis was used to examine the relationship between tree canopy coverage and graduation rates, controlling for campus demographics, socioeconomic factors, climatic conditions, and other potential confounders. Results: Significant disparities in tree canopy coverage were observed, with campuses enrolling higher proportions of Hispanic and Black students having lower tree canopy coverage. Tree canopy coverage was positively associated with higher graduation rates among White students only. After controlling for confounding variables, tree canopy coverage retained a positive association with overall graduation rates. Discussion: The observed disparities in tree canopy coverage among institutions with varying racial and ethnic compositions highlight the need to promote equity in campus planning. While tree canopy coverage was positively associated with higher graduation rates among White students, the lack of similar benefits for Hispanic students warrants closer examination. Potential mechanisms, such as mitigating heat stress, enhancing mental well-being, and fostering conducive outdoor study environments, may not equally benefit all populations due to differing contextual factors. Limitations such as the lack of detailed data on institutional budgets and landscaping policies underscore the need for future research to refine theoretical frameworks and investigate additional environmental and social factors that influence their educational outcomes.

319 Association between greenspace morphology and disability prevalence among the elderly in urban areas of the US

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Keywords: urban green spaces; disability rate; aging population; tract level; urban planning

Exposure to residential greenness has been associated with various positive health outcomes, including reduced risks of chronic diseases, cognitive decline, frailty, and mental illness. However, the relationship between greenness and disability remains unclear, and the association between greenspace morphology and disability among older adults remains unexplored. This ecological study investigates the associations between greenspace morphology metrics and the prevalence of disability among the elderly across 50,101 census tracts in urban areas of the contiguous United States. 30-meter resolution landcover data from National Land Cover Database were used to calculate greenspace morphology— percentage, density, shape, connectedness, diversity, and closeness of greenspace for each census tract. Spatial error models were employed to examine the associations while controlling for total green areas, and sociodemographic and geographic factors. The results revealed reduced disability prevalence in neighborhoods characterized by higher percentages of greenspace, and greater density, shape complexity, connectedness, diversity, and closeness. The standardized coefficients for these greenspace morphological factors were -0.432 (95% CI -0.639– -0.225) for percentage, -0.327 (95% CI -0.463– -0.191) for density, -0.274 (95% CI -0.447– -0.101) for complex shapes, -0.277 (95% CI -0.429– -0.125) for connectedness, -0.419 (95% CI -0.608– -0.230) for diversity, and 0.132 (95% CI 0.001– 0.263) for closeness, respectively. These findings suggest that considering greenspace morphology can be an effective strategy for urban planners and policymakers to support active aging and functional independence.

335 The Impact of Urban Visual Elements on Walkability Perception

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Keywords: Walkability Perception; Image segmentation; Sentiment analysis; Urban spaces

Walkability is a critical aspect of urban design, impacting not only physical health but also mental well-being by promoting active transportation and fostering social interactions in public spaces (Adkins, Dill, Luhr, & Neal, 2012). Prior research highlighted the importance of both physical and sensory dimensions—such as visual, auditory, and environmental factors on shaping user experiences in urban spaces (Liu, Kang, Behm, & Luo, 2014). Specifically, the presence of natural elements like trees, water features, and open green spaces has been shown to enhance perceptions of safety, comfort, and overall walkability (Huang et al., 2023). While much of the existing research focuses on how the physical design of urban environments impacts walkability, fewer studies have directly measured how particular visual features contribute to subjective perception of walkability. Our research aims to bridge this gap by linking the physical characteristics of urban spaces to how users perceive these spaces. The central research question guiding our study is: what is the relationship between visual elements in urban environments and perceptions of walkability? To address this, we adopted a mixed-methods approach. We applied image segmentation techniques to a series of urban images to quantify key environmental features such as trees, benches, and pathways. After that, we conducted a survey asking people to evaluate those urban images. The survey consisted of asking questions about their perceptions across six dimensions of walkability: overall walkability, feasibility, accessibility, safety, comfort, and liveliness. 683 participants filled the survey and ranked the images from 1-10 according to these dimensions. In addition to the visual analysis, we conducted sentiment analysis on textual feedback provided by participants, generating sentiment scores to further explore their satisfaction behind their responses. Data analysis involved calculating correlations between the segmented image features and user rankings, as well as examining the relationship between sentiment scores and rankings. The correlation of the image ranking and the elements segmented in the images shows that trees significantly enhance perceptions of overall walkability. Fences as one of the outdoor elements also have a small but positive effect on walkability, contributing to a sense of safety.

381 Let the Body Speak: How Physiological Responses Challenge Perceived Restorativeness in Indoor Green Spaces

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Keywords: Eye Movement Pattern; Physiological Response; Perceived Restorativeness; Fully Immersive Virtual Reality Environment (FIVRE); Indoor Green Environment

It is well understood that human interactions with nature spark a range of processes in the body, a topic that has been explored in both psychology and environmental psychology. These interactions often have distinct effects, both perceptually and physiologically (Saedi and Rice, 2022; Parasuraman, 1986). Still, much of the research tends to focus primarily on perception to gauge these impacts (Calogiuri et al., 2018; Korpela et al., 2010; Kaplan, 2001). What has been less explored is how the body physically reacts during these interactions and whether physiological and perceptual responses are aligned (Lee et al., 2015; Saedi et al., 2021). To address this gap, an exploratory experimental study was conducted to investigate whether the presence of natural greenery in indoor spaces can trigger restorative physiological responses, and whether people's perceptions of restorativeness match these physiological responses. For this study, 86 students were randomly assigned to walk down one of two versions of the corridor leading to their classroom. The two corridors were recreated using a fully immersive virtual reality environment (FIVRE). One of these environments featured natural greenery, while the other did not. Participants' eye movement patterns were recorded using VR goggles to capture physiological responses. Specific factors such as fixation location, fixation duration, and eye travel distance were analyzed. After completing the walkthrough, participants were asked to fill out the Perceived Restorative Scale (PRS) questionnaire (Hartig et al., 1997) to evaluate the perceptual impact of the two virtual corridors. The results revealed a significant difference in eye movement patterns between the two groups. Those who walked through the corridor with greenery demonstrated validated patterns related to restorative environments in all three aspects of the recorded eye movements. In contrast, participants in the non-greenery group did not show such patterns. Interestingly, despite these differences in physiological responses, neither group perceived the corridor as particularly restorative. This suggests that relying solely on perception to gauge the restorative qualities of an environment may not provide a complete understanding and could lead to premature or incomplete conclusions.

385 Biodiversity, Perception, and Health: Insights from a Systematic Review

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Keywords: Urban biodiversity; Species richness; Human health; Pathways to health

Numerous studies have explored the relationships between biodiversity in urban green spaces and human health (Dallimer et al., 2012; Fuller et al., 2007; Methorst et al., 2021). While previous review research has overviewed this research field (Aerts et al., 2018; Houlden et al., 2021; Marselle et al., 2021), they often applied a broad definition of biodiversity. Hence, our understanding of the health effects of narrowly defined biodiversity, such as the variability of biodiversity, across different cultural contexts remains limited. In this systematic review, we addressed three specific objectives. 1) Synthesize the relationships between the richness of biodiversity and human health; 2) reveal the pathways through which these relationships have been tested; and 3) describe the associations between subjectively perceived biodiversity and health outcomes. We assessed 41 studies published between 2018 and 2023, identified through three databases: ISI Web of Science, Scopus, and PubMed. The findings showed mixed relationships between the variability of biodiversity (e.g., species richness) and health outcomes, with only one-third of studies reporting beneficial health effects. Among all the pathways summarized, restoring and building health capacities were the two most focused mechanisms, exploring mental and physical health outcomes, respectively. We found individuals showed fair levels in distinguishing different levels of biodiversity, and the higher perceived biodiversity tended to be associated with better health outcomes. Future research should explore different pathways with multiple levels in biodiversity variables, explore causal effects, and collect covariates to clarify the connections between biodiversity and health. The exploration of functional biodiversity and its correlations with health can make research outcomes to be applied in practice. Moreover, investigating the relationships among different socioeconomic statuses on individual and neighborhood levels to uncover the interaction with inequitable distribution of biodiverse green spaces.

457 Training the next generation of designers – internships and expectations

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Keywords: internship; curriculum; experiential learning

Internships are common in design education, with the experience offering skill and knowledge gains beyond a program's plan of study. Studies have shown that the achievement and confidence gained through internship experiences offer benefits beyond educational content, providing a springboard to entry level employment and early career advancement. Despite these benefits, internships and post-graduation employment can be intimidating and anxiety inducing ideas for students approaching these milestones. Through a survey of students yet to experience an internship, students and recent graduates who have experienced internships, and professional design firm employers, this study hopes to address the confidence and educational achievement gaps that design programs can impact through their curricula and mentoring systems. This is not to say that design programs should be vocational in nature or that student employability is the ultimate metric to be pursued. Instead it should serve to inform students about professional expectations and processes while educating firms about who their future hires are and what they need. Academic programs can learn from both cohorts and adjust course and curricular content as needed in hopes of graduating professionals who will lead the future of landscape architecture. In this presentation, preliminary response data will be presented, with repercussions and concerns for academia highlighted for discussion. Revised Abstract Internships are common in design education, with the experience offering skill and knowledge gains beyond a program's plan of study. Studies have shown that the achievement and confidence gained through internship experiences offer benefits beyond educational content, providing a springboard to entry level employment and early career advancement. Despite these benefits, internships and post-graduation employment can be intimidating and anxiety inducing ideas for students approaching these milestones. Through an ongoing survey of students yet to experience an internship, students and recent graduates who have experienced internships, and design firm employers, this study hopes to address the confidence and educational achievement gaps that design programs can impact through their curricula and mentoring systems. Survey questions address student concerns and fear of performance, office culture and "fit", student coping strategies and advice, and professional firm indicators of employability, performance expectations, and specific skillsets. This is not to say that design programs should be vocational in nature or that student employability is the ultimate metric to be pursued. Instead, academic programs can learn from student and professional cohorts and adjust course and curricular content as needed in hopes of graduating professionals who will lead the future of landscape architecture. The findings from this study will illustrate strategies for students to use in pursuing internships and post-graduation employment, skills and knowledge areas to explore in their studies, and elements to showcase in portfolios and interviews. It will also describe strategies that successful students have used to address application, interview, and on-the-job mental health concerns. Design firms will be able to understand their future employees, aiding in recruitment and retention. In this presentation, preliminary response data will be presented, with repercussions and concerns for academia highlighted for discussion.

464 Building Resilience and Relieving Stress in Children Empowered by Different Play Types on Playgrounds

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Keywords: children's stress; resilience; natural playground; built form playground; play types

Stress today is an ongoing issue for all ages that is affecting all the way from job performance in the workplace to children in the classroom. Over 90% of the Gen Z are experiencing one or more symptom of stress and negative impacting interpersonal relationship or poor work experiences (1). Negative impacts on an individual's physiological systems can range from the occurrence of heart disease or diabetes to a shorter lifespan. For children, this can reduce their white and cortical brain matter, and by affecting communication, sensory and emotional responses (2). Their psychological issues can range from behavioral problems, high levels of conduct disorder, low levels of self-esteem, depression or social adaptation with peers (3). One of the most invaluable environments that influences a child's development is the playground found in schoolyards identified within the micro-system of Bronfenbrenner Ecological Systems Theory (4). His theory posits how interconnected environmental systems influences the growing child's development. Realizing the negativity of ongoing stress experiences that can dispirit a child's constructive growth, it is significant to support and assimilate positive achievements. Play is the work of a child's development, and the playground is the classroom for its accomplishment. Considering the design of a playground is invaluable to examine the work of Dr. Kenneth's theory model of the seven Cs of resilience with the attributes (5) that can be attained in successful play. Outside activities can amplify providing a child's personal capacity to persevere overcoming their daily stress. There are multiple types of play identified and each is invaluable for resilience and how its employed for positive psychological well-being. Each play type currently needs to be examined more fully as a contributor that heightens a child's ability interacting with stress. The type of playground environment itself ranging from built form to nature also needs consideration with the various play equipment utilized in the attributes of resilience. The study aims to compares and contrast different types of play and the equipment used, employing the Seven Cs framework. It then examines how the different play types interact to built play equipment versus nature playgrounds and determining applicability to elevate a child's resilience. The research endeavors to highlight the importance of how different play types and environments that can effectively counteract the impacts of children's stress. The profession and broader community can utilize findings to create supportive, enriching play spaces that will foster well-being and growth of children. Revised Abstract Stress today is an ongoing issue for all ages that is affecting all the way from job performance in the workplace to children in the classroom. Over 90% of the Gen Z are experiencing one or more symptom of stress and negative impacting interpersonal relationship or poor work experiences (1). Negative impacts on an individual's physiological systems can range from the occurrence of heart disease or diabetes to a shorter lifespan. For children, this can reduce their white and cortical brain matter, and by affecting communication, sensory and emotional responses (2). Their psychological issues can range from behavioral problems, high levels of conduct disorder, low levels of self-esteem, depression or social adaptation with peers (3). One of the most invaluable environments that influences a child's development is the playground found in schoolyards identified within the microsystem of Bronfenbrenner's Ecological Systems Theory (4). His theory posits how interconnected environmental systems influences the growing child's development.

Realizing negative ongoing stress experiences in the landscape that can dispirit a child's constructive growth, so it is significant to design solutions in the playground that will assimilate positive achievements. Play is the work of a child, and the playground is the classroom for its accomplishment. Considering the design of a playground is invaluable to examine the work of Dr. Kenneth's theory model of the seven Cs of resilience with the attributes (5) that can be attained in successful play. Outside activities can amplify providing a child's personal capacity to persevere overcoming their daily stress. There are multiple types of play identified and each is invaluable for resilience and how its employed for positive psychological well-being. Each play type currently needs to be examined more fully as a contributor that heightens a child's ability interacting with stress. The type of playground environment that ranges from built form to nature needs consideration of their various play equipment utilized in the attributes of resilience. The study aims to compare and contrast different types of play and equipment used between built form versus nature playgrounds and applicability to elevate a child's resilience. The research endeavors to highlight the importance of how different play types and environments that can effectively counteract the impacts of children's stress. The profession and broader community can utilize findings to create supportive, enriching play spaces that will foster well-being and growth of children.

469 Network analysis shows potential links between perceived built environment and mental, physical and social health: a natural experiment

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Keywords: Mental health; Physical health; Social health; Perceived built environment; Network analysis

Introduction: Urban residents worldwide face severe health issues. While theoretical and empirical studies highlight the benefits of the built environment on mental, physical, and social health, a gap remains in translating these theories into practical applications for professionals and policymakers. Methods: A cross-sectional survey collected data from 3,350 residents across 224 public housing communities in Hong Kong. The regulations of the public housing authority in Hong Kong constituted a natural experiment with minimal self-selection bias. We collected measures of perceived built environment including distance to the city center, accessibility to public transport, diversity of land use, neighborhood interactions, presence of nature, climatic conditions, housing conditions, and healthy lifestyle support. Measures of health status included mental health status, physical health status, and social health status. We used network analysis models to explore potential links between the perceived built environment and mental health status, physical health status, and social health status separately. Findings: We constructed a network model of 32 perceived built environment items and 9 mental health measures, indicating a network density of 0.276. The partial correlations matrix indicated that 18 perceived built environment factors correlated with mental health measures, with easy access to nearest bus stops correlated to five mental health measures. Availability of employment skills training facilities and lack of privacy in residence were correlated to three mental health measures separately. A network model of 32 perceived built environment items and 8 physical health measures, indicating a network density of 0.304. The partial correlations matrix indicated that 23 perceived built environment factors correlated with physical health measures, with easy access to nearest bus stops correlated to five physical health measures. And financially struggling neighbors and perception of unsafety were correlated to three physical measures separately. A network model of 32 perceived built environment items and 22 social health measures, indicating a network density of 0.229. The partial correlations matrix indicated that 28 perceived built environment factors correlated with social health measures, with willingness of residents to socialize linked to seven measures, easy access to urban centers, financially struggling neighbors, and difficulty in maintaining a healthy routine associated with five measures separately. Centrality analysis identified three key measures—easy access to green spaces, difficulty in maintaining a healthy routine, and easy access to nearest bus stops—with the highest node strength. Enhancing public transport and green space access may benefits residents' mental, physical and social health.

483 Liminal Landscapes and Impacts on Stress Reduction: A Mixed Methods Study of Urban Green Space

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Keywords: Designed environment.; Environmental psychology.; Liminal landscapes.; Cortisol sampling.; Health and wellness.

Studies increasingly show the potential for green space use to reduce stress and improve overall health (Ye et al., 2023). While the link between nature exposure and improved health seems increasingly clear, designers of urban environments need more information on the precise design qualities of different spaces that may lead to greater stress reduction. Many urban environments include pathways and other transitional spaces, yet there are no guidelines that aim to reduce stress in the body. This study aims to prove that being outdoors is enough to reduce stress in the body, even if greenspace is lacking. However, due to time limitations, this study will not provide guidelines for designing liminal spaces. The researchers identified the study site as the College Square Plaza, a highly used urban landscape, connecting the campus and University community with downtown Athens, Georgia. Due to its urban setting, there is a lack of designated greenspace in this area, yet it is still highly trafficked and utilized by students and the Athens community. The study employs a mixed method approach including cortisol sampling and assays, a questionnaire, and the perceived stress scale assessment (PSS) to help researchers understand users' perceived stress levels. Participants first completed the perceived stress scale (PSS) assessment. Participants were then asked to provide their three salivary samples at 3:00 PM during a one-week period after sitting in the College Square Plaza for thirty minutes. Prior to their salivary collections at College Square Plaza, participants were asked to provide saliva samples to establish a baseline for the study. After site use, participants completed a more qualitative questionnaire designed to collect user feelings and opinions about the plaza, detail design elements such as materials, and gather their perceptions of the site's impact on their well-being. Research is underway and final results will be presented in the paper presentation. Preliminary investigation suggests that the use of outdoor liminal space may offer significant stress reduction, even sites lacking in greenspace (Mennis et al., 2018). These results are significant for landscape architects and urban designers as urban populations increase and the design of urban greenspaces becomes increasingly important and should be taken into consideration by landscape designers when modifying the environment to promote maximum health and wellness among users. Revised Abstract Studies increasingly show the potential for greenspace use to reduce stress and improve overall health (Ye at al., 2023). While the link between nature exposure and improved health seems increasingly clear, designers of urban environments need more information on the precise design qualities of different spaces that may lead to greater stress reduction. Many urban environments function as transitional spaces, yet few guidelines provide specific instructions on design for stress reduction in busy urban transitional spaces. This study identifies design and environmental factors that should be reduced as much as possible to create a calm and relaxing transitional environment. The researchers identified the study sites as the University of Georgia President's Garden at Old College and College Square Plaza. Both sites are highly used urban landscapes, that connect the campus and University community with downtown Athens, Georgia. The difference between the urban settings can be attributed to the function of their surrounding buildings, urban density,

and the amount of designated greenspace located on each site. Both spaces have high levels of pedestrian traffic and both are utilized by students and the Athens community. The study employs a mixed methods approach including utilization of the perceived stress scale (PSS), a behavioral coding scheme, the Discrete Emotions Questionnaire (DEQ), and a survey designed by the authors to help researchers understand users' perceived stress levels. Participants first completed the PSS assessment, to establish baseline data for the study. Participants were then asked to sit in the President's Garden for 10 minutes, then take a short walk over to College Square Plaza and sit there for 10 minutes. During site use, participants were observed by the authors using the behavioral coding scheme to document observable indicators of stress and discomfort. After each site use, participants completed the DEQ, and survey designed by the authors to collect user feelings and opinions about the sites, detail design elements, and gather user perceptions of the site's impact on their well-being. Research is underway and final results will be presented in the paper presentation. Preliminary investigation suggests that use of outdoor liminal space may offer significant stress reduction, even sites lacking in greenspace (Mennis et al., 2018). These results are significant for landscape architects and urban designers as urban populations increase and the design of urban greenspaces becomes increasingly important, and therefore should be taken into consideration to promote maximum health and wellness among users.

495 From Streets to Cities: A Systematic Review of Multi-Scale Walkability and Built Environment Studies

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Keywords: Walkability; Scale; Built Environment

Background: As cities increasingly focus on creating healthier, more accessible, and sustainable urban environments, walkability studies have gained significant attention across various fields. Walkable urban spaces, ranging from streetscapes to broader transportation networks, are linked to numerous public health, environmental, and social benefits [1,2]. While macro scales typically address D variables (e.g., density, diversity, design), micro scales focus on street-level features, and meso scales measure environmental factors within specific areas, though these are rarely well-defined [3–6]. Despite the abundance of research, inconsistencies in categorizing study scales make it challenging to compare results across studies. Objectives: This systematic review aims to analyze walkability research across different scales—micro, meso, and macro—along with other terms such as metropolitan or city, neighborhood, and street scales. The goal is to provide clarity on how different studies define and approach these scales, contributing to a more cohesive understanding of the existing body of work. Methods: Using the PRISMA methodology, we conducted a systematic review of 380 articles published between January 2003 and April 2023, sourced from Web of Science, Scopus, PubMed, and JSTOR. A total of 131 studies met the inclusion criteria, comprising 5 qualitative studies, 16 mixed-method studies, and 110 quantitative studies. We analyzed variables related to geographic units, data collection methods, transportation systems, built environment factors, physical activity, perceptions, and socio-demographic variables. Results: We grouped macro and city, meso and neighborhood, and micro and street scales, resulting in 28 macro (city)-scale studies, 51 meso (neighborhood)-scale studies, and 52 micro (street)-scale studies. A chi-square test showed a statistically significant relationship between neighborhood and street scales ($p < 0.0001$). Macro-scale studies reported the highest frequency of D variables, such as density (e.g., population density, floor area), diversity (land-use mix, employment density), and greenness (vegetation presence). Meso-scale studies frequently included D variables, as well as street-level factors such as sidewalk continuity, greenness (street trees, planters), and destination accessibility (proximity to amenities). Micro-scale studies most often examined sidewalk conditions, building characteristics (e.g., building facades, building colors, identifiers), and street furniture (e.g., benches, safety facilities). Conclusion: Our findings reveal a chaotic approach to scale categorization in walkability research, with neighborhood-scale studies often appearing generic. The reliance on data availability has led to a lack of scale-specific focus. This review highlights the need for a consistent continuum of scales with standardized terminology, which will improve the comparability and consistency of future research.

577 A Systematic Review of Studies Utilizing Street-View Images for Urban Walkability Assessment

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Keywords: Street-View Images; Urban Walkability; Systematic Review

Background: Walkability is an essential aspect of urban design, influencing public health, sustainability, and quality of life (Rzotkiewicz et al., 2018; Liu et al., 2018). While traditional methods of assessing walkability are labor-intensive, the growing use of street-view images from platforms like Google Street View has provided researchers with a scalable alternative. Computer vision enables computers to interpret and analyze visual information, and recent advancements in deep learning have made it a powerful tool for assessing complex urban environments (Shi et al., 2016). These developments enable street-view images to be analyzed and automatically extracted for various urban features, including roads, buildings, trees, sky, cars, people, etc. However, despite the increasing application of street-view imagery in walkability studies, a comprehensive review of its use and effectiveness in this context is in demand. Objective: This review aims to systematically examine how street-view images have been employed to assess walkability in urban environments. It will focus on (1) the various methodologies used to analyze walkability via street-view images, (2) the types of walkability metrics commonly extracted, such as sidewalk quality, crosswalk availability, and other urban design elements, and (3) the relationship between built environment features and walkability outcomes, such as pedestrian flow and environmental perceptions. Methods: A systematic literature search will be conducted across databases such as Web of Science and Scopus using **Keywords** like “street-view images,” “computer vision” “walkability,” “urban environment,” and “pedestrian infrastructure.” Studies from 2019 to 2024 that utilize street-view imagery for evaluating walkability will be included. The review will exclude studies that do not specifically focus on street-view images or are irrelevant to walkability. Expected Results: The review is expected to show that street-view images provide a cost-effective and scalable alternative to traditional walkability assessment methods. The analysis will reveal commonly used methodologies and automated techniques that involve computer vision models to extract physical elements such as street crossings, sidewalk width, and conditions of pedestrian infrastructure. The review will also highlight key urban design factors influencing walkability, including sidewalk width, street lighting, vegetation, and traffic safety features. Contribution: This review will fill a gap on utilizing street-view images as a tool for urban walkability assessment. It will provide urban planners, designers, and policymakers insights into the potential of street-view imagery for large-scale, cost-effective walkability evaluations. It will offer a rapid assessment and provides researchers with guidance for the adoption and implementation of strategies aimed at advancing pedestrian-friendly environments.

591 Where and how to invest in Greenspace for optimal health benefits: a systematic review of Greenspace morphology and Human-Health relationships

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Keywords: Public health; Spatial pattern; Landscape architecture; Built environment; Greenspace

Research on the relationship between greenspace morphology and health is a growing field that informs the spatial design of greenspace to enhance health outcomes. This study reviews the current progress, methodologies, and knowledge gaps in this area. From a database search of 272 940 English articles and 39 053 Chinese articles up to April 18, 2024, we identified 22 and 7 studies on the topic for further evaluation. Predominantly cross-sectional and neighbourhood-scale analyses were conducted using land cover maps ranging from 0·25 to 250 metres in resolution. Six primary characteristics of greenspace morphology have been studied, including size, shape, fragmentation, connectedness, aggregation, and diversity. While associations between greenspace morphology and health outcomes have been observed, both their reliability and generalisability remain suggestive due to ecological study designs and heterogeneity among studies. Future research should prioritise individual-level prospective cohorts and intervention studies. Exploring mechanisms linking greenspace morphology and health, determining optimal map resolution, and distinguishing it from greenness magnitude in statistical analysis is essential. This evidence is crucial for health-promoting greenspace planning and should be routinely integrated into urban epidemiological research.

596 Beyond Playgrounds: Collectively Revisioning Outdoor Play for Diverse College Student Well-Being

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Keywords: New Materialism; Well-being; College students; Outdoor play; Public health

Emerging adults transitioning from high school to college experience dramatic shifts in peer networks, sense of belonging, identity, that among other factors, impact well-being (Arnett, 2000). Between 2020 and 2021, over 60% of undergraduate college students and 33.7% of U.S. adults aged 18-25 reported symptoms of at least one diagnosable mental illness, the highest rates ever recorded for these groups (HMN, 2023; SAMHSA, 2022). Thus, there is an urgent need to provide undergraduate college students with health-promoting resources including equitable access to outdoor play. Play is a state of mind entered into by engaging in any freely chosen, intrinsically motivated activity that is effortlessly engaging, and lacks any purpose besides being fun (Mews, 2022). While often viewed as the stuff of childhood, play remains an important component of learning, healthy development, and well-being into adulthood. In addition, outdoor play exposes individuals to the multiplicitous health benefits of nature interaction. However, little is known about college students' outdoor play behaviors. This paper presents findings from a mixed-methods study-in-progress that explores qualitative and quantitative aspects of college students' relationship with outdoor play. Employing a feminist new materialism onto-epistemology, this study aims to gain a deeper understanding of students' conceptualizations of and patterns of engagement with outdoor play. To do so, a survey was administered to undergraduate students at a large Midwestern University (N=737) in January 2024 and will be followed by participatory action research and arts-based, qualitative data gathering in November 2024. Initial results from ordinal logistic regression and chi-square analysis indicated statistically significant declines in students' outdoor play upon entering college ($p<0.01$), in part due to lack of time and peers to play with. Additionally, women and undeclared gender respondents were significantly more like to report crime as a barrier for pursuing outdoor play as compared to men. Finally, results from the survey indicated differing conceptualizations of play amongst racial minorities and international students, factors that will be further explored in the qualitative portion of this research. These results demonstrate the need to shift dominant design paradigms that relegate play to children's playgrounds and sports fields, toward more flexible greenspaces that accommodate diverse notion of play for equally diverse user groups. Practitioners and researchers alike should thus view outdoor play as a health-promoting resource, the design of which has the possibility to impact public health and environmental justice at local, national, and global scales.

627 Investigation into Outdoor Thermal Comfort for Older Adults

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Keywords: Aging; Thermal comfort; Physical activity; Landscape components

Older adults are one of the most vulnerable groups to climate-related diseases (Larriva et al.,2020). They are subjected to sensory changes that result in different demands and requirements in terms of environmental comfort (Matteo et al., 2015). Older adults may experience thermal comfort differently from younger people due to physical and behavioral changes that come with aging. They can be more sensitive to some environmental factors. At the same time, they can also exhibit diminished thermoregulatory responses to other factors that can put them at increased risk of hyperthermia compared to younger individuals (Hoof et al., 2006; Zhai et al., 2023; Akili & Tyagi, 2023). Perceptions of warmth are emerging as a significant element that impacts the utilization of outdoor spaces (Chen et al., 2012; Salata et al., 2017). Existing research has extensively explored the elderly's thermal comfort in indoor environments, but few studies have examined that in outdoor environments (Shao & Jin, 2020; Chen et al., 2018; An et al., 2021; Tang et al., 2020). The outdoor thermal environment is more complex (Zhang et al., 2009; Potchter et al., 2018). Understanding and mitigating the impact of thermal discomfort in outdoor settings is vital for protecting health and ensuring the well-being and quality of life of the aging population. The purpose of this study is to investigate how outdoor and different landscape settings, as well as landscape features affect older adults' thermal perception and physical activity under different landscape settings. This study is going to explore how older adults perceive thermal comfort in outdoor environments across varying landscape settings, as well as analyze which environmental factors (e.g., shading, vegetation, water features) have the most significant impact on older adults' thermal comfort, their preference for specific outdoor spaces and how these factors impact their physical activities. This study will employ a combination of questionnaires and on-site climate data collection. Questionnaires will gather subjective perceptions of thermal comfort and physical activities from older adults. On-site microclimate data will to gain deeper understanding of the specific environmental conditions of the site. This mixed-method approach aims to provide insights for designing age-friendly outdoor spaces. The findings from this study will provide insights into how landscape design can be adapted to enhance outdoor comfort for older adults, promoting physical activity and improving overall well-being.

Landscape Performance (LA CES)

127 Landscape Architecture: Evaluating the Environmental Benefit Values of Nature-based Solutions through Landscape Architecture

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Keywords: Biodiversity; Benefit valuation; Landscape performance; Investment; Literature review

Introduction The World Bank estimates that a $1 investment in nature-based climate adaptation—like wetland restoration or tree planting—yields $4 in environmental, economic, and social benefits. Environmental economics helps quantify the value of nature, showing benefits like improved mental and physical health, reduced heat stress, and enhanced community well-being. Nature-positive design addresses global challenges like biodiversity loss and carbon reduction. Landscape architecture uses nature-based solutions to increase value, as captured by the Landscape Architecture Foundation's Landscape Performance Series, which documents project benefits through case studies. Methods The University of Maryland Environmental Finance Center summarized data from 175 of the LAF LPS Case Study Briefs from U.S. projects. The Case Study Briefs in are developed by faculty-student research teams who work with practitioners document impacts and estimate the projects' environmental, economic, and social benefit outcomes and features. Thirty-three benefit categories in the Case Study data () were sorted and evaluated for benefit data, with numerical data (acres preserved, carbon sequestered) summed. Other data were summed to estimate benefit values with techniques like cost avoidance, benefit transfer, and applying the social cost of carbon. The data were sorted and summed in Excel; some data were summed in ChatGPT. Seven benefit categories from the Case Study Briefs were used to demonstrate how landscape architecture provides economic benefits and helps achieve goals in the five ASLA key areas. 1) Increased Biodiversity 2) Improved Human Health and Livability 3) Going Beyond Net-Zero 4) Strengthened Resilience 5) Expanded Investment and Sustainable Livelihoods Results The results estimate the environmental benefit value for biodiversity, recreation, scenic views, carbon sequestration, carbon reduction, stormwater management, and water conservation to demonstrate how nature-based solutions through landscape architecture can help achieve biodiversity, climate, and resilience goals. Two ASLA documents Landscape Architecture: Maximizing the Economic Benefits of Nature-based Solutions Through Design and How to Make the Economic Case for Nature-Based Solutions will translate this work for several audiences including policymakers, community groups, landscape architects, and other allied professionals. These studies will help communicate how this work can help achieve clients' climate and resilience goals. The content is intended for landscape architecture firms, landscape architects, and landscape architecture educators and students. Discussion This research will help the landscape architecture community make the strongest case possible with policymakers, clients, community groups, allied professionals, and the public for the economic benefits of nature-based solutions (NBS) in landscape architecture. Revised Abstract Introduction The World Bank estimates that a $1 investment in nature-based climate adaptation—like wetland restoration or tree planting—yields $4 in environmental, economic, and social benefits. Environmental economics helps quantify the value of nature, showing benefits like improved mental and physical health, reduced heat stress, and enhanced community well-being. Nature-positive design addresses

global challenges like biodiversity loss and carbon reduction. Landscape architecture uses nature-based solutions to increase value, as captured by the Landscape Architecture Foundation's Landscape Performance Series, which documents project benefits through case studies. Methods The University of Maryland Environmental Finance Center summarized data from 175 of the LAF LPS Case Study Briefs from U.S. projects. The Case Study Briefs in are developed by faculty-student research teams who work with practitioners to document impacts in thirty-three benefit categories and estimate the projects' environmental, economic, and social benefit outcomes and features (Case Study data is). Seven benefit categories were identified for valuation. Data from the Case Study Briefs and various methods from environmental economics were used to estimate dollar values. 1) Increased Biodiversity values estimate of population data and literature-based willingness-to-pay estimates. 2) Improved Human Health and Livability by quantifying recreational use values like walking in parks. 3) Going Beyond Net-Zero carbon avoided or sequestered in metric tonnes and based on the Social Cost of Carbon value. 4) Strengthened Resilience as measured by water conservation in dollar savings and runoff reduction to combined sewers. 5) Expanded Investment and Sustainable Livelihoods through positive economic impacts. Results The results estimate the environmental benefit value for biodiversity, recreation, scenic views, carbon sequestration, carbon reduction, stormwater management, and water conservation to demonstrate how nature-based solutions through landscape architecture can help achieve biodiversity, climate, and resilience goals. Three ASLA documents, Maximizing the Economic Benefits of Nature-based Solutions Through Design, How to Make the Economic Case for NbS, and Making the Economic Case for NbS in Climate Projects, translate this work for policymakers, community groups, landscape architects, and other allied professionals. These studies will help communicate how this work can help achieve clients' climate and resilience goals. The content is intended for landscape architecture firms, landscape architects, and landscape architecture educators and students. Discussion This panel features representatives from academia and nonprofit presenting research to help landscape architects advocate for the economic benefits of nature-based solutions (NBS). The discussion will address challenges in measuring their economic value.

323 Assessing the Ecosystem Services of Florida-Friendly Landscaping – Using Flip My Florida Yards as Laboratories

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Keywords: landscape performance; home landscape; environmental friendly yard; microclimate improvement; water conservation

Landscape architecture is an evidence-based discipline that advocates using scientific evidence from scholarly research to guide decision-making. In the past decades, various efforts have emerged to quantify ecosystem service benefits and showcase the value of sustainable landscape practices. Examples include LEED-ND, Sustainable Site Imitative (SITES), and Landscape Performance (LPS). However, many case studies of these evaluation systems are large and complex projects such as city parks, natural preserves, and recreational trails. The design strategies applied in these projects can be different from small sites, and their ecosystem service benefits are difficult to translate directly to individual residential properties. Nevertheless, as urbanization continues and climate change becomes a major societal concern, home landscaping is critical in adapting to extreme weather conditions and enhancing environmental sustainability. Flip My Florida Yard (FMFY) is a TV program that converts the landscapes of selected Florida homes to environmentally friendly yards. It provides excellent opportunities to measure and document ecosystem service benefits and conduct cost-effectiveness analysis. This study aims to identify ecosystem services attributable to Florida-Friendly landscapes and, using appropriate metrics, compare the pre and post-project conditions for these ecosystems. We have selected several properties from three seasons of FMFY across Florida. Each property is evaluated in the following aspects: microclimate, stormwater runoff, energy, water & maintenance, user satisfaction/ perception, and wildlife. To collect data, we have used mixed methods and tools. For microclimate, we measured two sets of microclimate data. The first set was on the project site, and the other was in the neighborhood, serving as the control group. For stormwater runoff, we used a combination of modeling and monitoring to evaluate the impact of the flip on stormwater runoff and nutrients at a lot scale. We also used a survey to 1) document energy and water usage and yard maintenance needs, 2) learn about homeowners' satisfaction with the flip, and 3) examine homeowners' knowledge about plants, wildlife, and stormwater management. Lastly, we created a wildlife species list with photos and provided it to homeowners to mark animals they observed on their properties before and after the flip. A preliminary result suggests that more wildlife species have been observed on these properties after the FMFY, homeowners' knowledge about wildlife, water conservation, and ecosystem services has increased, people spent more time in their yards, especially in the morning and evening, and enjoyed more types of activities. Detailed findings and analysis will follow. Revised Abstract Landscape architecture is evolving toward an evidence-based discipline that advocates using scientific evidence from scholarly research to guide decision-making. In the past decades, various efforts have emerged to quantify ecosystem service benefits and showcase the value of sustainable landscape practices. Examples include LEED-ND, Sustainable Site Imitative (SITES), and Landscape Performance (LPS). However, many case studies of these evaluation systems are large and complex projects such as city parks and natural preserves. The design strategies applied in these

projects can be different from small sites, and their ecosystem service benefits are difficult to translate directly to individual residential properties. Nevertheless, as urbanization continues and climate change becomes a major societal concern, home landscaping is critical in adapting to extreme weather conditions and enhancing environmental sustainability. Flip My Florida Yard (FMFY) is a TV program that converts the landscapes of selected Florida homes into environmentally friendly yards. This program provides excellent opportunities to measure and document ecosystem service benefits. This study aims to identify ecosystem services attributable to Florida-friendly landscaping, an effort incorporating key principles like watering efficiently, fertilizing appropriately, and attracting wildlife. Additionally, this study uses appropriate metrics to compare the ecosystem conditions before and after the landscape transformations. We created a survey for all 30 homeowners from three seasons of FMFY. The survey focuses on 1) documenting energy and water usage and yard maintenance needs, 2) learning about homeowners' satisfaction with the flip, and 3) examining homeowners' knowledge about ecosystem services. In addition, we selected nine properties, three from each season across Florida, for in-depth studies. Each property is evaluated in microclimate, stormwater runoff, and wildlife. For microclimate, we measured two sets of microclimate data. The first set was on the project site, and the other was in the neighborhood, serving as the control group. For stormwater runoff, we used a combination of modeling and monitoring to evaluate the impact of the flip on stormwater runoff at a lot scale. Lastly, we created a wildlife species list with photos and provided it to homeowners to mark animals they observed on their properties before and after the flip. A preliminary result suggests that more wildlife species have been observed on these properties after the FMFY, homeowners' knowledge about wildlife, water conservation, and ecosystem services has increased, people spent more time in their yards, especially in the morning and evening, and enjoyed more types of activities. Detailed findings and analysis will follow.

490 Exploring Design Parameters for Enhanced Cooling Performance of Urban Biosolar Roofs

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Keywords: BIOSOLAR ROOF; GREEN ROOF; PHOTOVOLTAIC (PV) ROOF; CLIMATE ADAPTATION; URBAN HEAT ISALND EFFECT

Utilizing rooftop spaces for green roofs and solar photovoltaic (PV) installations is increasingly important for climate action in urban areas where available land is scarce. Biosolar roofs—a vertical stacking of PV arrays over vegetated surfaces—are gaining attention because they harness synergies from co-location while delivering the benefits of both green roofs and PV roofs (Irga et al., 2021; Sattler et al., 2020). However, a knowledge gap exists regarding the optimal design of Biosolar roofs, particularly concerning parameters such as PV height, PV configuration, planting density, and plant species type (Abdalazeem et al., 2022; Talwar et al., 2023). Given scarce urban land, investigating Biosolar roof design is essential to enable multifunctional rooftop use and achieve urban sustainability goals (Chemisana & Lamnatou, 2014; Shafique et al., 2020). This study aims to identify the ideal Biosolar roof design to maximize cooling impact by exploring three key parameters: PV height, PV configuration, and plant types. Idealized 3D models with varying parameters will be utilized. PV heights are set at five levels: 50, 100, 150, 200, and 250 cm. PV configurations include half (50%) coverage with different deployment patterns and full (100%) coverage. Plant types are perennial ryegrass (shorter than 30 cm) for extensive planting strategies and shrubs (taller than 30 cm) for intensive strategies. Models will be created by combining these parameters. Each will be simulated to estimate cooling benefits using Envi-Met CFD software with 2021 Eugene, OR, EPW weather data, targeting the surface and 2-meter air temperature. Simulation results will be validated by comparing with real-field data from a Biosolar roof experiment on a University of Oregon rooftop. The setup consists of a 6’ x 6’ raised garden with a 10” soil layer and perennial ryegrass, with two 130W PV panels 1 meter above the vegetation. Air temperature, relative humidity, and wind speed will be measured, and solar radiation data will come from the UO Solar Monitoring Lab. Finally, the cooling magnitude of each model will be compared to assess design optimization. Considering the escalating heatwaves and intensifying urban heat island effects, identifying the optimal design settings for Biosolar roofs is imperative. This research will provide critical insights into how tailored Biosolar roof designs can serve as an effective strategy against heat-related urban challenges, offering valuable guidance for landscape architects, architects, urban planners, and decision-makers committed to climate change mitigation and adaptation. Revised Abstract Utilizing rooftop spaces for green roofs and solar photovoltaic (PV) installations is increasingly important for climate action in urban areas where available land is scarce. Biosolar roofs—a vertical stacking of PV arrays over vegetated surfaces—are gaining attention because they harness synergies from co-location while delivering the benefits of both green roofs and PV roofs (Irga et al., 2021; Sattler et al., 2020). However, a knowledge gap exists regarding the optimal design of Biosolar roofs, particularly concerning parameters such as PV height, PV configuration, planting density, and plant species type (Abdalazeem et al., 2022; Talwar et al., 2023). Given scarce urban land, investigating Biosolar roof design is essential to

enable multifunctional rooftop use and achieve urban sustainability goals (Chemisana & Lamnatou, 2014; Shafique et al., 2020). This study aims to identify the ideal Biosolar roof design to maximize cooling impact by exploring three key parameters: PV height, PV configuration, and plant types. Idealized 3D models with varying parameters will be utilized. PV heights are set at five levels: 50, 100, 150, 200, and 250 cm. PV configurations include half (50%) coverage with different deployment patterns and full (100%) coverage. Plant types are perennial ryegrass (shorter than 30 cm) for extensive planting strategy and shrubs (taller than 30 cm) for intensive strategy. Models will be created by combining these parameters. Each will be simulated to estimate cooling benefits using Envi-Met CFD software with 2021 Eugene, OR, EPW weather data, targeting the surface and 2-meter air temperature. Simulation results will be validated by comparing with real-field data from a Biosolar roof experiment on a University of Oregon rooftop. The setup consists of a 6’ x 6’ raised garden with a 10” soil layer and perennial ryegrass, with two 130W PV panels 1 meter above the vegetation. Air temperature, relative humidity, and wind speed will be measured, and solar radiation data will come from the UO Solar Monitoring Lab. Finally, the cooling magnitude of each model will be compared to assess design optimization. Considering intensifying urban heat island effects, identifying optimal Biosolar roof design settings is imperative. This research will provide critical insights into how tailored Biosolar roof designs can serve as effective strategies against heat-related urban challenges. However, current limitations—such as scale constraints, voxel resolution issues, and restricted PV angle settings—highlight the need for further model refinement and development, ensuring that future solutions are accurate and widely applicable.

561 Observations and Lessons from the Landscape Performance Series Case Study Data

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Keywords: landscape performance data; benefits; metrics; methods; trends

As of 2024, over 200 Landscape Performance Case Studies have been published on the Landscape Architecture Foundation's (LAF) Landscape Performance Series (LPS) website. The case studies feature exemplary sustainable site projects. Downloadable case study data includes information about each project's features, type, location, climate zone, size, budget, year completed, firm, and its quantified performance benefit statements, which are indexed to one or more environmental, social, or economic performance benefit categories. Such data has been shown to be valuable for extended research purposes (Yang, B. 2020; Wang et al., 2016; Luo & Li, 2015; and Modi, 2014). However, the data set does not include information about the metrics and methods used to assess the performance benefit statements, which limits further study. To address this, we created a database of project attributes, benefit statement categories, and metrics used, which were identified by manually reviewing each benefit statement from its corresponding methods document. Metrics were coded using the list of potential metrics published in LAF's "Evaluating Landscape Performance—A Guidebook for Metrics and Methods Selection" (Canfield et al., 2018). Several additional metrics were identified and added to the database list. We then sorted and descriptively correlated the data. The data reveals how the benefits were measured, what metrics were used most frequently, if project attributes affect selected metrics, and patterns and trends across the data set over time. In this paper, we discuss our findings and suggest revisions to the LAF Guidebook. Our findings also start to demonstrate how a fundamental set of benefits and metrics could be created for various types and scales of projects. Such information would be beneficial for practitioners and students when planning for or conducting a landscape performance assessment.

568 Developing a Generative AI Workflow for Landscape Performance Outcomes

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Keywords: artificial intelligence; landscape performance; computational modeling; parametric modeling; ecosystem services

Landscape architecture is continuously being surrounded by new tools, from analog to digital, to streamline project deliverables. Lately, artificial intelligence has gained significant traction in the profession as a tool not only within the design process but also in establishing a workflow of authorship (Fernberg, 2023). With AI's text- and image-based rendering capacities for time-saving practices, AI can begin to help landscape architects generate a workflow to integrate these capacities between qualitative (image-based) and quantitative (text-based) measurables and metrics for landscape performance outcomes. While AI can effectively analyze large data sets often used for landscape performance methods, its output often lacks meaning in the environmental, social, and economic outcomes generated, demanding the designer's role to shift from repetitive tasks to stewardship (Leach, 2018). AI also makes it possible to automatically increase the process of recognizing patterns and connecting relationships between certain variables, but current applications of this AI tool are limited in the generative outputs towards specific landscape performance outcomes. To generate these outcomes, artificial intelligence must have a proper understanding through machine learning to incorporate quantified results within a qualitative graphic representation to fulfill landscape performance goals. This study tests different approaches to integrating the text- and image-based capacities of artificial intelligence to generate accurate outcomes representative of landscape performance goals. Some of the ecosystem services tested are stormwater management, carbon sequestration, and outdoor comfort. Text-based generative AI is utilized to calculate the design needs for a set of performance goals to generate prompts for image-based generative AI. By streamlining this methodology to an outcome-based scenario for design goals, landscape architects are authored the ability to prioritize the environmental, social, and economic benefits of a space through prompted design interventions (Tebyanian, 2020). The results from this workflow are then evaluated for its measurable accuracy, such as for the required quantity of trees for carbon sequestration. AI infers these relationships either through human programming where the human provides the framework or through machine learning where AI learns from large datasets of landscape architecture images (Barbarash et al. 2022). If AI uses supervised machine learning, it receives feedback on whether its measurable outputs are accurate or inaccurate and learns to produce outcomes more closely aligned with the set of goals for a project. This methodology reinforces the idea that AI needs a fixed framework to function effectively and that through training, AI can independently create images that resemble project goals. Revised Abstract Landscape architecture is continuously being surrounded by new tools, from analog to digital, to streamline project deliverables. Lately, artificial intelligence has gained significant traction in the profession as a tool not only within the design process but also in establishing a workflow of authorship (Fernberg, 2023). With AI's text- and image-based rendering capacities for time-saving practices, AI can begin to help landscape architects generate a workflow to integrate these capacities between qualitative (image-based) and quantitative (text-based) measurables and metrics for landscape performance outcomes. While

AI can effectively analyze large data sets often used for landscape performance methods, its output often lacks meaning in the environmental, social, and economic outcomes generated, demanding the designer's role to shift from repetitive tasks to stewardship (Leach, 2018). AI also makes it possible to automatically increase the process of recognizing patterns and connecting relationships between certain variables, but current applications of this AI tool are limited in the generative outputs towards specific landscape performance outcomes. To generate these outcomes, artificial intelligence must have a proper understanding through machine learning to incorporate quantified results within a qualitative graphic representation to fulfill landscape performance goals. This study specifically tests text-to-image capacities with ChatGPT to generate measurable outcomes through visualizations of landscape performance goals. The text-based generative AI capacity of ChatGPT is utilized to calculate the design needs for a set of performance goals to generate prompts for image-based generative AI through the same platform. The results of the two generative AI outputs are tested within the scope of stormwater management, carbon sequestration, and outdoor comfort are compared to determined if the desirable outcomes and goals of a proposal are met. By streamlining this methodology to an outcome-based scenario for design goals, landscape architects are authored the ability to prioritize the environmental, social, and economic benefits of a space through prompted design interventions (Tebyanian, 2020). The two generative AI outputs are evaluated for measurable accuracy, such as verifying the required quantity of trees for carbon sequestration for a given design goal, by using both human programming where the human provides the framework, and through machine learning where AI learns from large datasets of landscape architecture images (Barbarash et al. 2022). By doing so, this approach aimed to evaluate the methodology on whether AI needs a fixed framework to function effectively or that through training, AI can independently create images that resemble project goals.

603 Using Creative Arts to Improve the Public's Awareness of Landscape Performance and Environmental Data

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Keywords: Landscape Performance; Public Awareness; Sustainable Development; Smart Devices; High-Spatial-Resolution Environmental Data

This study aims to explore the accessibility of high-spatial-density environmental data and to increase the public's awareness of landscape performance (LP). Limited access to high-quality data and low public awareness are two gaps in current LP research. LP research requires high spatial-quality data (including high spatial resolution) to capture and analyze environmental variables that impact outcomes accurately (Huang et al., 2022). However, researchers lack effective tools and methods to obtain such data (Lechner & Rhodes, 2016). Meanwhile, effective strategies are lacking to increase the public's awareness of LP and reduce the misconception that landscape is just an aesthetic add-on rather than a critical component of sustainable development (ASLA, 2014). Low awareness limits the development of LP services and research outcomes (ASLA, 2014). Smart devices have been proven in some related fields to collect high-quality environmental data and support more sustainable solutions (Shen et al., 2023). The National Estuarine Research Reserve System (NERRS) conducted a study using artworks to reflect the health of wetlands and convey the importance of wetland ecology to local communities (Horton, 2019). Thus, this study's two objectives are to 1) explore and test the feasibility of using smart devices to generate high-spatial-resolution LP data and 2) explore the effectiveness of using art formats such as visual arts and music to improve the public's awareness of LP. The researchers installed smart devices with air quality sensors and GPS on the experimental vehicles. The devices transmit dynamic air quality data in real time. The collected data is compared with traditional accessed environmental data. The researchers trained an AI model to generate 11 different pieces of music and dynamic visual art images according to different air quality variables. The researchers recruited 100 participants. Participants were based on 7-point Likert scales and open-ended questions to evaluate these artworks regarding artistry, comfort, perception of air quality, the level of increased interest in LP, etc. The results indicate that smart devices' collected data is more accurate, temporal relevant, and spatially resolved. These data assist researchers in better understanding how environmental variables dynamically affect LP. Using music and visual arts to convey environmental data greatly enhances participants' cognition and understanding of quantitative LP data and increases their interest in LP research. This study highlights how emerging technologies and creative communication methods can contribute to filling gaps in data accessibility and public engagement. It promotes more sustainable LP research and development practices. Revised Abstract This study aims to increase public awareness of landscape performance (LP) based on high-quality environmental data represented by visual and musical arts. Low public awareness of LP is one current research gap, as the interpretation of scientific data often requires professional knowledge. Effective strategies are lacking to increase the public's awareness of LP data and reduce the misconception that landscape is just an aesthetic add-on rather than a critical component of sustainable development (ASLA, 2014). Low awareness of LP limits the communication of the value of LP research and the impacts and values of sustainable approaches to the public (ASLA, 2014). The National Estuarine Research Reserve System (NERRS)

conducted a study using artworks to reflect the health of wetlands and convey the importance of wetland ecology to local communities (Horton, 2019). Therefore, this study focuses on exploring the effectiveness of using visual and musical arts to improve the public's awareness of the LP. The researchers' previous study has preliminarily tested the feasibility of using smart devices (lab-built devices with sensors) to collect high-quality environmental data (Shen et al., 2023). The researchers combine music composition and a computer algorithm to generate 10 different pieces of music and dynamic visual art images according to smart devices collected different air quality data (PM2.5, CO2, CO, etc.). The researchers recruited 100 participants on the University of Georgia's campus. Participants are based on 7-point Likert scales and open-ended questions to evaluate these artworks regarding artistry, comfort, perception of air quality, the level of increased interest in LP, etc. Based on the standard statistical (e.g., descriptive statistics and ANOVA test) and qualitative research methods, the researchers interpret the survey results. The results indicate using these art formats to convey environmental data greatly enhances participants' cognition and understanding of quantitative LP data and increases their interest in LP research. Art format could improve the public's understanding of air quality issues and the impacts and values of sustainable approaches. Meanwhile, although not included in the main purpose of this study, the survey results show that smart devices can collect more accurate, temporal relevant, and spatially resolved LP data. This study highlights how creative communication methods contribute to filling the gap in public awareness and environmental data accessibility. It provides more evidence support for further LP research related to art and emerging technologies. This study could contribute to promoting more sustainable LP research and development practices.

610 Exploring Biophony as a Landscape Performance Metric

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Keywords: landscape performance; soundscape; urban ecology; biophilia

What if understanding the health and function of a landscape was as simple as listening? Urban environments around the globe pose challenges for wildlife, with many avian and insect species experiencing declines (Outhwaite, 2022; Rosenberg, 2019). However, some soniferous species persist. Researchers in soundscape ecology, acoustic ecology, and bioacoustics increasingly recognize sound as a relevant indicator of biodiversity, ecosystem health, and human well-being (Farina, 2019; Pijanowski, 2011). However, most of these soundscape studies focus on ecological communities in rural and natural areas, with few examining biophony (the sounds made by living organisms) in urban landscapes. This presentation explores the research and development of a landscape listening guide and initial methods for field observation and analysis of urban soundscapes. Drawing upon a review of current literature and expert interviews, the research establishes essential parameters to facilitate understanding of spatiotemporal variations in biophony associated with the life cycles of species, and impacts of technophony (noise) in the urban environment. The study establishes preliminary methods to document essential biotic and abiotic variables within the landscape, providing a framework for knowing what to listen for based on the time and place. Field observations begin with a "sound walk" in a selected urban landscape, where targeted listening is used to identify seasonally occurring biophony within the soundscape. Once a strong biophonic occurrence is determined, the soundscape is recorded using a hand-held digital audio recording device. This recording is then analyzed to identify species occurrence using bioacoustic sound analysis software. Additional qualitative and quantitative measurements are also conducted during the observation, complimented by a desktop review of spatial data for the surrounding landscape to evaluate the landscape context at varying scales. This initial study revealed a high degree of variability from day to day due to environmental conditions. However, longitudinal observations indicated higher occurrences of avian and bat species correlating with lower-density development and habitat quality at the neighborhood scale. Furthermore, insects appeared to be a stronger initial indicator of site-scale microhabitat quality. Early results suggest that biophony can be utilized as a landscape performance metric for urban landscapes. However, the most immediate benefit is enhanced acoustic literacy that fosters a deeper connection to place - elevating our awareness of change in the natural world through informed listening and observation. Revised Abstract What if understanding the health and function of a landscape was as simple as listening? Urban environments around the globe pose challenges for wildlife, with many avian and insect species experiencing declines (Outhwaite, 2022; Rosenberg, 2019). However, some soniferous species persist. Researchers in soundscape ecology, acoustic ecology, and bioacoustics increasingly recognize sound as a relevant indicator of biodiversity, ecosystem health, and human well-being (Farina, 2019; Pijanowski, 2011). However, most of these soundscape studies focus on ecological communities in rural and natural areas, with few examining biophony (sounds made by living organisms) in urban landscapes. This presentation explores the research and development of a landscape listening guide and initial methods for field observation and analysis of urban soundscapes. Drawing upon a review of current literature and expert interviews, the research establishes essential parameters to facilitate understanding of spatiotemporal variations in biophony associated with the life cycles of species, and impacts of technophony (noise) in the

urban environment. The study establishes preliminary methods to document essential variables within the landscape, providing a framework for knowing what to listen for in a given time and place. Field observations consisted of over 100, 30-minute walking transects primarily in a well-established mid-density residential neighborhood. Targeted listening was used to identify seasonally occurring biophony within the soundscape, with observations primarily in the morning and evenings throughout all four seasons. Once a strong biophonic occurrence is determined, the soundscape is recorded using a hand-held digital audio recording device. This recording is then analyzed to identify species occurrence using bioacoustic sound analysis software. Additional qualitative and quantitative measurements of environmental variables (temperature, light, vegetation type/structure/density) were also conducted during the observation, complimented with a desktop review of spatial data exploring canopy coverage and impervious surfaces in the surrounding landscape to evaluate the habitat context at varying scales. This initial study revealed a high degree of variability from day to day due to environmental conditions. However, longitudinal observations indicated higher occurrences of avian and bat species correlating with lower-density development and habitat quality at the neighborhood scale. Furthermore, insects appeared to be a stronger initial indicator of site-scale microhabitat quality. Initial results suggest that biophony can be utilized as a landscape performance metric for urban landscapes. However, the most immediate benefit is enhanced acoustic literacy that fosters a deeper connection to place - elevating our awareness of change in the natural world through informed listening and observation.

626 South Oak Cliff Park Revitalization: Investigating the Social and Environmental Benefits of a Park Located in a Historically Disinvested Community

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Keywords: Disinvestment; Creek restoration; Case Study Investigation

South Oak Cliff Renaissance Park is a 1.8-acre park in the historically underserved South Oak Cliff neighborhood of Dallas, Texas. The park was created by the City of Dallas in response to a student-led walkout at South Oak Cliff High School, which highlighted the community's disinvestment. Located just a three-minute walk from the high school, the park is a tangible result of community advocacy, providing equitable access to green space and enhancing neighborhood safety. The park, situated along Alice Branch, a tributary of Five Mile Creek, has been transformed from an overgrown, littered area into a green space focused on creek restoration. In 2018, the Trust for Public Land (TPL) partnered with the high school and local residents to address long-standing concerns about the neglected creek and a vacant lot used for illegal dumping. Following a year of community engagement, TPL purchased the lot in 2019 and began turning it into South Oak Cliff Renaissance Park. The revitalized park now includes amenities such as basketball courts, BBQ areas, a playground, and an outdoor classroom, all designed with community input. This project has come to symbolize positive change and empowerment for South Oak Cliff residents. Research Question: This research quantified the social and environmental benefits of the construction of Renaissance Park. Methods: The research approach for the park's development began with understanding the community's social and historical context. This informed the survey questions and metrics used to assess the park's social benefits, such as site visits, secondary data research, and consultations with individuals from the school district and TPL. Environmental benefits were measured using tools such as iTree, iNaturalist, Merlin Bird ID, and the EPA Greenhouse Gas Calculator, while social benefits were assessed through methods including Ethogram, Census data, and GIS data from the Dallas Police Department. Results: Research uncovered environmental gains such as increased bird and insect populations on Alice Branch, water conservation, and improved stormwater management. Social benefits included enhanced recreation, health, safety, and access to green space. Discussion: While the park has shown positive social and environmental outcomes, it also brought to light complex community dynamics. As landscape architecture professionals, it's crucial to approach these projects with sensitivity to both the research and the broader issues within the community. Revised Abstract South Oak Cliff Renaissance Park is a 1.8-acre park in the historically underserved South Oak Cliff neighborhood of Dallas, Texas. The park was created by the City of Dallas in response to a student-led walkout at South Oak Cliff High School, which highlighted the community's disinvestment. The park, situated along Alice Branch, a tributary of Five Mile Creek, has been transformed from an overgrown, littered area into a green space focused on creek restoration. In 2018, the Trust for Public Land (TPL) partnered with the high school and local residents to address long-standing concerns about the neglected creek and a vacant lot used for illegal dumping. Following a year of community engagement, TPL purchased the lot in 2019 and began turning it into South Oak Cliff Renaissance Park. In addition to meeting community needs, the park was designed to serve as an anchor for the Five Mile Creek Greenbelt Parks, protect natural areas, and incorporate features to slow and clean runoff into Alice Branch Creek. Purpose The purpose of this research was to quantify the social and

environmental benefits of Renaissance Park. Methods: The research approach began by examining the history of South Oak Cliff to identify key factors influencing park development. This involved analyzing the community's social dynamics and their role in shaping the park's design, which informed the development of survey questions and metrics to measure social benefits. The methodology included site visits, secondary data analysis, and consultations with representatives from the school district and TPL. Environmental benefits were assessed using varying tools. iTree was employed to document the reduction in stormwater runoff following construction, based on landscape design and tree preservation. Biodiversity was observed using iNaturalist and Merlin Bird ID to identify various bird and insect species present at the site. The EPA Greenhouse Gas Calculator estimated CO2 savings achieved through the installation of solar lighting. Social benefits were evaluated using multiple methods, including online surveys, ethograms Census data, and GIS data from the Dallas Police Department. Results: Research uncovered bird and insect populations, water conservation, and improved stormwater management. Social benefits included enhanced recreation, health, safety, and access to green space. Discussion: While the park has shown positive social and environmental outcomes, it also brought to light complex community dynamics. As landscape architecture professionals, it is crucial to approach these projects with sensitivity to both the research and the broader issues within the community.

629 Ecological Design for Climate Adaptation: Comprehensive Impact of Landscape Elements on Microclimate in Fishtail Park

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Keywords: Ecological design; Climate change adaptation; Microclimate regulation; Synergistic effects; Fishtail Park

This study aims to explore how ecological design elements in urban parks synergistically regulate microclimates to address the challenges posed by climate change. Fishtail Park in Nanchang was selected as the research subject due to its rich landscape elements, providing ideal conditions for multidimensional data analysis, allowing a comprehensive quantification of the interactive effects of different design components. The study integrates geographic information data, design documentation, and field survey data, utilizing Structural Equation Modeling (SEM) to reveal the synergies and interactions of design elements—such as vegetation density, proximity to water bodies, open space ratio, ground materials, and sunlight exposure—on microclimate indicators, including temperature, humidity, and wind speed. The results indicate that the synergy between vegetation density and proximity to water bodies significantly enhances humidity regulation, with areas near water bodies and dense vegetation showing more notable humidity increases. The interaction between vegetation density and sunlight exposure has a significant impact on temperature: sparse vegetation areas experience temperature increases under direct sunlight, while densely vegetated areas effectively mitigate high-temperature effects. The synergy between open spaces and ground materials significantly influences wind speed, with open, hard-paved areas showing increased wind speed, while wind speeds are lower in closed, vegetated areas. This study reveals the complex mechanisms by which multiple ecological design elements regulate microclimates, providing important insights for optimizing design strategies to enhance the climate adaptability of urban parks.

Landscape Planning and Ecology (LA CES)

15 Nationwide Survey on Perceptions and Applications of Sustainable Design Practices in Landscape Architecture

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Keywords: Heat Reduction; Carbon Sequestration; Stormwater Management; Habitat Restoration; Social Justice

The escalating impact of climate change and disruptions caused by the COVID-19 pandemic have underscored the urgent need for sustainable environmental design in landscape architecture (Rousseau & Deschacht, 2020; Zang et al., 2021). Simultaneously, the pandemic has exposed and exacerbated vulnerabilities in public spaces, revealing inadequacies in social services and the lack of equitable access to green spaces, which are essential for physical and mental well-being (Moraci et al., 2020; Sepe, 2021). However, a distinct gap exists between theoretical knowledge of sustainable practices and their practical application, due to logistical, financial, and regulatory barriers (Abd Elrahman & Asaad, 2021). This study used a nationwide survey of members of the American Society of Landscape Architects to examine their perceptions and the frequency with which they apply sustainable design practice. It explored the actions and priorities of landscape designers, bridging the gap between theoretical frameworks and actual implementation in the field. Conducted in November and December of 2023, the online survey asked respondents to evaluate 23 sustainable design practices, exploring pre- and post-COVID perceptions and identifying a variety of facilitators and barriers, as well as socio-demographic and firm-related characteristics. The correlations between these characteristics and survey responses were analyzed through a series of mixed linear and stepwise ordinary least squares regression models. 225 responses were collected from various locations across the nation, and results revealed that employees at landscape architecture firms consistently rated their importance of all 23 sustainable design practices higher than how frequently these practices were applied. The perceived importance of these practices increased further after the COVID-19 pandemic. Social justice was perceived as less important and less frequently applied, whereas stormwater management was identified as the most critical and commonly implemented application. Budget constraints and client interest were found to be the primary barriers to implementing sustainable design. This study contributes valuable insights to the landscape architecture profession and provides a foundation for future legislation, education initiatives, and further research aimed at enhancing sustainable practices in the field.

64 North Carolina 2050: Challenges and Opportunities

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Keywords: Placemaking; Landscape Imperative; Real Estate Development; Sustainable Growth; Resilient Land Use

Introduction: North Carolina's ecologically diverse landscape is home to approximately 4,000 native plants, 700 of which are considered rare (1). In the next 25 years, North Carolina will grow by 3.5 million people (2). This growth will impact every aspect of North Carolina's landscape and society. A business-as-usual approach to accommodating explosive population growth will degrade the state's cherished natural resources. Since real estate development is a driver of these impacts, N. C. State University is starting a new interdisciplinary curriculum in real estate development that differs from traditional programs in that it is anchored in design, placemaking and community building. We contend that design programs must educate and graduate the next generation of leaders in community development to ensure that the conservation of natural resources goes hand-in-hand with quality growth. Additionally, we recognize the need to broaden the spectrum of career opportunities in landscape architecture by introducing real estate development tools and implementation strategies. Methodology: N. C. State undertook a case study comparison of real estate education programs across the nation. Analysis revealed that most programs are anchored in an understanding of capital markets, accounting, and return on investment that largely ignores community and place making. A three-pronged approach was developed that used design as the starting point of real estate development. This proof of concept focused on experimental coursework, applied research projects, and community engagement to gauge interest and support among students, faculty and professional allies. Currently, three certificate programs are being developed that cross disciplinary boundary. Results: In April 2024, the University received a gift of $10 million from an alumnus who shared our program's vision and core values (3). As a result, N.C. State is launching three 12-credit hour, practicum-focused Certificate programs in design, engineering and environment. When combined, these Certificates result in a Master of Real Estate Development. The use of Certificates is ideal for professionals, graduate students, and advanced undergraduates seeking to enhance their focus on how design and placemaking creates successful real estate projects and contributes to building vibrant communities. Discussion: Our presentation will explore the interrelationships between real estate industry needs, academic educational requirements, and community demand for early action solutions to growth and development, offering a new pedagogy for real estate development education.

75 Does Climate Change and Biodiversity Factor into Contemporary Planting Practice? A Survey of Practitioners in the U.S. Northeast and Mid-Atlantic

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Keywords: planting practice; climate change; biodiversity; professional knowledge; continuing education

Landscape architects strive to use plants and associated soils, water, and biota to create spaces that serve human needs and provide various ecosystem services. However, the question remains: How prepared are landscape architects to tackle climate change and biodiversity challenges in their daily professional practice? The complexity of these issues is daunting, as the relationships between the planted site and climate and biodiversity factors are bi-directional, multi-scaled, and often dynamic through time. At the ground level, regional climate and biodiversity changes are affecting projects at the site scale. Conversely, planted sites collectively contribute (positively or negatively) to climate change and biodiversity at local to global scales, with immediate and long-term implications. This study explores current and emerging trends in professional planting practice in the U.S. northeast and mid-Atlantic regions as they address climate change and biodiversity challenges. We administered a two-part study. Part one, and the focus of this presentation, consisted of a 30-question online survey with 107 complete responses. Respondents were geographically diverse and represented various professional practices, project types, and office sizes. Part two considered the survey results in the context of the American Society of Landscape Architects (ASLA) stated mission, vision, values, culture, and Landscape Architecture Continuing Education System offerings. Survey responses indicate that respondents are generally aware of climate change and biodiversity concerns and support efforts to reflect these in their planting practices. However, there are significant gaps between ASLA's stated positions, firm/client planting practice culture, and climate change and biodiversity issues. Notably, many respondents expressed a lack of understanding of regional climate change and biodiversity impacts, applied knowledge and technical ability in constructing appropriate plant palettes and details, and implementation and management protocols. The data also contained an undercurrent of equivocation; many responses allude to struggles to reconcile competing demands of clients, economic and time constraints, and municipal regulations on the one hand and fidelity to ASLA's professional mandate and company values on the other. Finally, in apparent repudiation of ASLA mandates, a small fraction of respondents openly dismiss climate and biodiversity concerns in their planterly practices, aligning with clients who embraced similar stances. Given these attitudes, gaps, and the complex interactions of planting practice, climate change, and biodiversity, we advocate for greater coordination between the academy, professionals, and local and state governments. This coordination is essential to ensure that plantings thrive while supporting human needs and broader environmental imperatives.

103 Integrating PLUS and InVEST Models to Predict Carbon Storage in Ecological Spaces: An Assessment of the Ecological Redline Policy

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Keywords: Carbon storage; LULC projection; Ecological redline policy; Ecological spaces; Climate change

Ecological redline areas in China are designated areas considered ecologically important and are, therefore, strictly protected from development (Lin & Li, 2019). They are essential components of ecological spaces that play a vital role in carbon storage and climate change mitigation (Bai et al., 2018; Jiang et al., 2019; Wu et al., 2023). Using Xiangyang City in China as a case study, this research aims to investigate the spatial and temporal responses of carbon storage within ecological spaces under the constraints of ecological redline policies. We began by analyzing the evolution of land use and land cover (LULC) using high-precision LULC data for 2000, 2010, and 2020. Then, we projected LULC changes up to 2030 using the Patch-generating Land Use Simulation (PLUS) Model (Gao et al., 2022). The carbon storage of ecological spaces from 2000 to 2030 was quantified using the InVEST model, and Getis-Ord Gi* was used to assess the spatial clustering. Our results indicated a degradation in ecological spaces from 2000 to 2020. However, the degradation rate was projected to decline by 2030 as a result of enforcing ecological redline policy constraints. The maximum carbon storage per grid unit was estimated to be approximately 18.47 kg, predominantly in forest lands. Furthermore, spatial clustering analysis revealed a "concentrated hotspots and scattered coldspots" pattern. Our findings provide scientific guidance for implementing "Carbon Neutrality" strategies (Zhao et al., 2022) and promoting low-carbon planning in similar cities.

131 Mix-Matched: Field Methods for Recording Phenological Mismatches

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Keywords: Biodiversity; Phenology; Climate Change; Habitat; Field Methods

This presentation outlines the logic and methodology behind the development of adaptive and multi-faceted landscape surveying techniques used to record changes in phenological relationships at a restored prairie over a three-year period. As a response to growing ecological urgency, this work prioritized understanding the sensitivity of site to atmospheric change and the long-term impacts possible phenological shifts can have on a site's ecological function and our disciplines design responses. Through the combination of typical surveying methods with the photographic process of cyanotyping, this project tested methods to track plant and animal biodiversity, development, and behavior, to identify where species are now in a phenological mismatch- a condition where a cascade of species interactions are interrupted or disturbed by temperature change. Over the summers of 2022 - 2024, this project utilized a 1-acre prairie, where 8 (3' x 3') test plots were identified across the site. Each plot was first surveyed using traditional methods for ground-based phenological observations--species identification and counts, biodiversity measurements, and documented phenomenological qualities. Using this information, plant specimens were collected to represent proportional species abundance and used to produce a cyanotype recording. These cyanotypes capture plant growth and development, highlighting moments of biological phenomena such as emergence, flowering, and senescence, and were used to compare plots across both years. By utilizing both methods of observation and documentation, there was an observed increase in number and diversity of fauna in 2023, despite plant species showing trends towards hastening, delaying, or halting biological development associated with climate change. While this project is only in its second year, the observations and trends already show changes in phenological conditions from one year to the next, pointing to the importance of this method of site documentation and testing. Ground-based methods for tracking the sensitive phenological relationships between species and changes to their environments are lacking in non-forest landscapes. This work has the potential to develop consistent methods for improving practices in more ephemeral ecological conditions such as prairies and wetlands.

139 Parkification of Post-Industrial Sites: A Transformational Approach to Disturbed landscape in Jordan

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Keywords: Post-industrial Sites; Landscape Transformation; Parkification

Post-industrial sites undergo significant landscape transformations due to the cessation of industrial activities, necessitating management intervention by authorities and stakeholders. Parkification, the conversion of these sites into urban parks, has emerged as a prominent approach in developing countries to address the complexities of post-industrial landscapes. This study focuses on three parkification projects in Ruseifa City, Jordan: the Pepsi Pond site, the phosphate mining sites, and the old phosphate mine and administration building site. Through comparative analysis of these sites and examination of their parkification processes, the study identifies the underlying reasons and key drivers for choosing parkification as a revitalization strategy for post-industrial sites over other landscape transformation approaches in developing countries. Semi-structured interviews with decision-makers and stakeholders involved in these projects, along with content analysis of relevant documents, reports, and policies, shed light on the decision-making processes and factors influencing the selection of parkification. The study identifies three distinctive parkification processes in Ruseifa City: the Restoration approach at the Pepsi Pond site, the Environmental Rehabilitation approach at the Phosphate Ore Hills site, and the Industrial Heritage Preservation approach at the Old Phosphate Mine and Administration Building site. Each process represents a unique strategy for addressing the specific challenges and key drivers associated with Ruseifa's post-industrial landscapes. These findings offer valuable insights into the effectiveness of parkification as a transformative strategy for managing post-industrial sites in Jordan, contributing to a broader understanding of how such approaches can be applied in similar contexts.

192 Beyond the Glow: Embracing Darkness & Reconciling Nocturnality in More-than-human Cities

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Keywords: Light Pollution; Nocturnal Wildlife; Migratory Birds; Dark Infrastructure; Natural Darkness

Light pollution, driven by the rapid expansion of artificial lighting in urban environments, has become a global concern, disrupting ecosystems, human health, and the visibility of natural night skies. (Cinzano et al., 2001; Falchi et al., 2016) As urbanization intensifies, artificial light at night (ALAN) increasingly impacts both human well-being and nocturnal wildlife, particularly migratory birds. (Gaynor et al., 2018; Horton et al.,2019; van Doren et al., 2017) In cities like Portland, Oregon, where growing urban development coexists with world-class dark sky reserves, the need for solutions is urgent. (Reagan & Manager, 2024) This paper explores how landscape architecture can mitigate light pollution by designing outdoor spaces that balance public safety, promote natural darkness as a resource, and are inclusive of the needs of nocturnal wildlife. By addressing society's disconnection from natural darkness and raising awareness of the challenges faced by nocturnal migratory birds in Portland, we can develop effective design strategies that benefit both humans and wildlife in Pacific Northwest cities. A multidisciplinary approach was used to analyze the impact of artificial lighting in Portland's urban areas. By combining field measurements, satellite imagery, and GIS spatial analysis, street illuminations were mapped, and key sources of light pollution and dark zones were identified. Using real-time bird migration data from BirdCast (Farnsworth et al.), critical locations for “dark infrastructure” (Sordello et al., 2022) were pinpointed to assess their effects on human and wildlife habitats. The project evaluated existing mitigation strategies, such as light shields and smart lighting technologies, while integrating the dark infrastructure framework into Portland’s green spaces, with Washington Park as a focal point. GIS analysis of light sources and topography was also used to establish a key focus site for design interventions. Through proposed site-specific interventions, such as the "Mirror Stone" installation and the Migration Night Trail, natural darkness at Washington Park in Portland can be restored, creating dark corridors for nocturnal wildlife, establishing higher-quality ecological corridors, and enhancing the effectiveness of urban sustainability efforts. Furthermore, a “New Urban Nocturnal Sublime” (Stone, 2018) is envisioned through the design by treating darkness as both a resource and an aesthetic for the urban landscape. Revised Abstract Light pollution, driven by the rapid expansion of artificial lighting in urban environments, has become a global concern, disrupting ecosystems, human health, and the visibility of natural night skies (Cinzano et al., 2001; Falchi et al., 2016). As urbanization intensifies, artificial light at night (ALAN) increasingly affects both human well-being and nocturnal wildlife, particularly migratory birds (Gaynor et al., 2018; Horton et al., 2019; van Doren et al., 2017). In regions like Oregon, where growing urban development coexists with world-class dark sky reserves, the need for solutions is urgent (Reagan & Manager, 2024). This project explores how landscape architecture can mitigate light pollution by designing outdoor spaces that promote natural darkness as a resource, balance public safety, and accommodate the needs of nocturnal wildlife. By addressing society's disconnection from natural darkness and raising awareness of the challenges faced by nocturnal migratory birds in Portland, Oregon, effective design strategies can be developed to benefit

both humans and wildlife in Pacific Northwest cities. A multidisciplinary approach was employed to analyze the impact of artificial lighting in Portland's urban areas. Using field measurements, satellite imagery, and GIS spatial analysis, the city's street illuminations were mapped, identifying key sources of light pollution as well as existing dark zones. By incorporating real-time bird migration data from BirdCast (Farnsworth et al.) and considering public access, critical locations for Portland's "dark infrastructure" — blue/green infrastructure with vital need for quality darkness (Sordello et al., 2022) — were evaluated for their potential to reconnect people with natural darkness. With Washington Park as a focal point, the project assessed the park's existing light pollution and proposed mitigation strategies, including light shields, smart lighting technologies, and dynamic lighting schedules. GIS analysis of light sources and topography was also used to identify a key site for design interventions. Through proposed site-specific interventions, the design envisions a "New Urban Nocturnal Sublime" (Stone, 2018), treating darkness as both a resource and an aesthetic for urban landscapes. Installations such as the "Mirror Stone" and the Migration Night Trail demonstrate how natural darkness at Washington Park in Portland can be preserved and restored. These interventions create dark corridors for nocturnal wildlife, establish higher-quality ecological pathways, enhance urban sustainability efforts, and provide immersive experiences that raise public awareness of nocturnal wildlife in cities.

260 Nationwide Analysis of Urban Land Use and Green Infrastructure Effects on PAHs Pollution in Urban Surface Runoff (1978-2023)

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Keywords: PAH pollutants; Urban runoff; Green infrastructure; BMP

Research on surface runoff water pollution has traditionally concentrated on pollutants such as nutrients, suspended solids, and heavy metals. These pollutants' impacts on human health and ecosystems are well-studied, leading to various developed mitigation strategies. However, recent urbanization has introduced new pollutants, including polycyclic aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), and microplastics, which present unique challenges. These emerging pollutants are characterized by complex sources, difficult detection, and limited public awareness, resulting in scant research on their presence in surface runoff. Current findings, however, indicate that these pollutants can have severe negative effects, including vegetation mortality, soil degradation, and increased risks of cancer and endocrine disruption in exposed populations. To address the urgent need to understand and mitigate the impacts of these new pollutants, this study analyzes PAH levels in urban areas across the United States over a 35-year period (1978-2023) using the BMP2023 database. Our research aims to answer following questions: (1) Which urban land use types are the primary sources of PAHs, and how do PAH concentrations vary spatially and temporally across USA? (2) How effective is traditional green infrastructure in reducing PAH levels in surface runoff, and which types of green infrastructure are most effective? Our research reveals that temporal and spatial factors significantly influence PAH concentrations, explaining 40%-80% of the variation in dependent variables. Over the past 30 years, most PAHs have shown an upward trend, with notable differences across climate zones. Among different LULC types, industrial, automotive, and mixed land use areas exhibit a strong positive correlation with PAH levels. In contrast, statistically significant BMP types, particularly MCTT, BR, and HDS, are negatively correlated with PAH, offering effective mitigation compared to inflow.

285 Low-impact Development Interventions for Urban Flooding: Comparing Stormwater Runoff under Different Territorial Structures in Nanjing, China

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Keywords: Hydrological response; Low-impact-development; Sponge city; Stormwater management; Urban flooding

Global climate change and the hardening of urban surfaces have exacerbated the problem of urban flooding, posing significant challenges to urban ecology and habitat. Due to the combined effects of climate change and frequent extreme weather events, the WMO World Meteorological Organization Report shows that weather, climate, and water extremes accounted for half of the total number of disasters from 1970 to 2019, with a five-fold increase in the number of disasters and more than a seven-fold increase in disaster losses (Canton, 2021; Devineni et al., 2015). At the same time, urbanization converts agricultural land and forests into hard surfaces that impede rainwater infiltration, shorten catchment times, and increase flood flows (Douris & Kim, 2021). To address urban stormwater flooding, low-impact development (LID) measures for building sponge cities have become a key strategy (Dietz et al., 2007; Eckart et al., 2017; Pour et al., 2020). Although researchers have widely evaluated the effectiveness of individual LID measures, comparative studies on the differences in rainfall and flooding effects between various urban functional areas and different LID measures still need to be improved. To suit the specific territorial characteristics of each study area, we propose LID implementation measures such as ground greening, roof greening, infiltration paving, and grass-planted trenches. Simulations using the CITYgreen model showed that LID measures significantly improved each area's rainfall and flood control capacity. In the simulated two-year, 72mm rainfall event, the LID measures successfully reduced the flood peak flow by 0%-56.1% and the runoff volume by 0%-41.7%, which is equivalent to constructing a reservoir (i.e., rainfall flood storage volume) of size 223-2675 m^3. Further analysis revealed a significant difference in the stormwater regulation effect of different LID measures, with ground-level greening performing the best, followed by infiltration paving, garden-type green roofs, lawn-type green roofs, and planted grass swales, in that order. Regarding stormwater storage per unit area（rainwater storage capacity per unit area of）, ground-level greening had the highest performance, followed by infiltration paving, about 29.3%-51.4% of the former. In contrast, roof greening and grass-planted gutters were relatively low. The results of this study not only highlight the differentiated effects of LID measures in various urban functional areas and between measures and provide a valuable scientific basis for the site selection, sustainable design, and incentive policy formulation of LID measures. The results can help address urban stormwater problems more accurately and efficiently. Revised Abstract Global climate change and the hardening of urban surfaces have exacerbated the problem of urban flooding, posing significant challenges to urban ecology and habitat. Due to the combined effects of climate change and frequent extreme weather events, the WMO report shows that weather, climate, and water extremes accounted for half of the total number of disasters from 1970 to 2019, with exponential increase in the number of disasters and disaster losses At the same time, urbanization converts

agricultural land and forests into hard surfaces that impede rainwater infiltration, shorten catchment times, and increase flood flows (Douris & Kim, 2021). To address urban stormwater flooding, low-impact development (LID) measures for building sponge cities have become a key strategy (Eckart et al., 2017; Pour et al., 2020). Although researchers have widely evaluated the effectiveness of individual LID measures (Peng et al., 2008), comparative studies on the differences in rainfall and flooding effects between various urban functional areas and different LID measures still need to be improved. We selected five representative functional areas in the city as a way to ensure strong coverage of the study in urban areas. Based on the original greening, we proposed LID implementation measures such as ground level greening, roof greening, infiltration paving and grass planting trenches. The CITYgreen model was utilized to demonstrate the efficiency of LID measures more visually and clearly. The results show that LID measures have significantly improved rainfall and flood protection in the region. In the simulated two-year, 72mm rainfall event, the LID measures successfully reduced the flood peak flow by 0%-56.1% and the runoff volume by 0%-41.7%, which is equivalent to constructing a reservoir (i.e., rainfall flood storage volume) of size 223-2675 m^3. Further analysis revealed a significant difference in the stormwater regulation effect of different LID measures, with ground-level greening performing the best, followed by infiltration paving, garden-type green roofs, lawn-type green roofs, and planted grass swales. Regarding stormwater storage per unit area（rainwater storage capacity per unit area of), ground-level greening had the highest performance, followed by infiltration paving. In contrast, roof greening and grass-planted gutters were relatively low. The results of this study: (1) highlight the differential effectiveness of LID measures across urban functional areas and between measures; (2) provide a valuable scientific basis for siting, sustainable design, and incentive policy development for LID measures; (3) contribute to more accurate and effective solutions to urban stormwater problems.

288 The Concept and Challenges of Urban Rewilding as an Alternative for Sustainable Development.

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Keywords: Sustainable Urban Development; Ecological Restoration; Rewilding Strategies; Human-Nature Interaction; Long-term Urban Planning

Introduction The concept of rewilding has emerged as an alternative to sustainable nature restoration, moving beyond the human-nature dualism towards interactivity between humans and non-humans. However, the theoretical and practical foundations of rewilding are deficient. The ambiguous concept has been criticized for causing confusion (Jørgensen, 2015), and there is a lack of evaluation criteria for its success. This study addresses three questions: What discursive currents have brought rewilding sites closer to cities? What are the differences of rewilding compared to existing nature-related discourses? How can effective urban rewilding be achieved? Methods This study utilized a qualitative approach, including a literature review and case studies of urban rewilding projects. I examined the emergence of rewilding concept, explored the meaning of 'wild' in its terminology, and compared it to existing ecological restoration concepts. By analyzing the benefits and challenges of urban rewilding. By doing this, I laid the groundwork for future discussions. Results Rewilding is a nature restoration strategy aiming for coexistence of humans and non-humans in landscapes where urban artificial spaces and natural areas are integrated. This study assesses the potential value of urban rewilding as an alternative to sustainable urban development. Benefits include a proactive response to climate change, increased urban biodiversity, and lower management efforts and costs. However, challenges need to be addressed, requiring interdisciplinary research and simultaneous urban rewilding experiments. Successful projects include community engagement, strategic planning of interventions, consistent monitoring, and proactive government support. Accordingly, educating citizens on the concept of rewilding is deemed highly important. Issues related to new species introduction, infection, destruction of natural areas, human-non-human conflicts, and urban-nature aesthetics were identified as challenges needing further research. Discussion Urban rewilding has the potential to reshape landscape architecture by promoting an integrated approach that values ecological processes alongside urban development. Implications for practice include the need for interdisciplinary collaboration and supportive policies for reforestation efforts. Limitations of this study include the need for more empirical data to substantiate findings and alternatives to quantify success and educate citizens to appreciate wildness. Conclusion The findings highlight the role of urban rewilding in creating sustainable urban environments for theorists and practitioners, including designers. It calls on landscape architects to actively use rewilding principles in their practices. It also urges advocates to conduct further research to address challenges and improve the effectiveness of urban rewilding, promoting coexistence between urban populations and natural ecosystems. Revised Abstract The concept of rewilding has emerged as an alternative to sustainable nature restoration, moving beyond the human-nature dualism towards interactivity between humans and non-humans. However, the theoretical and practical foundations of rewilding are deficient. The ambiguous concept has been criticized for causing confusion (Jørgensen, 2015), and there is

a lack of evaluation criteria for its success. This study addresses three questions: What discursive currents have brought rewilding sites closer to cities? What are the differences of rewilding compared to existing nature-related discourses? How can effective urban rewilding be achieved? This study utilized a qualitative approach, including a literature review and case studies of urban rewilding projects. I examined the emergence of rewilding concept, explored the meaning of 'wild' in its terminology, and compared it to existing ecological restoration concepts. By analyzing the benefits and challenges of urban rewilding. By doing this, I laid the groundwork for future discussions. Rewilding is a nature restoration strategy aiming for coexistence of humans and non-humans in landscapes where urban artificial spaces and natural areas are integrated. This study assesses the potential value of urban rewilding as an alternative to sustainable urban development. Benefits include a proactive response to climate change, increased urban biodiversity, and lower management efforts and costs. However, challenges need to be addressed, requiring interdisciplinary research and simultaneous urban rewilding experiments. Successful projects include community engagement, strategic planning of interventions, consistent monitoring, and proactive government support. Accordingly, educating citizens on the concept of rewilding is deemed highly important. Issues related to new species introduction, infection, destruction of natural areas, human-non-human conflicts, and urban-nature aesthetics were identified as challenges needing further research. Urban rewilding has the potential to reshape landscape architecture by promoting an integrated approach that values ecological processes alongside urban development. Implications for practice include the need for interdisciplinary collaboration and supportive policies for reforestation efforts. Limitations of this study include the need for more empirical data to substantiate findings and alternatives to quantify success and educate citizens to appreciate wildness. The findings highlight the role of urban rewilding in creating sustainable urban environments for theorists and practitioners, including designers. It calls on landscape architects to actively use rewilding principles in their practices. It also urges advocates to conduct further research to address challenges and improve the effectiveness of urban rewilding, promoting coexistence between urban populations and natural ecosystems.

340 Wetness Persists: The Aqueous Natural History of Chicago

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Keywords: Equitable water management; Natural history of cities; Stormwater resilience; Flooding in Chicago; Climate resiliency

Flood damage disproportionately affects the south and west sides of Chicago with chronic disinvestment and outdated infrastructure as significant factors [1], but an often overlooked cause lies, quite literally, beneath the surface – in the native soils and hydrology. Although the south and west sides of Chicago are naturally wetter, the development of the southern tip of Lake Michigan has diverted, eroded, and destroyed the natural hydrologic system. All this contributes to and worsens the flooding that afflicts this region; its severity is attested by residents, who often live in disinvested communities without a choice [2]. For this reason, when planning to improve water management in this region, it is necessary to equally consider the disinvestment of the infrastructure and the natural history of the landscape. We claim that it is only by understanding the hydrology and soils that a more holistic and effective water management plan can be designed -- a plan reflecting both environmental and socio-economic factors. In pursuit of these goals, this research overlays native topography, soils, and hydrology across other factors of modern-day Chicago in order to map the “insidious” presence of water – wetness that formerly sustained rich biodiversity but which now is perceived as detrimental: flooding, pollution, contamination. Fryxell’s Generalized Soil Map of the region of Chicago [3] documents the highly varied native surficial landscape of Chicago and is a primary resource for this research. Early settlers witnessed that the northern parts of Chicago were dunes and sand ridges, while the south and west were vast marshes transected by sluggish rivers correlating with the wettest neighborhoods, as indicated by the University of Illinois’ Topographic Wetness Index (TWI) [4]. These findings indicate that the natural history of the landscape cannot be ignored when planning for water management. This paper documents these conditions as a foundation for collaboration with communities on equitable access and resiliency to stormwater in disinvested neighborhoods.

344 Evaluating the Effectiveness of Blue-Green Infrastructures for Mitigating the Urban Heat Island Effect

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Keywords: Urban Heat Island (UHI) effect; Mitigation strategies; Blue-Green Infrastructures (BGI); Effectiveness; Thermal comfort

Urbanization brings significant transformations to natural landscapes, resulting in a spectrum of consequential environmental shifts (Girardet, 2020). The trajectory of numerous prominent U.S. cities has been marked by an evident temperature increase ranging from 0.5 to 3.08 degrees Celsius over the past century, attributed to an array of underlying factors (Akbari et al., 2001). Among these factors, the emergence of the Urban Heat Island (UHI) effect is an alarming phenomenon, manifesting as increased ambient temperatures within urban centers compared to rural peripheries (Erell et al., 2011). However, there is a lack of data-driven urban decision-making approaches that can give directives for urban planners and policymakers to create a comfortable urban microclimate in the urban expanses. This research endeavors to bridge this knowledge gap by investigating the prospects of enhancing environmental conditions through the strategic integration of vegetation and aquatic features within urban domains of the United States. This research will explore if the strategic deployment of Blue-Green Infrastructure (BGI), with different types of green spaces and water elements, can alleviate the adversities imposed by the UHI effect. An extensive literature review will be undertaken to reveal insights into the efficacy of BGI in reducing the UHI phenomenon, specifically within the American context. This study focuses on generating informed directives concerning the specific typologies of Blue-Green Infrastructure effective towards UHI mitigation while concurrently improving the outdoor thermal comfort conditions. This multifaceted inquiry aspires to recommend some design and implementation imperatives for urban planners and policymakers, empowering them with actionable tools to tackle the complexities inherent in climate risk mitigation. The findings from the literature review can contribute to fostering a more balanced urban thermal environment in the United States. This study aims to furnish pragmatic insights capable of steering urban planning and policy formulation endeavors by implementing green and aquatic elements. In summary, the present research aims to generate a comprehensive understanding of how thoughtful integration of Blue-Green Infrastructure can emerge as a transformative modality in mitigating the UHI effect and creating a more comfortable urban environment for the citizens of the United States.

374 Analyzing Floristic Quality Assessment Scores for Restored and Remnant Native Prairie at Theodore Roosevelt Presidential Library: A Local Provenance Approach

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Keywords: Prairie Restoration; Carbon Sequestration; Floristic Quality Assessment; Ecosystem Resilience; Conservation Management

Prairie restoration preserves biodiversity by protecting habitats crucial for species survival. It plays a significant role in carbon sequestration, vital in combating climate change. This research seeks to measure and compare the Floristic Quality Assessment (FQA) scores of remnant patches of prairie and restored prairie at the site of the Theodore Roosevelt Presidential Library in Medora, North Dakota. A cornerstone of successful prairie restoration lies in utilizing local seeds derived from native plant populations (McCormick et al., 2021; Pizza, Foster & Brudvig, 2023). Prairie plant seeds are unavailable from local sources in remote North Dakota. These sources are needed to promote genetic diversity within the restored habitat, fostering a more resilient plant community (Rodrigues & Loures, 2017; Doll et al., 2011). Local seed use enhances ecological suitability, ensuring the plants thrive in their restored environment (Stromberg et al., 2007; Pizza, Foster & Brudvig, 2023). This approach promotes the long-term sustainability of restored prairie ecosystems (Martin & Wilsey, 2006). FQA helps identify natural areas, facilitates site comparisons, monitors habitat quality over time, and informs restoration efforts by focusing on plant species with high FQA scores (Swink & Wilhelm, 1994). The study employs a mixed-methods approach, integrating a baseline comparison between the remnant and designed areas of the 20-acre library grounds to support future long-term monitoring of restoration efforts in combination with qualitative interviews with the design team, including landscape architects, ecologists, natural resource management professionals, volunteers, and cultivators. The species list specific to North Dakota has been developed by the USGS (Mushet et al. 2001), assigning coefficients of conservatism (C values, range 0 to 10) based on each species' reliance on natural habitats. Integrating these C values into restoration efforts aims to establish a baseline score for a diverse and resilient prairie ecosystem, supporting long-term ecological resilience. Higher C values correspond to species typically found in undisturbed habitats, whereas lower values indicate species more tolerant of human disturbances (Bauer, 2018). Restoration strategies are tailored to site-specific conditions, such as soil composition and climate, ensuring an ecologically appropriate approach. The study emphasizes the significance of local native seed collection and FQA-based restoration in enhancing prairie ecosystem resilience. It highlights the importance of site-specific strategies, continuous monitoring, and adaptive management for long-term sustainability. The restored prairie at the Theodore Roosevelt Presidential Library will offer critical habitat for native species and serve as a valuable resource for ecologists, landscape architects, and local authorities.

380 Virginia's Cancer Alley: Stories of Pollution Told By Community, Chemicals, and Catfish

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Keywords: Industrial afterlives; Watershed ecology; Toxicity; Metabolism; Environmental anthropology

In an approach via local and national environmental history, the toxic ecologies that have risen in Big Island, Virginia warrant examination. This piece builds on existing work in the field by introducing an embodied and personal way of understanding toxic presence for what it is: As part of an ecosystem. The community along the James River in Southwestern Virginia consists of a myriad of human and non-human actors, but these two categories fail to acknowledge the presence of toxicity in the ecology surrounding the town. Through ethnographic and sociological work conducted in the town along the James River, firsthand accounts of 'Cancer Alley' emerge as locational and regional embodiments of a toxic past that is still being reconciled today. By constructing a historical narrative of place, patterns emerge and elucidate what it means to live with toxicity and what it means when that is part of your local and regional history. Hand in hand with the extractive histories of this place, toxic history takes on multiple forms here in order to recognize and reconcile toxicity with the agency that it truly possesses, whether it is commonly acknowledged or not. By approaching toxicity as an active part of the human/non-human ecology of Big Island, Virginia, the impact left by toxic waste dumping can be better understood and rectified by the land upon which the process of toxification happens. Revised Abstract In an approach via local and national environmental history, the toxic ecologies that have risen in Big Island, Virginia warrant examination. As approached through new materialism and ecological thought from within the English discipline, this piece introduces an embodied and personal way of understanding toxic presence for what it is: As part of an ecosystem. The community along the James River in Southwestern Virginia consists of a myriad of human and more-than-human actors, but these two categories fail to acknowledge the presence of toxicity in the ecology surrounding the town. Through environmental monitoring and interview data conducted in the town along the James River, firsthand accounts of 'Cancer Alley' emerge as locational and regional embodiments of a toxic past that is still being reconciled today. By constructing a historical narrative of place, patterns emerge and elucidate what it means to live with toxicity and what it means when that is part of a local and regional history. Hand in hand with the extractive histories of this place, toxic history takes on multiple forms here in order to recognize toxicity in alignment with the agency that it truly possesses, whether it is commonly acknowledged or not. By approaching toxicity as an active part of the human/non-human ecology of Big Island, Virginia, the impact left by toxic waste dumping can be better understood and rectified by the land upon which the process of toxification happens.

399 Assembling an Inclusive Landscape Infrastructure Design and Research Practice

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Keywords: Nature based solutions; inclusive design; landscape infrastructure; augmented reality; modeling

This presentation examines the development of a transdisciplinary research design practice under the Inclusive Infrastructure Design Lab (IIDL), a USC initiative that integrates community engagement, the arts, and innovative design and engineering technology to reimagine urban infrastructure projects. With a current focus on the nature-based climate resilient revitalization of the Los Angeles River, the IIDL asks whether it is possible to address historical inequities in infrastructure design by fostering a more inclusive and technically adept design process that balances ecosystem restoration, community needs, and flood management? The core of this initiative lies in its hybrid approach, blending the expertise and voices of engineers, landscape architects, artists, community stakeholders, and project managers. The aim is to create a model for actionable and detailed landscape infrastructure design that not only incorporates advanced engineering but also places community voices and action at the forefront. This presentation outlines the mission, methodologies, and technologies employed by IIDL, highlighting the interplay between team building, technical innovation, social engagement, and environmental restoration in reshaping climate-stressed infrastructure. A key feature is the large hydraulic physical model of the LA River, an advanced tool designed to simulate water flow, landscape dynamics, and ecosystem functions. More than just an engineering tool, this model uses augmented reality to enable it to serve as a platform for design experimentation, ecological restoration, and community input. Through this tool, stakeholders can explore restoration scenarios that prioritize biodiversity while addressing flood management and urban resilience. The participatory model makes infrastructure design more accessible, allowing non-experts to engage meaningfully with balancing complex challenges. This presentation will present the current findings from IIDL's programming and collaboration with a social scientist, including from a series of focus groups, workshops, public exhibitions, and collaborations with artists. These initial results suggest that its integrated approach holds promise, but that it also faces many challenges. Further engagement with the city and Army Corps of Engineers also has revealed the nature of the challenge. Ultimately, this presentation advocates for rethinking infrastructure design to be more transdisciplinary, inclusive, and ecologically focused. By harnessing technology and art, along with community engagement, the IIDL offers a framework for creating equitable, resilient, and vibrant urban environments where infrastructure supports both human and natural systems. This approach highlights the potential for urban infrastructure projects to serve as tools for ecosystem restoration while balancing social and technical needs.

432 Analyzing Multiple Ecosystem Services Interactions to Support Ecological Planning: The Case of a Rural Mining Region in the Central Appalachians

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Keywords: ecosystem services tradeoffs and bundles; freshwater ecosystem services; surface mining; landscape changes; working landscapes

The study analyzed the interactions among a set of ecosystem services (ES) and derived ES bundles (Raudsepp-Hearne, Peterson, & Bennett, 2010) in the Headwaters of Coal River West Virginia, in the Central Appalachians, an area historically characterized by surface mining and coal extraction. Four ES were modeled using the InVEST system (Sharp et al., 2020), including Habitat Quality, Carbon Sequestration, Recreation and Tourism, and Sediment Delivery Ratio. High-resolution remote sensing data (1-2 m resolution) were used to incorporate historical information from land-cover transitions since 1976 to differentiate reclamation processes and characterize the forest class (Cribari, Strager, Maxwell, & Yuill, 2021). A custom model was specifically created to link water quality to freshwater ESs (Keeler et al., 2012), that included metrics to evaluate Aquatic Life, Water Contact and Recreation, and Water Supply for human consumption. The models obtained information at two different spatial scales based on hydrologic units, including Hydrologic Unit Code 12 (HUC-12) catchments (Seaber et al., 1985) and a smaller set named Custom Hydrologic Units, derived from stream data. The stream data included information about the Affected Designated Uses of water bodies from the impaired waters state list approved by the US Environmental Protection Agency. Consistent ES tradeoffs (Foley et al., 2005) were confirmed in areas characterized by surface mining processes that reported significant losses of Carbon Sequestration, Habitat Quality, and freshwater ESs. The interaction of complex anthropogenic processes within the specific landscape led to the definition of different ES bundles, characterized not only by coal mining processes but also by the distribution of settlements and developed areas. The utilization of relatively small hydrologic catchments (1-25 km2), the comparison with a more extensive set of spatial units, and the inclusion of high-resolution data with multiple LC classes, that included historical information, allowed the authors to infer knowledge about the interactions between ES changes and their drivers in the study area (Mouchet et al., 2014). The results can be used to delineate land units with specific characteristics, ranging from heavily disturbed landscapes that require consistent investments to complete reclamation efforts, to areas in above-average ecological condition but exposed to significant risk. The spatial mapping of ES bundles demonstrate how readily available datasets can be used to implement conservation and development-restoration strategies by integrating ES assessments into landscape ecological planning and promoting more sustainable land management in both working and ordinary landscapes, such as the one analyzed in the study.

444 Strategies for valuing and restoring ecosystem services of roadside vegetation following large-scale clearing

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Keywords: roadside vegetation scenario planning; Roadside tree removal; Interdisciplinary collaboration

Roadside vegetation in the right-of-way is an important asset of departments of transportation (DOTs) that requires collaboration among DOT units such as design (engineering), roadside safety, roadside maintenance, ecology, and landscape architecture. In the past decade, large-scale tree clearing has become an issue for departments of transportation (DOTs). DOTs clear-cut roadside vegetation for a variety of reasons, including to manage roadside safety, facilitate storm recovery, maintain sightlines, and increase visibility of billboards, among others. Indiscriminate large-scale roadside tree clearing may have environmental impacts, including disruption of habitat, increased erosion, and increased vulnerability to invasive species. In this study, we quantify some of these environmental impacts using ecosystem services. Ecosystem services valuation provides a framework for incorporating the economic value of ecosystem services into policy and decision-making processes and has been used to assess present-day function, monitor change over time, and inform future planning to maximize the services generated over space and time. Some studies have looked at the ecosystem services provided by roadside vegetation but largely in urban areas, right-of-ways, at broad scales, or in international locations. Thus, there is a dearth of information on the ecosystem services lost through roadside clearing, and, correspondingly, a recent call has been put forth to ask for more studies on ecosystem services of restored roadsides. We use an illustrative case study of the interstate corridors in the US state of Georgia, where a roadside tree removal program called “Right-of-Way Reclamation” was implemented in the late 2010s, resulting in more than 7,000 acres of trees cleared along interstate corridors alone. A potential solution to prevent this type of drastic action is to create an evaluative framework for measuring the benefits of roadside trees. First, we calculate the lost carbon ecosystem services that resulted from roadside tree removal in Georgia. We then propose three scenarios for partially restoring these carbon ecosystem services along the roadsides. Results are anticipated to fall into three categories: 1) to illustrate the value of conservation of the roadside forest within the constraints faced by DOTs; 2) to offer scenarios for roadside vegetation restoration; and 3) to enhance collaboration between DOT units through the transferable language of ecosystem services.

498 Damming the Amazon: effects of hydroelectric dams on Andean tributaries in Ecuador

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Keywords: River basin planning; dam effects; reservoir sedimentation; Amazon River; Ecuador

With a drainage basin of 7 million km2 and average discharge of 219,000 m3s-1, Amazon is the world's greatest river, in a class by itself. As mighty as it is, even the Amazon is being humbled by multiple dams on its many tributaries. The Andean headwaters are of special importance. Despite their limited area, they provide the river with the majority of its sediment and nutrient load, underpinning much of its productivity. Because of the steep drops and high potential to generate hydroelectric power, multiple dams are being built in Andean tributaries, utterly transforming this landscape, and ultimately affecting downstream river reaches by cutting off the supply of coarse sediment that was formerly transported from the Andes, creating sediment starved conditions downstream (Kondolf, 1997). Especially since 2000, the nation of Ecuador has prioritized shifting its electricity generation from fossil fuels to hydroelectricity, with an ambitious program of hydroelectric dam construction. However, a severe drought in 2023 and 2024 resulted in almost daily blackouts (Celi, 2024). In some cases, these hydroelectric dams are being built without understanding the river processes, which may be dominated by very high sediment loads and dynamic channel changes. Drawing upon results of government sampling programs, reservoir surveys, dam related information, their sites, national energy plans, topographic data, we assessed the likely effects of built and planned dams on Andean tributaries in Ecuador. We compiled and analyzed data on suspended sediments for these rivers, building sediment rating curves at gaging stations (data provided by the Ecuadorian Meteorological and Hydrological Service) for the three principal Ecuadorian tributaries to the Amazon, the Napo, Pastaza and Santiago rivers. We thereby developed a rigorous data set for the pre-dam sediment loads from this part of the Cordillera, finding annual sediment yields mostly between 30 to 150 tons km-2, but up to 5,000 tons km-2 in areas with high rainfall, steep slopes, and seismic activity. We then adapted the 3W and Cascade models to analyze the sediment trapping effects of existing and planned dams, assessing the cumulative effects on these rivers and the impacts of sediment accumulation on the sustainability of these reservoirs and sediment starvation on downstream reaches. A detailed case study analysis of the US$3billion Coca Codo Sinclair dam project demonstrates high sediment loads on the Coca River have interfered with diversion of water, and the dam itself is now threatened by headward migration of a headcut. Revised Abstract Draining 7 million km2, with an average discharge of 219,000 m3s-1, the Amazon is the world's greatest river, in a class by itself. But even the Amazon is being humbled by multiple dams on its many tributaries. The Andean headwaters are of special importance. Despite their limited area, they provide the river with the majority of its sediment and nutrient load, underpinning much of its productivity. Because of the steep drops and high potential to generate hydroelectric power, multiple dams are being built in Andean tributaries, utterly transforming this landscape, and ultimately affecting downstream river reaches by cutting off the supply of coarse sediment that was formerly transported from the Andes, creating sediment starved conditions downstream (Kondolf, 1997). Especially since 2000, the nation of Ecuador has prioritized shifting its electricity generation from fossil fuels to hydroelectricity, with an ambitious program of hydroelectric dam construction. However, a severe drought in 2023 and

2024 resulted in almost daily blackouts (Celi, 2024). In some cases, hydroelectric dams are being built without understanding the river processes, which may include very high sediment loads and dynamic channel changes. Our research approach was two-fold: 1) an analysis of sediment yields and dam effects for the Amazon subbasin tributaries in Ecuador, and 2) a case study on one dam project whose continued function is threatened by channel erosion. 1) We compiled and analyzed data on suspended sediments for these rivers, building sediment rating curves at gaging stations (data provided by the Ecuadorian Meteorological and Hydrological Service) for the three principal Ecuadorian tributaries to the Amazon, the Napo, Pastaza and Santiago rivers. We thereby developed a rigorous data set for the pre-dam sediment loads from this part of the Cordillera, finding annual sediment yields mostly between 30 to 150 tons km-2, but up to 5,000 tons km-2 in areas with high rainfall, steep slopes, and seismic activity. We then adapted two river-network-scale models, 3W and Cascade, to analyze sediment trapping effects of existing and planned dams, assess the cumulative effects of sediment starvation on these rivers, and analyze the impacts of sedimentation on the sustainability of these reservoirs. 2) We conducted a detailed case study analysis of the US $3 billion Coca Codo Sinclair dam project on the Coca River, where high sediment loads have interfered with diversion of water, and the dam itself is now threatened by headward migration of a headcut.

580 Mapping Potential Natural Vegetation of North America Grass-based Ecosystems for Green Infrastructure

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Keywords: ecoregion; native plants; nature-based solutions; biodiversity; low-impact development

Since the turn of the Twentieth century, the expansion of agricultural and urbanized land uses began to significantly alter or eradicate native plant communities in North America, especially, grass-based ecosystems (Ricketts et al., 1999). As a result, biological diversity (biodiversity) has become displaced by the destruction of natural habitats (Augustine et al., 2021). Green infrastructure such as green roofs, rain gardens, biofiltration swales, constructed wetlands, greenways, wildlife crossings, and nature preserves have the potential to support and revive habitat for biodiversity associated with grass-based ecosystems when vegetation native to those plant communities is used (Bretzel et al., 2016; Kowarik, 2011). Grass-based ecosystems were historically adapted to much of North America where the region's climate, altitude, topography, soils, and in some cases, land management activities such as ground fires were present (Bailey, 2007). Many urbanized regions in North America today have few remnants of grass-based ecosystems remaining to serve as a "habitat template" to guide the potential design and management of green infrastructure (Lundholm, 2006). The types and locations of remnant grass-based plant communities are currently sporadically reported in numerous small-scale maps as figures or as incomplete maps in published papers or generalized forms in online databases (Bailey & Cushwa, 1981; Omernik, 1987). There is little published at the regional scale regarding the kinds of native grass-based plant communities that can be utilized to support biodiversity on green infrastructure through grass-based ecosystems. This study investigates the kind and location of remnant grass-based ecosystems that potentially serve as habitat templates for green infrastructure. Through a systematic review of literature, the types, and locations of the Pre-Columbian grass-based ecosystems in North America are identified on a single map by kind and location for grass-based ecosystems (Omernik, 1995). Forest ecosystems are the dominant ecosystem reported (Bailey, 1994) while numerous grass-based ecosystems such as prairies, savannas, barrens, alvars, glades, meadows, and many other plant communities are potentially useful for use in green infrastructure, but are scarcely mentioned in the literature. Methods include the review of literature on grass-based ecosystems in North America, GIS databases, historic reports, and other peer-reviewed sources that identify their kind and location. The purpose of this research is to provide a baseline study of potential native vegetation for use with green infrastructure in North America. These results are useful to landscape architects, planners, ecologists, and educators looking to expand and identify reference plant communities for their region.

595 Damming Decisions: Case Studies from Coast to Coast

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Keywords: Dams; Rivers; Decision making; Indigenous environmental knowledge (IEK)

Dams have shaped complex socio-ecological systems across vast territories of the United States. They are a symbol of economic prosperity and cultural identity as well as a potential source of clean energy and opportunity for recreation. However, they have also had dramatic impacts on our freshwater and coastal ecosystems. They place a fixed object in a fluid and dynamic landscape, fragmenting migratory corridors for aquatic species, altering nutrient and sediment flows, and transforming the ways that people interact with rivers. In the United States there are over 100,000 dams, many over a century old. Thousands of dams across the United States are coming to the end of their life cycles and will either need to be repaired or removed in the coming decades. This work requires the untangling of complex political and environmental networks, seeking new ways for rivers and the more-than-human relatives that live along them to be stewarded. At the same time, Indigenous communities throughout the Americas have had long standing relationships with rivers. At this critical moment of reimagining dam management, Indigenous peoples are often at the forefront of restoration efforts that draw on deep environmental knowledge and place-based thinking. With this in mind, our panel takes a case study approach to exploring dams across three regions: New England, the Upper Midwest, and the Pacific Northwest. Considering participatory engagement, non-profit organizing, drawing as a constructive practice, and tribal leadership in dam removal, we explore how decisions about the future of dam management and removal are made across geographies and scales. From these comparisons, our panel will discuss the differing demands of each riparian ecosystem and how those socio-spatial contexts influence dam management and decisions. This discussion will focus particularly on the needs of riparian flora and fauna to achieve ecosystem health, as well as the ways that community engagement around dams can both recognize and support these habitats. Ultimately, the case studies demonstrate a need for ecologically and culturally specific river management practices where landscape architects can contribute to research and decision making around dams – an area of work that will become increasingly relevant as dams continue to age across the country.

631 Collaborative Landscape Planning for Holistic Resilience: case study from Muni Lagoon and City of Winneba, Ghana

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Keywords: Landscape planning; Holistic resilience; Wetland conservation; Collaborative planning

This paper examines the collaborative landscape planning efforts aimed at fostering holistic resilience in the City of Winneba and the adjacent Muni Lagoon in Ghana. The Muni Lagoon, a Ramsar site of international importance, holds deep cultural significance for the Effutu people, who believe it to be the spiritual home of their god, Kweku Muni (Attuquayefio, 1999; Gordon et al., 2000; Adu-Boahen et al., 2018). However, the lagoon and city face a confluence of challenges, including flooding, environmental degradation, informal urbanization, habitat loss, and declining fish stocks (Takahashi & Huang, 2023; Atubiga & Donkor, 2022), all of which threaten both the ecological integrity of the area and the cultural traditions tied to it. From 2017 to 2019, a series of collaborative workshops brought together local stakeholders, planners, landscape architects, and researchers from Ghana and the U.S. to address these complex challenges. The workshops employed participatory approaches allowing participants to map critical areas for intervention across four main themes: infrastructure, conservation, economy, and education. This process not only highlighted urgent issues but also facilitated consensus on priority actions, producing a shared blueprint for future development. A key focus of this effort was the concept of holistic resilience, which acknowledges that environmental, economic, and social challenges are deeply interconnected. Just as sustainability relies on three pillars—society, economy, and environment (Purvis et al., 2019)—so too must resilience encompass these dimensions. The collaborative planning approach integrated these pillars by addressing ecological degradation, economic instability, and the preservation of cultural identity in tandem. This holistic framework ensured that solutions were multifaceted and adaptive, capable of fostering long-term resilience for both the natural landscape and the local community. The collaborative planning approach was instrumental in bringing together diverse perspectives, building trust, and fostering co-ownership of the solutions. Local stakeholders, including the Municipal Assembly, the Wildlife Commission, and the University of Education, Winneba (UEW), actively contributed to the decision-making process. By integrating local knowledge with technical expertise, the process ensured that proposed actions aligned with both community needs and long-term environmental goals. This case study highlights the value of collaborative planning in achieving holistic resilience, offering a model for other coastal communities in West Africa and beyond.

People-Environment Relationships

29 Designing Parks for Prosperity: Unraveling the Microclimate and Economic Impacts of Urban Green Spaces in Champaign-Urbana

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Keywords: Design Impact; Green Infrastructure; Microcliamte; Mobility Data; Landscape Performance

Urban parks are increasingly recognized as vital components of green infrastructure, providing ecological, social, and economic benefits within cities. Research by Bowler et al. (2010) demonstrates that urban green spaces can mitigate urban heat island effects, improve thermal comfort, and potentially influence pedestrian activity in surrounding areas. Additionally, studies have shown that well-designed parks can enhance the economic performance of nearby businesses by increasing foot traffic and creating more attractive commercial environments (Wolf, 2005). However, the specific mechanisms by which landscape features and microclimates of parks affect mobility patterns and the economic vitality of adjacent businesses remain underexplored. This study investigates these relationships in the Champaign-Urbana area, aiming to establish a foundation for future research. By collecting primary microclimate data and utilizing secondary data on foot traffic and mobility, this research seeks to understand the design impacts of urban parks. The findings will provide insights into how park features contribute to local microclimate variations and pedestrian behaviors, potentially affecting economic activity in adjacent commercial zones. The outcomes are intended to inform landscape architecture practices and urban planning strategies that prioritize environmental sustainability and economic resilience, ultimately enhancing public well-being. Revised Abstract Urban parks are increasingly recognized as vital components of green infrastructure, providing ecological, social, and economic benefits within cities. Research by Bowler et al. (2010) demonstrates that urban green spaces can mitigate urban heat island effects, improve thermal comfort, and potentially influence pedestrian activity in surrounding areas. Additionally, studies have shown that well-designed parks can enhance the economic performance of nearby businesses by increasing foot traffic and creating more attractive commercial environments (Wolf, 2005). However, the specific mechanisms by which landscape features and microclimates of parks affect mobility patterns and the economic vitality of adjacent businesses remain underexplored. This study investigates these relationships in the Champaign-Urbana area, aiming to establish a foundation for future research. The methodology integrates primary data collection and secondary data analysis to comprehensively explore park impacts. First, primary microclimate data, including thermal comfort indices, are collected using sensors such as PocketLab sensors. This data captures key variables like air temperature, humidity, and wind conditions within parks (Wang et al., 2023). Second, secondary data from the Safegraph dataset, including point-of-interest foot traffic and visit timestamps, is analyzed to assess pedestrian mobility patterns in areas adjacent to the parks. By correlating microclimate conditions with foot traffic data, the study identifies how variations in thermal comfort influence daily foot traffic levels. Preliminary results indicate that parks with more favorable thermal comfort indices tend to experience higher daily foot traffic. These findings shed light on the connections between park design, microclimate regulation, and economic activity in nearby commercial zones. The outcomes of this research provide actionable insights for landscape architecture and urban planning practices, emphasizing strategies that enhance environmental sustainability, economic resilience, and public well-being.

31 Quantifying the Economic Benefits of Urban Parks Using the Travel Cost Method: A Data-Driven Study in Austin, TX

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Keywords: Park Economic Benefit; Travel Cost Method; Mobility Data; Quantify Public Welfare; Consumer Surplus

Urban parks are vital public spaces in cities, playing a crucial role in enhancing the quality of life for residents (Chiesura, 2004). It is essential for local governments to be well-informed when making decisions about park development, particularly concerning funding for reconstruction and maintenance. However, the Parks and Recreation Department struggles to quantify the indirect value of the parks they manage, which is vital for justifying investments, shaping policy, planning, and guiding efforts in maintenance and enhancement (Harnik, 2009). Moreover, traditional methods for measuring park benefits face several challenges in accurately capturing the complex dynamics of tourist behavior. Quantifying the indirect economic values of parks is particularly difficult, as data often suffer from low reliability and small sample sizes. The objective of this research is as follows: 1. What is the annual consumer surplus for all urban parks in the City of Austin? 2. What factors are related to the consumer surplus of urban parks in the City of Austin? The next phase of the research will explore how park facilities and the surrounding urban environment affect these economic benefits. This study calculated the economic benefits of 209 parks in Austin, TX, before COVID-19, using the Travel Cost Method (TCM) to quantify public welfare. The economic benefit estimation combines user travel costs and opportunity costs of time. The dataset includes 1,761,809 entries related to parks, capturing weekly visitation patterns and sampling percentages for each Census block group (BG), which represents an average of 5.67% of the population. It is powered by mobility data from SafeGraph and Advan, which are valued for their precision and timely updates across various ground truth datasets. Ethical concerns were addressed through privacy measures, such as the Laplacian noise algorithm (SafeGraph: Places Accuracy, 2023). The research estimated the annual indirect economic benefits from recreational uses of Austin's urban parks at around $14,695,000. It also employs a Fixed Effect Model to identify the correlation between consumer surplus and various factors and conducts a longitudinal study on park consumer surplus. The findings support a data-driven approach to resource allocation for urban green spaces, offering policymakers a solid justification for investing in park development and maintenance (Ababneh, 2023). This method could also assist local governments in land-use planning for public lands and prioritizing budgets based on benefit value to improve public welfare. Revised Abstract Urban parks are vital public spaces in cities, playing a crucial role in enhancing the quality of life for residents (Chiesura, 2004). It is essential for local governments to be well-informed when making decisions about park development, particularly concerning funding for reconstruction and maintenance. However, the Parks and Recreation Department struggles to quantify the indirect value of the parks they manage, which is vital for justifying investments, shaping policy, planning, and guiding efforts in maintenance and enhancement (Harnik, 2009). Moreover, traditional methods for measuring park benefits face several challenges in accurately capturing the complex dynamics of tourist behavior. Quantifying the indirect economic values of parks is

particularly difficult, as data often suffer from low reliability and small sample sizes. The objective of this research is as follows: 1. What is the annual consumer surplus for all urban parks in the City of Austin? 2. What factors are related to the consumer surplus of urban parks in the City of Austin? This study calculated the economic benefits of 209 parks in Austin, TX, before COVID-19, using the Travel Cost Method (TCM) to quantify public welfare. Consumer surplus, measured using TCM, reflects the extra value park visitors receive beyond what they are willing to pay to access the parks (Kabisch et al., 2021). The economic benefit estimation combines user travel costs and opportunity costs of time. The dataset includes 1,761,809 entries related to parks, capturing weekly visitation patterns and sampling percentages for each Census block group (BG), which represents an average of 5.67% of the population. Powered by mobility data from SafeGraph and Advan, valued for their precision and timely updates across diverse ground truth datasets, this analysis addresses ethical concerns through privacy measures like the Laplacian noise algorithm (SafeGraph: Places Accuracy, 2023). The research estimated the annual indirect economic benefits from recreational uses of Austin's urban parks at around $14,695,000. It also employs a longitudinal study using the fixed effect model to identify the correlation between consumer surplus. The findings support a data-driven approach to enable the quantification and specification of recreational value in city parks, offering landscape designers a solid justification for investing in park design, development, and maintenance (Ababneh, 2023). This method could also assist landscape designers and urban planners in land-use planning for public lands and in prioritizing budgets based on benefit value to enhance public welfare.

70 Transforming Landscape Narratives into Landscape Literacy through Design: Hunter's Point South Waterfront Park

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Keywords: Landscape biography; Holistic landscape; Case study

Ann Whiston Spirn has described landscape literacy as enabling people "to read the environmental, social, economic, and political stories" of the landscape (Spirn, 2019). Those stories, histories, and experiences can be evident in the design process and influence the human experience in that space (Heatherington, 2011). With the conference theme exploring processes and impacts, this presentation will focus on how landscape history can be incorporated into a design and how people can demonstrate landscape literacy. A case study methodology was used at Hunter's Point South Waterfront Park to understand the history of the landscape, its human and more-than-human communities, and how the site is functioning today. A landscape biography (Kolen et al., 2017) was incorporated to tell a story about the history of the land and the relationship between humans and more-than-humans on that site. It explored design interventions, critical narratives, and system relationships. That information along with semi-structured interviews were then examined to understand how the current design by SWA/Balsley highlights the past and prepares this site for the future. Lastly, intercept surveys and site observations were conducted to see how people understand and relate to the site. Prior to its restoration, Hunter's Point South Waterfront Park, located across the water from midtown Manhattan in Queens, New York, was an abandoned site that once served as a rail depot, coal yard, and ferry terminus. The site presently includes several of the original rail lines and other postindustrial remnants that help to reveal historical narratives. Contaminated brownfields were transformed into a shoreline filled with tidal marshes to increase the site resilience. This site design focuses on making sustainable design strategies visible on the site. Intercept surveys demonstrated that site users understood at least one narrative of the landscape system. The human dominance of this site and site history became evident when people's responses were related to human systems rather than more-than-human systems. This case study demonstrated how volunteers can connect with the land in ways others may not. It also emphasized the need for us to consider both human and more-than-human literacy within landscape design. As designers, these components are often visible, but further intention with human experience to create landscape literacy is needed within the design process to illuminate their significance. Lastly, a holistic approach to design allows us to consider both the human and more-than-human past, present, and future. Revised Abstract Ann Whiston Spirn has described landscape literacy as enabling people "to read the environmental, social, economic, and political stories" of the landscape (Spirn, 2019). Those stories, histories, and experiences can be evident in the design process and influence human experience in that space (Heatherington, 2011). With the conference theme exploring processes and impacts, this presentation will focus on how landscape history can be incorporated into a design and how people can demonstrate landscape literacy. A case study methodology was used at Hunter's Point South Waterfront Park to understand the history of the landscape, how the site is functioning, and its human and more-than-human elements such as wildlife, vegetation, water, and air. A landscape biography (Kolen et al., 2017) was incorporated to tell a story about the history of the land and relationship between humans and more-than-humans on that site. It explored design interventions, critical narratives, and system relationships. That information along with semi-structured interviews of

those involved in designing and stewarding the park were examined to understand how the current design by SWA/Balsley highlights the past and prepares this site for the future. Prior to its restoration, the park was an abandoned site that once served as a rail depot, coal yard, and ferry terminus. This site design focuses on making sustainable and historical design strategies visible on the site. Intercept surveys and site observations were conducted with general site users. These methods focused on how people connected to the landscape and if they could identify the sustainable and historical elements of the site design. Additional surveys were conducted with volunteers that participated in stewardship. Intercept surveys demonstrated that over 50% of site users (n=60) understood at least one narrative of the landscape. The human dominance of this site became evident when people's responses were related to human systems rather than more-than-human systems. Sixty-nine percent (69%) of stewards versus 20% of site users demonstrated sustainable components of the landscape. This demonstrated how stewards connect with the land and recognize more-than-human components in ways general site users may not. It also emphasized the need for us to consider human and more-than-human literacy within landscape design. As designers, these components are often visible, but further intention with human experience to create landscape literacy is needed within the design process to illuminate their significance. Lastly, a holistic approach to design allows us to consider both human and more-than-human past, present, and future.

71 The Adaptive Capacity of Place Attachments in Response to Place Change: Learning from Community-based Action Projects

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Keywords: Place attachment; Adaptation to change; Community action projects

Introduction: Place attachments are people's emotional bonds to places; they are complex and dynamic relationships that form at both the individual and community level (Manzo & Devine-Wright, 2021). Typically studied as rootedness to a place based on length of residency (Lewicka, 2011), place attachments have been assumed to be change averse. However, given the dynamism and complexity of our emotional bonds to place, this approach limits our capacity to see how place attachments can function to help individuals and communities adapt to change (Devine-Wright & Quinn, 2021). Methods: This presentation uses a comparative case study method to illustrate the role of place attachments in helping communities adapt to changes that threaten their communities (Francis, 2019). Specifically, this presentation highlights how two distinct marginalized communities in the Pacific Northwest of the U.S. have leaned upon their place attachments to mobilize and empower themselves in the face of environmental change. One case focuses on how residents of an historically Black neighborhood in Seattle have drawn upon their place attachments to resist displacement and retain their cultural heritage. The second case focuses on how an indigenous community on the rural coast of Washington has drawn upon their place attachments as a way to practice self-determination and initiate a relocation away from the tidal lowlands in response to sea level rise and tsunami risk. This research takes a qualitative approach/critically reflexive approach to explore aspects of place attachment that are less evident in more conventional quantitative studies (Manzo & Pinto de Carvalho, 2021). Such an approach considers how place attachments are influenced by their particular geopolitical contexts and how place attachments are experienced in non-normative ways. Data are drawn from community workshops and individual interviews with residents in each of the two case study communities. Results: Despite the significant differences in the communities under study and their context, there are notable similarities in the mobilizing power of place attachments to adapt to change. Both of these cases make clear that place attachments have significant capacity to mobilize and empower communities to reaffirm their identity, influence their trajectories and ensure cultural continuity. Discussion & Conclusions: Findings suggest that place attachments have a significant capacity to help communities adapt to place change whether it be due to demographic shifts and urban displacement or climate change. Implications for place attachment research and the role of landscape architecture will be discussed. Revised Abstract Place attachments are people's emotional bonds to places; they are complex, dynamic relationships that form at both the individual and community level (Manzo & Devine-Wright, 2021). Typically studied as rootedness to a place based on length of residency (Lewicka, 2011), place attachments are assumed to be change averse. However, given the dynamism and complexity of our emotional bonds to place, this view limits our capacity to see how place attachments can function to help individuals and communities adapt to change (Devine-Wright & Quinn, 2021; Manzo et al., 2023). This presentation draws together lessons from two qualitative research studies that ask how marginalized communities facing displacement can draw on place attachments to mobilize and adapt to changes that threaten their communities. This research takes a critically reflexive approach to explore aspects of place attachment that are less evident in more conventional quantitative studies (Manzo & Pinto de

Carvalho, 2021) and considers how place attachments are influenced by their geopolitical contexts and are experienced in non-normative ways. Using a comparative case study method (Goodrick, 2020), this presentation reports how two distinct BIPOC communities in the Pacific Northwest of the U.S. have used place attachments to mobilize and empower themselves in the face of environmental change. One case uses interviews (n=60) of residents of an historically Black neighborhood in Seattle to understand how they have drawn upon place attachments to resist displacement and protect cultural heritage. The second case uses interviews via community workshops (n=25) to understand how an indigenous community on the Washington coast draws upon place attachments to practice self-determination and respond to environmental risk. Despite differences in these communities, there is a significant similarity in the way community members mobilize their place attachments to adapt to change and maintain self-determination in the context of uncertainty. Both cases make clear that place attachments have significant capacity to empower communities by reaffirming their heritage, identity, and values, and ensuring cultural continuity. Thus, place attachments influence the trajectory of communities and the future of their everyday landscapes. Findings suggest that place attachments have the capacity to help communities adapt to place change whether from demographic shifts and urban displacement or climate change. This presentation will discuss implications for place attachment research – e.g. the need to reconceptualize attachments in a context of change – and for landscape architecture's role in helping communities respond to disruption by engaging place attachments to adapt to various forms of change.

137 Park features, neighbourhood environment, and time factors affect park visitor volume: A meta-analysis

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Keywords: systematic review; park visitors; urban greenspace; park visitation; observational

Urban parks are crucial for healthy, sustainable urban planning, yet their usage patterns are complex and often misunderstood. This meta-analysis of 30 journal articles aims to identify and quantify factors associated with park user volume, focusing on park attributes, neighbourhood environments, and temporal aspects. Key findings through random-effects models reveal that park size, facilities, organized activities, trail availability, maintenance, and overall quality correlate positively with visitor volume. Neighbourhood characteristics such as population density and nearby points of interest positively impact park use, while usage decreases in disadvantaged areas. Temporal factors, particularly time of day and season, significantly influence visitation patterns. On the other hand, factors such as water features, greenness, crime safety, transit accessibility, and road density, showed mixed or insignificant results. Regional variations were noted, with population density and transit accessibility having more pronounced effects in U.S.-based studies compared to Asian contexts. These findings underscore the interplay between park features, neighbourhood context, and temporal factors in shaping usage patterns. By elucidating these relationships, this study provides valuable insights for urban planners and landscape architects to design parks that meet diverse user needs, optimize visitor volume, and enhance the positive impacts of urban parks on communities. Revised Abstract Urban parks are crucial for healthy, sustainable urban planning, yet their usage patterns are complex and often misunderstood. This meta-analysis of 30 journal articles aims to identify and quantify factors associated with park user volume, focusing on park attributes, neighbourhood environments, and temporal aspects. Following the PRISMA framework, we systematically searched Scopus and Web of Science databases, analyzing studies that used direct observation, social media data, and mobile services. The selected 30 studies use diverse data collection methods, including direct observation (51%), social media data (30%), and mobile services (18%). Key findings through random-effects models reveal that park size, facilities, organized activities, trail availability, maintenance, and overall quality correlate positively with visitor volume. Neighbourhood characteristics such as population density and nearby points of interest positively impact park use, while usage decreases in disadvantaged areas. Temporal factors, particularly time of day and season, significantly influence visitation patterns. On the other hand, factors such as water features, greenness, crime safety, transit accessibility, and road density, showed mixed or insignificant results. Regional variations were noted, with population density and transit accessibility having more pronounced effects in U.S.-based studies compared to Asian contexts. These findings underscore the interplay between park features, neighbourhood context, and temporal factors in shaping usage patterns. By elucidating these relationships, this study provides valuable insights for urban planners and landscape architects to design parks that meet diverse user needs, optimize visitor volume, and enhance the positive impacts of urban parks on communities.

167 Systematic Observation of Trail Use with Passive Infrared Cameras: Case Study of Falling Run, Morgantown, West Virginia

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Keywords: trail counts; physical activity; trail design; greenspace planning; wildlife

This case study demonstrates the utility of passive infrared cameras for long-term trail use monitoring, with implications for trail planning and management. While direct observation and video are the most accurate methods for quantifying trail use, manual counts are time consuming, and accuracy varies by researcher (Active Living Research, 2013). Infrared sensors can differentiate cyclists from pedestrians, but undercount users by 5% to 15%, particularly those in groups (Active Living Research, 2013). Passive infrared cameras also undercount users by 5% to 50% (Active Living Research, 2013) but photos provide additional details about trail use activity -- e.g., running/walking; in groups/solo; visit duration (Abildso et al., 2021). Infrared cameras can monitor trail use and wildlife simultaneously (Miller, Leung & Kays, 2017; Duke & Quinn, 2008). For a two-year period during the establishment of Falling Run (2016 to 2018), infrared cameras were used for trail use and wildlife counts at all neighborhood park entrances. A two-month follow up count in 2020 at the main entrance provided a trail use estimate during the COVID-19 pandemic. Further comparisons were made through short interval (<3 week) infrared camera counts at two additional University-owned public trail systems located in similar steep, forested terrain in Morgantown, West Virginia: Core Arboretum (2019) and West Run Woods (2022). At Falling Run, trail use was heaviest in April, with a second peak in September. May, June and July were the most representative of average year-round use. The average visit duration was short, under 25 minutes. Trail use increased by 59% from 2018 to 2020, reflecting the COVID-19 pandemic. At the newly established trail systems (Falling Run and West Run Woods, which opened in 2018 and 2022, respectively) about two-thirds of trail users were male. However, at Core Arboretum (established in 1948) the gender of trail users was balanced. Children made up only 3% of trail users at Core Arboretum and Falling Run, but 18% of mountain bikers at West Run Woods. This suggests that mountain bike optimized trails are of more benefit for promoting physical activity among children than hiking-only trails. The observation that runners often doubled back at entrances led to design changes at Falling Run, adding more figure eight loops to the trail system, which was designed to maximize neighborhood connectivity. Trail use counts, coded from infrared camera photos, can provide insights into visitor volumes, activity and even trail preferences, providing feedback during implementation of trail systems. Revised Abstract This case study demonstrates the utility of passive infrared cameras for long-term trail use monitoring, with implications for trail planning and management. While direct observation and video are the most accurate methods for quantifying trail use, manual counts are time consuming, and accuracy varies by researcher (Active Living Research, 2013). Infrared sensors can differentiate cyclists from pedestrians but undercount users by 5% to 15%, particularly those in groups (Active Living Research, 2013). Passive infrared cameras also undercount users by 5% to 50% (Active Living Research, 2013). Infrared cameras can monitor trail use and wildlife simultaneously (Miller, Leung & Kays, 2017; Duke & Quinn, 2008). A previous validation study at Falling Run compared infrared cameras to counters: “Concordance was strong between instruments… Inter-counter reliability was 91.1%” (Abildso et al., 2021). For a two-year period during Falling Run’s establishment (2016 to 2018), infrared cameras measured trail use at all park entrances. A two-month follow

up at the main entrance allowed for comparison during the COVID-19 pandemic. Short (<3 week) counts at two University-owned trail systems in Morgantown, Core Arboretum (2019) and West Run Woods (2022), provided further comparisons. In all, 77,735 photos captured trail use activity of 14,981 people; animal activity was also coded. Photos provided details about trail use -- e.g., running/walking; in groups/solo; visit duration. At Falling Run, trail use was heaviest in April, with a second peak in September. May, June and July were the most representative of average year-round use. The average visit duration was short, under 25 minutes. Trail use increased by 59% from 2018 to 2020. The observation that runners often doubled back at entrances led to design changes creating more trail loops. At the new trail systems (Falling Run and West Run Woods, opened in 2018 and 2022, respectively) about two-thirds of trail users were male. However, at Core Arboretum (established 1948) gender was balanced. Children made up only 3% of trail users at Core Arboretum and Falling Run, but 18% of mountain bikers at West Run Woods. This suggests that bike trails promote physical activity among children more effectively than hiking-only trails. Trail use counts using infrared camera photos can provide insights into visitor activity and preferences -- providing early feedback during trail implementation. Counts across three trail systems, combined with other public data, allowed for estimates of overall trail use early in the implementation of a planned community-wide trail system.

179 Changing sense of place in privately owned public spaces during the pandemic: Evidence from a regression discontinuity in time design

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Keywords: Privately owned public space; Coronavirus pandemic; Regression discontinuity in time; Natural language processing; Sentiment analysis

In response to COVID-19 outbreak that began in late 2019, countries worldwide implemented lockdown measures and social distancing policies to reduce the spread of pandemic threats. New York City, one of the hardest-hit areas of the pandemic, also responded by introducing or amending policies and regulations to ensure adequate and sufficient public spaces for urban dwellers' social interactions and recreational opportunities (Honey-Rosés et al., 2020). For example, as part of its Phase 2 reopening plan, New York City allowed for the reopening of parks and playgrounds, which had been closed for several months by the shutdown orders, as of June 22, 2020. Additionally, as of June 27, 2020, the city mandated the opening of all outdoor privately owned public spaces (POPS) to the public, facilitating temporary uses for outdoor dining, entertainment, retail, and queuing spaces in a socially distant manner. Amidst the social and health crises induced by the pandemic, the importance and influences of public spaces on human health and well-being have been of interest in recent pandemic studies. In particular, in addition to using online questionnaire surveys or interviews to research the mental health and wellness outcomes of the pandemic, a growing body of research has utilized social media and online platform data to broaden the understanding of how individuals react to and interact with urban public spaces during the pandemic, at a high level of details in both spatial and temporal dimensions. However, while POPS have also been crucial urban features open for public use and enjoyment, especially under the unprecedented stress of the pandemic, most current research has primarily focused on urban parks and green spaces (Lopez et al., 2021). Using a regression discontinuity in time design combined with natural language processing techniques, this study thus explores how people's emotional experiences within POPS expressed in tweets changed following the onset of the COVID-19 pandemic in Manhattan, New York City. The primary datasets used in the study include 1) maps and records of POPS in Manhattan obtained from the New York City Department of City Planning, and 2) geolocated Twitter data collected via the Twitter API v2. The study period encompasses both pre- and post-pandemic period. Leveraging location-aware online data analytics, the study suggests significant implications for urban planners and policymakers to adopt more contextually attuned, human-centered strategies in developing healthy urban environments that better cater to the needs and behaviors of urban residents. Revised Abstract As COVID-19 directly and indirectly affected a wide range of urban living and activity spaces, people's sense of place and human-place interactions in urban public spaces have attracted considerable interests across various disciplines. In particular, a growing body of research has utilized online platform data to broaden the understanding of how individuals react to and interact with urban public spaces during the pandemic, at detailed spatiotemporal dimensions. However, while POPS have also been crucial urban features open for public use and enjoyment, especially under the unprecedented stress of the pandemic, most current research has primarily focused on urban parks and green spaces (Cheng et al., 2021; Marchi et al., 2022; Wang et al., 2022). Using a donut regression discontinuity in time design combined with natural language processing techniques, this study aims to examine and compare variations in people's subjective sentiment polarities in tweets within POPS and

outside of POPS before and after the pandemic outbreak in Manhattan, New York City. The primary datasets used in the study include 1) maps and records of POPS in Manhattan obtained from the New York City Department of City Planning, and 2) geolocated Twitter data collected via the Twitter API v2. Specifically, the dataset contains 403,236 geolocated tweets, among which 43,718 (10.84%) of total tweets are generated in POPS in Manhattan, New York City. The study period embraces both pre- (from January 2019 to December 2019) and post-pandemic period (from July 2020 to June 2021), excluding the city's lockdown peak period when most POPS of the city had been closed to the public since the U.S.'s first reported case of COVID-19. Findings reveal that while people using Twitter tended to express heightened negative sentiments overall after the pandemic outbreak, their sentiment levels within POPS exhibited a comparatively muted decline compared to those in other locations outside of the spaces. Recognizing POPS as potential sentimental respites during such crises, this research underscores the need for continued practical and academic endeavors to explore the role of POPS in urban settings, regarding their design, accessibility, and functionality in promoting positive emotional experiences among users, not only during emergencies like the pandemic but also in everyday contexts. Leveraging location-aware online data analytics, the study further suggests significant implications for urban planners and policymakers to adopt more contextually attuned, human-centered strategies in developing healthy urban environments that better cater to the needs and behaviors of urban residents.

186 What makes neighborhoods livable? Neighborhood environments, intergenerational interactions, and perceived livability among older adults in Austin, Texas

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Keywords: Livable communities; Intergenerational Interactions; Aging in place

Introduction: Population aging is a global issue leading to many societal challenges (Sander et al., 2015). Aging in place has gained increasing prominence as a means of responding to challenges associated with population aging (Owusu et al., 2023). Building an age-friendly community that is safe and livable for people of all ages is the key to supporting healthy aging in place (Choi, 2022). Intergenerational interaction is increasingly acknowledged as a crucial element in creating livable neighborhoods, offering mutual benefits that enhance the social fabric and foster community engagement among different age groups (Knight et al., 2014; Krzeczkowska et al., 2021; Zhong et al., 2020). Livability literature targeting the general population, not specifically addressing older adults, has indicated that neighborhood environments, such as safety, mixed land uses, walkability, and green infrastructure, are important for promoting livability (Baobeid et al., 2021; Parker & Simpson, 2018). However, empirical studies investigating predictors of livability among older adults are limited. This study aims to examine personal and environmental predictors of perceived neighborhood livability and explore how intergenerational interactions may mediate the associations between neighborhood environments and perceived livability among older adults. Methods: This cross-sectional study in Austin, Texas included survey data (2018-2019) and GIS-based objective measures. Binary logistic regressions were conducted to investigate environmental predictors of older adults' perceived livability. Structural equation models were built to explore the mediating role of intergenerational interactions. Results: Social, economic, and physical environments predicted older adults' perceived livability, and intergenerational interactions mediated the association between physical environments and livability. Significant social and economic environmental domains encompass social cohesion and support, crime safety, affordable housing, property value, and density of children. Physical environmental domains important for perceived livability contain land use mix, walkability, transportation, aesthetics, green infrastructure, traffic safety, and neighborhood surveillance. Discussion/Conclusion: Environmental features identified to be important for supporting livability can become the much-needed empirical evidence to guide the development of livable communities with supportive policies/programs/services and environmental attributes. Unlike many individual-level factors (e.g. health conditions, education) that are difficult to change, policy and environmental strategies that can be readily implemented will bring broader and long-term impacts at the population level. More efforts are needed to explore the complex causal relationships among neighborhood environments, social activities, and livability, which can guide future policy, program, and environmental interventions for promoting older adults' livability and healthy aging in place. Revised Abstract Introduction: Population aging is a global issue leading to many societal challenges (Sander et al., 2015). Age-friendly communities that are safe and livable can support healthy aging in place (Choi, 2022). Intergenerational interactions contribute to enhanced social fabric and community engagement among different

age groups (Knight et al., 2014; Krzeczkowska et al., 2021; Zhong et al., 2020). Livability literature targeting the general population indicates that neighborhood environments, such as safety, walkability, and green infrastructure, are important for promoting livability (Baobeid et al., 2021; Parker & Simpson, 2018). However, evidence investigating predictors of livability among older adults is limited. This study examines personal and environmental predictors of livability and explores how intergenerational interactions may mediate the associations between neighborhood environments and livability among older adults. Methods: This cross-sectional study in Austin, Texas included survey data (2018-2019) and GIS-based objective measures. We developed an intergenerational community survey (Zhong & Lee, 2022) to capture livability, intergenerational interactions, neighborhood environments, and personal characteristics. We generated one binary outcome variable (strongly satisfied vs. somewhat satisfied/somewhat dissatisfied/strongly dissatisfied) to evaluate participants' satisfaction with their neighborhoods as good places to live (Cerin et al., 2006). The raw ArcGIS data measuring social, economic, and physical environments were gathered as part of an NIH-funded research project (R01CA197761). Binary logistic regressions were conducted to investigate personal and environmental predictors of livability. Significant factors identified from regression models were added to structure equation models to further explore the mediating role of intergenerational interactions. Results: Social, economic, and physical environments predicted older adults' livability, and intergenerational interactions mediated the association between physical environments and livability. Significant social and economic environmental domains encompass social cohesion and support, crime safety, affordable housing, property value, and density of children. Physical environmental domains important for livability contain land use mix, walkability, transportation, aesthetics, green infrastructure, traffic safety, and neighborhood surveillance. Discussion/Conclusion: Environmental features identified to be important for supporting livability can become the much-needed empirical evidence to guide the development of livable communities with supportive policies/programs/services and environmental attributes. Unlike many individual-level factors (e.g. health conditions, education) that are difficult to change, readily implementable environmental strategies will bring broader and long-term impacts at the population level. More efforts are needed to explore the complex causal relationships among neighborhood environments, social activities, and livability, which can guide future policy, program, and environmental interventions for promoting livability and healthy aging in place.

237 Investigating the Influence of Previous Living Environments on Soundscape Preferences in Outdoor Learning Spaces

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Keywords: Soundscape; Outdoor learning environments; Perception

This study explores the relationship between students' previous living environments and their current soundscape preferences when studying in outdoor spaces. Existing research highlights the role of soundscapes in shaping experiences and well-being, particularly in educational environments (Indrani et al., 2023; Scannell et al., 2016; Visentin et al., 2023). Natural sounds, such as birdsong and rustling leaves, are often associated with increased focus and reduced stress, promoting restorative environments conducive to learning (Visentin et al., 2023). However, preferences for specific soundscapes can vary significantly based on personal exposure and adaptation over time (Farina, 2014; Kang & Schulte-Fortkamp, 2018). Socio-cultural background, auditory health, and previous environmental exposure are key factors influencing soundscape preferences (Farina, 2014; Kang et al., 2016). For instance, students from rural areas often gravitate toward natural soundscapes, while those raised in urban environments may find comfort in mechanical sounds like traffic noise, which they associate with familiarity and nostalgia. Moreover, research indicates that soundscapes not only impact emotional and psychological states but also affect cognitive processes such as attention, memory, and learning outcomes (Clark et al., 2006; Clark & Paunovic, 2018). This study employs an interactive online module, which allows participants to customize their ideal outdoor study soundscapes by selecting and adjusting the levels of natural, human, and mechanical sounds. These preferences are analyzed alongside demographic and environmental background data to uncover correlations between previous living environments and current soundscape preferences for identified learning tasks. The findings will shed light on how individuals use outdoor spaces for learning and how their past auditory experiences shape these preferences. This research builds on existing literature by examining how different soundscapes influence productivity, well-being, and overall learning experiences in outdoor educational contexts. By understanding these relationships, educational institutions can better design outdoor study environments that cater to diverse auditory needs, fostering inclusivity and enhancing the well-being of students from varied backgrounds. Revised Abstract This study explores the relationship between students' previous living environments and their current soundscape preferences when studying in outdoor spaces. Existing research highlights the role of soundscapes in shaping experiences and well-being, particularly in educational environments (Indrani et al., 2023; Scannell et al., 2016; Visentin et al., 2023). Natural sounds, such as birdsong and rustling leaves, are often associated with increased focus and reduced stress, promoting restorative environments conducive to learning (Visentin et al., 2023). However, preferences for specific soundscapes can vary significantly based on personal exposure and adaptation over time (Farina, 2014; Kang & Schulte-Fortkamp, 2018). Socio-cultural background, auditory health, and previous environmental exposure are key factors influencing soundscape preferences (Farina, 2014; Kang et al., 2016). For instance, students from rural areas often gravitate toward natural soundscapes, while those raised in urban environments may find comfort in mechanical sounds like traffic noise, which they associate with familiarity and nostalgia. Moreover, research indicates that soundscapes not only impact emotional and psychological states but also affect cognitive processes such as attention, memory, and learning outcomes (Clark et al., 2006; Clark

& Paunovic, 2018). This study employs an interactive sound mixing module that allows participants to customize their ideal outdoor study soundscapes by selecting and adjusting the levels of natural, human, and mechanical sounds. Preferences are evaluated in relation to specific learning tasks, including reading, creative writing, problem-solving, memorization, and group collaboration. The module also incorporates survey questions to gather data on participants' socio-cultural backgrounds and previous soundscape exposure. The study uses statistical and spatial analysis to explore relationships among demographic factors, prior exposure, and soundscape preferences. The findings will provide insights into how individuals use outdoor spaces for learning and how their past auditory experiences shape these preferences. This research builds on existing literature by examining how soundscapes influence productivity, well-being, and overall learning experiences in outdoor educational contexts. Additionally, it highlights the potential long-term effects of environmental exposure on the development of soundscape preferences, emphasizing the role of urban planning and design in shaping auditory preference over time. By revealing these gradual influences, the study aims to contribute to debates on how to better design urban spaces and outdoor study environments that not only cater to diverse auditory needs but also promote inclusivity and well-being for individuals from varied backgrounds.

240 Integrating Nature Playscapes in School Playground Regeneration: A Case Study of Tarpum Bay Primary School

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Keywords: nature playscape; children; participatory design; school playground

Children worldwide consistently seek unstructured play in natural settings where they can dream, explore, and invent their own activities (Derr & Rigolon, 2016). Nature playscapes are designed to facilitate this child-nature engagement within protected yet unstructured outdoor environments (Kochanowski & Carr, 2014). Given concerns about nature deficit disorder (Louv, 2008) and the rise of urban childhood (Bustamante et al., 2019), nature play is increasingly recognized as necessary for children's development. Tarpum Bay Primary School is located in a small settlement in Eleuthera, the Bahamas, and has served the local community for many years. It provides the only primary education to children in the settlement and serves as a community hub for various local activities. Currently, the school's playground is in notably poor condition due to tropical storms and economic issues affecting the quality of students' outdoor play. This research aims to investigate children's play behaviors and preferences of their outdoor play environment to inform the regeneration of the school playground. By considering the nature playscape concept, the study seeks to create an environment that reflects the children's desires and supports their developmental needs. Behavioral mapping observations and participatory design workshops involving 74 children (grades 3 to 6) were conducted in May 2024. The data were analyzed using a qualitative thematic analysis to identify children's key play preferences, behaviors, and ideas regarding playground regeneration. Coordination with Tarpum Bay Primary School ensured student participation and confidentiality. Observations revealed that functional and rule-based play activities were predominant, while constructive play was less common. Children preferred shaded areas and engaged mainly in small-group cooperative play, favoring fixed, manufactured structures over natural features. Participatory design workshops highlighted the children's desire for playground improvements, including renovated sports courts, covered social spaces, and physical activity features. They also noted a lack of cognitive play opportunities and suggested adding constructive play elements, sensory activities, and arts and music features. Children's drawings reflected their cultural backgrounds and vision for an ideal playground. This study indicates that nature playscapes can improve standard playground designs by encouraging diversified play, cognitive growth, and social interaction. The research highlights the need for child participation in redesigning outdoor spaces to create meaningful and engaging settings. The findings show how child-driven designs can enhance physical, cognitive, and social development and emphasize the need to incorporate natural features and cultural context into playground design to create inclusive, engaging play settings. Revised Abstract Children worldwide consistently seek unstructured play in natural settings where they can dream, explore, and invent their own activities (Derr & Rigolon, 2016). However, concerns have been expressed about behavioral and social-emotional issues connected with a lack of exposure to natural habitats, commonly referred to as 'nature deficit disorder' (Tillmann et al., 2019). Therefore, nature playscapes are designed to facilitate this child-nature engagement within protected yet unstructured outdoor environments (Kochanowski & Carr, 2014). Tarpum Bay Primary School is located in a small settlement in Eleuthera, the Bahamas, and has served the local community for many years. It

provides the only primary education to children in the settlement and serves as a community hub for various local activities. The school's playground, currently in poor condition due to tropical storms and economic challenges, is set to be renovated using insights from this study. By considering the nature playscape concept, this research aims to investigate children's play behaviors and preferences of their outdoor play environment to inform the regeneration of the school playground that promotes children's well-being across physical and mental domains. Behavioral mapping observations and participatory design workshops including mapping exercise, photo preferences, and dream playgrounds exercise involving 74 children (grades 3 to 6) were conducted in May 2024. The data were analyzed using a qualitative thematic analysis to identify children's key play preferences, behaviors, and ideas regarding playground regeneration. Coordination with Tarpum Bay Primary School ensured student participation and confidentiality. Observations revealed that functional and rule-based play activities were predominant, while constructive play was less common. Children preferred shaded areas and engaged mainly in small-group cooperative play, favoring fixed, manufactured structures over natural features. Participatory design workshops highlighted the children's desire for playground improvements, including renovated sports courts, covered social spaces, and physical activity features. They also noted a lack of cognitive play opportunities and suggested adding constructive play elements, sensory activities, and arts and music features. Children's drawings reflected their cultural backgrounds and vision for an ideal playground. This study indicates that nature playscapes can improve standard playground designs by encouraging diversified play, cognitive growth, and social interaction. The research highlights the need for child participation in redesigning outdoor spaces to create meaningful and engaging settings. The findings show how child-driven designs can enhance physical, cognitive, and social development and emphasize the need to incorporate natural features and cultural context into playground design to create inclusive, engaging play settings.

242 The Impact of Biodiversity in User Experience: Learning from Urban Parks in Texas

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Keywords: Biodiversity; User Experience; Urban Parks; Public; Urban Landscape

Biodiversity loss due to human activities is a worldwide phenomenon, and the rate of species extinction is detrimental to ecosystems (WWF, 2022). Humanity's survival is dependent upon functioning ecosystems (CBD, 2011). The American Society of Landscape Architects (ASLA), recognizing the severity of biodiversity loss, surveyed its members on biodiversity conservation, responses through design, and educational opportunities (ASLA, 2024). Designing for biodiversity increases the quality and quantity of ecosystems services beneficial to humans. Therefore, it is important for landscape architects to understand how designing for biodiversity impacts user experience in their respective region (Park et al., 2024; Fernandez et al., 2022; Palliwoda et al., 2017). This research assesses the impact of biodiversity on the user experience in urban parks. It explored who uses biodiverse urban parks, how biodiversity impacts user experience in urban parks, and which elements of biodiverse design are impactful for park users. The study focuses on three urban parks in Texas having at least one programmed element of biodiverse design. This research is mixed method inquiry benefitting from both qualitative and quantitative methods (Deming and Swaffield, 2011). Three data sets were analyzed and synthesized using descriptive statistics, content analysis and summary narratives to assess user experience and the critical design elements of biodiversity. In addition to systematic literature review where biodiversity design parameters are reviewed and assessed, original data was collected through case studies (Francis, 2001) of biodiverse park design, on-site surveys, and passive observation techniques in two periods to assess seasonal variations in user experiences (Beebe, 2005; Palliwoda et al., 2017). Three well-established urban parks in Texas primarily serving public were chosen as case studies by surveying park users in urban areas with at least one area of biodiverse planting design within the park boundary. In conclusion, the findings start illustrating that design with biodiversity design parameters and goals are still in its infancy stages in urban parks and their functions and benefits, beyond aesthetic appeal, is not as clear to those who are using the urban parks. Although research discovers that biodiversity in Texas urban parks does effect user experience by providing stronger visual appeal, their relevance to sustainable and resilient urban ecosystems has yet to be better revealed through design and implementation. Understanding how park visitors experience biodiversity in public spaces can help landscape architecture practitioners decide how to design for biodiversity in the built environment while supporting performative landscapes and ecosystems in urban regions. Revised Abstract Biodiversity loss is a pressing global issue, with far-reaching ecological, social, and cultural consequences (CBDTA, 2011). The American Society of Landscape Architects (ASLA) recognizes the biodiversity crisis as equal in urgency to the climate crisis and emphasizes the importance of incorporating biodiversity conservation into design practices (Green, 2024). However, regional experiences of the relationship between biodiversity in downtown parks and its users remain unexplored. The purpose of this research is to gain an understanding of the level of biodiversity present in downtown public parks within the Dallas Central Business District (CBD) and to assess park users' perceptions and interactions with the biodiversity encountered in the selected parks. Specifically, the study focuses on downtown parks that were developed

through The Renaissance Plan for Dallas Parks & Recreation (Carter & Burgess Inc., 2002). The research explores the following questions: 1) Are the six downtown Dallas public parks developed through the Renaissance Plan biodiverse? 2) How do users of the three shortlisted parks perceive the park's plant and animal biodiversity? 3) How do users of the three shortlisted parks interact with the park's plant and animal biodiversity? This research utilizes mixed method inquiry (Deming & Swaffield, 2011). First, each of the six downtown parks were assessed for biodiversity using a meander survey looking at plant species richness (Shaw & Flauta, 2023), animal species richness using the Wildlife Listing Method (Sutherland, 2006), and an Urban Pollinator Score using the Urban Pollinator and Ecological Health Assessment (Shaw & Flauta, 2023). Three of the six public downtown Dallas parks, displaying the most observable indicators of biodiversity, were selected to study park users' experiences of plant and animal biodiversity encountered through on-site surveys and observations (Beebe, 2005; Palliwoda et al., 2017). These methods were carried out in early spring. The three data sets were analyzed and synthesized to assess elements of biodiversity in the parks and subsequently user experience of the biodiversity encountered. In conclusion, findings highlight the critical role of native plant palettes in influencing positive user experiences that align ecological goals with human well-being in downtown Dallas. It also provides insight into biodiverse urban landscapes balancing the presence of biodiversity with user satisfaction and can offer guidance for future projects in metropolitan contexts. Additionally, this research provides a method for landscape architects looking to assess biodiversity through the lens of design and its perceived impact on public park users in their respective regions.

248 Extending Cues to Care: The influence of neighborhood context and visible stewardship signs on maintenance behaviors in urban neighborhoods.

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Keywords: Cues to Care; Maintenance; Residential landscape

We are investigating how cues to care (CTC) and the mechanisms underlying effectiveness might be influenced by varied neighborhood characteristics and by visible stewardship on adjacent properties. This investigation is particularly relevant in American legacy cities, where vacant property presents significant challenges to neighborhood stability and property maintenance. The absence of visible maintenance can discourage residents from investing in their properties, leading to declines in property values, perceptions of reduced safety, and diminished confidence in staying within the community - creating a trend of abandonment and vacancy (Wood & Giles-Corti, 2008). In one legacy city, Krusky et al. (2015) found that residential parcels near well-maintained produce gardens exhibited higher levels of care than parcels near vacant lots. Residents may also feel safer and connected in neighborhoods with positive physical cues such as mown turf, fences, trimmed trees and hedges. (Nassauer & Raskin, 2014). Therefore, enhancing CTC in neighborhoods with high vacancy rates could be a practical tactic to encourage maintenance behaviors on residents' home landscapes and foster community stewardship. We reviewed literature in these three areas to explore how the diffusion of CTC may influence residents' maintenance behaviors within and beyond their home landscapes. Introduced by Joan Nassauer, CTC are "landscape elements that are immediately recognizable as designed, and that signal continuing human presence to care for a landscape" (Li & Nassauer, 2020). In the current study, maintenance behaviors refer to actions such as mowing, weeding, and clearing debris that residents take to improve or sustain the condition of home landscapes. Stewardship refers to care for spaces other than where residents live but within the block of their home. Specifically, we are investigating: 1) whether CTC affect the appearance of adjacent lots and the broader neighborhood, and 2) whether CTC can encourage maintenance behaviors that extend beyond individual properties, fostering a shared sense of responsibility and care within the community. In this presentation, we draw on existing literature: 1) to elucidate definitions of CTC, maintenance behaviors, and stewardship; 2) to examine relationships among these areas, especially in urban neighborhoods; and 3) to propose a conceptual framework linking CTC with individual landscape management practices and community stewardship. This extends the foundation for further exploration of care and stewardship in home landscapes. Further, it contributes to the ongoing discussion on urban revitalization, emphasizing the role of CTC in enhancing community stewardship in urban neighborhoods. Revised Abstract Landscape care theory is particularly relevant to American legacy cities, where vacant property presents significant challenges to neighborhood stability and property maintenance. Addressing neighborhoods characterized by property vacancy, we employ landscape care theory to analyze literature addressing population characteristics related to community stewardship, which we define as visible maintenance behaviors that extend beyond where residents live but within the street block of their homes. Nassauer (1988; 1995; 1997) introduced landscape care theory to explain mechanisms that affect the relationship between noticeable landscape care and perceptions that motivate community behavior to accept and sustain designs that have socio-

environmental benefits; she introduced cues to care (CTC) as landscape elements that are immediately recognized as intentional and that signal continuing human presence. Much subsequent research has underscored the importance of maintenance to landscape provision of socio-environmental benefits. For example, noticeably inadequate maintenance can discourage nearby residents from investing in their properties, leading to declines in property values, perceptions of reduced safety, and diminished confidence in staying within the community (Wood & Giles-Corti, 2008). At the same time, CTC may have a halo effect, promoting maintenance of nearby properties (Nassauer & Raskin, 2014). Therefore, enhancing CTC in neighborhoods with high vacancy rates could be a practical tactic to encourage residents' maintenance behaviors of home landscapes and foster community stewardship. In the current study, we compare the CTC literature with a review of literature addressing maintenance behaviors and community stewardship. A review by Li and Nassauer (2020) identified 47 CTC employed in the international literature, but did not explicitly track maintenance characteristics of those CTC. In the current study, we review literature addressing visible maintenance behaviors for home landscapes (e.g. mowing, weeding, and clearing debris) and their role in fostering community stewardship. By synthesizing the concepts and empirical studies of care, maintenance, and community stewardship in landscape research, this review suggests that CTC could affect the appearance of adjacent lots and the broader neighborhood through a proximity effect and could reinforce and extend neighborhood norms. Furthermore, it suggests that individuals' maintenance efforts and visible signs of care in their surroundings may foster (and be reciprocally fostered by) psychological ownership and social capital, encouraging broader community engagement and stewardship. This study extends landscape care theory with practical implications for stewardship of neighborhoods undermined by inadequate maintenance.

250 Rediscovering Everyday Nature through the Aesthetic Experience of Urban Birdwatching

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Keywords: Everyday Nature; Urban Birdwatching; Aesthetic-ecological Literacy; Human-bird Relationship; Landscape Design

In recent years, urban birdwatching has gained momentum in South Korea, with enthusiasts shifting their focus from distant 'natural' habitats like wetlands and islands to urban spaces such as city parks and even high-rise housing complexes. This practice challenges the dichotomy between cities as artificial spaces and nature as remote sanctuary by revealing the abundant presence of nature within urban environments. Through participatory observations and in-depth interviews, this study explores how birdwatchers appreciate birds and urban spaces they inhabit, rediscovering “everyday nature” in cities. As in general birdwatching, urban birdwatchers typically spot birds through the extended vision provided by binoculars. The observers attentively watch the birds’ behavior, adjusting the observers' actions accordingly (Sung, 2022). This dynamic equally applies in urban settings, with birdwatchers using binoculars as a material medium to bring birds into focus, recognizing them as agents in the city who evoke intense aesthetic pleasure and intimacy. Through this process, birdwatchers develop aesthetic literacy about bird species and urban environments. This aesthetic literacy is deeply intertwined with ecological literacy (Saito, 2010). Urban birdwatching is important because it fosters aesthetic-ecological literacy in cities, which have been considered distant from nature and devoid of vibrant life For urban residents who engage in birdwatching, their perception of birds extends beyond specific times and designated spaces, permeating daily routines such as commuting or leisurely stroll. The aesthetic-ecological literacy developed through birdwatching defamiliarizes everyday environments. For instance, hearing the call of a cuckoo not expected to reside in a metropolis like Seoul, or discovering that the small birds casually assumed to be sparrows are long-tailed tits, materializes the city as a place filled with a diverse range of species and their aesthetic qualities. This study interprets these everyday encounters as what Scott Hess termed “everyday nature,” which 'redefines “nature” to encompass the everyday, thereby reshaping our perceptions of self, work, and society' (Hess, 2010). Finally, this study highlights that landscape architecture plays a crucial role in creating primary meeting points for everyday nature, as birds are typically found in parks, waterfronts, and urban forests. Whatever vision landscape architects had for nature, and whatever spaces they intended to create, designed landscapes have emerged as fields of human-bird interactions. In a time when both humans and nonhumans face urban crises due to climate change, integrating the aesthetic dimensions of everyday nature into landscape design enriches the urban experience and promotes socio-ecological resilience, challenging the city-nature dichotomy.

253 Unpacking Women's Recreational Spaces: Feminist Perspectives on Recreational Inequality in the Urban Peripheries of Kolkata – Insights from the Pilot Study

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Keywords: Subaltern Women; Recreational Space; Feminist perspective; Urban Peripheries; Indian Cities

This pilot study explores how the invisibility of spatial production and the practices of ordinary women from marginalized backgrounds, such as Bengali-Muslim and migrant Bangladeshi women in the urban peripheries of Kolkata, contribute to recreational inequality. Referred to as 'subalterns', their spatial realities are often rendered invisible and 'othered' under the dominant 'Babu culture' of Hindu, upper-middle-class, educated Bengali society (Roy, 2003). This study addresses issues within recreational policies in Indian cities like Kolkata, which lack a gender-mainstreaming framework for recreational environments. Current policies create homogenized spaces, such as parks and commercial areas, alongside beautification initiatives since 2011 that prioritize aesthetics and safety features like CCTV cameras to enhance women's enjoyment (Ray, 2020). However, these initiatives adopt a ubiquitous, male-centered view of recreation as 'fun' or public activities during 'free time,' aiming for a 'world-class city' status (Sharma-Brymer, 2021). This overarching focus on public spaces and a narrow focus on safety and aesthetics overlooks the diverse recreational needs of Bengali-Muslim and migrant Bangladeshi women. Building on Lefebvre's (1976) concept of the "production of space," this study adopts feminist perspectives to explore women's recreational spaces by examining the subjective meanings of leisure in their everyday lives (Henderson, 2012; Massey, 2005). This study investigates how socio-demographic positions influence marginalized women's construction of recreational meanings and the spaces they use, aiming to gain preliminary insights into their daily recreational activities and associated socio-physical settings. Deploying feminist ethnography, the study conducted semi-structured interviews with 10 participants during Summer-2023 in two peripheral areas—Patuli and Sonarpur-Rajpur, using snowball sampling. The interviewees of Patuli were Bangladeshi migrants on government leasehold land, while those in Sonarpur-Rajpur lived in a low-income Muslim neighborhood threatened by gated communities. Interviews were recorded, transcribed, and analyzed using the techniques of qualitative coding (Miles et al., 2018). The findings reveal both similarities and differences in women's leisure behaviors and meaning-making in the two contrasting peri-urban areas. Leisure is seen as a contested space shaped by social roles, identity, and community-building in daily life, leading to varied interpretations of "recreation" and "leisure". Consequently, leisure consists of fragmented, unstructured activities across different ordinary, self-made places in four settings: 1) residence/housing, 2) neighborhood/community resources, 3) kids-based resources, and 4) workplace surroundings. The study concludes that women's recreational spatial practices form a local, context-specific system rooted in localized, women-centered knowledge, challenging male-centered leisure models. It advocates for feminist frameworks for inclusive recreational space policies. Revised Abstract This preliminary small-scale pilot study explores how the invisibility of the spatial practices of ordinary women from marginalized backgrounds—predominantly Bengali-Muslim and Bangladeshi migrants living under class, caste, and religious disparities in the urban peripheries of Kolkata—perpetuates recreational

inequality. Representing one-third of those in quasi-legal settlements, the spatial realities of these subaltern women have historically been othered under the dominant Babu culture of Hindu, upper-middle-class, Bengali society (Roy, 2003). This study critiques recreational policies in Indian cities like Kolkata, which lack a gender-mainstreaming framework. Current policies create homogenized public spaces, such as parks and commercial places, alongside beautification initiatives since 2011, prioritizing aesthetic upgrades and safety through CCTV surveillance for women's enjoyment (Ray, 2020). However, these initiatives adopt a ubiquitous, male-centered view of recreation as fun or public activities during free time overlooking the complex recreational needs and diverse spaces of subaltern women (Sharma-Brymer, 2021). Building on Lefebvre's (1976) concept of the production of space, I adopt feminist perspectives to explore women's recreational spaces through the subjective meanings of recreations in their everyday lives (Henderson, 2012). I investigate how socio-demographic positions influence subaltern women's construction of recreational meanings and spaces, providing preliminary insights into their daily activities and socio-physical settings for further fieldwork. This pilot fieldwork, based in Patuli and Sonarpur-Rajpur, two peri-urban neighborhoods in Kolkata adopted a participatory-ethnographic approach. I accessed the area through municipalities and conducted 10 semi-structured interviews via snowball sampling, following Hesse-Biber's (2013) qualitative feminist framework, which emphasizes 8-10 samples for in-depth insights, questions, and methodological refinement. Participants in Patuli were Bangladeshi migrants on government leasehold land, while those in Sonarpur-Rajpur lived in a low-income Muslim neighborhood. Interviews were recorded, transcribed, and analyzed using qualitative coding (Miles et al., 2018). The findings reveal similarities and differences in women's recreational behaviors across contrasting peri-urban areas. Subaltern women's recreation is shaped by a nuanced interpretation of recreations and leisure, embedded in fragmented, everyday activities. The study identifies informal, self-made spaces, across four settings: residences, neighborhood resources, kid-based resources, and informal workplaces. Analysis shows that recreational practices are influenced by socio-cognitive needs like legitimacy, familiarity, and control, shaped by social roles, identity, norms, and agency specific to groups and locations. The study concludes that subaltern women's recreation is a contested space, where the physical characteristics of spaces require a detailed understanding of context-specificity, socio-demographic intersections, and women-centered lived experiences, guided by a feminist framework in the next phase.

254 The Influence of Visitation Frequency and Distance to Place Types on Social and Neighborhood Satisfaction Among People with Disabilities

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Keywords: Path Analysis; Social Satisfaction; Neighborhood Satisfaction; Individuals with disabilities; Social capital

Individuals living with disabilities often experience higher levels of isolation and fewer social connections along with facing challenges in engaging in daily activities. The complex construct of disability significantly influences community participation of individuals with disabilities more than their non-disabled peers. For example, people with disabilities are more likely to experience social isolation and have fewer social connections. Community integration, which is defined as active engagement in daily activities such as work, recreation, and social life, plays a crucial role in promoting positive mental health. It is also a significant factor in reducing loneliness and fostering a sense of belonging. In an appropriately supportive environment, individuals with disabilities can meet their needs and integrate more effectively into the community, much like their non-disabled counterparts. People with higher community integration often have more access to social networks, and opportunities, which positively affect their satisfaction with social life. Also, the more integrated people feel within their communities, their emotional connection to their environment would be stronger, which enhances their sense of attachment to the place and satisfaction with neighborhood. The role of urban environment in improving or degrading social ties and interactions has been the subject of debate in many studies In this study we are looking at the role of place types, such as places of work, religious activities, leisure facilities on the level of satisfaction with social life. While existing studies acknowledge the positive impact of place types, there is still limited empirical data on how the visitation frequency to these places could impact satisfaction with social life among individuals living with disabilities. To address this gap, we aim to examine the interaction between visitation frequency to various place types, the distance individuals travel to these locations, and their overall satisfaction with social life, neighborhood, and sense of attachment to the place. A survey targeting individuals with disabilities in Utah, USA, was conducted, yielding 189 responses. A path analysis was then employed to explore the relationships between demographic and independent variables and the level of social and neighborhood satisfaction, as well as attachment to place. The findings suggest that frequent visits to specific place types, including places of worship and indoor and outdoor recreational facilities, are associated with higher levels of neighborhood and social satisfaction. Moreover, living in single-family housing and frequent visits within one's neighborhood significantly enhance one’s sense of attachment to the community.

286 Chasing Winter Sun: Finding Winter Nook for Aging Gracefully in Urban Jungles

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Keywords: Age-friendly environment; Urban microclimate; Sunbathing; Informal open spaces; Sustainable cities

As the elderly population flourishes, the call for age-friendly urban havens grows ever more urgent. With the onset of winter, many older adults experience behavioral constraints due to harsh climatic conditions, often leading to a profound sense of loneliness (Wilkinson et al., 2004; Qiu et al., 2020; Huang et al., 2022). Limited mobility confines them to the immediate surroundings of their homes (Wahl et al., 2012; Peng & Maing, 2021). Neighborhood open space (NOS)-public realms woven into the fabric of their homes-emerge as vital shelters, nurturing not just physical activity, but fostering social bonds and enhancing psychological well-being (Sugiyama et al., 2009; Lak et al., 2020). These “shelters” are not formally planned, but are located in all corners of the city. In these corners, the sunlight that penetrates the clouds gives many older adults warmth in the form of sunbathing, allowing them to overcome the cold and emerge from the cocoon of loneliness. This is far more important than providing them with monetary subsidies and amenities. In China, communal sunbathing emerges as a cherished ritual among the elderly, who gather to bask in the gentle warmth of the sun, seeking both relaxation and social connection amid the winter's cold embrace (Jang et al., 2013; Culp, 2019).Consequently, a spatial planning intervention must be embraced to identify and optimize NOS, thereby enhancing the well-being of elderly residents, especially during the harsh winter months. To find urban NOS suitable for winter sunbathing for them, we developed a novel framework to assess and improve the suitability of NOS across Jiande, China. This city is one of the oldest in China and has entered an advanced aging society. By simulating winter sunlight exposure, wind conditions, and integrating walkability analysis, we identified 495 informal open spaces (IOS) that meet both climatic comfort and accessibility needs. Our findings reveal a significant spatial disparity, with older residential areas benefiting from greater access to suitable NOS, while newer developments face a shortage. The reasons for this situation are closely related to the spatial planning of urban buildings, often notably in some high-density cities. This research highlights the critical role of spatial planning interventions in promoting climatic comfort and accessibility, addressing gaps in age-friendly space provision. The proposed framework offers a replicable approach for urban planners and policymakers to create inclusive and livable environments that support healthy aging in rapidly urbanizing contexts. Revised Abstract As the elderly population flourishes, the demand for age-friendly urban havens becomes increasingly urgent. In winter, many older adults experience behavioral constraints due to harsh climatic conditions, often resulting in isolation and loneliness (Qiu et al., 2020; Huang et al., 2022). Limited mobility confines them to the immediate surroundings of their homes (Wahl et al., 2012; Peng & Maing, 2021). Neighborhood open spaces (NOS) emerge as vital shelters, nurturing not only physical activity but fostering social bonds and enhancing psychological well-being (Lak et al., 2020). These informal 'shelters' are scattered throughout the city, providing warmth and solace. This need is far more pressing than financial subsidies or

amenities. In China, communal sunbathing has become a cherished ritual among older adults during winter (Jang et al., 2013; Culp, 2019). Consequently, spatial planning interventions are needed to identify and optimize NOS suitable for winter sunbathing for older adults. To find these suitable NOS, we developed a novel framework to assess and improve their suitability in Jiande, China. This city, one of the oldest in China, has entered a highly aged stage, with elevations ranging from -18.6 to 231.1 meters and many communities located on slopes. Considering the city's complex terrain, a 1:1 scale elevation model was created using Rhinoceros. Local climate data was used in Ladybug and CFD to simulate sunlight duration and wind speed (de Sousa Freitas et al., 2020), following the Evaluating Standard for Healthy Housing (2024) issued by China. We used McHarg's 'layer-cake' method to overlay four NOS factors (climate, area, accessibility, and quantity), ultimately identifying 495 suitable informal open spaces (IOS). We classified the residential areas according to the year of completion, designating those built before 2000 as older residential areas (Xian & Chai, 2021). Notably, 68% of the elderly population lived in these older residential areas, with most residents over 70, while newer residential areas housed residents aged 65-69. The results reveal clear spatial differences: older areas have better access to comfortable spaces but cover less area, while newer areas offer more space but face harsher climate exposure. This situation is closely tied to urban building spatial planning, particularly in high-density cities. This research highlights the importance of spatial planning in enhancing climatic comfort and accessibility, addressing gaps in age-friendly spaces. The proposed framework offers a replicable approach for urban planners and policymakers to create inclusive environments that support healthy aging in rapidly urbanizing areas.

317 Transit for Health and Mobility among Older Adults in El Paso, TX: The Role of Neighborhood Environment

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Keywords: Active travel; Neighborhood environment; healthy aging

Introduction: Public transit remains significant in promoting physical activity and providing alternative transportation modes to better serve the mobility needs of older adults. However, the low public transit ridership in El Paso reflects the potential barriers that may prevent residents from using it (U.S. Census Bureau, 2021). Apart from the individual-level health and mobility barriers, neighborhood environment characteristics may also impact older adults' access to public transit. Despite the growing interest in the neighborhood features in association with transit use, limited studies have focused on older adults. This study aims to (1) compare transit users and non-users regarding demographics, health behaviors and outcomes, and perceived barriers to transit use; and (2) examine the role of neighborhood environment features in public transit use. Methods: The data for this study are from a larger project on public transit and health and mobility of people living in El Paso, TX. In this study, by focusing specifically on older adults aged 60+ (N=573), we analyzed cross-sectional survey data collected from June 2018 through May 2019 and objective measures of the neighborhood environment. Descriptive analyses were conducted comparing transit users (N=172) and non-users (N=364) to understand their differences in personal characteristics and the perceived barriers to transit use. Bivariate and multivariate logistic regression analyses were conducted to examine the neighborhood environment's impact on transit use. Results: Compared to non-users, transit users tended to be more likely to walk at least once a week, have more recreational walking on neighborhood streets or sidewalks, and spend less time sitting. The multivariate logistic regression results highlighted that after adjusting for personal factors, environmental factors were significantly associated with transit use. Those who lived in neighborhoods with the presence of crosswalks and pedestrian signals (OR=2.75), more transit stops (OR=1.04), and higher level of safety from crime (OR=1.58) were more likely to use public transit. There were four major perceived barriers to transit use among older adults, but no significant differences were found between users and non-users. Conclusions and Implications: Our study suggests the potential health benefits of using public transit among older adults - more walking and less sedentary time, and the significance of neighborhood environment in promoting transit use. Planning and design efforts to promote active travel need to prioritize pedestrian safety and crime safety within neighborhoods and adjust existing transit services and policies to promote transit use and healthy aging in place. Revised Abstract Public transit remains significant in promoting physical activity and providing alternative transportation modes to better serve the mobility needs of older adults. However, the low public transit ridership in El Paso reflects the potential barriers that may prevent residents from using it (U.S. Census Bureau, 2023). Apart from health and mobility barriers, environmental characteristics (e.g. greenness, topography, walkability, access to transit) may also impact older adults' access to public transit. Despite the growing interest in neighborhood environment in association with transit use, limited studies

have focused on older adults. This study aims to (1) compare transit users and non-users regarding demographics, health behaviors and outcomes, and perceived barriers to transit use; and (2) examine the role of neighborhood environmental features in public transit use. The data for this study are from a larger project on public transit and health and mobility of people living in El Paso, TX. In this study, by focusing specifically on older adults aged 60+ (N=573), we analyzed cross-sectional survey data collected from June 2018 through May 2019 and objective measures of the neighborhood environment. Descriptive analyses were conducted comparing transit users (N=172) and non-users (N=364) to understand their differences in personal characteristics and the perceived barriers to transit use. Bivariate and multivariate logistic regression analyses were conducted to examine the neighborhood environment's impact on transit use. Compared to non-users, transit users tended to be more likely to walk at least once a week, have more recreational walking on neighborhood streets or sidewalks, and spend less time sitting. The multivariate logistic regression results highlighted that after adjusting for personal factors, environmental factors were significantly associated with transit use. Those who lived in neighborhoods with the presence of crosswalks and pedestrian signals (OR=2.75), more transit stops (OR=1.04), and higher level of safety from crime (OR=1.58) were more likely to use public transit. There were four major perceived barriers to transit use among older adults, but no significant differences were found between users and non-users. Our study suggests the potential health benefits of using public transit among older adults - more walking and less sedentary time, and the significance of neighborhood environment in promoting transit use. Efforts on planning policy, urban/landscape architecture design practice, and transit service provisions to promote active travel and healthy aging in place need to prioritize safer and accessible neighborhood environment by providing crosswalks, pedestrian signals, more transit stops, and strategies to reduce crime.

325 Determining the combined influence of park characteristics and socio-economic factors on community park visitation patterns in Atlanta, GA

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Keywords: Equitable access; Park visitation; Public health; Socio-Economic factors; Urban greenspaces

Urban greenspaces, particularly parks, are widely recognized for promoting human well-being. These areas reduce stress (Ulrich et al., 1991; Kaplan, 1995), encourage physical activity (Cohen et al., 2007), promote social cohesion (Coley et al., 1997; Holtan et al., 2014), and mitigate urban pollution (Bolund & Hunhammar, 1999). However, these benefits are not equally accessible to all populations. Research shows that low-income and marginalized communities often have fewer parks and greenspaces compared to high-income neighborhoods, which will lead to disparities in health outcomes (Dai, 2011; Park & Guldmann, 2020). To address this inequity, urban planners, designers, and landscape architects must prioritize accessibility and inclusivity in park development and design. This study leverages smartphone mobility data to explore park visitation to 30 community parks over a one-year timeframe in Atlanta, Georgia, a major U.S. city with a diverse population and over 3,000 acres of parkland (City of Atlanta, 2024). Park visitation is compared to park characteristics and locational socio-economic factors to assess how different populations benefit from greenspace use. While previous studies have often focused on either park-specific characteristics such as amenities, or socio-economic factors like income, few have investigated the combined effect. This gap highlights the need for more comprehensive research that integrates multiple data sources to assess both physical and social determinants of park use. By integrating various datasets, including SafeGraph mobility data, Sentinel-2 satellite imagery, the U.S. Census API, the City of Atlanta Parks and Recreation website, and Google Places images, this study provides a more complete understanding of the factors driving park visitation patterns. A multivariate linear regression model was employed to analyze the relationship between park visitation and park size, greenery levels, amenities, and socio-economic factors such as median household income. Three variables—median household income, swimming pools and splash pads, and field and court amenities—emerged as significant predictors of park visitation ($p<0.05$). Correlation analysis revealed a positive relationship between median household income and park visitation, park size, and the presence of water-related amenities. These findings suggest that wealthier populations were more likely to visit parks during the time and place of this study, particularly those with more recreational features. These insights can be used to promote equitable access to parks by prioritizing particular investments in underserved communities. Revised Abstract Urban greenspaces, particularly parks, are widely recognized for promoting human well-being. These areas reduce stress (Ulrich et al., 1991; Kaplan, 1995), encourage physical activity (Cohen et al., 2007), promote social cohesion (Coley et al., 1997; Holtan et al., 2014), and mitigate urban pollution (Bolund & Hunhammar, 1999). To support inclusive public health, parks should be designed to ensure equitable access and use for all community members. While previous research identifies disparities in greenspace availability, particularly for low-income and marginalized populations (Dai, 2011; Park & Guldmann, 2020), less is known about how socio-

economic factors and park features collectively influence visitation patterns. Exploring these dynamics is crucial for informing park design and investment strategies that can foster more inclusive use of greenspaces. This study leverages smartphone mobility data to explore park visitation to 30 community parks in Atlanta, Georgia, a major U.S. city with a diverse population and over 3,000 acres of parkland (City of Atlanta, 2024). Park visitation is compared to park characteristics and locational socio-economic factors to assess how different populations benefit from greenspace use. By integrating multiple data sources, including SafeGraph mobility data, Sentinel-2 satellite imagery, the U.S. Census API, the City of Atlanta Parks and Recreation website, and Google Places images, this study assesses both physical and social determinants of park use and provides a comprehensive understanding of the factors driving park visitation patterns across all community parks in Atlanta. A multivariate linear regression model was employed to analyze the relationship between park visitation and park size, greenery levels, amenities, and socio-economic factors such as median household income. The results showed that median household income and specific amenities like swimming pools, splash pads, and field and court facilities are significant predictors of park visitation, while greenery levels were not. These findings suggest that prioritizing investments in high-impact amenities, such as swimming pools, water bodies, and other recreational features, over planting initiatives may enhance park use for all community members. Additionally, a correlation analysis highlighted disparities in park amenities across income groups. Lower-income parks are more likely to have pools and splash pads, while higher-income parks are associated with other types of water features. Future research should explore these differences in relation to park visitation patterns to identify amenities that most effectively serve diverse income groups and promote park use. These insights can guide the design of accessible and inclusive parks that ensure equitable benefits for all community members.

333 Impacts of Natural Zoo Design on the Active Mental State of Visitors and Their Perception of Zoos

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Keywords: Zoo; Design; Enclosure; Visitor; Perception

Zoological institutions have always struggled to gather support for their conservation efforts due to the various ethical dilemmas perceived by the public (Milstein, 2009). Present-day zoos must carefully balance their funding to ensure enough is allocated to keep visitors excited and engaged, while also conducting conservation work and caring for often costly animals (Carr & Cohen, 2011). Many people do not realize that their support through visits to zoological parks is crucial for keeping zoos open, allowing them to care for their animals and contribute to conservation efforts and species survival plans worldwide. Research shows that visitors with a previous positive experience at a zoo are more likely to support conservation efforts than those who had a negative experience or did not visit a zoo at all (Godinez & Fernandez, 2019). This study aims to analyze the factors in natural zoo design that contribute to a positive experience for visitors from all demographics. Initial survey results reveal that very few respondents were regular zoo visitors, but nearly all reported having visited other zoos before. A total of 200 surveys were collected from visitors at three AZA-accredited zoos in Michigan, providing insight into the relationship between enclosure design qualities and visitor satisfaction and emotions. Visitor perceptions of animal welfare were also included as a variable to measure whether these perceptions are linked to the perceived quality of the design. It was expected that regardless of animal behavior, exhibits that better immerse visitors into natural environments would evoke more positive emotions, thereby supporting the notion that zoos have a positive impact on conservation and species survival. Interestingly, over half of the subject animals were recorded as sleeping or resting during the survey durations, yet the perceived animal welfare was still rated an average of 4.42 out of 5. Additionally, the perceived animal welfare showed stronger correlations with visitor ratings for exhibit size and animal visibility than with visitor ratings for the amount of vegetation. There is no clear correlation between the actual amount of vegetation used in the exhibit and the visitor rating for vegetation. However, there is a slight positive correlation between the visible vegetation from the survey location - which includes vegetation not necessarily originating from within the enclosures - and the visitor rating for the amount of vegetation in the exhibit. Revised Abstract Zoological institutions have always struggled to gather support for their conservation efforts due to the various ethical dilemmas perceived by the public (Milstein, 2009). Present-day zoos must carefully balance their funding to ensure enough is allocated to keep visitors excited and engaged, while also conducting conservation work and caring for often costly animals (Carr & Cohen, 2011). Many people do not realize that their support through visits to zoological parks is crucial for keeping zoos open, allowing them to care for their animals and contribute to conservation efforts and species survival plans worldwide. Research shows that visitors with a previous positive experience at a zoo are more likely to support conservation efforts than those who had a negative experience or did not visit a zoo at all (Godinez & Fernandez, 2019). This study aims to answer whether exhibit design elements, such as size, vegetation density, and material types, directly influence visitor emotions, perceptions of the zoo, and perceptions of animal welfare. A total of 187 surveys were collected from visitors at three AZA-accredited zoos in Michigan, providing insight into the

relationship between enclosure design characteristics and visitor satisfaction and emotions. Initial survey results reveal that very few respondents were regular zoo-goers, but nearly all reported having visited other zoos before. It was expected that regardless of animal behavior, larger exhibits with more vegetation and that better immerse visitors into natural environments through 'invisible barriers' would evoke more positive emotions, thereby supporting the notion that zoos have a positive impact on conservation and species survival. Interestingly, the perceived animal welfare showed stronger correlations with visitor ratings for exhibit size and animal visibility than with visitor ratings for the amount of vegetation. There is no clear correlation between the actual amount of vegetation used in the exhibit and the visitor rating for vegetation. However, there is a slight positive correlation between the visible vegetation from the survey location - which includes vegetation not necessarily originating from within the enclosures - and the visitor rating for the amount of vegetation in the exhibit. This implies that visitors may be more concerned with their overall park experience rather than the specific experience of the captive animals. Study results positively demonstrate that better animal visibility and larger exhibits lend more towards a positive zoo-going experience than any other factors.

353 Place Attachment and Placemaking in Rural E-commerce Participation: A Case Study of Dinglou Village

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Keywords: Rural E-commerce; Place attachment; Community transformation; Rural development

Rural e-commerce has significantly transformed China's socio-economic landscape since 2010, playing a crucial role in rural revitalization (Haji, 2021; Zhang et al., 2022). While the economic impacts of this phenomenon have been extensively studied, there is limited research on its effects on residents' experiences and relationships with their local environment. This study investigates how e-commerce participation reshapes residents' place experiences and relationships with their home environment in Dinglou village, recognized as China's first "Taobao village.1" Grounded in place attachment theory, which proposes that individuals develop emotional connections to specific locations influencing their perceptions and behaviors (Scannell & Gifford, 2010), our study addresses the question: How do participants in e-commerce activities perceive and respond to changes in their domestic and community environments across emotional, cognitive, and behavioral dimensions? We conducted in-depth semi-structured interviews with 40 households engaged in e-commerce activities in Dinglou village. Data were analyzed through thematic coding (Patton, 2015), guided by the place attachment framework. Our findings reveal a complex relationship between e-commerce participation and place attachment: Emotionally, participants expressed enhanced affection for home due to family reunification and improved economic conditions, alongside increased stress from balancing work and personal life. Cognitively, e-commerce participation redefined home meanings, transforming residences into workplaces and altering daily routines. Community pride increased, but concerns arose regarding environmental changes and social dynamics. Behaviorally, we observed significant home modifications, changes in daily movement patterns, and new forms of community engagement. The key takeaway is that strong emotional ties with home motivated initial participation in e-commerce, with successful engagement further strengthening these connections. However, some participants experienced diminished attachment due to negative impacts. This transformation necessitates strategies to preserve positive aspects of rural life while planning environments that meet evolving needs. This research extends the application of place attachment theory to rural e-commerce contexts, providing a nuanced understanding of rural transformation beyond economic indicators. It emphasizes the importance for landscape architects and rural planners to consider place attachment in e-commerce-driven development strategies. The findings have implications for sustainable rural development and offer a new perspective on rural revitalization in the digital age, highlighting the need for adaptive planning that balances economic opportunities with the preservation of meaningful place connections. 1. A Taobao Village is a rural village in China where a significant portion of the local economy is driven by e-commerce, specifically through the Taobao online retail platform. Revised Abstract Rural e-commerce has profoundly transformed China’s socio-economic landscape since 2010, catalyzing unprecedented opportunities for rural revitalization through digital entrepreneurship (Haji, 2021; Zhang et al., 2022). Through the lens of place attachment theory (Scannell & Gifford, 2010), this study investigates how rural residents perceive, interpret, and respond to e-commerce-driven

environmental changes in Dinglou village—one of China's first "Taobao villages1"—where 85% of households participate in e-commerce activities. The majority of residents are village natives who had previously migrated to urban areas but returned to seize e-commerce opportunities. Drawing on in-depth interviews with forty e-commerce participating households, our findings reveal three primary interconnected mechanisms through which place attachment mediates rural digital transformation. First, e-commerce participation generates distinctive emotional geographies characterized by "economically-mediated attachment"—where place bonds increasingly reflect economic performance and regional competition, creating tensions between achievement-based pride and development anxieties. Second, cognitive frameworks evolve toward "entrepreneurial rurality," where village identity integrates economic achievement while maintaining distinctive rural characteristics, though this shift raises concerns about the sustainability of traditional community bonds. Third, behavioral responses manifest through multiple patterns, including "selective re-rootedness," where residents strategically maintain connections to multiple places while anchoring primary economic activities in the village, and spontaneous place-making activities such as collective environmental stewardship and social engagement demonstrating the potential for bottom-up rural development. These findings advance place attachment theory by demonstrating its active mediating role in rural economic transformation, moving beyond static conceptualizations to reveal dynamic evolution patterns. For landscape planning practice, our research suggests that sustainable rural revitalization requires approaches that support both economic modernization and meaningful place connections through infrastructure that balances e-commerce efficiency with community livability, leverages emerging forms of collective environmental stewardship, and addresses tensions between development and place-based social relationships. 1. A Taobao Village is a rural village in China where a significant portion of the local economy is driven by e-commerce, specifically through the Taobao online retail platform.

376 Reclaiming the River: Neoliberal River Restoration and Resistance of River Communities in Guangzhou's Waterfront Transformation

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Keywords: Ecological resistance; Waterfront redevelopment; Urban political ecology; Indigenous Knowledge; Fisherfolk

Invocations of sustainability and resilience are often intertwined with existing urban development frameworks, resulting in reinforced social control, economic growth, and exacerbated inequality under the guise of environmental commitment (Goh, 2021). This paper centers on the displacement of the river communities—derogatorily called Dan—who have lived along the Pearl River since the 10th century but are now depicted as sources of "pollution and disorder" amidst the Guangzhou government's river environmental restoration efforts. Drawing on archival research, including government bulletins, reports, newspapers, and over 40 interviews with two boat people communities conducted between October and December 2023, this study examines the confrontations, negotiations, and conflicts between water-bound communities and the neoliberal urbanization in the name of sustainability since the 1980s. The first part of the paper traces how Guangzhou has actively mobilized public discourse, landscape planning, and river engineering to "purify, beautify, and green" the Pearl River based on the aesthetics of the Seine River, positioning the revival of an imagined clear river as both an environmental commitment and a political achievement. The second part examines how these water-bound communities developed alternative discourses that critique the countereffects of the government's over-engineered and highly manipulated projects, such as dam construction, river dredging, and embankment projects—projects that have been used to justify their displacement. Drawing on their generational knowledge of coexisting with rivers, tides, mudflats, and fish migration patterns, the river communities have adapted their survival strategies to persist at the margins of neoliberal landscapes and dominant narratives. By shifting their livelihoods from traditional fishing to activities such as catching mosquito larvae and collecting scrap metal, they have forged adaptive strategies that assert their control over their means of livelihood in the increasingly artificial river environment. This paper argues that the river restoration efforts have masked the actual neoliberal waterfront development and the goals to compete in the global capitalist market under the guise of "sustainability." Furthermore, grounded in urban political ecology (Swyngedouw, 2004) and theories of everyday resistance (Scott, 1985, 2016), this paper argues that the livelihood strategies of indigenous boat people, rooted in localized ecological knowledge, serve as subtle, non-confrontational everyday forms of resistance. These indigenous tactics challenge the state's monolithic approaches to urban development and the official narrative of a "clean environment" and open new possibilities for advancing urban ecological justice by involving local communities and knowledge.

384 Must Be Nice: Opportunities for Residential Design and Community Building through Emergent Strategies

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Keywords: residential design; collective; mutual aid; shift academic perspectives; ecologies of care

Residential design has the potential to significantly benefit communities by fostering environments that support mutual aid and collective well-being. This abstract explores how thoughtful residential design can enhance community cohesion and facilitate mutual aid through strategic spatial planning, shared resources, and adaptable living environments. By integrating principles of accessibility, sustainability, and "emergent strategies", residential designs can encourage social interaction, support local networks, and promote resilience. The study highlights case examples where residential projects have successfully created spaces that enable neighbors to engage in collaborative activities, share resources, and support each other. The findings suggest that residential design not only shapes physical living conditions but also plays a crucial role in strengthening social ties and enhancing the overall fabric of communities. The study advocates for a shift in academic perspectives to embrace the complexity and significance of residential landscape design, proposing a more integrated approach that acknowledges its role in shaping ecological and social environments. The paper calls for a broader recognition of residential design's role in community building and advocates for integrating mutual aid principles into design practices to create more supportive and resilient residential environments. Revised Abstract Residential design has the potential to significantly benefit communities by fostering environments that support mutual aid and collective well-being. This abstract explores how thoughtful residential design can enhance community cohesion and facilitate mutual aid through strategic spatial planning, shared resources, and adaptable living environments. By integrating principles of accessibility, sustainability, and "emergent strategies," designers can encourage social interaction, support local networks, and promote both social and ecological resilience. The study highlights case examples where residential projects have successfully created spaces that enable neighbors to engage in collaborative activities, share resources, and support social and ecological well-being. Case studies were evaluated through adrienne maree brown's five elements of emergent strategy from Emergent Strategy: Shaping Change, Changing Worlds (2017): Fractal, Adaptive, Interdependence and Decentralized, Non-Linear and Iterative Resilience, Transformative Justice, and Creating More Possibilities. Using a mixed-methods approach—including mapping, historical and ecological context, construction drawings, process diagrams, ethnographic photography, and client interviews—the analysis identified opportunities for collaboration between landscape design clients and their communities. The study also incorporated an economic evaluation of installing new landscape features, considering both the short-term installation investments and long-term benefits to enhance personal and community well-being. Case studies further emphasized that the unique relationship between designers, practitioners, and homeowners can spark deeper discussions on social and environmental impacts beyond property boundaries. These conversations can foster opportunities to "create incentives [for designers and their clients] to nurture a gift economy that runs right alongside the market economy, where the good that is served is community" (Kimmer, 2020). The study advocates for a shift in academic perspectives to acknowledge the complexity and importance of residential landscape design in

shaping both ecological and social environments. It calls for integrating mutual aid principles into design studies to foster more supportive, resilient residential spaces. Expanding research on the social and ecological potential of residential design encourages collective problem-solving that can be practically implemented in local contexts. Key findings reveal a model, adaptable wherever residential design is practiced, that can strengthen the interconnected social and ecological ties that contribute to a collective future.

396 Exploring the Roles of Neighborhood Cohesion in Depression: Mediating Effects of Modifiable Behaviors

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Keywords: Neighborhood Environments; Depression; Health Behaviors; Mechanism/Pathway; Healthy Community Planning

Background. Depression is increasingly recognized as a significant mental health challenge. In 2021, approximately 8.3% (21.0 million) of U.S. adults aged 18 or older had at least one major depressive episode in the past year (Substance Abuse and Mental Health Services Administration, 2022). Existing research highlights the significance of social attributes of neighborhoods, such as neighborhood cohesion, in mitigating depression (Blair et al., 2014). However, the causal mechanisms underlying this relationship have not been fully investigated. Objectives. This study explores the modifiable pathways through which perceived neighborhood cohesion (NC) affects depressive symptoms in adult populations. The primary objectives are to 1) investigate the relationship between NC and major depressive symptoms (MDS), and 2) identify the mediating roles of modifiable behaviors including physical activity (PA) and social activity (SA) in this relationship. Methods. We collected survey data from 296 El Paso residents in 2020 (including pre-COVID retrospectively and early-COVID data) and again in 2022 from the same residents (for the post-COVID data). Participants' MDS was measured using the Patient Health Questionnaire-2 scale (Kroenke et al., 2003). NC was evaluated using a 4-point Likert scale (strongly disagree to strongly agree) (Li et al., 2015). PA was measured based on the aerobic activity guidelines for adults (U.S. Department of Health and Human Services, 2018), and SA was measured by self-reported leisure or social activities in their daily lives (no vs. yes). We utilized structural equation models to examine the direct and indirect relationship between NC and DS while controlling for COVID-19 and demographic factors. Results. The model results indicated that PA and SA significantly mediate the relationship between NC and MDS, with higher neighborhood cohesion associated with increased activity levels, which in turn reduces depression. Furthermore, NC significantly mediated the demographic factors and MDS. Particularly, older adults and never-married individuals showed distinct patterns of depressive outcomes related to their varying perceptions of NC. Older adults experienced lower risks of MDS due to their stronger perceptions of NC, while never-married individuals faced higher MDS due to a weaker perception. Conclusions. This study enhances our understanding of how neighborhood cohesion influences depression, highlighting the significant mediating roles of PA and SA. It also reveals the mediating effect of NC on depressive outcomes across different demographic groups. These insights are crucial for planners and policymakers to create more cohesive, activity-friendly communities that mitigate depression and improve overall well-being.
Revised Abstract Background. Depression is increasingly recognized as a significant mental health challenge. In 2021, approximately 8.3% (21.0 million) of U.S. adults aged 18 or older had at least one major depressive episode in the past year (Substance Abuse and Mental Health Services Administration, 2022). Existing research highlights the significance of social attributes of neighborhoods, such as neighborhood cohesion, in mitigating depression (Blair et al., 2014). However, the causal mechanisms underlying this relationship have not been fully investigated. Objectives. This study explores the modifiable pathways through which perceived neighborhood

cohesion affects major depressive symptoms in adult populations. The primary objectives are to 1) investigate the relationship between neighborhood cohesion and depressive symptoms, and 2) identify the mediating roles of modifiable behaviors including physical and social activities in this relationship. Methods. We collected survey data from 296 El Paso residents in 2020 (including pre-COVID retrospectively and early-COVID data) and again in 2022 from the same residents (for the post-COVID data). Participants' depressive symptoms were measured using the Patient Health Questionnaire-2 scale (Kroenke et al., 2003). Neighborhood cohesion was evaluated using a 4-point Likert scale (Li et al., 2015). Physical activity was measured based on the aerobic activity guidelines for adults (U.S. Department of Health and Human Services, 2018), and social activity was measured by self-reported leisure or social activities in their daily lives (no vs. yes). We utilized structural equation models to examine the direct and indirect relationship between neighborhood cohesion and individual depressive symptoms while controlling for COVID-19 and demographic factors. Results. The model results indicated that physical and social activities significantly mediated the relationship between neighborhood cohesion and depressive symptoms, with stronger perceived neighborhood cohesion associated with increased activity levels, which in turn reduced depression. Furthermore, neighborhood cohesion significantly mediated the demographic characteristics and depression. Particularly, older adults and never-married individuals showed distinct patterns of depressive outcomes related to their varying neighborhood cohesion perceptions. Older adults experienced lower risks of depression due to their stronger perceived neighborhood cohesion, while never-married individuals faced heightened depression due to a weaker perception. Conclusions. This study enhances our understanding of how neighborhood cohesion influences individual depression, highlighting the significant mediating roles of physical and social activities. It also reveals the mediating effect of neighborhood cohesion on depressive outcomes across different demographic groups. These insights are crucial for planners and policymakers to create more cohesive, activity-friendly communities that mitigate depression and improve overall well-being.

467 Evaluating Spatial and Social Equity in Urban Greenspaces and Parks: A Comparative Analysis of Three Global Cities

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Keywords: Greenspace; Park; Spatial equity; Social equity; Global cities

Ensuring that all urban residents have equitable access to high-quality greenspaces is a key goal within Sustainable Development Goal (SDG) 11 (Sweileh, 2020), strongly supported by the World Health Organization (WHO). Cities aiming for fair distribution of urban greenspaces benefit from a deep understanding of both spatial and social equity regarding greenspace quantity and accessibility. This understanding is essential for effective urban greenspace planning and investment. In recent years, equity-focused research on urban greenspaces has grown significantly, driven by greater data availability, advanced analytical methods, and region-specific empirical studies (Nesbitt et al., 2018). However, despite these advancements, there is still no comprehensive framework that systematically addresses greenspace equity. Additionally, comparative studies examining greenspace systems across various urban development contexts and planning strategies remain limited, constraining a deeper understanding of greenspace equity on a global scale. This paper adds to the existing body of literature by developing a comprehensive framework that addresses both spatial and social equity in the provision and accessibility of greenspaces. The framework is applied in a comparative analysis of six major global cities—Beijing, Shanghai, Tokyo, New York, Paris, and London—each selected for their diverse approaches to urban greenspace planning, distinct urban development histories, and significant influence on global urban trends. The study aggregates data from multiple sources to create a series of indicators that measure the provision and accessibility of urban greenspaces and city-managed parks at a 500x500 meter scale. These indicators reveal a wide variation in greenspace and park provisions across the cities and highlight that higher levels of provision do not necessarily guarantee spatial and social equity in access. Bivariate spatial autocorrelation analysis is used to identify areas where greenspace and park provisions do not align with population densities, particularly for groups with greater needs for these amenities, such as young children and the elderly. Importantly, the research demonstrates that park planning can be a critical tool in addressing equity issues related to greenspace distribution. Revised Abstract Ensuring that all urban residents have equitable access to high-quality greenspaces is a key goal within Sustainable Development Goal (SDG) 11 (Sweileh, 2020), strongly supported by the World Health Organization (WHO). Cities aiming for fair distribution of urban greenspaces benefit from a deep understanding of both spatial and social equity regarding greenspace quantity and accessibility. This understanding is essential for effective urban greenspace planning and investment. In recent years, equity-focused research on urban greenspaces has grown significantly, driven by greater data availability, advanced analytical methods, and region-specific empirical studies (Nesbitt et al., 2018). However, despite these advancements, there is still no comprehensive framework that systematically addresses greenspace equity. Additionally, comparative studies examining greenspace systems across various urban development contexts and planning strategies remain limited, constraining a deeper understanding of greenspace equity on a global scale. This paper adds to the existing body of literature by developing a comprehensive framework that addresses both spatial and social equity in the provision and

accessibility of greenspaces. The framework is applied in a comparative analysis of three major global cities—Beijing, Tokyo, and London—each selected for their diverse approaches to urban greenspace planning, distinct urban development histories, and significant influence on global urban trends. The study aggregates data from multiple sources to create a series of indicators that measure the provision and accessibility of urban greenspaces and city-managed parks at a 500x500 meter scale. These indicators reveal a wide variation in greenspace and park provisions across the cities and highlight that higher levels of provision do not necessarily guarantee spatial and social equity in access. Bivariate spatial autocorrelation analysis is used to identify areas where greenspace and park provisions do not align with population densities, particularly for groups with greater needs for these amenities, such as young children and the elderly. Importantly, the research demonstrates that park planning can be a critical tool in addressing equity issues related to greenspace distribution.

470 “Oh, the places you’ll go:” Campus Perception and its Potential as a Built Environment Classroom

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Keywords: Mental Mapping; Nodes; Third Places; Campus

In 1948, Tolman found rats better able to traverse the same maze over time when they are hungry (have a need) and provided with food (earn a reward) each time they begin their journey. The animals build their own cognitive map – a map of space held in memory. This same approach applies directly to humans as we build significant experiences during physical journeys through space to help us to remember our pathways. Working in a separate research area, Lynch (1960) found humans map their environments based upon districts, edges, pathways, nodes, and landmarks. Later, Oldenburg (1989) began to organize the built environment as first, second, and third places: home, work, and community anchors. Such mapping methods would not be less common today as university students traverse campus to find their cafeteria and classes and return as alum for campus events. Students in design and built environment majors have their campus as a model for the theories taught in entry-level courses. Their campus can serve as an effective classroom for future design practitioners to understand the principles of effective planning, design, and engineering activities. South Dakota State University (SDSU) design faculty asked each of the graduating seniors and spring-semester freshmen in design majors to draw the main SDSU campus. With nearly 200 maps of raw data and basic demographics of each cartographer, the research team coded and organized the data to understand the students’ perceptions of campus. Challenging the hypothesis that students will draw Lynch’s elements, students instead highlighted the different ways one can utilize their campus according to Oldenburg’s organization. Graduating seniors statistically identify their “second” places (primary academic buildings) and draw their maps more broadly. The freshmen instead identify “first” and “third” places utilized for social bonding and detail public places such as campus greens and sidewalks. This suggests that a student’s needs for campus evolve over time from making social connections and establishing feelings of home to seeing campus as a more utilitarian working environment. University campuses and faculty have the opportunity to aid our built environment students in their intentional and incidental learning through designing inspirational features in these critical first and third places. A well-designed campus, planned in accordance with student values, can imprint upon our future landscape architects and related professionals the healthy design principles needed in our rapidly changing world. Revised Abstract Animals build their own cognitive map – a map of space held in memory (Tolman, 1948). As humans, we build significant experiences during physical journeys through space to help us to remember our pathways. These significant experiences can be our reward while our destination is our need. Working in a separate research area, Lynch (1960) found humans map their environments based upon districts, edges, pathways, nodes, and landmarks. Later, Oldenburg (1989) began to organize the built environment as first, second, and third places: home, work, and community anchors. Such mapping methods would not be less common today as university students traverse campus to find their cafeteria and classes and return as alum for campus events. Students in design and built environment majors have their campus as a model for the theories taught in entry-level courses. Their campus can serve as an effective classroom for future design practitioners to understand the principles of effective planning, design, and

engineering activities. South Dakota State University (SDSU) design faculty asked each of the graduating seniors and spring-semester freshmen in design majors to draw the main SDSU campus. With nearly 200 maps of raw data and basic demographics of each cartographer, the research team coded and organized the data to understand the students' perceptions of campus. Each building or area is identified in a binary means for analysis using SPSS. Challenging the hypothesis that students will draw Lynch's elements, students instead highlighted the different ways one can utilize their campus according to Oldenburg's organization. Graduating seniors identify their "second" places (primary academic buildings) and draw their maps more broadly. The freshmen instead identify "first" and "third" places utilized for social bonding and detail public places such as campus greens and sidewalks. This suggests that a student's needs for campus evolve over time from making social connections and establishing feelings of home to seeing campus as a more utilitarian working environment. University campuses and faculty have the opportunity to aid our built environment students in their intentional and incidental learning through designing inspirational features in these critical first and third places. A well-designed campus, planned in accordance with student values, can imprint upon our future landscape architects and related professionals the healthy design principles needed in our rapidly changing world.

494 Planning and Practice Research on Natural and Cultural Dual Heritage Corridors in River Basins

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Keywords: River basin; Ecological corridor; Cultural corridor; Scenic path system; Planning framework

Natural and cultural heritage in river basins often coexist but have historically faced conflicts with basin development (Oriaghe, 2023). Similarly, contradictions arise in constructing ecological and cultural corridors (Xu et al., 2019). The research proposes an ecological-cultural composite corridor network to identify key patterns of regional development and contradictions, facilitating the implementation of key nodes and promoting sustainable ecological and cultural development. The research focuses on the Bortala River Basin, the only east-west flowing river within the Tianshan Ecological Zone of China. Using 10 categories of natural elements, 5 types of historical heritage, as well as tourism and village resources, a three-step planning framework is developed. Step 1: Spatial recognition, involving network construction through quantitative analysis and simulation ((Yang et al., 2021); Step 2: Integration planning, utilizing systematic approaches based on natural and cultural strategies; Step 3: Node design, with tailored interventions adapted to regional conditions. In the spatial planning phase, ecological corridors were established based on assessments of historical data, ecological sensitivity, and functional importance. Key ecological protection areas and river resource redlines were integrated to define the protected area, core zone, and expansion zone. Through the evaluation of historical heritage, tourism, and villages, key planning nodes with high development potential were identified. The MCR model was applied to simulate route selection, leading to the construction of a scenic path system and the identification of new, upgraded, and connecting sections. At the natural level, based on the spatial identification of the ecological corridors, the ecological space is further planned around four key strategies: soil and water conservation, carbon sequestration, biodiversity enhancement, and stormwater management (Yu et al., 2021). Culturally, the construction of a scenic path system improves transportation infrastructure, protects and utilizes surrounding cultural heritage, and showcases the cultural diversity of ethnic groups. This also supports rural revitalization and tourism development. The plan is dynamic, incorporating a flexible and adaptive design toolbox. A total of 24 key nodes were selected, with tailored strategies to ensure efficient implementation. Broad public participation and stakeholder collaboration were achieved, with a project library supporting sustainable development. A 15-kilometer scenic path and four nodes have been implemented and opened to the public in October 2023. This research provides an innovative river-centered framework for basin planning, integrating rich natural and cultural resources along the river, and serves as a valuable reference for establishing sustainable People-Environment Relationships in the future. Revised Abstract River basins, as cradles of civilization, harbor rich natural and cultural resources, yet their conservation and development often involve inherent conflicts (Oriaghe,2023). This study focuses on the Bortala River Basin, which serves as the primary water source for Ebinur Lake, the largest saline-alkali lake in Xinjiang, and functions as a critical ecological barrier within the Tianshan Mountain ecological zone, playing a vital role in China's ecological security. Simultaneously, the basin holds profound cultural significance as a key segment of the ancient Silk Road, leaving a wealth of natural and cultural heritage. However,

under the dual pressures of global warming and local infrastructure development, the basin's natural systems are increasingly disrupted, resulting in four major challenges: soil erosion, vegetation degradation, biodiversity loss, and flooding. Simultaneously, the cultural heritage of the region faces inadequate protection and limited display, compounded by lagging rural development, poor transportation connectivity, and underdeveloped tourism. To address these intertwined natural and cultural challenges, this study establishes a planning framework for watershed ecological and cultural integration tailored to local practices. On the natural front, GIS-based multi-source data are used to assess ecological sensitivity and the importance of ecosystem service Functions, identifying ecological source areas for corridor protection. By employing the Minimum Cumulative Resistance (MCR) model and circuit theory, key ecological corridors and those requiring optimization are identified, constructing an ecological security pattern for the basin. Scenario simulations further validate the effectiveness of the proposed ecological network planning (Yang et al., 2021). On the cultural front, tourism and village resources are evaluated to identify high-potential nodes for planning. The MCR model is applied to simulate scenic route alignments, creating a cultural corridor network for the basin. By integrating the blue-green ecological network with the cultural scenic route network, a dual heritage corridor that synergizes natural and cultural resources is developed (Xu et al., 2019). This study proposes five optimization strategies for the Bortala River Basin: soil and water conservation, carbon sequestration and oxygen release, biodiversity enhancement, stormwater management, and scenic path system (Yu et al., 2021). Furthermore, a flexible, customizable, and highly adaptive node design toolbox is established, encompassing ecological, cultural, and exhibition components. By constructing an innovative planning framework centered on rivers while balancing natural and cultural functions, this research provides significant value for guiding local planning and implementation. It also offers valuable references for integrated ecological-cultural planning in critical river basins both in China and globally.

534 A Comparative Study of Emotional Performance between Wilderness and Cultural Parks Using Within- and Between-Subject Analyses

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Keywords: Urban parks; Ecological Design; Nature engagement; Experience Sampling; Landscape Performance

As cities increasingly adopt nature-based solutions to tackle ecological challenges, urban park design must balance both ecological and emotional services. This study compares the emotional benefits provided by two distinct types of urban green spaces—Artificial Parks (AP), characterized by curated and meticulously managed nature, and Wilderness Parks (WP), which embrace a holistic expression of natural environments. Informed by theories such as Attention Restoration Theory (ART) and Stress Reduction Theory (SRT), we investigate whether Wilderness Parks, recognized for their ecological advantages, can also provide superior emotional services compared to more curated parks. The study employed both within- and between-subject analyses to explore emotional mechanisms in urban parks. Linear mixed models were used to analyze repeated measures data, capturing the emotional constructs arising from interactions within Wilderness Parks. Additionally, a between-subjects intercept survey compared participant responses between a Wilderness Park and a Cultural Park to identify the unique emotional services each type provides. Findings suggest that Wilderness Parks not only excel in ecological services but also in fostering emotional well-being, supporting restoration, transcendent engagement, and cultural connections. These results demonstrate that thoughtful park design focusing on holistic natural settings can simultaneously enhance both ecological sustainability and emotional well-being, supporting the potential for Wilderness Parks to serve as an integrated solution to urban ecological and social needs. Revised Abstract As urban areas increasingly integrate nature-based solutions to address ecological challenges, urban park design must balance ecological sustainability with emotional well-being. Existing literature has well established the connection between nature and well-being (Song, C., et al., 2016), with some examining elements like water (White, M., et al., 2010), vegetation (Harris, V., et al., 2018), and the holistic, physical, and picturesque characteristics of the environment and their effects (Park, B., et al., 2011; Wang, X. X., et al., 2016). This study introduces and examines two distinct categories of urban green spaces: Artificial Parks (AP) and Wilderness Parks (WP). These categories were conceptualized to explore contrasting design approaches—APs represent curated, highly managed environments with plants shaped as objects or areas, while WPs emphasize functional ecological systems and immersive experiences. This categorization was specifically developed for the purpose of this study to highlight an important design difference. Grounded in Attention Restoration Theory (ART) (Kaplan, R., & Kaplan, S., 1989) and Stress Reduction Theory (SRT) (Ulrich, R., et al., 1991), the research follows a two-phase approach. In the first phase, a between-subjects intercept survey investigated participant responses in a Wilderness Park to identify the emotional services it provides and their defining characteristics. In the second phase, referencing the experience sampling method from Schertz et al. (2023), a within-subject study was conducted in Wilderness Parks, and data were analyzed using linear mixed models to assess emotional constructs such as restoration, transcendent engagement, and cultural connection. Findings suggest that Wilderness Parks foster greater emotional well-

being, supporting restorative processes, transcendent experiences, and deeper cultural connections. They also lead to strong place attachment and improved public satisfaction with land stewardship. These results underscore the potential of Wilderness Parks as integrated solutions for urban ecological and social challenges. By embracing holistic natural settings, urban park design can simultaneously enhance ecological resilience and human well-being, advocating for the prioritization of Wilderness Parks in future urban planning.

540 Landscape Lifecycles

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Keywords: Lifecycle; Assessment; Care; Adaptive strategies

In practice, much attention is given to the initial phases of landscape projects, less to their final stages of use. Often, we are working across private and public domains where control and power of these spaces is isolated to certain moments of influence which peter-out as the project nears its close. Even such integral considerations as maintenance of a project beyond its construction become tenuous as responsibility changes hands, budgets get cut and initial design intentions lose their potency over time. With so many constraints (budgetary and otherwise) as well as competing desires and priorities during the design process, it is not surprising that landscape architects focus their efforts and resources within the realm of implementation, site performance, site maintenance - the prospect of expanding the field of vision to the potential range of future configurations becomes a daunting task. Our presentation critiques the extent of the involvement of design professionals in the lifecycle of landscape projects, with the goal of foregrounding exceptional examples of practice that offer alternatives to the status quo. We draw from scholarship that foregrounds the maintenance of infrastructure through multi-scale networks of care and communities of practice (Mattern 2018), the afterlives of buildings (Jacobs and Cairns 2014; Moe 2018), the impacts of weathering (Mostafavi and Leatherbarrow 2001), and the need to consider the design of enduring landscape elements (DeSilvey, 2017). In this presentation we will present a framework to guide context-specific sustained involvement by design practitioners over the lifecycle of built projects that reconciles engagement (from discard on one end to keep on the other) and action (from active to passive management) which provides a matrix through which to read various approaches inherit in an extended design practice. The matrix brings attention to one's own approach to a project and the type of materials, labor and histories that apply to a given project's context. We will showcase possible applications of the framework through illustrative case studies that bring attention to current shortcomings as well as opportunities for further involvement that extend the realm of design into the ongoing care of landscape projects. Revised Abstract In practice, much attention is given to the initial phases of landscape projects, less to their final stages of use. Drawing from scholarship that provides a critical lens into the end phase of projects with reference to the built environment (Hutton 2019, DeSilvey 2017, Easterling et al. 2014), this presentation explores a variety of processes that define, analyse and contrast the legacies of landscape projects, foregrounding the ways in which the built environment is assembled and disassembled across geographic and temporal scales. Our goal is to contribute to scholarship that offers alternative approaches to the maintenance of infrastructure through multi-scale networks of care and communities of practice (Mattern 2018), and centers the design of enduring landscape elements (DeSilvey, 2017). We will first present a framework to guide context-specific sustained involvement by design practitioners over the lifecycle of built projects that reconciles engagement and action conceived as a matrix through which to approach an extended design practice. The matrix highlights a range of project approaches and considers the type of materials, labor and histories relevant to a particular context and scale. To demonstrate, we will present applications of this framework through two illustrative design competition submissions that concurrently challenge the competition model and investigate alternative, flexible and adaptive strategies that document materials used and wastes produced. The case studies of the:

(1) Chaumont-Sur-Loire International Garden Festival and (2) Toronto Winter Stations design competition, will be used to test the application of these ideas. Ultimately, this work seeks to understand the role that a full lifecycle approach can have in achieving truly sustainable built projects and landscapes.

547 Climate Fiction Narratives of Future History

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Keywords: Climate Fiction; Storytelling; Anthropocene

The aim of this project is to investigate the intersections of land craft, built form, lineages of cultural knowledge, aesthetics, loss, and memory as a way to restructure the vernacular into novel landscapes of resilience and counter-response. As anthropogenic activity continually necessitates warnings about the distressing state of the climate crisis, the project pushes these existing predictions to their ends, narratively imagining a radically different earth than we inhabit now (Robinson, 2021). What landscapes emerge from this? How do new or renewed ways of conceptualizing our response emerge from this (The British Library, 2021)? How do networks of hyperlocal intervention become indicative of culture, politics, and people within? Politics of water, land, and resources are inherently tied to these thoughts, and the project aims to navigate growing resource inequity through peculiar economies of place based intervention taking agency in these changing/ed landscapes (Ghosh, 2016). The project sites itself in the near distant future, in a world in which existing climate predictions have manifested to their expected or unexpected end (Robinson, 2022). The project aims to imagine how and who will inhabit these new landscapes? How do historic land practices shift and merge into new ways of placing ourselves within the landscape? Both digital and analogue means of representation will aim to express the poetics of these landscapes and cultures within. Animation, world building, storytelling, drawing, and physical proxies will all be means of representing the work. Through critical analysis of historical, contemporary, and projected relationships to land, resources, and associated aesthetic representations, the project aims to imagine new relationships in this changed global landscape that are both highly poetic and rooted in scientific rigor (Jones, 2020). This all though serves as a proxy for understanding today's larger structural failing contributing to vast inequity, conflict, and the collapsing climate (Butler, 1993). Questions about what is lost, who is lost, and what is remembered become quandaries that are pondered through the project, and importantly, how does this impact how we behave, live, and relate as society? The project envisions a critical, future vernacular that finds root in the systems of the changing landscapes, taking advantage of new relationships between the biotic and abiotic, and forming new relationships between people, places, and ecological systems of place. Revised Abstract
The aim of this project is to investigate the intersections of land craft, built form, lineages of cultural knowledge, aesthetics, loss, and memory as a way to restructure the vernacular into novel landscapes of resilience and counter-response. As anthropogenic activity continually necessitates warnings about the distressing state of the climate crisis, the project pushes these existing predictions to their ends, narratively imagining a radically different earth than we inhabit now (Robinson, 2021). What landscapes emerge from this? How do new or renewed ways of conceptualizing our response emerge from this (The British Library, 2021)? How do networks of hyperlocal intervention become indicative of culture, politics, and people within? Politics of water, land, and resources are inherently tied to these thoughts, and the project aims to navigate growing resource inequity through peculiar economies of place based intervention taking agency in these changing/ed landscapes (Ghosh, 2016). The project sites itself in the near

distant future, in a world in which existing climate predictions have manifested to their expected or unexpected end (Robinson, 2022). The project aims to imagine how and who will inhabit these new landscapes? How do historic land practices shift and merge into new ways of placing ourselves within the landscape? Through critical analysis of historical, contemporary, and projected relationships to land, resources, and associated aesthetic representations, the project aims to imagine new relationships in this changed global landscape that are both highly poetic and rooted in scientific rigor (Jones, 2020). This all though serves as a proxy for understanding today's larger structural failing contributing to vast inequity, conflict, and the collapsing climate (Butler, 1993). Questions about what is lost, who is lost, and what is remembered become quandaries that are pondered through the project, and importantly, how does this impact how we behave, live, and relate as society? Expected outcomes include a speculative novel that deconstructs traditional narrative structures, physical artifacts that serve as proxies for the imagined world, and visualizations that provoke dialogue about the role of narrative and speculative design in landscape architecture within the climate crisis. The project envisions a critical, future vernacular that finds root in the systems of the changing landscapes, taking advantage of new relationships between the biotic and abiotic, and forming new relationships between people, places, and ecological systems of place.

562 Effects of Various Vegetation Types on Human Thermal Comfort at Nighttime

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Keywords: Thermal comfort; Outdoor comfort; Nighttime comfort; Vegetation types; Small-scale necessary

Outdoor thermal comfort significantly impacts the use and enjoyment of urban spaces, particularly in environments that encourage outdoor activity (Chen et al., 2012). However, research on this topic has primarily focused on large-scale spaces (Andrade et al., 2008; Taleghani et al., 2015), simple elements such as surface materials (Karimi et al., 2020; Irmak et al., 2017; Yan et al., 2015)or overall urban design, and summer or daytime conditions (Xu et al., 2010). There is a gap in understanding how different types of vegetation influence human thermal comfort at night, especially in small-scale urban spaces, such as those found on college campuses where outdoor activities persist into the evening. This study aims to evaluate how various vegetation types affect thermal comfort at night during winter. Four specific vegetation types will be examined: open lawn area, shrub around lawn area, tree around lawn area, and mixed vegetation area. These sites, located on a college campus, were chosen based on their high user density, availability for observation, and the distinct thermal environments they create through different vegetation arrangements and coverage. The research will involve a combination of environmental data collection and subjective surveys. Sensors will be used to gather continuous data on temperature, humidity, and wind speed in each of the vegetated areas during nighttime. Simultaneously, students who are active in these spaces will be recruited to participate in surveys assessing their perceptions of thermal comfort. The collected data will be analyzed to identify correlations between environmental conditions and comfort levels, providing insights into how different vegetation types can enhance nighttime thermal comfort in outdoor spaces. The primary audience for this research includes urban planners, landscape architects, and designers focused on improving the usability and comfort of outdoor spaces. The study aims to inform better landscape design strategies that can be adapted to nighttime and winter conditions, particularly in educational and public urban settings. This project will contribute to the growing body of knowledge on thermal comfort in outdoor environments, filling a critical gap in understanding how different vegetation types function at night. The results will provide actionable recommendations for improving the design and planning of outdoor spaces in cold and nighttime conditions, making them more inclusive and usable year-round. Additionally, by focusing on nighttime activities, the study highlights the importance of designing for underexplored temporal aspects of urban life, promoting equitable social outcomes by making spaces more comfortable for diverse populations. Revised Abstract This study aims to evaluate how various vegetation types affect thermal comfort at night during winter. Outdoor thermal comfort significantly impacts the use and enjoyment of urban spaces, particularly in environments that encourage outdoor activity (Chen et al., 2012). However, research on this topic has primarily focused on large-scale spaces (Andrade et al., 2008; Taleghani et al., 2015), simple elements such as surface materials (Karimi et al., 2020; Irmak et al., 2017; Yan et al., 2015)or overall urban design, and summer or daytime conditions (Xu et al., 2010). There is a gap in understanding how different types of vegetation influence human thermal comfort at night, especially in small-scale urban spaces, such as those

found on college campuses where outdoor activities persist into the evening. Four specific vegetation types were examined: open lawn area, shrub around lawn area, tree around lawn area, and mixed vegetation area. These sites, located on a college campus, were chosen based on their high user density, availability for observation, and the distinct thermal environments they created through different vegetation arrangements and coverage. We hypothesize that the mixed vegetation area has the best thermal comfort and the open lawn area has the worst thermal comfort at nighttime in winter. The research involved a combination of environmental data collection and subjective surveys, thereby verifying the hypothesis. Sensors were used to gather continuous data on temperature, humidity, and wind speed in each vegetation type area during nighttime. Simultaneously, active students in these spaces were recruited to participate in surveys assessing their perceptions of thermal comfort. The research was administered through on-site surveys. Sensor microclimate data collection was conducted simultaneously with the questionnaire survey. First, we sent and introduced the questionnaire and explained its content, location, and experimental route to the volunteers. Next, volunteers stayed in four areas for five minutes. Finally, they completed the questionnaire. After the experiment, we obtained objective site microclimate data, human clothing behavior data, and subjective personal perception data. The collected data was analyzed quantitatively using SPSS to identify correlations between environmental conditions and comfort levels. This project will contribute to the growing body of knowledge on thermal comfort in outdoor environments, filling a critical gap in understanding how different vegetation types function at night. The results will provide actionable recommendations for improving the design and planning of outdoor spaces in cold and nighttime conditions, making them more inclusive and usable year-round.

563 The Impact of Physical Activity-Promoting Built Environment on Intergenerational Interactions Between Children and Older Adults.

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Keywords: Intergenerational Interaction; Intergenerational Community; Built Environment; Physical Activity; Structural Equation Model

Introduction: Intergenerational interactions support children's development, offering a range of benefits that enhance their social, emotional, and cognitive health. These interactions allow children to learn from older adults who act as mentors, helping to foster empathy, improve social skills, and boost emotional well-being and self-confidence (Gualano et al, 2018; Kaplan & Haider, 2015). The physical environment plays a crucial role in supporting these interactions by offering accessible, safe, and aesthetically pleasing spaces that encourage engagement across different age groups (Norouzi, 2023; Zhong, Lee, & Lee, 2020; 2022). Although existing research has examined the relationships between the built environment, intergenerational interaction, and physical activity, most studies have tended to focus on only two of these elements at a time (Carlson et al., 2012; Zhang, 2024). This approach leaves a gap in understanding how all three factors interact, particularly the mediating role that physical activity plays in the relationship between the built environment and intergenerational interactions. Method: We surveyed 1,154 parents/guardians of children in kindergarten through sixth grade across 36 Independent School Districts (ISDs) in Texas from November 14, 2023, to January 4, 2024. We used structural equation modeling (SEM) to examine how built environment characteristics influence intergenerational interactions, with physical activity as a mediating variable. The model includes three domains of variables: children's interactions with older adults, physical activity, and built environment characteristics. We captured built environment characteristics through measures of accessibility (e.g., access to shops and transit), walkability, bikeability, traffic and crime safety, public place presence, and neighborhood aesthetics. Results: The SEM analysis indicated that the presence of activity places had a significant positive association with physical activity. Frequent physical activity positively influenced intergenerational interactions, suggesting active children were more likely to engage with older adults. While accessibility to main destinations did not significantly influence physical activity, it had a positive impact on intergenerational interactions. Additionally, demographic factors influenced these relationships, with girls less likely to engage in physical activity, children with more siblings being more active, and younger children more frequently interacting with older adults. Conclusion: Our preliminary findings show that built environment factors influence intergenerational interactions directly or indirectly through physical activity. This study highlights the importance of designing neighborhoods that not only encourage physical activity but also promote intergenerational engagement, thereby creating environments that support children's development and strengthen community well-being. Revised Abstract Introduction: Intergenerational interactions support children's development, offering a range of benefits that enhance their social, emotional, and cognitive health. These interactions allow children to learn from older adults who act as mentors, helping foster empathy, improve social skills, and boost emotional well-

being and self-confidence (Gualano et al, 2018; Kaplan & Haider, 2015). The physical environment plays a crucial role in supporting these interactions by offering accessible, safe, and aesthetically pleasing spaces that encourage engagement across different age groups (Norouzi, 2023; Zhong, Lee, & Lee, 2020; 2022). Although existing research has examined the relationships between the built environment, intergenerational interaction, and physical activity, most studies focus on only two of these elements at a time (Carlson et al., 2012; Zhang, 2024). This leaves a gap in understanding how all three factors interact, particularly the mediating role that physical activity plays in the relationship between the built environment and intergenerational interactions. Method: We surveyed 1,154 parents/guardians of children in kindergarten through sixth grade across 36 Independent School Districts (ISDs) in Texas from November 14, 2023, to January 4, 2024. We used structural equation modeling (SEM) to examine how built environment characteristics influence intergenerational interactions, with physical activity as a mediating variable. The model includes three domains of variables: children's interactions with older adults, physical activity, and built environment characteristics. We captured built environment characteristics through measures of accessibility, walkability, traffic and crime safety, and neighborhood aesthetics. Results: SEM results showed the presence of activity places (e.g., parks, playgrounds, trails, sidewalks) had the strongest positive association with physical activity. Maintenance and aesthetics also had a significant positive impact on physical activity, highlighting the importance of well-kept and visually pleasing environments. SEM further suggested the positive influence of physical activity on intergenerational interactions, suggesting that active children were more likely to engage with older adults. Walkable destinations (e.g., stores, transit stops, and health/medical services) were associated with higher levels of intergenerational interaction, but notwith physical activity. Socio-demographic factors also played significant roles: girls were less likely to engage in physical activity; children with more siblings were more active; and younger children interacted more frequently with older adults. Conclusion: Our preliminary findings showed the complexity of the relationship between the built environment, physical activity, and intergenerational interactions. Findings suggest well-maintained, visually attractive, and walkable neighborhoods, with diverse activity-friendly and utilitarian destinations within easy walking distance, can help promote physical activity and intergenerational engagement.

594 The Economic, Mental, and Physical Human Health Impacts of Pluvial Flooding in Baltimore's Underserved Communities

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Keywords: Pluvial Flooding; Human Health and mental Well-being; Financial Cost; Basement Flooding; Underserved Communities

Pluvial flooding (PF), caused by intense short-duration rainfall, is increasingly problematic in urban areas due to climate change and rapid urbanization (Siljeg et al., 2024). PF can have devastating consequences, including loss of life and property damage (See, 2019). Urban PF frequently results in street flooding or overwhelmed sewer systems, which can lead to contamination with gastrointestinal and respiratory pathogens, posing significant health risks (Mulder et al., 2019). While much research has been conducted on the causes of PF, its impact on human health and financial costs remains underexplored (Singh, 2023). This study aims to investigate the impacts of PF on homeowners' financial costs, mental health, and social well-being in the underserved Broadway East neighborhood of Baltimore, Maryland. The methodology includes a comprehensive literature review and a survey. Data will be gathered using a questionnaire consisting of 60 multiple-choice and open-ended questions, structured into seven sections: 1) property condition (e.g., housing type, elevation, sewage system status) (Rozer, 2024); 2) flood experience (e.g., flood depth and frequency) (Goodrich, 2020); 3) damage (e.g., extent of property and personal losses) (Spekkers et al., 2011); 4) health impact (e.g., physical and mental health issues) (French, 2019); 5) financial impact (e.g., cost of living, insurance use) (Grahn, 2017); 6) coping strategies (e.g., preparedness and knowledge) (Rozer, 2024); and 7) socio-demographic information (e.g., age, income, education, family structure). The data collected will be analyzed using SPSS software, with both qualitative and quantitative results examined. Linear regression tests will be employed to explore the relationships between the severity of PF and various impact variables, as well as between demographic factors and the extent of those impacts. The study's findings will address significant research gaps concerning PF's effects on health and finances, offering insights for improving disaster management and urban planning strategies to mitigate the risks posed by PF events. Revised Abstract Pluvial flooding (PF), caused by intense short-duration rainfall, is increasingly problematic in urban areas due to climate change and rapid urbanization (Siljeg et al., 2024). PF can have devastating consequences, including loss of life and property damage (See, 2019). Urban
PF frequently results in street flooding or overwhelmed sewer systems, which can lead to contamination with gastrointestinal and respiratory pathogens, posing significant health risks (Mulder et al., 2019). While much research has been conducted on the causes of PF, its impact on human health and financial costs remains underexplored (Singh, 2023). This study aims to investigate the impacts of PF on homeowners' financial costs, mental health, and social well-being in underserved neighborhoods of Baltimore, Maryland. The methodology includes a comprehensive literature review and a survey. Data will be gathered using a questionnaire consisting of 60 multiple-choice and open-ended questions, structured into seven sections: 1) property condition (e.g., housing type, elevation, sewage system status) (Rozer, 2024); 2) flood experience (e.g., flood depth and frequency) (Goodrich, 2020); 3) damage (e.g., extent of property and personal losses) (Spekkers et al., 2011); 4) health impact (e.g., physical and mental health issues) (French, 2019); 5) financial impact (e.g., cost of living, insurance use) (Grahn,

2017); 6) coping strategies (e.g., preparedness and knowledge) (Rozer, 2024); and 7) socio-demographic information (e.g., age, income, education, family structure). We will focus on neighborhoods known to have been severely impacted by chronic PF, including Cherry Hill, Broadway East, Perry Hall, White Marsh, Sandtown-Winchester, Hollins Market, and Harlem Park. The survey will be distributed via mixed methods, including door-knocking, community events, email listservs, and agency websites. The targeted sample size is 200. The collected data will be analyzed using the SPSS statistical software, and qualitative and quantitative results will be examined. Linear regression tests will be employed to explore the relationships between the severity of PF and various impact variables, as well as between demographic factors and the extent of those impacts. The study's findings will address significant research gaps concerning PF's effects on health and finances, offering insights for improving disaster management and urban planning strategies to mitigate the risks posed by PF events.

602 Understanding community perception and stewardship of coastal nature-based solutions for climate resilience: A case study in Cedar Key, Florida

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Keywords: Living shorelines; Green infrastructure; Shoreline management; Coastal resilience; Community engagement

This study reports observations and findings from an interdisciplinary project focusing on the planning and design of nature-based solutions (NBS) in Cedar Key, Florida. Climate change is exacerbating socio-ecological challenges (e.g., social inequities, extreme weather impacts, sea level rises and chromic erosions, habitat loss) in many coastal communities in the U.S. Nature-based solutions (NBS), which are "actions to protect, sustainably manage, and restore natural or modified ecosystems", are a promising alternative to traditional mitigation measures like levees and floodwalls [1]. Designed with the goal of addressing societal challenges effectively and adaptively, NBS may enhance flood resilience while providing other co-benefits for human well-being and biodiversity. However, NBS must be tailored to address specific community priorities and values to be culturally sustainable [2]. Research indicates negative perceptions of NBS regarding aesthetic and recreational values can greatly undermine community buy-in [3]. Consistent maintenance and funding support also challenge the effectiveness of NBS over time [4]. These challenges are particularly pronounced in Cedar Key, a small seaside town located in one of the poorest counties in Florida and faced with significant threats from coastal disasters and climate change impacts. Additionally, Cedar Key has a small population of permeant residents mainly consisting of retirees, though there is an influx of visitors and seasonal residents during the peak tourism months. To inform our NBS planning and design proposals to the City of Cedar Key, the research team conducted an in-person community survey during December 2022 to March 2023 (N = 178). Using the survey data, we investigated how residents' and visitors' environmental attitudes, concerns about climate change impacts, and sense of place may relate to their perceptions and potential stewardships of inland and shoreline NBS. Preliminary results indicate a significantly higher preference for NBS over traditional mitigating measures. Interestingly, the survey respondents expressed a strong desire to prioritize the environment and local residents over tourists and recreational uses in NBS development. Additionally, beyond an expectation that the state and city governments should play a major role in NBS maintenance and funding, local residents and business were also considered as largely responsible for NBS maintenance, while tourists and developers were considered as largely responsible for NBS funding. The next stage of the study will be further examining how perceptions and attitudes vary between residents vs. visitors and relate to environmental attitudes (measured by the New Ecological Paradigm) and concerns and sense of place through regression analyses. Revised Abstract This study reports observations and findings from an interdisciplinary project focusing on the planning and design of coastal nature-based solutions

(NBS) in Cedar Key, Florida. Climate change is exacerbating socio-ecological challenges in many coastal communities in the U.S. Nature-based solutions (NBS), which are “actions to protect, sustainably manage, and restore natural or modified ecosystems”, are a promising alternative to traditional mitigation measures like levees and floodwalls that may not only enhance flood resilience but also provide other co-benefits for human well-being and biodiversity [1]. However, NBS must be tailored to address specific community priorities and values to be culturally sustainable [2]. Research indicates negative perceptions of NBS regarding aesthetic and recreational values can greatly undermine community buy-in [3]. Consistent maintenance and funding support also challenge NBS implementation and a desirable performance over time [4]. These challenges are particularly pronounced in Cedar Key, a small coastal city located in one of the poorest counties in Florida and faced with significant threats from shoreline erosion, intense storms, and increasing coastal flooding. Additionally, it has a small population of permeant residents, with many visitors and seasonal residents coming in during the peak tourism months. To inform our NBS planning and design proposals to the City of Cedar Key, the research team conducted an intercept survey within the community during December 2022 to March 2023 (N = 155). Using the survey data, we investigated how various stakeholder groups perceive different coastal infrastructure options on the green-gray spectrum and how they may involve in stewarding behaviors of contributing to coastal infrastructure maintenance or funding. Preliminary results indicate significantly better perceptions of NBS over traditional gray measures like sea wall, including perceived protection function. This finding contrasts with previous studies where perceived protection was often reported as higher for gray measures than NBS (e.g., [5]), and it might be explained by the overall high environmental awareness present in the community. Additionally, beyond an anticipated expectation that state and city governments should play a major role in NBS maintenance and funding, many participants identified local residents and shore anglers as responsible parties, although boat anglers were viewed as less responsible. This study provides new insights for landscape architects to address local contexts and engage with stakeholder groups in the planning and design practice for coastal resilience. It points out the importance to consider a community’s overall environmental views and the potentially different expectations for various users.

609 Assessing Campus Walkability: A Mixed-Methods Approach Combining Participatory GIS and Mathematical Analysis at Texas Tech University

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Keywords: Campus walkability; Participatory GIS; Spatial analysis; Graph theory; Built environment

University campuses play a crucial role in shaping students' ability to adopt healthy lifestyles. A well-designed campus environment can promote walking, a key form of active transportation, which is essential for physical activity, especially as students often face stressors that limit time for regular exercise. Despite its significance, a comprehensive campus walkability assessment that maps the impacts of built environments on walking behaviors is lacking for urban planners and policymakers. This study fills that gap by proposing a mixed-methods approach combining participatory GIS (PGIS) and mathematical analysis to evaluate campus walkability at Texas Tech University (TTU). The research involved three phases: the first phase utilized graph theory, random walk analysis, and geometrization to assess the campus's physical structure, predicting areas with low pedestrian flow, accessibility issues, navigational difficulties, and spatial integration challenges. The second phase used participatory mapping to capture the social and spatial dimensions of walkability, involving a two-day workshop where diverse student groups utilized ArcGIS Field Maps and Survey123 to record walking trajectories and perceptions on a web map of the campus. This approach combined subjective experiences with objective spatial data, highlighting how campus structure influences pedestrian behavior. The final phase gathered broader campus perceptions through an IRB-approved online survey with students, faculty, and staff, collecting feedback on walking experiences. This research underscores the value of integrating mathematical modeling, spatial analysis, and participatory engagement to create a robust framework for assessing campus walkability, ultimately fostering healthier and more inclusive university environments. Revised Abstract Walkable university campuses are crucial for promoting physical activity, which is associated with numerous health benefits, including reduced risks of cardiovascular diseases, obesity, and mental health issues. They also enhance cognitive function and academic performance, contributing to a healthier and more productive campus community. Despite these advantages, there is no standardized campus walkability index to guide urban planners and policymakers in designing spaces that effectively promote walking behaviors. This gap is particularly concerning given the alarming levels of physical inactivity among college students, with studies reporting that many do not meet federal guidelines for aerobic activity. This study addresses this gap by evaluating the walkability of Texas Tech University (TTU) through a mixed-methods approach that integrates mathematical analysis, participatory GIS (PGIS), and community feedback. The research consists of three phases: First, a mathematical analysis using graph theory, random walk analysis, and geometrization revealed that areas such as the library, Memorial Circle, and the Student Union Building are highly integrated, facilitating pedestrian movement and fostering walking due to their connectivity, crowd presence, and perceived safety. Conversely, physically isolated zones

like AT&T Stadium, student housing, and the Student Recreation Center were found to be disconnected and underutilized. Second, participatory mapping using ArcGIS Field Maps and Survey123 engaged diverse student groups to map their walking trajectories and perceptions, producing heat maps of key zones. The analysis demonstrated that integrated zones were characterized by proximity to amenities, navigability, and safety, while isolated areas highlighted challenges such as poor lighting, long distances, and underutilized pathways. Finally, an IRB-approved survey collected feedback from students, faculty, and staff, revealing significant sociodemographic differences in walking behaviors and perceptions. Female participants reported greater challenges, including inadequate infrastructure and safety concerns, which limited their ability to walk freely. This study highlights the strong alignment between morphological findings and user perceptions, emphasizing the role of physical design, environmental factors, and community engagement in shaping walking behaviors. By addressing these challenges, it provides a comprehensive framework for assessing and improving campus walkability. The results underscore the potential of walkable campuses to integrate physical activity into students' daily routines, mitigate sedentary behaviors, and enhance overall well-being. This research offers actionable insights for creating healthier, safer, and more inclusive university environments that align with the principles of sustainable and equitable campus design.

615 The Forest, The Tree, and the CLT Panel: Framing a Critique of Mass Timber Mania

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Keywords: forests; mass timber; land management; forest ecology

When Europeans arrived on the North American continent, the pine savanna dominated the southeastern landscape, particularly in the gulf coastal plain. Sparse pines underlaid by a blanket of biodiverse grasses and forbs characterized this pyrogenic region. Since then, the southern pines and the forests they comprise have been shaped and shuffled by economy and industry: first for turpentine, then timber. Today, this landscape consists of vast patchworks of pines grown and managed for commercial timber production: “forest products” such as poles, dimensional lumber, or pulpwood. Though in many ways reminiscent of historic forest forms like the savanna, these plantations are artificial, more agriculture than forest. Lacking the complex trophic systems that support a wide range of species, their forms and rhythms are governed by a set of anthropogenic processes related to optimized planting and the science and business of biomass extraction. In the last decade, mass timber has emerged as a new and compelling timber-based building system. Architects, engineers, and builders have pronounced it the way of the future; it is strong, flexible, beautiful, and ostensibly “renewable.” Commercial foresters in the southeast, long trained to prioritize fiber production over forest ecology, are eager to bolster a flagging forest products business. A growing cadre of timber collaboratives at universities across the country advance research, while state forestry commissions estimate production capacities. Thus, this technology and its accompanying industry are poised to transform the southern forest once again. Given the current group of stakeholders, a critical lens on mass timber production – one that might argue for the value of intact forest ecologies – is absent. This paper asks whether these landscapes might also be considered through the lens of design and thus explicates the various agents, protocols, and policies that produce the southern pine forest long before the standard two by four arrives on a wholesaler’s shelves or is cross-laminated into mass timber panels. Landscape Architecture has clear potential to articulate a more nuanced vision for the southeast’s forests, one which works to understand the potential ecological, social and cultural implications of timber production across the landscape. Thus, this paper will interrogate the forest not as an optimized machine which produces a product – a view of the landscape for which we have centuries of well-documented, adverse impacts – but instead argue for a vision of the southeastern forest capable of holding a variety of values – economic, aesthetic, ecological, cultural, and social. Revised Abstract When Europeans arrived on the North American continent, the pine savanna dominated the southeastern landscape, particularly in the gulf coastal plain. Sparse pines underlaid by a blanket of biodiverse grasses and forbs characterized this pyrogenic region. Since then, the southern pines and the forests they comprise have been shaped and shuffled by economy and industry: first for turpentine, then timber. Today, this landscape consists of vast patchworks of pines grown and managed for commercial timber production: “forest products” such as poles, dimensional lumber, or pulpwood. Though in many ways reminiscent of historic forest forms like the savanna, these plantations are artificial, more agriculture than forest. Lacking the complex trophic systems that support a wide range of species, their forms and rhythms are governed by a set of anthropogenic processes related to optimized planting and the science and business of biomass

extraction (Moe 2019, Elkin 2022). In the last decade, mass timber has emerged as a new and compelling timber-based building system. Architects, engineers, and builders have pronounced it the way of the future; it is strong, flexible, beautiful, and ostensibly “renewable.” Commercial foresters in the southeast, long trained to prioritize fiber production over forest ecology, are eager to bolster a flagging forest products business. A growing cadre of timber collaboratives at universities across the country advance research, while state forestry commissions estimate production capacities. Thus, this technology and its accompanying industry are poised to transform the southern forest once again. Given the current group of stakeholders, a critical lens on mass timber production—one that might argue for the value of intact forest ecologies—is absent. Building from a graduate studio at Auburn University, this project asks whether these landscapes might also be considered through the lens of design. Drawing from fieldwork and engagement with a diverse range of forest and industry stakeholders, students applied design research methods to the question of the future of the southeastern pine forest, explicating the various agents, protocols, and policies that govern it. Students designed novel forest trajectories which responded to the realities of contemporary forest production in the region. Rather than understanding the southeastern forest as a machine optimized to produce a product a view of the landscape for which we have centuries of well-documented, adverse impacts - their body of work argues for a vision of the southeastern forest as capable of holding a variety of values: economic, aesthetic, ecological, cultural, and social.

633 Bringing Nature Home: The Influence of Greenery on Well-being in High-rise Balcony Designs

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Keywords: Immersive Virtual Reality Environment (IVRE); Well-being; Residential Balcony; Greenery Volume

Interest in well-being within the built environment has gained significant attention in recent years, especially during the COVID-19 pandemic, when limited access to outdoor spaces highlighted the value of environments that allow some interaction with nature. This study explores how incorporating greenery into high-rise residential building balconies can impact residents' well-being. Using an Immersive Virtual Reality Environment (IVRE), an experiment was conducted with 65 participants, who were randomly assigned to one of three groups. Each group experienced two different VR balcony environments: one without vegetation (consistent across all groups) and another featuring varying amounts of greenery (low, medium, or high). Participants were then interviewed using a standardized questionnaire designed to assess well-being in the built environment, with the goal of identifying which balcony design had the greatest effect. The findings revealed that the presence of greenery on balconies positively influences well-being. Participants exposed to green balcony environments reported higher levels of happiness, satisfaction, a sense of social connection, increased independence, and improved task performance, all of which contribute to better mental health. Interestingly, the volume of greenery (whether low, medium, or high) did not significantly alter the effects on well-being, suggesting that even small amounts of greenery, such as a few potted plants, can have a meaningful impact. Additionally, no significant differences in well-being outcomes were found across different ages, indicating that the positive effects of greenery on balconies are broadly applicable.

Research by Design and Implementation

16 Knowledge Infrastructure for Coastal Infrastructure: a perspective on the Y02A patent initiative as heuristic for site-based climate adaptation strategies

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Keywords: coastal adaptation; innovation; resilience; design heuristics; research methods

This presentation discusses methods of bridging between global innovation networks and design/planning praxis as a vital form of knowledge exchange between domains of expertise addressing issues climate adaptation. Highlighting the method of knowledge exchange, the research explores coastal adaptation and resilience planning processes integrated with patent innovation studies to design advanced forms of coastal infrastructure in the San Pablo Bay, California - linking global innovation networks to real coastal sites. The Y02A patent classification scheme covering the “technologies for adaptation to climate change” organizes coastal, riverine, and urban climate adaptation innovations into distinct sub-classes with the aim of building technical capacity and coordinating discovery in related sectors. The relative newness of the Y02A classification scheme, and general obscurity of the patent system within the discourses of coastal design and planning, creates a unique situation. On one hand, the existence of a global framework for the management and diffusion of innovation in climate sectors is a provocation, or call-to-action, with the possibility to facilitate positive change in communities and ecosystems. On the other, the mechanisms and processes through which novel adaptation and resilience technologies are invented, tested, translated, and implemented through environmental/spatial design, planning praxis remain largely unknown - leaving gaps in knowledge that may slow the pace of innovation. To address the unique, and potentially transformative, relationship between climate innovation covered by the Y02A and coastal planning, this article introduces important aspects of the classification scheme and offers a case study analysis from 2017/18 Resilience By Design Bay Area Challenge in California which utilized patent innovation studies to develop site-based adaptation and resilience strategies. Revised Abstract This presentation discusses heuristic methods for bridging between domains of technological innovation and site-based climate adaptation strategies. Design heuristics facilitate the creation of novel design solutions in the early phase of ideation, building knowledge through research, precedent, and contextualization of a problem space. Highlighting the heuristic method of knowledge exchange, this presentation explores how coastal adaptation and resilience planning processes may be informed by patent innovation studies facilitated by the Y02A patent classification scheme to design advanced forms of coastal infrastructure. The Y02A patent classification scheme covering the “technologies for adaptation to climate change” organizes coastal, riverine, and urban climate adaptation innovations into distinct sub-classes with the aim of building technical capacity and coordinating discovery in related sectors. The relative newness of the Y02A classification scheme, and general obscurity of the patent system within the discourses of coastal design and planning, creates a unique situation. On one hand, the existence of a global framework for the management and diffusion of innovation in climate sectors is a provocation, or call-to-action, with the possibility to facilitate positive change in communities and ecosystems. On the other, the mechanisms and processes through which novel adaptation and resilience technologies are invented, tested, translated, and implemented through environmental/spatial design and planning praxis remain largely unknown - leaving gaps in knowledge that may slow the pace of innovation. Although the primary function of the

patent system is bureaucratic management of innovation and establishment of legal rights for inventors, it also serves as a repository of technical knowledge, providing deep insights about innovation, past discoveries, imaginaries, and future trends, that can inform decision making and heuristics in landscape, urban, and environmental planning. To address the unique, and potentially transformative, relationship between climate innovation covered by the Y02A and coastal planning, this research presentation introduces important aspects of the classification scheme and offers a case study analysis from 2017/18 Resilience By Design Bay Area Challenge in which the design team employed heuristic methods to translate patent innovation studies into site-based adaptation and resilience strategies for subsidence reversal, sediment management, and construction of artificial benthic ecologies. Details of the “Grand BayWay” project developed by Tom Leader Studios (TLS) and the “Common Ground Team” (The SF Explortorium, Michael Maltzan, Guy Nordenson, SITE Lab Urban Studio, Dr. John Oliver, Richard L HIndle) in the San Pablo Bay, will be presented in combination with innovation studies utilized during the design phase.

67 Material Temporalities and Earthen Material Practices

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Keywords: Digital fabrication; Material exploration; Design process; Site-based installation

Earthen material practices, combining soil, clay, sand, and stabilizers, offer less extractive and carbon-intensive alternatives to conventional construction typologies (Gallipoli, et. al. 2017). While most research and practice focus on creating permanent architectural structures (Laborel-Préneron et. al, 2016; Elahi, et. al, 2020) or architecturally-oriented digital fabrication (Rael and San Fratello, 2018, Akemah and Ben-Alon, 2023) this article aims to extend conversations around experimental earthen material and digital fabrication practices to landscape architecture. A small-scale installation at [location redacted for peer review] serves as a case study using earthen materials as a process to support emergent ecological systems and habitats, respond to variable hydrological conditions, and degrade over time. The design and fabrication process melds high-fidelity digital fabrication with a low-fidelity material process to develop custom site-based modules. The work questions the necessity of permanence in the built environment, speculating on alternative temporalities and material compositions that might foster or encourage a range of new landscape performative functions. Phase 1 places twenty-four modules in two unique forms (the “donut” to capture sediment and organic matter, and the “mound” to shed water and support microhabitats) at the edge of a marsh, exploring the relationship between water, earthen materials, and time. Phase 2 places twelve modules in four forms to capture organic matter and support vegetation growth in a prairie before, during, and after a prescribed burn. In both phases, each module was cast with differing material compositions to test ideas about aesthetic qualities, material permanence, and construction methodologies, including materials found on-site, such as sand, soil, seeds, and grasses, and waste materials, such as paper, cardboard, coffee, and biochar. Repeated site visits, photography, and hybrid representations document and record changes in the modules, micro-hydrologies, vegetation, and habitat creation. The installations reveal new potentials and lines of inquiry for designing with temporal change, construction as processes, and landscape aesthetics. On a material and detail scale, earthen materials support a design that embraces natural processes over time (Dixon, 2021), including growth and decay, collection and conveyance, and permeability and infiltration, and becomes a host for both designed and spontaneous future activities. Design becomes a process in “continuous transformation” (Diedrich, 2021), rather than aiming for a static state or permanence, thus encouraging new aesthetics tied to dynamic ecological processes (Reed and Lister, 2016). Overall, these case studies and framing theoretical discourse aim to suggest new materials, forms, and functions for earthen materials in landscapes.

132 Practice-Based Research Ascending, Part 2: Motivations + Mechanisms for Research in 12 Design Firms

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Keywords: Practice-based research; Design research; Design firms

Research activities at professional design firms are on the rise, whether formalized through internal initiatives like research labs and grant programs or informally through design staff interest and curiosity. More firms are committing resources to the complex area of practice-based research, and more practitioners are expressing interest in engaging in research efforts and in partnering with academics to answer questions that need answering. A looming backdrop to this trend is the decades-long dialogue about the need for stronger connections between research and practice in landscape architecture, and the role that the academy can play (Beson, 1998; Brown and Corry, 2011; Jost and Lamba 2010; Van den Brink and Bruns, 2012; Nijhuis and de Vries, 2022; Deming, 2022; Melcher, 2023). While research activities pursued within professional design offices differ in many ways from those conducted in an academic setting, academic researchers benefit significantly by engaging more deeply with colleagues in professional practice. This process is facilitated when academics understand how firms think about research and how they are pursuing research-related activities in practice. To facilitate this exchange, this presentation summarizes findings from interviews with leading design firms that are engaging in a wide range of research-related activities (Barnes et al, 2024). The interview process replicated and expanded upon Robert Ryan's 2023 study, which interviewed 9 design firms to identify motivations and mechanisms for research in their practice. This effort interviewed 12 additional design firms that were identified in one of two ways: they were selected under Ryan's criteria (including "research" on their website) and did not participate, or they are known by the Landscape Architecture Foundation to be engaging in research activities to some degree. Interviews were administered by the author and analyzed for key findings. Findings will be presented under several themes: models for practice-based research, motivations and incentives, funding mechanisms, collaboration models, methods utilized, and research products/outcomes. The presentation will also discuss interviewed firms' opinions on which research skills are most needed by landscape architecture program graduates entering the workforce. Ultimately, research pursuits in the interviewed firms were found to be diverse, context-dependent, and often driven by staff and their curiosity. The goal of this presentation is to shed light on current approaches to practice-based research within design offices and offer inspiration for new collaborations between academia and practice.

158 Green Infrastructure on Campus for Experiential Learning

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Keywords: Sustainable design; Nature-based solutions; Learning landscape; Prototyping

As green infrastructure has become a critical component of the profession, it is imperative that faculty engage in teaching demonstrations and transdisciplinary research to illustrate their impacts on the environment (Johnson et. al., 2019; Lovell et. al., 2009). Focusing on the conference theme, Processes + Impacts, panelists representing five landscape architecture programs across the United States explore the implementation of green infrastructure (GI) on campus landscapes and how they can be used to conduct research and enhance experiential student learning. While living stormwater infrastructure is commonly employed by designers and engineers, students need to explore and interact directly with GI prototypes to learn more deeply from them. Impacts are not just on the natural environment but also on learning experiences themselves. We can incorporate student engagement into the process to increase student knowledge and skills. The learning cycle includes “experiencing, reflecting, thinking, and acting” (Kolb, 2024). As students actively engage in prototype design, implementation, monitoring, and stewardship, they gain hands-on experience in creating a GI feature, reflect on what is working or failing within the system, consider solutions to solve problems, and explore critical ideas to determine GI effectiveness (LeBleu et. al., 2019; Rottle et. al. 2022). Experiential learning opportunities create invaluable educational experiences while providing valuable research on GI technologies. A case study methodology will be used to compare four university faculty/student experiences regarding their implementation, process, funding, and lessons learned (Yin, 2003). Each case study will be represented by a panelist who will explore how their university has implemented green infrastructure prototypes that have served as research projects and field applications and provided interactive teaching/learning opportunities for students. The panel will open by examining various learning strategies to understand how landscape architecture students can learn by exploring interventions within a campus landscape (Center for Teaching, n.d.). Each panelist will then delve into GI installations at their respective university–including green roofs, living walls, floating wetlands, rain gardens, porous paving, and bioswales. They will note specific GI designs, project implementation strategies, and funding sources. The panelists will further describe the impact their work has had on their research (and scholarly advancement) to date. Finally, a discussion of student learning and engagement strategies and lessons learned related to each project will be highlighted.

177 Ecotone: Tools for a Mobile Documentary Process Along the Puyallup River

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Keywords: Ecoliteracy; Storytelling; Natural Dye; Colorshed; Tool-making

A tool performs a specific function in a specific context–"the right tool for the job". A tool is an extension of the body which augments one's capacity (Haraway). A tool is a manifestation of ideologies (Lorde). If site photography, satellite orthomosaics, geospatial data, survey/site plans and environmental quality monitors are foundational tools for encountering and transforming unfamiliar places, they augment one's capacity to transcribe environmental information. That is to say, these tools function to facilitate faster abstraction (Brain), broader extraction (Dumpelmann), and more complete estrangement from the material realities of place (Johnson). Design's engagement with previously unfamiliar places can therefore be energized (Wettstein) as a new site for developing decolonial practices and potentials. How can one come to a place and engage in right relation with its scale, its ghosts (Tuck and Ree), its beauty, its ephemerality, its scars, its totality, its stewards, its histories, its relatedness to other places? How do the tools and the methods used to engage with place adapt to different positionalities in different settings (Cadogan)? These questions animated the authors' walk through Puyallup lands. From August 20-23, 2024 we walked from the mouth of the Puyallup River toward its headwaters on Tahoma/Mt. Rainer*, gathering plants, fungi and minerals to create a dyed map of the river as we experienced it. We passed through various ecotones, perceiving fleetingly the transitions between each community. We tinkered with old tools and produced new ones to structure a relationship with the Puyallup River. The first tool, the neologism "colorshed" (a region of shared hues and pigments), was a conceptual frame used to constrain the actors and extents shaping our short encounter. The second tool was a set of logistical and ethical guidelines for moving through and documenting the colorshed. The third tool, a 20-foot fabric wearable wrap, organized and made visible the results of our process (see www.eco-t.one). This experiment with tools and methods offers a framework for attuning to the hyperspecificity of place and for fashioning one's own implements. Significantly, this proposal reframes the ostensibly-neutral conceptual tool for many design actions–site–as yet another offering in the toolbox, with its own attendant functions and ideological limitations. Perhaps it is time to retool. Revised Abstract A tool performs a specific function in a specific context–"the right tool for the job". A tool is an extension of the body which augments one's capacity (Haraway 1987). A tool is a manifestation of ideologies (Lorde 1984). If site photography, geospatial data, and survey/site plans, e.g. are tools for encountering and transforming unfamiliar places, they augment one's capacity to transcribe environmental information. In other words, these tools function to facilitate faster abstraction (Brain 2018), broader extraction (Dümpelmann 2014), and more complete estrangement from the material realities of place (Johnson 2012). Design's engagement with previously unfamiliar places can therefore be re-energized (Wettstein 2020) to develop decolonial practices and potentials. How can one come to a place and engage in right relation with its scale, its ghosts (Tuck & Ree 2013), its ephemerality, its scars, its stewards, its histories, its relatedness to other places? How do the tools and the methods used to engage with place adapt to different positionalities in different settings (Cadogan 2024)? From August 20-23, 2024 we walked from the mouth of the Puyallup River–previously unfamiliar to us–

toward its headwaters on Tahoma/Mt. Rainer to document and perceive landscape through pigmentation. We passed through various ecotones, perceiving fleetingly the transitions between each community. We tinkered with existing tools and made new ones to structure our encounter with the river. The first tool we made, the neologism “colorshed” (a region of shared hues and pigments), was a conceptual frame that trained our attentions on pigment-giving actors and the forces that brought them within a shared region. The second tool was a set of logistical and ethical guidelines for moving through and documenting the colorshed. For example, we stopped roughly every 15 minutes to collect pigments and took only enough plant matter to fill a 20 mL vial. We used the Puyallup’s waters to make dye baths. We carried everything on our backs. Our third tool, a 20-foot fabric wearable wrap carrying 138 unique vials, made visible the linear order in which collected pigments along the Puyallup River. This experiment with tools represents a framework for attuning to the hyperspecificity of place and for fashioning one's own implements to represent those specificities. Significantly, this proposal reframes the ostensibly neutral conceptual starting point for many design actions–site–as yet another offering in the toolbox, with its own attendant functions and ideological limitations. Perhaps it’s time to retool.

404 A Six-dimensional Regenerative Design System: Expanding the Body of Knowledge in Landscape Architecture through the Integrated Field of Urban Infrastructure

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Keywords: body of knowledge; urban regeneration; urban infrastructure; field theory; interdisciplinary integration

[Introduction] Based on the paradigm shift of China's urban development pattern, this research aims to expand the landscape architecture body of knowledge oriented to the regeneration of the urban built environment. This endeavor not only aligns with the pressing issues of rapid urbanization and its consequent human impacts, but also delves into the evolving dynamics of design pedagogy and professional practice under the lens of interdisciplinary methodologies. [Methods] This study is anchored in a comprehensive theoretical framework that synthesizes the insights of sociological "field theory" with the transformed urban conditions. This dynamic framework provides a robust platform for dissecting and reinterpreting the complex interrelationships within social structures and implementation mechanisms, particularly in the context of urban regeneration. The research identifies three key paradigm shifts that are critical to the regeneration of urban infrastructure: 1) a shift in how we view the relationships in the "field" between people and the built environment; 2) a strategic shift in the pathways to urban regeneration; 3) a redefined identity for landscape architects. In terms of professional practice, the study draws on extensive redevelopment projects along the waterfronts of the Huangpu River and Suzhou Creek in Shanghai, among others, to construct a "Six-dimensional Regenerative Design System, SdRDS". This system is meticulously designed to address the multifaceted challenges of urban regeneration, emphasizing sustainable and inclusive growth for both physical placemaking and non-material urban systems. [Results] The study suggests transcending disciplinary boundaries and fostering collaboration among diverse stakeholders to advance the landscape architecture body of knowledge. The findings underscore the need for six critical dimensions: 1) systematic knowledge of placemaking; 2) responsive knowledge of cultural and historical contexts; 3) innovative integration of infrastructure; 4) strategic creation of scene nodes; 5) ecological knowledge for environmental restoration; 6) artistic intervention in public spaces. Each dimension is explored in depth, revealing its intrinsic value and potential impact on the broader field of urban regeneration. [Discussion and Conclusion] By advocating cross-disciplinary integration, the research presents a compelling case for a paradigm shift in the field of landscape architecture. This shift is critical not only for expanding the knowledge base, but also for empowering the landscape architecture community to forge new values, perspectives, and leadership roles. It is envisioned that landscape architects will emerge as key coordinators and harmonizers, leading the way in navigating the complexities of urban regeneration against the backdrop of contemporary social and environmental challenges.

418 Research and Practice Collaboration, Two Case Studies

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Keywords: research; practice; climate; biodiversity

In this presentation, I propose more collaboration between academics and practicing professionals, mutually beneficial arrangements that can offer practitioners better access to new information and academics more opportunities to field test ideas. The need for collaboration stems from the rapid evolution of information and technology and equally rapid changes in society and the environment that make growth in practice urgent. I will illustrate with practice-as-research case studies from our work at MKSK, both successes and failures, and discuss logistics, financing, and results. Three Case Studies: Public Housing Wellness Landscape Pilot Project – Based on the findings by a group of Scandinavian ecologists/immunologists (Dunn, 2018, pp 53-74; Hanski, et al, 2012; Puhakka, et al, 2019), MKSK collaborated with NC State ecologist Rob Dunn to design an experiment that explores the potential of biodiverse landscapes and microbiomes to benefit human health. This before-and-after study would replace a relative monoculture with a diverse landscape and test health outcomes. We chose a public housing site because people spend the most daily hours at home. Swabs will be taken of subjects' skin and interior surfaces of apartments for microbial DNA testing. DC Public Housing supports the project and is willing to help finance it. We are working on connections with DC research hospitals immunology departments. DC Mini-forest – This partnership – four environmental non-profits, led by MKSK – will plant Washington, DC's first Miyawaki forest (SUGi, 2024), planned for March 2025. The site is a turf hillside within an existing community garden in Ward 7, an underserved and historically Black community. The team will collaborate with UDC's College of Agriculture, Urban Sustainability and Environmental Science for post-construction monitoring. Acknowledge Farm Invasive Species Management Plan – This 2021 project is based on scholarship pioneered by Steven Hadel in the 2000's which found that replanting native species in invasive removal areas makes landscapes more resistant to reinvasion (Johnson & Handel, 2019). Working on a boutique CBD farm in western Maryland, MKSK prepared a manual that ties "mug shots" of invasive species to an interactive location map, a calendar of removal times, and a list of native replacement species. We are seeking an academic partner to expand on the species catalogued in our system and turn the manual into a phone app for field use. Revised Abstract In this presentation, I will discuss two nascent practice based research case studies, examples of collaborations between professional landscape architects and academics. This growing trend in collaboration (Smithwick, 2023; Barnes, 2024) has the potential to yield a positive feedback loop of mutual benefits – access to new information for practitioners and field testing opportunities for academics. However, these arrangements are not without logistical pitfalls, a topic that has not been discussed in depth to date. I will illustrate how political, regulatory, scheduling and funding issues require great flexibility and perseverance from teams, but will advocate for continued growth in this arena. Two Case Studies: DC Mini-forest – This partnership – four environmental non-profits, led by MKSK – will plant Washington, DC's first Miyawaki forest (SUGi, 2024), planned for March 2025. Our team chose to target public sites not owned by the Federal government (too much red tape) on the underserved east side of the Anacostia River, but entanglements with DC government have slowed the process. The site is owned by the DC Housing Authority, but controlled by UDC's community/experimental East Capitol Street Urban Farm in Ward 7, an historically Black

community. The team will collaborate with UDC's farm staff and faculty to plant the mini-forest and monitor it post-construction. The research goal is to measure mini-forests' touted environmental co-benefits. The farm staff has expanded the research goals by including recreation of densely planted food forests, an historic supplementary food practice in DC's Black community. Recently, District DOT, the funding agency, has decided to put the project out for public bid. Public Housing Wellness Landscape Pilot Project – Based on the findings by a group of Scandinavian ecologists/immunologists (Hanski, et al, 2012; Puhakka, et al, 2019), MKSK collaborated with NC State ecologist Rob Dunn to design an experiment that explores the potential of biodiverse landscapes and microbiomes to benefit human health. This before-and-after study would replace a relative monoculture with a diverse landscape and test health outcomes. We chose a public housing site for this experiment because people spend the most hours at home daily. Swabs will be taken of subjects' skin, interior surfaces of apartments, and from outdoor air samples for microbial DNA testing, to measure the presence of microbes in interior vs exterior space (Dunn, 2018, pp 53-74). DC Public Housing supports the project and is willing to help finance it. We are working on connections with DC research hospitals immunology departments.

541 How to make the stuff to make the stuff: the necessity of analog material knowledge in 3D fabrication

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Keywords: Digital fabrication; Precast concrete; Material exploration; Materials selection; Design process

This paper discusses the impact that a robust knowledge of analog materials, or lack thereof, plays in a digital fabrication process from 3D modelling to final prototype. As designers increasingly utilize 3D modelling, the missing materials knowledge link between 3D modelling and prototype fabrication can have a profound impact on the viability of the final product. The research team utilizes multiple recently finished prototyping projects of precast concrete urban elements at The University of Calgary as case studies that illustrate the necessity of embodied knowledge with “analog” building, craft, and materials selection in a digital fabrication process. These lessons are particularly of value in academia where student researchers frequently do not have years of experience upon which to draw. The two precast concrete prototype case studies span the summers of 2022-2024 by University of Calgary research teams in partnership with The City of Calgary, as part of their initiatives to enhance public space in the downtown core. The materials selection process around creating the “mold inserts” for the concrete pours profoundly impacted everything from software choice, materials selected, fabrication machines used, methods of assembly, and the finish quality of the final prototypes, with each impactful variable discussed in detail. Software: switching from Rhino to Fusion360 (CAD/CAM) was necessary due to the physical geometry of the proposed prototype and CNC milling process to create the mold inserts. Materials selection and fabrication machines used: the successes and failures with using rigid foam, plastics (HDPE, puck board, PETG), polyurethane (two-part liquid rubber and finishes), adhesives, mold release agents, and engineered lumber (MDF, HDO) in creating the mold inserts with a combination of CNC and 3D printers. Collaborative manufacturing: discusses the impacts to the material selection and fabrication process necessitated by utilizing a concrete subcontractor, as the prototypes exceeded the capacity of our university workshop. Post-fabrication finishing: discusses what materials and techniques (sandblasting) were needed to refine the concrete prototype prior to installation. The case studies illustrate how the entire design and fabrication process was enhanced by deep knowledge of the physical materials that were needed to craft the mold inserts of a successful precast concrete prototype. As such, we argue that analog techniques and materials selection factors play an equal, if not greater role than digital tools in isolation as much can be lost in translation between digital models and physical material choices Revised Abstract This paper discusses the impact that robust knowledge of physical materials, or lack thereof, plays in a digital fabrication process from 3D modelling to final prototype. As designers increasingly utilize 3D modelling, the missing materials knowledge between modelling and prototype fabrication (Beorkrem, West) can have profound impacts on the viability of final products as the process is far more complicated than a “direct link” between modelling software and 3D output devices. This paper focuses on creating better strategies for the missing link between software and viable precast concrete prototypes: the mold building process. Two case studies will be used to illustrate the profound impact physical materials knowledge brokers have with successfully fabricating ‘mold inserts’, as this step between 3D modelling and the final prototype constituted most of the fabrication effort and the most critical part of enabling the concrete plant to create

viable precast prototypes. The University of Calgary research team created two prototyping projects made of precast concrete between 2022-2024 in partnership with City of Calgary: a four-piece modular patio barriers / planters set and a site furniture set. Though the projects utilized different design approaches (topology optimization versus technical precedent), mold fabrication techniques (CNC milling versus robotic hotwire) and modelling software (Rhino versus Fusion360), both were impacted equally by the materials selected, fabrication machine versus material outcomes, methods of assembly, and the finish quality of the final molds. The results of both projects were enhanced by our knowledge brokers (experienced professors / practitioners, workshop technicians, and concrete manufacturing consultants) general knowledge base along with successful additions of trial-and-error experiments to work around poor outcomes, human error, and unknowns. The research team meticulously documented every aspect of material selection and fabrication in a detailed fabrication journal supplemented with photography and videos, resulting in an evolving “likeliest outcomes guidebook” to get to final prototypes more efficiently and with less costly failures during the mold building stage. In the ever-evolving realm of digital fabrication in academic environments, rigorous documentation of “process and result” with past projects could result in establishing more reliable resources for how to better create successful prototypes. The research documentation may also serve as a new baseline for students as they frequently do not have years of experience upon which to draw and their fabrication process rarely deviates from the “direct link” between modelling software and 3D output.

552 Trans species Landscapes: 3D printing, fungi, and pots

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Keywords: fungi; 3D printing; bio materials; resilience; filament

Hannah Brandt's challenge to landscape architecture "They (landscape architects) could start by framing conceptual tools that are ontological, that respect a fundamental collaborative status of being as opposed to just taking charge, either as stewards or by setting all living things against each other in some false survivalist narrative." (Brandt, 2024) challenges a "thinking profession" (Ingraham, 2024) that builds physical worlds to rethink its ontologies. This proposal begins to develop a testing space for ontological tools, conceptual and physical. Landscape architects commonly specify inoculation with fungi for planting mixes. These fungi are often neither local nor germane to the plant being placed in the ground. Substantial research suggests that these fungi inoculations are more wishful thinking than actual support of the ecology of the trees or shrubs. (Goode, 2022) Also, fungi live in communities in the soil. (Bhatnagar, 2022) However, Rudgers Lab at the Sevilleta Long Term Ecological Research Site has shown native fungi symbionts do improve plant species outcomes. (Kivlin et al, 2013) The authors propose to 3D print visualizations of thick spaces of sentient landscapes (interrelations among plant and other species) to be used as a matrix for improving plant fungi relationships. The Machine and Hand Lab's 3D printing experimentation with biodegradable, low impact, materials and embedding fungi and seeds into these forms create both an illustration and an active experiment. The 3D printed forms are tested by planting them in a greenhouse application where germination rates and fungi fruiting are tracked with a stop motion camera set up. Forms and species of fungi and seeds will be tracked. Conclusions: These methods result in comparative conclusions about morphologies, materials, and fungi seed interactions. For a final presentation these will be expressed in imagery documenting the three month duration of the experiment and tables reflecting quantified surface areas, porosity and other measures for morphologies, as well as seed germination and fungi fruiting rates. Discussion: This project enacts inter and trans species interactions through the medium of 3D printing and landscape explorations. In a practical application, these methods of nurturing fungi and plants together may lead to in field methods to improve resilience and germination of landscapes from seed. This is a companion presentation to Trans species Landscapes: Sentient Worlds, which is an exploration of plant sentience, Neo Materialist theory, and OOO theory applied to landscape architecture. Revised Abstract Fungi live in communities in the soil and support plant life. (Bhatnagar, 2022) Landscape architects thus commonly specify inoculation with fungi for planting mixes. These fungi are often neither local nor germane to the plant being placed in the ground. Research suggests that these fungi inoculations are more wishful thinking than actual support of the ecology of the trees or shrubs as they are mismatches for the plant species involved. (Goode, 2022) However, Rudgers Lab at the Sevilleta Long Term Ecological Research Site has shown native fungi symbionts do improve plant species outcomes. (Kivlin et al, 2013) The authors 3D print small test pots from biodegradable filaments made from leaf litter, egg shells, and other similar materials, with fungal spores mixed in, through the expertise of the Hand Machine Lab at University of New Mexico (Beuchley). Authors accessed two sources of spores. The first is soil from blue gramma grass roots and near blue gramma plants as collected at the Sevilleta Long Term Ecological Research (SEV LTER) site. The second is an inoculation mix

created by a local landscape firm (Raincatcher, Santa Fe). The test pots are evaluated for fungal growth over a month on a matrix of biodegradable filament materials crossed referenced with spore type. Best performing mixture pots are re-printed with the same spore/material and filled with native soils (alkaline, low organic matter). Blue gramma grass seeds are planted in the pots and their germination rates tracked over another month. Research questions: can 3D printed biodegradable materials inoculated with spores provide a method for inoculating plants with supportive symbiont fungi? How do native grasses (Bouteloua gracillis) interact with native soil symbiont fungi vs more generalized fungal inoculants? Conclusions: These methods result in comparative conclusions about types of biodegradable materials as pot materials, interaction of 3D printing with spore germination and fungal growth, and seed germination as a proxy for plant fungal symbiont effectiveness in relationship to one native grass in the Chihuahuan desert. The resulting matrix of materials and fungal spores will guide further exploration into specificity of species interactions or trans species landscape understanding. In a practical application, these methods of nurturing fungi and plants together may lead to in field methods to improve resilience and germination of landscapes from seed. This is a companion presentation to Trans-species Landscapes: Sentient Worlds, an exploration of plant sentience, Neo Materialist theory, and OOO theory applied to landscape architecture.

573 Curbing Sediment: Field Test Conclusions

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Keywords: stormwater; construction; curbs; waterquality; green infrastructure

Stormwater runoff has substantial impacts on receiving waters. Pollutants such as sediment, nutrients from lawn fertilizers, bacteria, viruses, pesticides, metals, microplastics, deicing salt, and oils and greases. Pollutants accumulate on the road surface and wash off during storm events, carried to storm drains via concrete curbs/gutters/aprons, and deposited into waterways, often without treatment. Once pollutants enter the waterways, they impact the ecosystem and negatively impact water quality. The interdisciplinary project team has developed novel drainage infrastructure, Curbing Sediment, to ameliorate stormwater quality impacts on receiving waters. Curbing Sediment seeks to rethink dated drainage infrastructure to collect sediment and toxins that accumulate on roads. In 2019, laboratory tests simulated runoff on twenty-one different curb and gutter designs. Seven of the designs provided >80% reduction in total suspended solids in simulated stormwater meeting the EPA's criteria to become a BMP. In 2022, the team received an Ohio State Energy Partner Grant to build a pilot project on Ohio State University's campus. In May of 2023, the team completed construction on the pilot. The pilot includes 200 ft of new curb, gutter, and apron tested in real rainfall conditions. Automated sampling techniques have been used to collect paired stormwater samples from runoff from standard curb, apron, and gutter to act as a control and the Curbing Sediment system. This presentation will outline the status of the project since final construction. This will include the processed data collected from over a year of monitoring, a visual catalog of the curb before, during, and after construction, and lessons learned for future applications. This includes a new parking lot design for the Hampton Roads Planning Commission, in Chesapeake, Virginia, which has included Curbing Sediment. This demonstration parking lot, under construction, will use Curbing Sediment as a pretreatment for porous asphalt. Monitoring of the new application will begin once construction is complete in December 2024. The parking lot includes additional green infrastructure features and was designed with the goal of being a demonstration lot for the region.

590 Foraging Indeterminacy

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Keywords: indeterminacy; foraging; ecological infrastructure; cultural practices

At an important juncture in his career, John Cage composed a collection of short performance pieces he called, Indeterminacy, much of it inspired by his life-long practice of mushroom foraging. Through foraging Cage engaged with a broader, yet largely hidden and often marginalized cultural practice (Shackleton et.al.) that also involves encounters with the indeterminacy of ecologies (Tsing). Like Cage, contemporary foragers can be seen as part of a vanguard discovering value in the uncurated plant assemblages of emergent ecologies while also transgressing boundaries (public/private, culture/nature) to claim common space and rights of access for public harvest. This presentation identifies the potential for extending Cage's intentional strategies and linking them with the vital cultural practices of foraging as a means of designing more flexible ecological infrastructure that responds to the uncertainties of climate change. It synthesizes recent multi-disciplinary research, including urban geography and anthropology, on the contemporary resurgence of foraging to identify challenges and opportunities for design. The potential for applying new frameworks and practices is illustrated in a case study of a community-based project to develop a nine-mile urban riparian corridor as an edible ecology for public harvest. Through a transdisciplinary and action-oriented research process with diverse community partners this project demonstrates ways of working with the indeterminacy of ecological infrastructure and increasing community agency and rights of use through foraging. Revised Abstract At an important juncture in his career, John Cage composed a collection of short performance pieces he called Indeterminacy, much of it inspired by his lifelong pursuit of mushroom foraging. This presentation begins at the intersection of Cage's chance compositions and foraging as means of opening new design pathways that work with the indeterminacy of novel ecologies of climate change and informal social practices. It identifies how Cage's embrace of indeterminacy emphasizes open-endedness and temporality over static compositional methods aligns with contemporary design strategies, such as in the work of Gilles Clément or Scape's Living Breakwaters project, for flexible frameworks that engage the unpredictable and emergent nature of ecologies. Foraging for edible mushrooms and plants is seen as a fundamental, however often marginalized cultural practice, that also involves chance encounters as well as spaces, such as vacant lots or urban peripheries, that are open to indeterminate process because they fall outside or in-between areas conventional control. Contemporary foragers can be seen as part of an informal vanguard transgressing boundaries (public/private, culture/nature) and discovering value in the "spontaneous" plant assemblages in these leftover spaces. The challenges and opportunities for designing with indeterminacy and foraging are explored in a case study of a community-based project to develop a nine-mile urban riparian corridor as an edible ecology for public harvest. Using an action-oriented research approach, this on-going project emphasizes collaborative engagement with diverse partners through community-led foraging walks, planting events, and design charrettes to build foraging knowledge, networks, and practices that expand access to edible ecologies, increase community agency, and change policy. The role of indeterminacy in this design approach is assessed through a set of practices analogous to Cage's operations such as revealing value in found landscapes, emphasizing event over form, providing cues for actions, and creating

openings for new systems to emerge. This approach demonstrates ways of recognizing the value of indeterminacy and working with the vital practices of foraging for designing places open to novel uses and ecologies in the face of unpredictable systems change.

607 You Can Move Mountains / Puedes Mover Montañas

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Keywords: Monterrey; Extractivism; Adobe; Indigenous craft; Material research

This material research explores how bodies function within different building processes, ranging from adobe and compressed earth to large-scale monolithic concrete developments in Monterrey, Mexico. Both industrial and earth-based practices involve extraction, but at vastly different scales and impacts. Through material collection and hybrid drawings, the work examines the scalar relationship between embodiment, indigenous craftsmanship, and land commodification, aiming to integrate land use and value within an ethical framework. While earthen architecture is clearly a place-based strategy, Monterrey's prolific use of steel and concrete is place-based in its own way, since both materials are deeply tied to the city's industrial identity. These materials have also shaped Monterrey – both in building and the voids left behind from harvesting material for concrete for the global manufacturers located there. The dramatic mountains that cradle the city are shoveled away to expose a flattened surface that erodes quickly, that plants cannot grow as easily on, almost creating a room out of a mountain. Knowing that extraction and exchange will always be a part of our relationship to the landscape, how might we consider the void as a design opportunity? Our research drew from visits to protected landscapes in Nuevo León, studying the interaction of bodies with manual adobe brick tradition and compressed earth building methods, and a visit to an abandoned industrial quarries, part of the legacy known as the "scars of the mountains" (Las cicatrices de las montañas). Ultimately, we reflect on the tactile relationship between the body and land, and how commodification reduces this connection to a mere product. Through the creation of a bilingual soil swatchbook (a micro-extraction of our own), curation of thermal photographs of building materials, and hybrid drawings exploring a range of building tactics, this research investigates how land value perceptions change through these processes. Monterrey's mountainous landscape supports ecotourism and vernacular adobe architecture, while its urban identity is tightly linked to industry and foreign investments, such as Tesla's new Gigafactory. In the context of today's green energy transition, we are accessing rare earth materials and minerals through highly extractive processes, and shipping them across the world. Extractive processes will continue to shape our landscape. As we take up a handful of earth, a micro-extraction, what can we let it teach us? Revised Abstract This material research explores how bodies function within different building processes, ranging from adobe and compressed earth to large-scale monolithic concrete developments in Monterrey, Mexico. Both industrial and earth-based practices involve extraction, but at vastly different scales and impacts. Through material cataloging, brick-making workshops, and hybrid drawings, the work examines the scalar relationship between embodiment, indigenous craftsmanship, and land commodification, aiming to integrate land use and value within an ethical framework. While earthen architecture is clearly a place-based strategy, Monterrey's prolific use of steel and concrete is place-based in its own way, since both materials are deeply tied to the city's industrial identity. These materials have also shaped Monterrey – both in building and the voids left behind from harvesting material for concrete for the global manufacturers located there. The dramatic mountains that cradle the city are shoveled away to expose a flattened surface that erodes quickly, that plants cannot grow as easily on, almost creating a room out of a mountain. Knowing that extraction and exchange will always be a part of our relationship to the landscape, how might we consider

the void as a design opportunity? Our research draws from visits to protected landscapes in Nuevo León, studying the interaction of bodies with manual adobe brick tradition and compressed earth building methods, and a visit to an abandoned industrial quarry, part of the legacy known as the "scars of the mountains" (Las cicatrices de las montañas). Using thermal imaging, we compare materials' solar footprints and demonstrate the capacity for earth-building techniques to pose solutions for living through climate acceleration, carbon sequestration, and material reuse. Ultimately, we reflect on the tactile relationship between the body and land, and how commodification reduces this connection to a mere product. These hyper-local, tactile practices have implications for our profession: if the discipline of landscape architecture involves the re-organization of landscape, earth-building can teach us accessible methods to analyze soil composition and ultimately, to understand what belongs to a site. We develop embodied awareness of differences between construction techniques, reading site limitations and opportunities through our own physicality. In the context of today's green energy transition, we are accessing rare earth materials and minerals through highly extractive processes and shipping them across the world. Extractive processes will continue to shape our landscape. As we take up a handful of earth, a micro-extraction, what can we let it teach us?

Research Methods

11 Large Language Model (LLM) Analysis of the Urban Park and its User Characteristics Using Social Networking Service Image Datasets

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Keywords: Urban Parks; Park Physical Characteristics; User Characteristics; User Behavior; User Sentiment

The importance of urban parks as green infrastructure is becoming increasingly urgent as landscape architects work to mitigate the impacts of the climate crisis. Research methodologies in this field have evolved to address both ecological elements (e.g., NDVI or NDWI) (Li et al., 2020) and user behaviors or emotions, which are typically studied through field or questionnaire surveys (Deng et al., 2020; Luo et al., 2022). With advancements in AI, research methods in landscape architecture are continuing to diversify (Fernberg & Chamberlain, 2023). A notable trend is the use of social media data to study both park characteristics and user behaviors (Fernandez et al., 2022; Lu et al., 2021). In particular, analyzing images posted by social media users has become crucial for understanding park features and user preferences (Huai et al., 2022; Song et al., 2020). However, while several methods are available for image analysis, such as image segmentation or CNN-based techniques, the lack of park-specific labels makes it difficult to achieve in-depth results without an extensive labeling process for each iteration. To address this gap in visual data research, we adopted a large language model (LLM) to analyze image content through natural language processing. We analyzed 350,284 geo-tagged Instagram images of urban parks posted between January 2017 and August 2023. The study examined park features, user characteristics, usage patterns, and emotions. We employed the vision-language model InternLM-XComposer-VL for binary classification of park versus non-park images and ChatGPT-4o to analyze multimodal elements. This approach enabled us to query images for park features, user types, activities, times, seasons, and emotions. The results showed that plant elements dominated park images, followed by infrastructure such as roads, pavements, stairs, benches, pavilions, and playground equipment. Picnic items like food and blankets were also common. People often appeared alone or in pairs, frequently with children or dogs. Walking was the most common activity, and park use peaked in the late afternoon and evenings, particularly in the summer. Emotionally, neutral expressions were the most common, followed by happiness, calm, and curiosity. With the results that highlight how users behave in parks and engage with park features during specific times and seasons, our findings offer noteworthy context for urban park design and demonstrate how AI technologies such as LLMs can enhance and streamline landscape research through large-scale image analysis.

33 Comprehensive Review of Measurement Methods for Thermal Comfort Assessment in Microclimate Design

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Keywords: Thermal Comfort; Microclimate Design; Measurement Methods; Thermal Sensitivity; Core Temperature

Introduction: Microclimate design plays a critical role in ensuring thermal comfort across various populations. Accurately assessing thermal comfort involves a complex interplay of physical, physiological, and psychological factors. This paper provides a comprehensive review of the research methods and measurement techniques used in microclimate studies focused on thermal comfort, applicable across different age groups. Methods: This systematic review examines 141 peer-reviewed studies that assess thermal comfort across various age groups. The review categorizes the research methods used to measure key factors, including metabolic rate, blood flow, blood pressure, core and skin temperatures, sweat rate, thermal sensitivity, and preferred temperature. The analysis includes both traditional and emerging measurement techniques, evaluating their efficacy and applicability in different research contexts. Special attention is given to the methodologies used to measure core temperature from various physiological sites, skin temperature, sweat rate, heart rate, and thermal sensitivity, which are critical in understanding thermal comfort across diverse populations. Results: The review identifies a wide range of measurement methods employed in the studies, from direct physiological measurements to subjective assessments of thermal comfort. It highlights the strengths and limitations of these methods, particularly in capturing the nuanced needs of different populations. The analysis reveals that while many methods are effective, adjustments or refinements may be necessary to ensure accurate assessment of thermal comfort across diverse age groups, particularly regarding preferred temperature and thermal sensitivity. Discussion: The findings suggest that a flexible and comprehensive approach to research methods is essential for advancing microclimate design for thermal comfort across all age groups. While these methods are broadly applicable, they may be particularly beneficial for older adults, whose physiological and psychological characteristics may require more sensitive and specific measurement techniques. Refining methods for core temperature, skin temperature, sweat rate, and thermal sensitivity can ensure these tools are suitable for capturing the unique thermal comfort needs of older adults as well as other populations. Conclusion: This review contributes to the field by offering a comprehensive overview of the research methods used in thermal comfort studies, with a focus on their applicability across all age groups. By highlighting the need for versatile measurement techniques, the paper provides valuable guidance for researchers and practitioners aiming to improve microclimate design and thermal comfort for diverse populations.

80 Community Resilient Landscapes: Examining blue green networks as a catalyst for social resilience

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Keywords: Blue Green Infrastructure; Social Resilience; Spatial Planning; Urban Resilience; Equitable Greenspace

Blue Green Infrastructure (BGI) has the potential to provide vital social infrastructure that foster community interactions and strengthen community bonds (Beatley & Newman, 2013; Jennings & Bamkole, 2019). These spaces enhance public health, bridge social divides, and transform public spaces into catalysts for social resilience (Coutts & Hahn, 2015; Minh Pham et al., 2020; Mukherjee & Takara, 2018). Understanding how to better incorporate BGI to foster social resilience while addressing varied cultural and social needs of diverse populations is critical for cities (Saja et al., 2018). Achieving this requires greater involvement from landscape architects and urban designers to ensure its seamless integration into urban environments. This research applies the BGI Social Resilience Framework to explore the relationship between BGI and social resilience in Wellington, New Zealand (Campbell et al., 2024). This mixed-method research design integrates GIS spatial analysis and survey research to examine the role of BGI in social resilience (Campbell et al., 2024). This research design bridges the complexities of the physical environment with the social fabric of community to demonstrate how BGI supports social capital and equitable access. The GIS spatial analysis evaluates the spatial distribution and connectivity of BGI in relation to pedestrian infrastructure and demographics, focusing on walkability, proximity, safety and slope. Regression modelling and spatial statistics identifies gaps in access, highlights inequities, and informs targeted interventions to improve BGI access for underserved groups. The online survey complements the spatial analysis by assessing how community members use BGI spaces with diverse offerings and whether their engagement fosters social capital. The data, analyzed uses regression modelling and descriptive statistics, reveals which perceptions and activities are linked to social capital and how this varies by demographics, providing valuable insights to inform the planning of spaces that accommodate diverse community needs. The findings reveal an uneven distribution of BGI with notable gaps in accessible BGI within the central city. While proximity to BGI is crucial, topography and safety significantly limit accessibility. Demographic disparities show older adults (65+) have relatively better accessibility to BGI, while women and low-income groups face poorer accessibility to BGI. Preliminary survey analysis highlights that when individuals perceive parks as spaces that foster social interactions and friendships, they are more likely to report benefits in building social networks, trust, reciprocity, and participation. Human activities in these spaces drives network-building, while greenery/nature, and safety foster community participation. Further analysis will assess specific activities tied to these social outcomes across demographics.

87 Conducting Systematic Review in Environmental Research with an AI-assisted Literature Screening Method Combining ChatGPT 3.5 Turbo with Domain Knowledge

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Keywords: Literature review; Large Language Model; ChatGPT fine-tuning; Environmental science; Literature screening

Systematic reviews (SRs) in environmental science are challenging due to the field's interdisciplinary and heterogeneous nature (Fortuin et al., 2011; Haddaway et al., 2018; Rasmussen & Arler, 2010). The inherent challenges of environmental science led to inconsistencies in applying eligibility criteria during the evidence-screening process, potentially resulting in inaccurate and unreliable SR outcomes (Haddaway et al., 2018). To address these challenges, we developed a novel AI-assisted evidence-screening method and evaluated its effectiveness with a case study to systematically review the relationship between land use and land cover (LULC) and stream fecal coliform concentrations. This case spans various domains, including hydrology, ecology, public health, and urban planning, covering a wide range of methodologies, data types, spatiotemporal scales, and terminologies. To enhance the consistency and reliability of the screening process, we introduced a fine-tuned ChatGPT-3.5 Turbo model integrated with the expertise of environmental researchers. Initially, reviewers independently assessed a selection of randomly chosen articles, discussing, and resolving any discrepancies (Higgins, 2008). This process was repeated iteratively, refining, and finalizing the eligibility criteria. The finalized criteria were then translated into prompts for the ChatGPT model. Using a binary-labeled dataset, the model was fine-tuned and performed two key screening steps: title & abstract screening and full-text screening. In the end, from an initial pool of 711 articles, the method successfully identified 120 articles that quantified the statistical relationship between LULC and fecal coliform concentrations. The results showed substantial alignment between the fine-tuned model and human reviewers, with high internal consistency across multiple runs. These findings demonstrate that integrating ChatGPT-3.5 Turbo into the evidence-screening process can significantly reduce human workload, improve screening consistency, and enhance the overall reliability of SRs (Gue et al., 2024). This method is generalizable to other environmental science studies, particularly for screening large volumes of diverse literature. Moreover, it can resolve discrepancies among researchers with varying domain knowledge and perspectives, offering a robust approach to standardize evidence screening in interdisciplinary SRs (Wang et al., 2020).

200 Integrating SWAT+ and InVEST for Multifunctional Green Infrastructure Decision-making: A Case Study in Jones Falls Watershed

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Keywords: green infrastructure; decision support system; multi-objective optimization; ecosystem services; spatial planning

The rapid pace of global urbanization has intensified concerns over the environmental impacts of urban development and the necessity for sustainable urban environments. Green infrastructure (GI), defined as a strategically planned network of natural and semi-natural areas designed to deliver a wide range of ecosystem services (ESs), offers a promising solution due to its multifunctionality—the ability to provide multiple ESs simultaneously. As urban spaces become increasingly limited, maximizing multiple ESs when planning GI has become an important goal for sustainability. However, optimizing multifunctional GI plans is inherently complex, involving multiple ES objectives and potential solutions (Wang et al., 2020). SWAT+ (Soil and Water Assessment Tool +) and InVEST (Integrated Valuation of Ecosystem Services and Tradeoffs) are among the most popular models used for assessing ESs (Francesconi et al., 2016). Research shows that SWAT+ excels in simulating hydrological processes but overlooks other ESs, while InVEST offers broader ES assessments but is less precise in hydrological modeling (Cong et al., 2020; Gashaw et al., 2022). Integrating SWAT+ and InVEST models is necessary to provide a holistic evaluation of multiple ESs in GI planning. This paper introduces a spatially explicit GI decision support framework that integrates SWAT+ and InVEST models with the NSGA-II, a multi-objective evolutionary algorithm. The framework employs NSGA-II to optimize GI allocation by simultaneously considering hydrological and non-hydrological ESs, thereby enhancing decision-making support for GI planning. Applied to the Jones Falls watershed in Maryland, USA, the framework demonstrates its efficacy in optimizing GI spatial allocation. The integration of SWAT+ and InVEST models allows for a comprehensive assessment of multiple ESs, including flood mitigation, habitat quality enhancement, and nature accessibility. The NSGA-II algorithm facilitates the generation of Pareto-optimal solutions that effectively balance trade-offs among competing objectives (Rahman et al., 2021). The results indicate that the proposed framework efficiently enhances multiple ESs in the study area, providing planners and decision-makers with a robust tool for guiding GI spatial planning and decision-making. By capturing the multifunctional nature of GI, the framework supports the formulation of holistic and sustainable urban development strategies. In conclusion, the integration of SWAT+, InVEST models, and the NSGA-II algorithm presents a significant advancement in GI planning, offering a powerful decision support tool to address the complexities of multifunctionality in GI. Future research will focus on validating the framework's applicability across diverse urban contexts, and incorporating additional ESs.

216 A Mixed-Methods Analysis of Flood Risk and Green Stormwater Infrastructure Distribution in Milwaukee

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Keywords: Green stormwater infrastructure (GSI); Flood risk; Justice; Spatial alignment; Mixed-methods approach

There remains a limited understanding of the factors driving the spatial distribution of on-the-ground Green Stormwater Infrastructure (GSI) facilities. This knowledge gap constrains our ability to develop strategic plans that optimize its multifunctional benefits in addressing urban challenges, especially in enhancing flood resilience.This study focuses on: (1) investigating how the intention to address various urban challenges, along with biophysical conditions and socioeconomic factors, shaped decisions on the spatial distribution of GSI; and (2) specifically analyzing the correlation between GSI distribution and flood exposure, identifying which physical or social factors, if any, explain the presence and density variations of GSI in areas with high flood exposure. Milwaukee was selected as the case study due to its well-established GSI regulations and active promotion of GSI incentive programs. A mixed-methods approach was utilized to conduct the analysis. The first phase involves reviewing all published GSI-related reports, plans, and legal documents in Milwaukee to identify the key objectives and factors associated with GSI planning from the outset. The second phase focuses on interviews with local municipal staff to gain insight into how these objectives and factors were considered during the GSI implementation process, the challenges encountered, and the factors that ultimately influenced the execution of GSI initiatives. The findings from this two-phase analysis reveal that, although GSI plans aimed to optimize its multiple functions, actual implementation was often driven solely by land feasibility. As a result, the installations are likely to fall short of delivering their intended benefits. To test these propositions, the third phase of the study involves a comprehensive quantitative analysis, including the hotspot analysis and multiple stepwise regressions. In the regressions, GSI presence or GSI density serves as the dependent variable, while biophysical factors, socioeconomic variables, and various urban challenges to be addressed by GSI as either independent or control variables. The biophysical parameters include soil type, slope, groundwater table depth, depth to bedrock, and land use (high-density residential areas). The socioeconomic parameters include age, education, income, racial demographics, and housing characteristics. The urban challenges include flood risks, green space accessibility, water pollution, air quality, urban heat island effects, and health vulnerability index. The outcomes are expected to offer insights for future GSI implementation to more effectively deliver their intended benefits. (The statistical analysis part is still in progress at the time of submitting this abstract, as the author has only recently completed all the data collection.). Revised Abstract The increased frequency of extreme storm events has driven more cities in the U.S. to adopt Green Stormwater Infrastructure (GSI) as a solution for mitigating local flooding (Hoover et al., 2021). The fact is, flood risk is unevenly distributed, with disadvantaged communities often facing disproportionate exposure (Cutter et al., 2013). Therefore, prioritizing GSI allocation to “high flood-risk areas”— defined as where high social vulnerability spatially coincides with high flood exposure—is crucial for achieving socially just flood risk management (Chakraborty et al., 2023). Despite increasing GSI policy initiatives, comprehensive analyses of their effectiveness in distributing GSI through a justice lens are lacking (Matsler et al., 2021). This entails assessing GSI siting criteria (Kuller et al., 2018; Shokry et al., 2020) and whether GSI

resource allocation prioritizes high flood-risk areas (Tate et al., 2021; Walker, 2021). Milwaukee's sustained efforts in implementing GSI under challenging socioeconomic conditions, along with its influence on GSI policies in other cities (e.g., Detroit, Pittsburgh), establish it as a valuable case study for addressing this gap (Hopkins et al., 2018; Keeley et al., 2013). This study seeks to evaluate the extent to which Milwaukee's GSI policies (2013–2024) have prioritized resource allocation to high flood-risk areas in a socially just manner. A mixed-methods approach is utilized for the analysis. The initial phase reviews published GSI reports and plans in Milwaukee to identify key siting criteria, which are then categorized into three groups: high GSI opportunities, high flood risk, and severe water quality issues. The second phase involves interviews with municipal staff, including representatives from the Milwaukee Metropolitan Sewerage District and Milwaukee, to understand how the identified siting factors were incorporated into GSI implementation and how equity concerns (if any) were addressed. Interviews were also extended to staff from Dane County, Kenosha, and Watertown to identify any commonalities across municipalities. The third phase involves a two-step regression analysis to examine the spatial alignment between GSI density (storage volume) and high flood-risk areas (identified by the "Social Vulnerability Index" and "Wet Basements" from 10- and 100-year storms) at the block group (BG) level. Step 1 is a logistic regression with GSI presence (binary) as the dependent variable (DV) across all BGs, while Step 2 is a spatial lag regression with GSI density as the DV across BGs with GSI. Control variables include "Feasible GSI Area," "Water Quality," and "GSI Opportunity." This mixed-methods approach ensures robust and reliable conclusions.

222 Can research methods for landscape architecture differ from the other scientific realm?

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Keywords: design research; science-practice gaps; evidence-based design; actionable research

Research in the field of landscape design often confronts a significant dilemma, which is that it tends to venture into other disciplines as soon as it commences, adopting methodologies from those fields and following their research standard and rationales. Consequently, some research is overly scientific to the extent that it lacks practical applications, failing to promote evidence-based design. Drawing on the difference and gaps between modern scientific research and landscape design practice, this report suggests that three types of research that should be focused by the field of landscape architecture because they differ from other scientific research realm and possess a high potential for application. The first set is prioritization research, reversing the research directions from reductionism for holistic approaches and taking a step further from synthesis for decision-driven priorities to support landscape design and governance action. Prioritization research is valuable for identifying core problems and methods among many challenges revealed by reductive science. The second set is outlier research to identify the mechanism of categories and extremes beyond general trends. Outlier research is crucial in demonstrating a place's positioning in the whole and potential innovations. The third set is performance research, which not only transfers landscape strategies into research hypotheses but also allows for simulating, exploring and evaluating the complex and multi-scalar effects of landscape interventions. The three sets of studies emphasize action-oriented data analytics to increase reflexive learning, new research directions incorporating more multidimensional systems understandings, and novel research hypotheses testing multifunctionality of landscape interventions. And the three sets of research represent a framework for 'refining one's core challenges -learning from others - reflecting on one's effectiveness', which can serve as a better science-policy-practice interface for deciphering the world towards sustainability not only for the field of landscape architecture but also for other practical research towards actions. Revised Abstract Research in the field of landscape design often confronts a significant dilemma, which is that it tends to venture into other disciplines as soon as it commences, adopting methodologies from those fields and following their research standard and rationales. Consequently, some research is overly scientific to the extent that it lacks practical applications, failing to promote evidence-based design. Drawing on the differences and gaps between modern scientific research and landscape design practice, this report suggests that three types of research are distinct from other scientific research and possess significant potential for application within the field of landscape architecture. The first set is prioritization research, reversing the research directions from reductionism for holistic approaches and taking a step further from synthesis for decision-driven priorities to support landscape design and governance action. Prioritization research is valuable for identifying core problems and methods among many challenges revealed by reductive science. The second set is outlier research to identify the mechanism of categories and extremes beyond general trends. Outlier research is crucial in demonstrating a place's positioning in the whole and potential innovations. The third set is performance research, which not only transfers landscape strategies into research hypotheses but also allows for simulating, exploring and evaluating the complex and multi-scalar effects of landscape interventions. Performance research can evaluate individual pillars of sustainability,

as well as the holistic concerns of ecosystem services or sustainable development goals. The presentation will be supported by concrete research examples on what is prioritization, outlier, and performance research and how they might be applied interactively in real-world contexts to solve practical problems. The three sets of studies emphasize action-oriented data analytics to increase reflexive learning, new research directions incorporating more multidimensional systems understandings, and novel research hypotheses testing multifunctionality of landscape interventions. And the three sets of research represent a framework for ‘refining one’s core challenges -learning from others - reflecting on one’s effectiveness’, which can serve as a better science-policy-practice interface for deciphering the world towards sustainability not only for the field of landscape architecture but also for other practical research towards actions.

280 Towards Effective Conservation: Rethinking Human Impact Assessments in Protected Areas

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Keywords: Human Interference Gradient; Human Impact Assessment; Resistance Surface Model; Protected Areas; Spatial Governance

Global protected areas are facing significant threats from human activities, both within and beyond their designated boundaries. The primary challenge to effective governance of human impacts arises, to some extent, during the initial assessment process.
Existing assessment approaches may not adequately address the complexities of human activity impacts in protected areas. Critical characteristics, including landscape gradient heterogeneity, spillover effects, and interactions with nature, are often overlooked, resulting in suboptimal management strategies and substantial financial burdens. To address these issues, a new approach should be explored. By leveraging the landscape resistance in landscape genetics, human interference can be conceptualised as a process that overcomes the resistance of the surrounding landscape environment, thereby creating a refined gradient surface that captures differentiated ecological risks and spillover effects. Based on this concept, we propose the Human Interference Gradient (HIG) methodology for protected areas and their surrounding regions. This approach also incorporates machine learning to enhance granularity and objectivity. Specific procedures are outlined in a case study conducted at Jinfo Mountain, China. Initially, we identified an optimal spatial scope for the study area by detecting changepoints in the spatial autocorrelation coefficients of representative indicators across different buffer extents, to minimize external effects from a larger scale. Secondly, it is essential to develop an adaptive system of source and resistance indicators tailored to specific ecosystems and conservation goals within a defined framework. Thirdly, we adapted the Resource Selection Function and incorporated the eXtreme Gradient Boosting method for objective weight determination. Furthermore, cost-distance analysis was employed based on the aforementioned weights to generate the HIG and its sensitivity was tested. Additionally, the Normalized Difference Vegetation Index and Hemeroby Index were utilized to substantiate the rationale and benefits of the HIG, using the average root mean square error and the average cosine similarity, respectively. Finally, the Continuous Boyce Index was applied to reclassify the HIG, providing more reasonable guidance on the spatial management of human impacts. In conclusion, by adapting the landscape resistance and incorporating multiple characteristics of human interference, the HIG stands out as a refined and effective methodology for assessing anthropogenic impacts in protected areas and their surrounding regions. It particularly highlights revealing the heterogeneity, spillover effects and differentiated ecological risks, facilitating evidence-based decision-making, ultimately contributing to more effective conservation and management practices in protected areas. Revised Abstract Global protected areas face significant threats from human activities both within and beyond their boundaries. The initial assessment of human impact is often inadequate due to the complexity of human-nature interactions, landscape heterogeneity, and spillover effects. Existing direct assessment methods (e.g., Human Footprint, Ecological Footprint, Landscape Development Index, Hemeroby Index) often fail to account for landscape variability and spatial distribution of activities. Indirect methods (e.g., MODIS Global Disturbance Index, Night Light Index) provide

more continuous assessments but fall short in identifying specific human activities and excluding other factors, limiting their usefulness for refined management. Moreover, current methods often overlook the natural environment's role, using weighting techniques or focusing solely on natural elements, thus failing to capture the Interaction characteristics of human impact. Additionally, spillover effects from surrounding areas, which threaten protected areas, are difficult to quantify and often neglected. To address these challenges, a novel approach integrating landscape resistance from landscape genetics is proposed, which termed the Human Interference Gradient (HIG). This method conceptualizes human interference as a process overcoming the resistance of the surrounding landscape, combining the strengths of direct and indirect assessment methods while revealing environmental differences and distance biases. The HIG methodology was tested in Jinfo Mountain, China. The process began by identifying an optimal spatial scope using changepoint analysis of spatial autocorrelation coefficients, minimizing external influences and accounting for spillover effects. A tailored adaptive system of source and resistance indicators, developed using the Resource Selection Function (RSF) and eXtreme Gradient Boosting (XGBoost), allowed for accurate weighting of indicators. Cost-distance analysis generated the HIG, with sensitivity testing confirming its robustness. The HIG's validity was further supported by incorporating the Normalized Difference Vegetation Index, the Hemeroby Index, and the Night Light Index, showing promising results in human impact assessment. The study reveals significant spatial and temporal changes in human impact on Jinfo Mountain, with risk areas identified for early warning and management. Human activities in adjacent regions and control zones are expanding, threatening core conservation areas. This highlights that protected areas are interconnected, with human-nature interactions and spillover effects influencing conservation. The study emphasizes the need for refined mapping and early warning systems for effective management. While not exhaustive, it provides valuable insights for decision-making, helping managers identify high-risk areas and human activity impacts for better conservation. Further research, including field studies and threshold exploration of the HIG methodology, is needed to improve its applicability across protected areas.

304 A comparison of factors on housing sale prices between high-income and low-income wards in Washington, D.C.

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Keywords: Housing sale prices; artificial neural network; high-income wards; low-income wards; house to BMPs in parks

The measurements of real estate price change are crucial for understanding aggregate wealth and investment behavior, particularly in the housing market (Wallace & Meese et al., 1997). Generally, the factors that determine housing sale prices are vital for making strategic real estate investment decisions. Previous literature has identified variables such as the proximity of best management practices (BMPs) inside parks, impervious roads, parcel size, and unemployment rate as influential on housing sale prices (Park & Kweon, 2024). In particular, housing sale prices are influenced by proximity to green space, high educational, and cultural levels in high-income neighborhoods (Huang et al., 2017), while housing sale prices are influenced by accessibility of transportation (Adair et al., 2000), income and ethnic or racial background (Byrne et al., 2009) in lower-income neighborhoods. However, the comparative analysis of these factors across high-income and low-income wards has received limited attention. Therefore, this study aims to provide the important predictors which affect the housing sale prices between high-income and low-income wards in Washington, D.C.. We collected 5930 housing sale prices from high-income wards ($102,882-$114,363) and 3563 from low-income wards($13,245-$45,318) between 2017 and 2020, focusing on single-family residential properties. The artificial neural network using SPSS® 26.0. was applied to compute the importance of each predictor in determining the neural network among 36 variables. The highest accuracy was obtained by the multilayer perceptron neural network with a 7-3-0 partition. A standardized rescaling method was used for covariates. Our preliminary findings indicate that housing sale prices are affected by the following order: total number of bathrooms, age of buildings, income, proximity to public schools, and proximity of houses to BMPs in parks in high-income wards, whereas housing sale prices are affected by the following order: total number of bathrooms, total number of bedrooms, the proximity of house to BMPs in parks, size of the parcel, and length of residency (2000-2009) in low-income wards. Interestingly, both total number of bathrooms and the proximity of house to BMPs in parks are important factors on housing sale prices for high-income and low-income wards. This analysis reveals significant insights into the relevance of important predictors for forecasting residential housing sale prices between high-income versus low-income wards. It can contribute to the field of urban planning and landscape architecture by offering a crucial framework for understanding real estate trends, while also aiding in the decision-making process for future research directions. Revised Abstract As the demand for high-quality environments increases, understanding both traditional housing factors (e.g., number of bedrooms) and other variables, such as neighborhood characteristics and socioeconomic status, plays a significant role in strategic decisions regarding real estate values such as housing sale prices. This paper investigates important factors affecting housing sale prices in high-income and low-income wards in Washington, D.C. Previous studies found that housing sale prices were influenced by factors such as proximity to green space and high educational levels in high-income neighborhoods (Huang et al., 2017), while in lower-income neighborhoods, housing sale prices were influenced by factors, such as accessibility of

transportation (Adair et al., 2000), income and ethnicity (Byrne et al., 2009). Although studies suggest that the proximity of best management practices (BMPs) inside of parks, parcel size, and unemployment rate affect housing sale prices (Park & Kweon, 2024), the traditional hedonic pricing method has limitations in explaining which variable has more importance in predicting the housing sale prices. We suggeste using artificial neural network to compute the importance of predictors among 36 variables using the Statistical Package for the Social Sciences (SPSS®) 26.0. in determining housing prices. We collected 5,930 housing sale prices from high-income wards ($102,882-$114,363) and 3,563 from low-income wards ($13,245-$45,318) during 2017-2020, including single-family residential properties. The highest accuracy was obtained by the multilayer perceptron neural network with a 7-3-0 partition. A standardized rescaling method was used for covariates. Our findings indicate that housing sale prices are affected by the following factors in hign-income wards: total number of bathrooms, age of buildings, income, proximity to public schools, and proximity of houses to BMPs in parks in high-income wards. In contrast, housing sale prices in low-income wards are affected by the following order: total number of bathrooms, total number of bedrooms, the proximity of house to BMPs in parks, size of the parcel, and length of stay (2000-2009). It is important to point out that the proximity of houses to BMPs in parks is a significant factor in high-income and low-income wards. This analysis reveals how landscape elements, like proximity to parks and storwaterwater features, affect housing prices and how various factors in the built and natural environment impact property values in different socioeconomic levels. This can contribute to urban planning and landscape architecture by providing a critical information framework to better understand the economic return on sustainable or green designs.

403 Landscape Performance Modeling: A historical case study for evaluating the environmental, social, and functional benefits of urban parkways

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Keywords: landscape performance; nature-based solutions; urban parkway; resilience; multifunctional

Contemporary urban landscapes face increased pressure from rapid urbanization and climate change, demanding shifts in infrastructure towards nature-based solutions to enhance environmental, social, and functional resilience (Zawarus, 2013; Steiner, 2014)). This study explores the potential landscape performance benefits of integrating multifunctional infrastructure into urban designs, using the Olmsted Brothers' unbuilt 1928 parkway proposal for Los Angeles as a case study. Unlike traditional landscape performance assessments, which rely on post-occupancy evaluations of built projects, this research offers an alternative approach by analyzing a historical design through archival documents, predictive modeling, and advanced digital visualization techniques (Canfield et al., 2018). In response to Los Angeles' rapid population growth and the ecological challenges of urban sprawl during the 1920s, the Olmsted Brothers landscape architecture firm coauthored the report Beaches, Parks, and Playgrounds for Los Angeles County (Gumprecht, 1999). The report outlined goals for a 440-mile multifunctional parkway network designed to address environmental, social, and functional needs, including parks and recreation amenities, equitable access to nature, and stormwater management (Olmsted & Bartholomew, 1930; Deverell & Hise, 2000). Twenty-six miles of the proposed parkway were designed in detail, complete with planting plans, layout plans, drainage plans, and technical cross-sections highlighting the parkway's nature-based design strategies. These construction documents, the published report, and historical maps are the foundation for establishing baseline data and metrics for the landscape performance modeling of the parkway. Primary methods in the performance evaluations include hydrological modeling with the EPA's Storm Water Management Model (SWMM) to simulate stormwater functions and i-Tree Landscape software to quantify ecological benefits such as tree canopy cover, carbon sequestration, and improved air quality. The Shannon Diversity Index measures biodiversity, while geospatial analysis using ArcGIS Pro evaluates the social benefits of equitable access to green spaces, particularly for underserved communities. The findings indicate that the Los Angeles parkways would have delivered substantial landscape performance benefits, including managing stormwater from 100-year flood events for a 30,000-acre urban watershed, contributing over 2,800 acres of tree canopy, and supporting high biodiversity. The parkway's social benefits include increased access to green spaces, with 67% of residents within ½ miles of the parkway living among the least desirable neighborhoods. This study underscores the enduring relevance of the Olmsted Brothers' design strategies in addressing contemporary urban challenges. It offers a framework for assessing historical and future unbuilt projects and highlights the potential of multifunctional infrastructure to foster equitable and performative landscapes within urban environments.

405 Comparative Spatial Cognitive Mapping in Children's Participatory Design: Methods for Adapting Children's Cognitive Abilities of Different Ages

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Keywords: Cognitive Maps; Participatory Design; Drawing Analysis Tools; Kevin Lynch; Urban Space

Children's Participatory Design (CPD) is a design methodology that ensures the active involvement of children in the design and decision-making processes, signifying a shift in landscape architecture thinking and values(Yiwei,2020). Within CPD, spatial cognitive mapping is a key tool for capturing children's cognition. Recent research has focused on integrating multiple mapping methods to acquire more comprehensive cognitive data（Kathleen L,2024）. However, this combination compromise the accuracy of the results. Studies in brain science have indicated that different regions of the brain develop at varying rates during childhood（Bethlehem,2022）, leading to differing levels of maturity in language, behavior, and image recognition abilities across ages. Since each spatial cognitive mapping method relies on different cognitive modules, some of these methods may not match children's cognitive abilities when using the combination method, which will affect the authenticity of the data. Additionally, employing a combinatorial approach generates multi-source heterogeneous data（Zhang,2021）. This type of data often exhibits poor compatibility and inconsistency during analysis, thereby complicating the analytical process further. The objective of this study was to investigate spatial cognitive mapping methods that correspond with the cognitive abilities of children across various age groups to optimize existing combinatorial approaches. To achieve this goal, we compared three methodologies—cognitive map analysis, semantic analysis, and behavioral analysis—at both overall and indicator levels while focusing on their performance regarding stability, generalization ability, and indicators related to spatial elements. The subjects involved were children aged 6-14 from three primary schools in Beijing; a total of 945 participants were selected through stratified random sampling. The research encompasses three main aspects: firstly, this study explores optimal methods for different age groups at an overall level, comparing their stability and generalization ability through inter-method consistency tests and cross-validation. Secondly, the reasons each method is suitable for a specific age group are analyzed in depth from the indicator level. Quantitative analyses of images, texts, and path data were conducted using tools such as Gandony Map Drawing Analyzer (GMDA), Leximancer, and ArcGIS. The differences in accessibility, importance, complexity, perception, and clarity among the various methods were systematically compared. Finally, a framework was constructed to obtain design opinions based on children's cognitive abilities. The purpose of this study is to provide precise opinion support for Child Product Design (CPD). It is anticipated that this comprehensive comparison will serve as a valuable reference for methodological development. Revised Abstract Children's Participatory Design (CPD) is a methodology ensuring children's active involvement in design and decision-making. It evolved from the “child participation” concept by Kevin Lynch in Growing Up in Cities(Lynch, K.,1977). According to CPD, cognitive-spatial mapping is a key tool for capturing children's cognition. Recent research focuses on integrating multiple mapping methods to acquire more comprehensive cognitive data（

Kathleen L.,2024）. However, this combination compromises the accuracy of the results. Studies in brain science have indicated that different brain regions develop at varying rates during childhood（Bethlehem,2022）, leading to differing maturity levels in language, behavior, and image recognition abilities across ages. Since each spatial cognitive mapping method relies on different cognitive modules, some of these methods may not match children's mental skills, they are used in the combination method, which will affect the authenticity of the data. Additionally, a combinatorial approach generates multi-source heterogeneous data（ Zhang,2021）. This data type often exhibits poor compatibility and inconsistency during analysis, thereby complicating the analytical process. This study aimed to investigate spatial cognitive mapping methods that correspond with the mental abilities of children across various age groups to optimize existing combinatorial approaches. To achieve this goal, we compared three methods —cognitive map analysis, semantic cognitive analysis, and Pathfinding Behavior Analysis—at both overall and indicator levels while focusing on their performance regarding stability, generalization ability, and indicators related to spatial elements. The subjects involved children aged 6-14 from three primary schools in Beijing; a total of 945 participants were selected through stratified random sampling. The research encompasses three main aspects: firstly, this study explores optimal methods for different age groups at an overall level, comparing their stability and generalization ability through inter-method consistency tests and cross-validation. Secondly, the reasons each method is suitable for a specific age group are analyzed in depth from the indicator level. Quantitative analyses of images, texts, and path data were conducted through tools such as Gandony Map Drawing Analyzer (GMDA), Leximancer, and ArcGIS. The differences in accessibility, importance, complexity, perception, and clarity among the various methods were systematically compared. Finally, a framework was constructed to obtain design opinions based on children's cognitive abilities. This study's purpose is to provide precise opinion support for CPD. It is anticipated that this comprehensive comparison will serve as a valuable reference for the development of methodology.

427 Research on Full-Process Automated Landscape Architecture Design Based on Generative Adversarial Networks

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Keywords: landscape design; generative design; generative adversarial networks; data augmentation; outdoor green space

The traditional work model of landscape architects relies on manual, paper-based design and iterative modifications. With the continuous innovation of digital technology, landscape design has evolved from hand-drawing to parametric design. In the era of artificial intelligence, deep learning technologies are rapidly advancing, bringing new possibilities and challenges to the field. However, there is currently limited research on the application of GANs in landscape design. This study focuses on small to medium-sized green spaces, drawing on the basic design process of "site-layout-plan," and constructs a fully automated design system for green spaces based on Pix2Pix and CycleGAN. We adopt a combination of quantitative and qualitative methods to assess the system's generation effects under different data volumes and compare the performance differences between the two algorithms. The experimental results show that: 1) CycleGAN outperforms Pix2Pix in terms of stability and accuracy in layout generation and design proposal generation, especially when handling complex site conditions. 2) The addition of a data augmentation module significantly enhances the quality of generated design proposals after data expansion, making the results more aligned with actual design requirements. 3) The system demonstrates clear advantages in optimizing the design process and reducing manual workload, providing designers with more efficient design tools. This work accelerates the iterative speed of designers' thinking through artificial intelligence technology, thus improving the overall speed and efficiency of the design process and offering new pathways for urban planning and design. To further promote the application of artificial intelligence in landscape planning and design, this research will develop an AI Agent platform to achieve a more complete workflow framework for fully automated design. Through this workflow framework, AI can provide intelligent support for various stages of the landscape design process, accelerating design generation and optimization, thereby driving technological advancements in the industry. Revised Abstract The traditional work model of landscape architects relies on manual, paper-based design and iterative modifications. With continuous innovations in digital technology, landscape design has gradually evolved from purely hand-drawn methods to computer-aided design. In the era of artificial intelligence, deep learning technologies are rapidly advancing, bringing new possibilities and challenges to the field. However, there is currently limited research on the application of Generative Adversarial Network(GAN) in landscape design. This study focuses on small to medium-sized green spaces, drawing on the basic design process of "site-layout-plan," and constructs a fully automated design system for green spaces based on Pix2Pix and CycleGAN. To investigate the quality of layout generation, we established an evaluation system. In the quantitative evaluation phase, the study employed PSNR, SSIM, MSSIM, and LPIPS to assess model performance. In the qualitative evaluation phase, the evaluation was conducted based on landscape-specific criteria, focusing on image quality, design

capability, and expressive effectiveness. The experimental results show that: CycleGAN outperforms Pix2Pix in terms of stability and accuracy in layout generation and design proposal generation, especially when handling complex site conditions. The addition of a data augmentation module significantly enhances the quality of generated design proposals after data expansion, making the results more aligned with actual design requirements. The system demonstrates clear advantages in optimizing the design process and reducing manual workload, providing designers with more efficient design tools. This work accelerates the iterative speed of designers' thinking through artificial intelligence technology, thus improving the overall speed and efficiency of the design process and offering new pathways for urban planning and design. To further promote the application of artificial intelligence in landscape planning and design, this research will develop an AI Agent platform to achieve a more complete workflow framework for fully automated design. Through this workflow framework, AI can provide intelligent support for various stages of the landscape design process, accelerating design generation and optimization, thereby driving technological advancements in the industry.

435 Automatic Workflow for Existing Tree Extraction and Modelling from 3D Point Clouds

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Keywords: tree modeling; thermal environment analysis; point cloud; LiDAR; automation

Continuously increasing global temperature has brought severe impairment in human health and has stimulated an upsurge in research on the effect of urban green space spatial patterns on thermal comfort level, which promotes urgent requirements for modelling simulation of thermal comfort environment for the existing trees in minor scare urban green space for residents. However, traditional methods to carry on analysis of microclimate environment in microclimate simulation software such as ENVI-met mainly take the ideal model to be a replacement of a real tree, which is a kind of regular model with basic geometric form such as columnar, globe and broad oval, but generally discrepant with existing trees in their location and especially in the geometric form. The shape of a real tree model is always irregular and cannot be simply replaced by a regular geometry model. The uniqueness of each existing tree needed to be reproduced through a tree model with high similarity and accuracy to the existing trees when being studied in research related to the thermal environment. Consequently, this paper promotes an automated workflow to reconstruct the highly quantitative and accurate tree model based on the point clouds scanned from the existing trees. The accuracy of the whole generated model can be very high, with only a mean error of 1.6cm and a maximum error of 7.50cm. This workflow bridges the research gap of modelling real existing tree communities for microclimate environment simulation. It provides an efficient tool for measuring the true impact of real trees on residential building sunlight indoor and thermal comfort. Revised Abstract Continuously increasing global temperature and extreme weather events has brought severe impairment in human health, which promotes urgent requirements for outdoor thermal comfort simulation modelling. However, in traditional micro-climate simulation software such as ENVI-met, real trees are usually modelled as regular model with basic geometric form such as columnar, globe and broad oval, but the shape of a real tree model is always irregular and cannot be simply replaced by a regular geometry model. The uniqueness of each existing tree needed to be reproduced through a tree model with high similarity and accuracy to the existing trees when being studied in research related to the thermal environment. Consequently, this paper promotes an automated workflow on high quality tree model reconstruction based on the point clouds, which optimises and integrates two types of point cloud processing algorithms, DBSCAN clustering algorithm and alpha shape algorithm for surface reconstruction. The implementation of the method is exemplified by the digital twin model generation of a group of 16 scholar trees on the west side of a large lawn near a building in a university in Beijing, which have varying ages and different problems of crown loss and partial crown. The model quality through this workflow was validated by Cloudcompare to calculate the distance between the generated model and the point clouds, the mean error of all trees is 1.6cm and the maximum error is 7.50cm. The basic parameters extracted from the model is very close to the filed measured data with the max relative error of only 1.04% in crown width, but with 3.71% in height for the limitation of DBSCAN algorithm in single tree segmentation, that's also decides another incapable application in shrub modelling. We also carried out a comparison application of these two different models; during the hottest periods, our model was on average 200

Wh/m2 lower than the ideal model in solar radiation intensity, with a maximum difference of 2.59% in the shading area of a single tree, and during the wind simulation of extreme strong wind events, our model could identify risk trees that would be difficult to detect with the ideal model.This workflow bridges the research gap of modelling real existing tree communities for microclimate environment simulation. It shows potential broader impacts in the study of tree position optimising for insolation mitigation, and will help to save more tree with wind damage risk during extreme weather events.

538 Urban Park Features and User Satisfaction: A Sentiment Analysis of Michigan Urban Parks

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Keywords: Urban Parks; Park Amenities; Public Perceptions; Sentiment Analysis; Natural Language Processing

Urban parks provide a range of benefits related to leisure activities, individual well-being and overall quality of life (Wan, Shen, & Choi, 2020). Previous research has demonstrated how various activities (Rung, Mowen, Broyles, & Gustat, 2011) and well-maintained facilities (Kulczyk, Woźniak, & Derek, 2018) can enhance user satisfaction and well-being. In addition, studies indicate that a diverse amenities, including playgrounds, sports fields, picnic areas, and fountains are associated with increased park visits and higher satisfaction among users (Csomós, Farkas, Szabó, Bertus, & Kovács, 2023). Online reviews provide valuable insight into public evaluation of urban parks. However, the use of Natural Language Processing (NLP) techniques, such as sentiment analysis, in landscape design and planning research remains unexplored (Song, Wang, Fernandez, & Li, 2021). Sentiment analysis allows for quantitative assessment of subjective landscape perceptions, providing a more objective lens for analysis (Ghahramani, Galle, Ratti, & Pilla, 2021; Romolini, Ryan, Simso, & Strauss, 2019). This primary aim of this study is to explore the relationship between urban parks features and user satisfaction, as reflected in Google reviews. This study employs a binary coding system to quantitatively assess the presence of park amenities and activities. Furthermore, sentiment and word frequency analyses are utilized to capture public perceptions. This combination of binary coding and textual analysis enhances the understanding of user reviews by identifying the frequency of terms associated with positive and negative experiences. We analyzed 82,253 Google reviews of urban parks in Michigan. A Sentiment score for each park was considered as dependent variable while the existence of park facilities and amenities served as independent variables. The findings reveal that facilities such as lighthouses, playgrounds, and concession stand generated the most positive sentiment, while activities such as hiking, fishing, and biking significantly influenced visitor experiences. The study concludes that well-maintained and diverse park amenities promote positive user experiences. It highlights the potential bias inherent in user-generated content, as it reflects only the views of those motivated to leave reviews. Future research could address these limitations by incorporating visual data from attached images and extending sentiment analysis to nested comments. These enhancements would offer a more comprehensive understanding of which park features most contribute to visitor satisfaction, thereby informing urban planning and park management practices.

581 The landscape interview: A qualitative method of dialogue, memory and interpretation

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Keywords: Interview; Immersive; Homelessness; Urban landscape; Empathy

Critics say qualitative methods lack rigor, searching for a few opinions from a few people by asking questions (Baxter and Myles 1997). How do we then enhance the rigor and engagement of people's responses to questions about the landscape? To transcend limits of time and representative sampling, qualitative methods require triangulation with other data, an accountability to the reality and systems that shape our world (Pierce and Lawhon 2015). This can be improved by 1) engaging subjects in dialogue and by 2) engaging subjects with the landscape in place. Researchers can ground the subject in a place by adapting questions, discarding others and providing feedback according to the direction set by the subject. The interviewer, by expressing empathy and asking for clarification, gives the subject respect and realistically places the conversation in larger debates, even when the opinions expressed are not shared. Similarly, the landscape provides a kind of accountability or confirmation of subject statements. By interviewing people in situ, the researcher can confirm (or deny) the words of the subject while the subject is in dialogue. Walking interviews, site visits and local ethnographies use a narrative approach where the narrative reorients around space, rather than time (Chase 2003). I use examples from collective urban research on homelessness and public space to illustrate this method. An interview done while immersed in or moving through the landscape allows the empowered subject to interpret the landscape, rather than the researcher. This has larger implications for ongoing dialogues with people about the landscape, its structures and its interpretation. Revised Abstract Qualitative methods within landscape studies seek a depth of understanding of the uniqueness of a place, one which cannot be sub-divided into various disciplines. When engaging with stakeholders, how can we enhance the rigor and engagement of people's responses to questions about the landscape? To transcend limits of time and representative sampling, qualitative methods require triangulation with other data, an accountability to the reality and systems that shape our world (Pierce and Lawhon 2015). Interviews are enhanced by an on-site analysis of place. Observations are enhanced by repeat visits at different times of the day. This method can be improved by 1) engaging subjects in dialogue and by 2) engaging subjects with the landscape in place, rather than interviewing people elsewhere. Researchers can ground the subject in place by adapting questions, discarding others and providing feedback during interviews according to the direction set by the subject. This relies on a dialogic approach to understanding the landscape, a new way of looking at space. The interviewer, by expressing empathy and asking for clarification, gives the subject respect and realistically places the conversation in larger debates, even when the opinions expressed are not shared by the interviewer. Similarly, the landscape interviewer and interviewee move through provides a kind of accountability or confirmation of subject statements. By interviewing people in situ, the researcher can confirm (or deny) the words of the subject while the subject is in dialogue. Walking interviews, site visits and local ethnographies use a narrative approach where the narrative reorients around space, rather than time (Chase 2003). I use examples from collective urban research on homelessness in two California cities and their public spaces to illustrate this ambulatory method. An interview done while immersed in or moving through the landscape allows the empowered subject to interpret

the landscape, rather than relying on the researcher. This has larger implications for ongoing dialogues with people about the landscape, its structures and its interpretation.

608 Rural is … Method Based Studio

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Keywords: rural; design methods; new dialogs; studio

Rural is.. a land designation.. an idea in our collective imagination.. the binary urban “other”.. an archive of living systems.. a place of exploitation.. a cut or insult.. a great source of pride. Rural is the out-of-sight-out-of-mind territory that allows for strange juxtapositions to coexist. According to the U.S. Census Report of 2017, 1 out of 5 Americans live in this massive land area that comprises 97% of the United States. Rural often refers to the country, or country life, or country people. Characterized as rustic, simple, unsophisticated - but in reality this vast land area is an assembly of diverse conditions. Michael Woods has described the rural as “a messy and slippery idea that eludes easy definition and demarcation”. The Rural is.. studio advocated for this messy/slippery territory through survey, writing, abstraction and hypotheticals to investigate the possibilities latent in rural happenings. The founding of our discipline has historically attached itself to rural conditions. From the Jeffersonian grid championing the rural citizen. To the improvements of elite countryside estates. To reserving rural pockets as shared commons. To Downing’s call for the American landscape aesthetic. To replicating the rural through designing country parks. In truth, landscape architecture has only recently elevated the urban as a source of knowledge to understand the gradient of territory that the urban is dependent upon. Rural environments do not follow the rules of the urban. Physical distance, visual abundance of unbuilt land, loose codes restrictions, limited services and public space register in the rural landscape. Our surrounding/spatial circumstances impact how we approach the landscape and influence how we occupy, consume and engage land. Rather than dismissing the rural as informal, the Rural is.. studio explored the formal and spatial patterns in rural landscapes that catalyze unfamiliar logics, tactics and strategies. The studio’s sought to develop new ways of thinking and methods of working in the rural. Rural is.. was framed as a research-to-method studio. The studio collectively defined ruralism building a manual of engagement from found rural conditions. Abstract practices were developed to understand rural logics as working methods. These methods were tested on hypothetical environments to reveal the potential of working from rural strategies rather than on rural sites. While the studio did not directly address typical landscape concerns, the work produced collectively offer new disciplinary dialogs regarding rural operations. A topic that has been left lingering in the margins of landscape architecture. Revised Abstract Rurality is both a land designation and a cultural construct, shaped by diversity and contradictions. Often viewed as the "other" to urbanity, it encompasses vast, complex landscapes where physical distance, limited services, and loose regulations shape distinct spatial logics. Central to the origins of landscape architecture—from the Jeffersonian grids to Downing’s rural aesthetics—the rural has been romanticized, exploited, and overlooked. This method-based studio model explores rural landscapes through surveys, writing, and abstraction, uncovering formal patterns and latent possibilities. By reframing the rural as a territory of knowledge, the studio challenges landscape architecture to rethink conventional narratives and adopt new approaches that seek to engage and understand the significance of rural landscapes. Rural Sampling Students develop a local database of diverse rural environments. Each team documents, maps, diagrams, and synthesizes 20+ sites. Through locating, observing, and curating rural conditions, teams define ruralism(s). This definition is expanded by developing a glossary, organizational system and written manifesto to share their

findings. Rural Mechanism Each student develops an abstract working method to explore rural strategies in more depth. Based on defined terminology and site observations, these methods—such as eidetic documents, analogous constructs, and storytelling— generate visual artifacts that are independent of specific locations. The intent is to gain a deeper understanding of rural strategies. Students develop processes, constructs or systems that expand their thinking and inform their approach. All mechanisms must be tangible, resulting in physical, material outcomes. Rural Hypotheticals Students test the spatial consequences of their novel design approach on the ground. The site selected may be real or abstract, chosen for its potential to amplify the working method's impact. Design skills are applied as exploratory tools to uncover new possibilities within rural contexts, iteratively shaping a rural attitude. This method emphasizes rapid, exploratory processes through continual drawing, modeling, and writing to refine and test ideas. By exploring rural logics through inventive approaches, students challenge traditional methods of engaging with rural spaces. This approach advances landscape architecture by offering new rural-centered methods that challenge reductive views and foster more nuanced engagement with rural space. The studio research resulted in a diversity of projects (i.e. queer rural land app, Amazon return garden, ATV relocation tactics, and rural kit of parts) that highlight the complexity embedded in the rural. Collectively, the studio work offers critical insight into the evolving relationship between landscape architecture and rural-urban divide.

617 Business Development Skills and Career Progression in Landscape Architecture: A Path to Leadership Roles

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Keywords: Professional practice; Leadership; Management; Careers; Promotion

Landscape architects' careers unfold in the context of a highly competitive professional services industry (BLS, 2023; Hart, 2023). This crowded marketplace sees not only firms vying for the same contracts, but entirely different disciplines (e.g., civil engineering, architecture) jostling to claim ownership of traditional sectors of landscape architectural practice (Laryea & Watermeyer, 2021; Schnabel, 2024). It also involves professionals competing for the best job openings, both on the open market and within the hierarchy of their current firms, a perennial trend made more pervasive due to retirements and pandemic-related openings, and exacerbated by the tightening search for talent (De Smet, Dowling, Mugayar-Baldocchi & Schaninger, 2022). As a result, skill competency that provides a competitive advantage to practitioners may help both their careers and the firms that employ them. Career progression for landscape architects as well as allied professionals typically progresses along an incremental, tiered path from entry-level design staff to more senior positions, and potentially to senior leadership roles, including principal, principal-in-charge and/or partner. As leadership and responsibility increases, compensation and job security also generally rise (AIA, 2024; IIDA, 2021). However, little is known about career advancement criteria in landscape architecture. Surveys of the discipline's scholarship (e.g., Gobster, Nassauer, & Nadenicek, 2010; Powers, & Walker, 2009) find that this subject has not been examined empirically. Consequently, the factors affecting career advancement, who is selected for promotion, and what determines which practitioners ascend to principal, principal-in-charge or partner are not well understood. To address this gap, business leadership topics were explored through interviews conducted with 12 accomplished professional practitioners currently holding senior leadership titles including principal, director and/or partner within the U.S. landscape architecture community. Business development skills were focused on, particularly as they affected participants' promotion to positions of leadership, and due to their relevance in the financial success of firms (Gensler, Lindenmayer, & Wittnebel; Hernandez, 2024). This study provides a first look into the importance of one skill area—business development—in the path to leadership for landscape architects. Results suggest that senior landscape architects' are routinely expected to engage in business development, and also shed light on the priorities behind who is promoted to management positions in firms. The results likewise offer insights into the management duties of principals, and suggest that business skills play an critical role in successful professional practice. Finally, the study suggests that business operations warrant further study by scholars, particularly in regard to practitioners' careers.

Resilience and Climate Action

102 Smart Tree Watering in Arizona's Urban Environment

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Keywords: Green stormwater infrastructure; shade equity; climate resilience; health; underserved communit

Tree planting is a cost-effective way of mitigating urban heat and enhancing healthy communities; however, limited precipitation in Arizona, exacerbated by drought, makes it challenging to provide adequate water for tree growth (Martin et al., 2023; City of Tucson, 2022). This study explores smart watering techniques to tackle this challenge. The research team conducts a controlled experiment at the Campus Agricultural Center in Tucson, Arizona, to test new and existing water conservation practices, such as organic woodchip mulch and hydrogels, on the establishment of four native or drought-adapted tree species. To push the limits of current water use, the research team cut weekly watering to half of the range commonly used in the urban landscape and has shown positive tree growth at nearly 60% less water use. These preliminary results suggest that if current watering practices start to reduce water use for trees, an annual saving of 1,700 gallons per year for a single tree is expected. The results also show that technologies such as mulch, tree-well basins, and hydrogels can retain between 22% and 37% higher soil moisture compared to conventional drip irrigation (Yang et al., 2023; Yang et al., 2024a, 2024b). The next step of research includes forecasting the co-benefit of smart irrigation for water saving and heat mitigation in Arizona's urban environment, scaled up to neighborhoods and cities, ultimately informing water use policy and guideline development to achieve environmental sustainability and equity goals. Revised Abstract Tree planting is a cost-effective way of mitigating urban heat and enhancing healthy communities; however, limited precipitation in Arizona, exacerbated by drought, makes it challenging to provide adequate water for tree growth (Martin et al., 2023; City of Tucson, 2022). This study explores smart watering techniques to tackle this challenge. The research team conducts a controlled experiment at the Campus Agricultural Center in Tucson, Arizona, to test new and existing water conservation practices, such as organic woodchip mulch and hydrogels, on establishing four native or drought-adapted tree species. To push the limits of current water use, the research team cut weekly watering to half of the range commonly used in the urban landscape and has shown positive tree growth at nearly 60% less water use. These preliminary results suggest that if current watering practices start to reduce water use for trees, an annual saving of 1,700 gallons per year for a single tree would be expected. The results also show that technologies such as mulch, tree-well basins, and hydrogels can retain between 22% and 37% higher soil moisture compared to conventional drip irrigation (Yang et al., 2023; Yang et al., 2024a, 2024b). The study provides climate-resilient design tools for landscape architects to simultaneously address heat mitigation and water conservation and demonstrates the co-

benefits of smart irrigation in Arizona's urban environment. The next step in the research includes utilizing artificial intelligence and machine learning models to showcase how these smart irrigation techniques can be applied at scale and ultimately inform water-use policies and guidelines.

151 Third Landscapes for Flood-Resilience: Locating the Missing Scale of Green Infrastructure in Neighborhoods in Khulna, Bangladesh.

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Keywords: Urban Flooding; Climate Adaptation; Nature-based Design; Third Landscape; Green Infrastructure

Nature-based design adaptations to urban flooding in response to ongoing urban development and the impacts of climate change are growing in research and implementations, yet the applications of these are uneven globally (Mertens 2021). Further, applications of nature-based design, such as green infrastructure for flooding, are not a one-size-fits-all approach and must also be adapted to its specific context (Gill etal. 2007, Czechowski etal 2014). This paper focuses on an in-depth case study in Khulna, Bangladesh where the landscape architecture profession has yet to evolve but site-based, nature-based approaches to urban flooding are needed. Located in the southwest part of Bangladesh, Khulna is threatened by the dual effects of sea-level rise and waterlogging during heavy rainfall (Rahman etal 2009, Water as Leverage, Natural Drainage Solution for Khulna City, 2019). Additionally, an inadequate and not well-functioning drainage system, poor waste management, and lack of integrated planning have increased impacts and suffering from flooding (Rahman etal. 2009). Over the past decade, numerous studies conducted by local planners and architects, Khulna City Corporation, and international consultants, explored the redevelopment of outdated flood-mitigation infrastructures (flood gates and polders) and drainage networks across Khulna City which has raised concerns recently. This paper reveals that those recent developments across the city have exacerbated the flooding conditions and highlights the urgent need for a new understanding of local, urban flooding conditions that vary in different neighborhoods. The research questions are: 1. Why are there gaps between theoretical flood-mitigation models and experiences of local flooding in Khulna neighborhoods? 2. How can we rethink landscape design approaches to make the city flood-resilient in the future? 3. How can landscape architects play an active role in bridging these gaps with nature-based adaptation strategies in the Khulna context? Research methods include fieldwork—direct observations of existing flooding conditions and interviews with regional experts and residents—which were crucial to reflect on local flooding. Furthermore, reviewing recent studies by the municipality helped to understand the shortfalls of flood-mitigation infrastructures and the importance of nature-based design adaptations to urban flooding. Importantly, this paper identifies and discusses the potential uses of “third landscapes” in the Khulna flooding context, defined as abandoned, leftover, and interstitial landscapes at neighborhood scales, and suggests further research and application strategies. I conclude with a reflection on the landscape architects' role in the Khulna context, where landscape architecture is not established as a profession yet to envision a flood-resilient city. Revised Abstract Nature-based adaptations to urban flooding in response to ongoing impacts of climate change and urban development are expanding in research and implementation, yet the applications of these are globally uneven (Mertens 2021). Further, applications, such as green infrastructure for flooding, are not a one-size-fits-all approach and must be adapted to specific contexts (Gill etal. 2007, Czechowski etal 2014). This paper explores the call for site-specific, nature-based design adaptations through an in-depth case study of Khulna, Bangladesh, where the landscape architecture profession has yet to evolve and where recurring urban flooding is in dire need of

address. Located in the southwest part of Bangladesh, Khulna is threatened by the dual effects of sea-level rise and waterlogging during heavy rainfall (Rahman etal 2009, Water as Leverage, Natural Drainage Solution for Khulna City, 2019). Additionally, an inadequate and not well-functioning drainage system, poor waste management, and lack of integrated planning are worsening flooding conditions (Rahman etal. 2009). Over the past decade, numerous studies conducted by planners and architects, professionals at the Khulna City Corporation, and international consultants suggested redevelopment of the outdated existing flood-mitigation infrastructures (flood gates and polders) and drainage networks across Khulna City. This paper reveals that the recent drainage redevelopments across the city are altering landforms, changing flow directions, and clogging water in streets and basements; exacerbating the situation. The paper shares why there are gaps between theoretical flood-mitigation models and actual, on-the-ground experiences of local flooding in Khulna neighborhoods and proposes how landscape architects can play a new, active role in bridging these gaps with nature-based, local-scale adaptation strategies in the Khulna context. Critical to the research methods is on-the-ground fieldwork, which will be the focus of this paper. Direct observations of existing flooding conditions and interviews with regional experts and residents provide important insights into causes, individual experiences, their personal stories of adaptation, and potential design responses to local flooding. Within this new local, landscape-based approach, this paper defines the neighborhood and street scale as a “third landscape”--an interstitial space–that will be fundamental in real solutions in the Khulna context. Comparative case studies in the Netherlands and New Orleans further helped to connect how local, on-the-ground solutions can become a critical part of existing broad-scale planning. I conclude with a reflection on landscape architects' role in the Khulna context, where landscape architecture is needed as a profession to envision a flood-resilient city.

331 Will you walk with us? : Partipant Observation and Co-Creation in Research-through-Design

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Keywords: Ethnography; Research-through-design; Co-design; Willamette Valley; Territoriality

This Research-Through-Design (RTD) project investigates the role of a cultural and agricultural center within the Anáhuac Farm Program in shaping an emergent hybrid territoriality that spans the Willamette Valley in the United States and extends across borders. The research asks: How does the design of this center contribute to the creation and negotiation of hybrid "territorialities" for Mesoamerican farmworker communities in a North American landscape? Drawing on Raffestin's theory of relational territoriality and Besse's concept of landscape as a relational act, this study uses the design process itself, along with qualitative methods, to examine the center's role in shaping cultural, agricultural, and spatial practices.The project integrates participant observation, semi-directed interviews, and co-design workshops with the Mesoamerican farmworker community—representing primarily Maya, Nahuatl, Purepecha, Zapotec, and Mixteco peoples—who actively contribute to the design of the center and its surrounding 22 hectares of agricultural land. The Anáhuac Farm Program seeks to preserve and adapt ancestral practices related to agriculture, language, spirituality, and culinary arts, and the center becomes a key site for these practices in a new landscape. This paper focuses on the ethnographic methodologies employed in the design process, particularly participant observation, and explores how this method—commonly used in the social sciences but rarely in landscape architecture—can offer new insights when applied to design. I will argue that the six principles of respectful and responsible research with Indigenous Peoples should serve as foundational guidelines for this research and beyond, providing a framework for ethical collaboration. Moreover, the paper will reflect on the potential of landscape architecture, as a project-based discipline, to engage marginalized communities through co-design and reciprocal relationships and will address the challenges encountered during participant observation, particularly in relation to the power dynamics between researcher and community, while offering suggestions for how landscape architects might incorporate ethnographic approaches into practice. By contributing to the conversation on Indigenous-led design and landscape architecture, this paper aims to fill a gap in the discipline and argue for the need to invest in and support Indigenous landscape architects. Revised Abstract This paper focuses on the integration of the 6 Rs of Indigenous Research and ethnographic methodologies in the design process. It explores how these research methods from the social sciences can offer new insights when partnered with research-through-design (RTD). Two key concepts from cultural geography underpin this research: Raffestin's theory of relational territoriality, defined as "the interaction between two systems, spatial and informational, to ensure a community's autonomy over time…an analysis of systems of relationships" and Besse's landscape as a relational act between humans evolving metamorphoses. The RTD project in question is part of an ongoing doctoral dissertation, questioning the role of the design of the Anáhuac Farm Program Center in the creation and negotiation of hybrid territorialities for the Mesoamerican farmworker communities in Oregon through qualitative research methods and the design process. It integrates participant observation, co-design sessions, and semi-directed interviews with the farmworker community— representing primarily Maya, Nahuatl, Purepecha, Zapotec, and

Mixteco peoples—who are active in the design of the center and its surrounding 22 hectares of agricultural land. The Anáhuac Farm Program is a pilot project dedicated to the preservation and adaptation of ancestral practices related to agriculture, language, spirituality, and cuisine to a new landscape. In contrast to a project design process in response to a brief, the RTD process emphasized relationship-building first, followed by translating observations and conversations into the design. Participant observation as a regular volunteer over several months included a diversity of the activities of the Anahuac Farm Program including farmwork, spiritual practices as well as meal-sharing and administrative meetings. The six principles of respectful and responsible research with Indigenous Peoples (Respect, Relationship, Responsibility, Relevance, Reciprocity, and Representation) served as foundational guidelines for this research and have the potential to become a normative framework for ethical collaboration in research and design projects in light of Besse and Raffestin concepts of spatial relationalities. Moreover, the paper reflects on the potential of landscape architecture as a project-based discipline to engage marginalized communities through co-design and reciprocal relationships, addresses challenges encountered during participant observation in relation to the power dynamics between researcher and community, and offers suggestions for how landscape architects might incorporate ethnographic approaches into practice. By contributing to the conversation on Indigenous-led design and landscape architecture, this paper aims to fill a gap in the discipline and argue for the need to invest in and support Indigenous landscape architects.

369 Envisioning the Application of Sponge Cities in Wellington, New Zealand

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Keywords: sponge cities; resiliency; climate adaptation; urban streams; daylighting streams

Cities worldwide are increasingly facing severe impacts from climate change, prompting them to develop various strategies for adaptation and mitigation. However, there is a notable gap in research on local-scale Sponge City strategies, with most studies focused at the regional level. In Aotearoa New Zealand, cities are working to address the challenges posed by climate change, which include more frequent extreme rainfall, stronger storms, intensified tropical cyclones, and coastal flooding (NIWA 2017; NIWA 2019). These issues can lead to landslides, saturated soil, and significant strain on urban stormwater systems and transportation infrastructure. A recent report examined how to implement the Sponge City concept in the unique context of Aotearoa New Zealand. This project focuses on Te Whanganui-a-Tara (Wellington), a city defined by its steep terrain and numerous waterways. Urban development has historically buried many of Wellington's natural streams, severing its connection to ecological heritage. The aim is to reimagine Wellington's urban landscape by integrating water management systems and Sponge City principles, especially by uncovering and restoring these hidden streams. Wellington is also part of the 100 Resilient Cities initiative and has launched several initiatives, including a zero-carbon plan by 2050, the Let's Get Welly Moving project, and the Green Network Plan. Drawing insights from the Sponge City report (Mercier 2023), this research assesses various approaches to raising the visibility of the hidden streams, stormwater management, biodiversity, resilience and climate change planning by focusing on how Sponge Cities can effectively meet these challenges. This project introduces the Sponge City concept to Wellington through a range of speculative design methods that incorporate the city's buried streams and cultural frameworks. This project explores the various underground streams, the planning contexts and speculative design responses to envisioning different resilient future scenarios. Revised Abstract The Sponge City concept, which uses green infrastructure like permeable pavements, green roofs, and urban wetlands, is essential for managing urban flooding and water scarcity (Mercier, 2023; Qi et al., 2020). However, research on adapting these strategies to Oceania's unique socio-cultural and ecological contexts remains limited (Mercier, 2023). Kiddle et al. (2021) highlights the need to emphasize nature-based solutions tailored to human health and traditional ecological knowledge in urban areas. Cities like Wellington are tackling challenges posed by nuisance flooding, sea-level rise, and stormwater management through various design approaches (Chanse et al., 2022; Chanse et al., 2021). Wellington's initiatives, including the 100 Resilient Cities program, a zero-carbon plan by 2050, and the Green Network Plan, provide pathways for resilience and complements changing regulation which seeks to protect the water quality and hydrology in urban streams. Drawing on the Sponge City for Aotearoa report (Mercier, 2023), this research explores methods to enhance visibility of hidden streams, improve stormwater management, foster biodiversity, and address climate change through Sponge City concepts. Previous studies have examined the cultural and ecological importance of Wellington's buried streams (Skinner, 2023; Skinner, 2024) and opportunities for biodiversity within urban neighborhoods like Te Aro (Bryant et al., 2016). This research investigates how the Sponge City

approach can be applied to Wellington, New Zealand, with its bi-cultural, ecological and seismic context. The study focuses on design-research strategies that incorporate Wellington's buried underground streams as central elements. It proposes a framework for applying Sponge City principles to Aotearoa and tests speculative design methods that address cultural and ecological challenges unique to Wellington. Through these speculative projects, lessons are drawn on how Sponge Cities can address climate change, enhance urban resilience, and restore ecological and cultural connections in the distinct contexts of a city in Aotearoa.

407 Natural Infrastructure Lab: Innovative Coastal Infrastructure through Collaborative Design Research at the University of Virginia

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Keywords: coastal resilience; design experimentation; federal agency collaboration; innovative practices; natural infrastructure

The Natural Infrastructure Lab (NIL) at the University of Virginia's (UVA) School of Architecture is a collaborative design research initiative that bridges applied science, art, and landscape architecture. NIL draws on diverse disciplines to develop innovative and culturally significant forms of coastal, estuarine, and riverine infrastructure along the Mid-Atlantic coastline and beyond. Funded by the U.S. Army Corps of Engineers' Engineering Research and Development Center (ERDC) and its Engineering With Nature (EWN) Initiative, NIL's projects unite academics, federal agencies, and local, regional, and state stakeholders to explore and implement natural infrastructure that enhances human and ecological health over time (Bridges, 2015). Interdisciplinary collaboration is central to NIL's mission. By fostering partnerships with multiple federal agencies and leveraging the strengths of a public university, NIL exemplifies thought leadership by drawing on the expertise of researchers from diverse backgrounds. Led by co-directors Associate Professor Brian Davis and Assistant Professor Michael Luegering from UVA's Landscape Architecture Department, NIL is supported by three full-time staff members: Ruby Zielinski (project manager), Emma Potter (project associate), and Adrian Robins (research specialist). Their expertise spans graphic arts, operations and maintenance, community engagement, and the natural sciences. NIL represents a new model for landscape architecture practice, advancing research across landscape architecture and the natural, physical, and digital sciences. Our approach shares many of the interdisciplinary and experiential methodologies of other landscape labs (Tao et al., 2019), while distinguishing itself through a strong emphasis on natural infrastructure, technological integration, and federal partnerships. NIL offers aspiring landscape architects the opportunity to break out of traditional career molds by employing and supporting early professionals in design, experimentation, and emergent technology development (such as wave makers, hyperspectral tools, and unmanned aerial systems), place-based fieldwork, and hands-on experience with nature-based infrastructure. By looking to influential designers such as J.B. Jackson and testing methodologies for applying natural forms and processes (Jackson, 1984), NIL researchers are creating a template for future work by designers, government agencies, and academics aiming to implement innovative solutions at various scales. Ultimately, NIL's goal is to foster innovative landscape design research in academia, traditional practice, and the public realm by bridging the gap between land and water, enhancing community and ecological resilience. Revised Abstract The climate crisis calls on landscape architects to design more dynamically. The Natural Infrastructure Lab (NIL) at the University of Virginia's (UVA) School of Architecture is a research initiative that tests new methodologies for nature-based design rooted in experimentation, the use of advanced technologies, and collaboration that spans disciplines and bureaucratic scales. NIL leverages diverse academic, governmental, and community expertise to design and implement new forms of coastal, estuarine, and riverine infrastructure, particularly along the Mid-Atlantic

coastline. Our projects are funded through the public university by the U.S. Army Corps of Engineers' Engineering Research and Development Center (ERDC) and its Engineering With Nature (EWN) Initiative. In each of NIL's pursuits, we engage with federal agencies, local stakeholders, practitioners, and academic researchers to explore natural infrastructure solutions that promote long-term human and ecological health (Bridges 2015). Central to NIL's approach is its question-driven methodology, which encourages design innovation, hands-on fieldwork, iterative modeling, and collaborative partnerships with expert entities. Led by UVA's Associate Professor Brian Davis and Assistant Professor Michael Luegering, along with a dedicated team of diverse researchers and professionals, NIL engages in speculative design processes that include the use of advanced technologies like wave generation systems, hydrodynamic modeling software, unmanned aerial systems, and hyperspectral imaging tools. These methods allow for iterative testing, data collection, and refinement of natural infrastructure designs that follow and generate questions, rather than seek answers (da Vinci). NIL's approach to landscape architecture blends scientific methods from various disciplines with artistic rigor. Inspired by other interdisciplinary landscape labs, NIL focuses on natural infrastructure, technology integration, and partnerships with federal, state, local, and private entities (Tao et al., 2019). Influenced by thinkers like J.B. Jackson, NIL tests methodologies for applying natural forms and processes, laying the groundwork for future design and policy initiatives (Jackson, 1984). Current projects include tracking rhizomatic species migration in sand dunes, developing satellite systems and spectral libraries for plant observation and identification, constructing erosion-mitigating features at Assateague National Seashore, and addressing marsh collapse in eastern North Carolina's national wildlife refuges. NIL's integrative approach aims to enhance ecological resilience and community well-being, advancing landscape design research and application across academic, professional, and public spheres.

440 Improving resilience and military readiness with climate forward design at a large military installation

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Keywords: climate forward design; stormwater; accessibility

The Defense Community Resilience Program (DCRP) is a multidisciplinary, collaborative partnership that works with military installations and their surrounding communities to engage stakeholders to improve green infrastructure using nature-based solutions to strengthen military and community resilience. As a component of this effort, graduate students from a land grant institution created site specific plans to address critical areas of concern on a large installation in the southeastern US that suffers from frequent flooding, excessive heat and inaccessible design. Goals for the site plans adhered to the Army sustainability criteria. Students developed plans that improved resilience using climate forward strategies to enhance user experience while reducing impacts stemming from strictly singular-function design. Students visited and mapped the site using Real-Time Kinematic (RTK) systems and assessed site conditions. They created designs that were presented to stakeholders, with decision making authority, who are now engaging with their organizations to implement many of the ideas. The designs sought to improve resilience by enhancing biodiversity with indigenous plant communities, reducing stormwater impacts, mitigating urban heat island impacts, producing energy, and protecting cultural resources while creating opportunities for emergency access, universal design, way-finding and aesthetic improvement to an otherwise bleak area. Presenters will share lessons learned from the design process, project implementation and using metrics to sway decision-makers striving to comply with sustainability goals such as climate adaptation, energy resilience and implementing green infrastructure solutions.

500 Expanding Blue-Green Infrastructure in Metropolitan Cities: Exploring New Potentials, from Ground to Rooftops

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Keywords: Blue-Green Infrastructure; Biodiversity; Multifunctional Roooftops; Three Ecologies; Climate Adaptation

As cities around the world face increasing climate challenges, the role of blue-green infrastructure (BGI) in enhancing urban resilience is becoming more significant. This study examines how multifunctional rooftops—integrating functions such as food security, biodiversity, rainwater harvesting and energy transition,—contribute to climate-sensitive BGI systems in four metropolitan cities: Istanbul, New York, Boston, and Dallas. By comparing rooftop use in different environmental, social, and planning contexts, this research identifies opportunities for cross-city learning and practical policy applications. The method classifies and compares rooftops in these cities based on their functions. Rooftops provide a framework for understanding their use in areas such as food security, rainwater management, energy efficiency, social engagement, and biodiversity, considering the unique geographical and regulatory challenges of each city. In Istanbul, where earthquake preparedness and urban transformation are key concerns, rooftops help mitigate urban heat islands and provide emergency energy and water storage (Seçkin et al., 2011). In New York and Boston, rising sea levels and extreme weather events demand rooftop designs that prioritize stormwater management, landscapes for biodiversity and energy efficiency as part of climate-sensitive BGI frameworks (Raven, 2021). Meanwhile, Dallas grapples with urban sprawl and stormwater quantity and quality, where rooftops are considered as part of green infrastructure solution in urban landscape (Ozdil et al., 2023). This study offers a novel framework for leveraging rooftops for urban resilience. While Felix Guattari's Three Ecologies—environment, social relations, and human subjectivity—provides an inspiring lens for evaluating multifunctional rooftops, the core focus is on pragmatic, policy-driven approaches. "Green" concepts are shaped by their cultural and geographical context (Doherty, 2017). This multidimensional evaluation provides insights into how rooftops contribute to both ecological health and social cohesion, making them vital for sustainable urban environments (Akin, 2019). The findings reveal that although cities share interests in climate adaptation, rainwater harvesting, food security, energy transition, and social engagement, each faces unique geospatial, regulatory, and planning challenges. This comparative analysis presents adaptable strategies for cities to enhance rooftop infrastructure,

paving the way for more resilient and sustainable urban environments. Revised Abstract As cities face escalating climate challenges, multifunctional rooftops—integrating food security, rainwater harvesting, energy efficiency, and biodiversity—are emerging as key components of climate-sensitive blue-green infrastructure (BGI). This study presents a comparative analysis of rooftop infrastructure in four metropolitan cities: Istanbul, New York, Boston, and Dallas. The research adopts a mixed-methods approach, combining qualitative case studies, spatial analysis, and policy evaluation to compare rooftops based on four key criteria: Climate Adaptation (e.g., stormwater management, heat mitigation), Resource Management (e.g., rainwater harvesting, energy efficiency), Biodiversity Enhancement, and Social Engagement (e.g., food security, community use). In Istanbul, rooftops address earthquake preparedness and urban heat islands while offering emergency water and energy storage (Seçkin et al., 2011). In New York and Boston, rising sea levels demand stormwater management, energy-efficient designs, and green landscapes for biodiversity (Raven, 2021). Dallas, grappling with urban sprawl and stormwater quality, uses rooftops as part of broader green infrastructure solutions (Ozdil et al., 2023). The study employs Felix Guattari's Three Ecologies—environment, social relations, and human subjectivity—as a conceptual lens to assess the cultural and geographical influences shaping rooftop solutions (Doherty, 2017). Findings highlight shared interests in climate resilience across cities, yet distinct regulatory, spatial, and planning challenges emerge. This research proposes a policy-driven framework for integrating multifunctional rooftops into urban infrastructure, offering adaptable strategies for fostering ecological health and social cohesion. By identifying practical applications across diverse metropolitan contexts, this study provides actionable insights for planners, designers, and policymakers aiming to enhance urban resilience (Akin, 2019). The findings reveal that while cities share common priorities—such as climate adaptation, rainwater harvesting, food security, energy transition, and social engagement—each faces distinct geospatial, regulatory, and planning challenges. This comparative analysis identifies adaptable, context-specific strategies to optimize rooftop infrastructure, including stormwater management systems, biodiversity corridors, and community-driven food production spaces. By addressing these challenges through policy-driven and design-oriented solutions, the study offers a practical framework for cities to transform rooftops into vital components of resilient, sustainable urban environments.

501 Subtract | Add: Just Post-Carbon Futures for Pacific Northwest Forests and Mass Timber through Regenerative Waste Ecologies

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Keywords: Regenerative economies; Cross-laminated timber; Timber harvesting; Demolition; Deconstruction

This presentation examines the environmental and social consequences of demolition and timber harvesting, focusing on how these practices erase histories and contribute to waste. Demolition is presented as a destructive force that strips away a building's materials and the cultural significance embedded in its landscape by erasing histories and devaluing materials. Similarly, timber harvesting removes trees en masse, disregarding the ecological and social contexts they inhabit. Both processes are critiqued for perpetuating extractive systems that prioritize new construction over environmental and community health and well-being. To contrast these heavy-handed practices, this presentation showcases a series of case studies to advocate for alternative approaches that emphasizes care, recovery, and sustainability. For example, Re:Purpose Savannah serves as a key case study for deconstruction, as its practices emphasize preserving valuable materials, documenting site histories, and fostering resource-sharing systems that acknowledge the interconnectedness of living and nonliving elements. Their approach showcases how practices like deconstruction can be a more sustainable and just alternative to traditional demolition. Through deconstruction, materials like old-growth timber can be salvaged, preserving their histories and reducing waste. The critique extends to the Green New Deal (GND), which, while addressing climate change, still operates within a market-driven framework that does not fully challenge the extractive nature of industries. The presentation argues that building a truly post-carbon future requires a fundamental shift from linear, extraction-based systems to circular, regenerative systems that prioritize the reuse of materials already in circulation. I apply the concepts of "subtraction" and "addition" to frame this shift, advocating for thoughtful, strategic methods that recognize the broader ecological and historical contexts of materials and landscapes. By examining waste as a socially constructed and dynamic concept, the presentation calls for a reimagining of how we plan and manage materials. The future of sustainable development lies in moving away from extractive practices and towards regenerative economies that prioritize recovery, particularly in marginalized communities affected by environmental degradation. The presentation concludes by urging a more interconnected, relational approach to material lifecycles, one that values the remnants of the past and incorporates them into the planning of post-carbon futures. Revised Abstract This presentation explores the environmental and social impacts of demolition and timber harvesting, critiquing their roles in erasing site histories, devaluing materials, and perpetuating waste. Drawing on the Pacific Northwest's timber industry and case studies such as Re:Purpose Savannah, it highlights the measurable benefits of deconstruction as an alternative to demolition. By preserving materials like old-growth timber, documenting site histories, and fostering resource-sharing systems, deconstruction reduces landfill contributions, mitigates greenhouse gas emissions, and supports equitable workforce development. The analysis situates these practices within the framework of the Green New Deal (GND), which, despite its vision for climate action, often reinforces extractive systems. This presentation applies the concepts of "subtraction" and "addition" to propose nuanced strategies for unbuilding and rebuilding, integrating lifecycle assessments to quantify the environmental benefits of regenerative

approaches. For instance, materials salvaged through deconstruction have demonstrated reduced embodied carbon in construction projects and supported the reuse of rare or high-quality resources such as old-growth timber in rebuilding or for cross-laminated timber (CLT) production. Case studies provide evidence of these impacts, showcasing outcomes such as increased waste diversion rates, the creation of local jobs through material salvage, and enhanced site resilience through adaptive reuse. In particular, the collaborative work of Re:Purpose Savannah offers a replicable model for coupling deconstruction with community empowerment. By framing waste as a socially constructed and relational concept, this presentation emphasizes the necessity of transitioning from extractive, linear systems to regenerative, circular economies. It advocates for reimagining material supply chains and site practices, centering marginalized communities in the planning and implementation of post-carbon futures. Ultimately, it calls for restorative justice approaches to forestry, timber industries, and the built environment—integrating historical traces and present resources into sustainable systems that prioritize recovery over exploitation.

511 Resilient Greenway Strategies for Urban Heat Island Mitigation: A Case Study of Garosu-gil, Seoul

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Keywords: Resilience; greenway Design; 3D Microclimate Simulation; Urban Heat Island (UHI); Thermal Comfort

With the acceleration of global warming, the frequency of extreme weather events is increasing globally. In particular, the Urban Heat Island (UHI) effect is causing significant heat stress to urban populations. The IPCC (2001) has projected that heat island phenomena, driven by climate change, will continue to expand across cities worldwide, leading to a sustained rise in heat-related illnesses and mortality. In response, greenways have emerged as a potential solution to mitigate UHI effects. Greenways possess the capacity to alleviate urban heat through various mechanisms, including shade provision, reduced heat accumulation, and enhanced evapotranspiration. The specific characteristics of tree species (e.g., height, canopy width) and the Three-dimensional structural design of street greenery are critical factors in lowering urban temperatures, which increases people's thermal comfort. This study aims to assess the thermal comfort of greenways through 3D microclimate simulations, focusing on Garosu-gil in Seoul, and to propose resilient greenway strategies. First, a set of scenarios was developed by combining two key aspects: tree species characteristics (shape, height, canopy width) and the three-dimensional design of greenway (linear green spaces, rooftop greening, facade greening). Second, the ENVI-met v4.46 3D simulation program was used to calculate Physiological Equivalent Temperature (PET) and Universal Thermal Climate Index (UTCI) values for each scenario. Third, thermal comfort resilience was evaluated across scenarios based on the PET and UTCI values, and the scenario demonstrating the highest resilience was identified. Finally, based on the selected scenario, strategies for designing resilient greenway were proposed. This research determined the pivotal role that tree species selection and greenway structural design play in mitigating the Urban Heat Island effect. Simulation results demonstrated that complex greenway configurations effectively reduce heat stress. These strategies provide practical insights and solutions for addressing thermal comfort in urban design and landscape planning.
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578 Climate Change and Foodshed Dynamics: A Pilot Study on Redefining Foodshed Boundaries and Projected Food Insecurity

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Keywords: Foodshed; Geospatial Analysis; Climate Projections; Scenarios

Food production and associated processes on a global scale account for approximately 25% of greenhouse gas emissions, which contribute to climate change (Poore and Nemecek, 2018). Ironically, these emissions, quantified through Representative Concentration Pathways (RCPs) and later projected into scenarios (IPCC, 2014), are already affecting the nutritional quality of the food we consume. For instance, future projections, based on current trends, indicate that wheat, rice, and other grains may experience a 17–30% decrease in zinc, protein, iron, and vitamin B content by the year 2050 (Ault et al., 2016; Poore and Nemecek, 2018). Crop yields may persist, however the nutritional value of these crops could be diminished to a state of obsolescence. During the 1990s, the concept of a "foodshed" emerged in an effort promote health and well-being through the lens of sustainability and food security. Scholars, local purveyors, and non-profit organizations developed this idea and devised geospatial boundaries, defined by discrete and peer-reviewed criteria, similar to those of an Ecoregion (Omernik, . Likewise, mapping analyses were conducted to identify food deserts and the geospatial criteria that define them (McEntee and Agyeman, 2010). In response to changing food system conditions informed by recent data and climate change projections, this project seeks to redefine what a foodshed is, by establishing and conducting a pilot test to examine how foodshed boundaries may be redefined. The project's methodology consists of three phases: a) a mixed-methods approach to data collection, b) geospatial analysis of current conditions and a pilot study of foodshed delineations, and c) an evaluation of spatial extents. This mixed-methods approach incorporates literature reviews, geospatial data analysis, and the examination of temporal conditions related to current food production. The method explores what food production looks like as a geospatial boundary across three geographic regions in the U.S. Finally, the project assesses the effectiveness of the new foodshed delineations using performance indicators and future projections of agricultural production and climate change impacts. The results of this study are expected to demonstrate tested criteria for identifying conditions that affect both the quantity and quality of crops within a foodshed. Additionally, the study aims to propose various foodshed solutions for regions in need of remediation. The broader impacts of this research are intended to provide future researchers with a framework and tools to identify, analyze, and evaluate the conditions and phenomena within our food systems.

644 Changing the Rules- Solutions for Greater Shade Equity

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Keywords: Urban Forestry; Shade Value; Regulations; Climate Resilience; Extreme Heat

As extreme heat days increase in the Southwest US the role of the urban forest as a community cooling resource and climate resilience resource will be increasingly valuable. Many cities have collected data on the trees in the public realm in their parks and on their streets. The inventories include valuable data on the size and species of the trees, their condition and their maintenance schedule. New methods are advancing in species recognition and shade modelling as an alternative to manual time consuming work required to inventory the individual trees that make up the urban forest. The USC Urban Trees Initiative project has been working with the City of Los Angeles Urban Forestry Division and the Los Angeles Bureau of Sanitation on multiple topics to better understand and plan for the future of the urban forest, primarily in areas of the City with populations most likely to be negatively affected by longer periods of extreme heat. Our first question was how to assist the City in identifying vulnerable populations and their primary pedestrian routes to select and prioritize tree planting locations. We have investigated anticipated mortality rates to better understand the anticipated loss of trees over time to estimate the magnitude of necessary replacement efforts to avoid net loss of canopy. We have compared policies across the state of California that determine street tree spacing and setbacks from common urban elements and infrastructure to explain why we have patterns of shade deserts. Our current work defines the shade value of urban tree species, and describes the potential for valuable shade cover, or the underperforming forests of small low value trees selected for their aesthetic qualities. Inventory data illustrates, as expected, that we have many vulnerable neighborhoods in Los Angeles with low canopy potential due to their historic development with overhead utilities and narrow planting conditions. Through interviews with agency personnel and review of regulatory polices we have found that there are a range of setback standards, all based on a narrow vein of research and publications and often on a rational fear of liability. Ultimately we are using design research to explore changes to setbacks and other more surgical strategies to find opportunities for planting large, high value shade species to maximize shade benefits with reasonable maintenance needs where shade is most needed. Revised Abstract The World Health Organization (WHO) has identified heat stress as the leading cause of climate-related deaths and illnesses. Portions of Los Angeles will experience an increase in days of extreme heat, especially in locations with vulnerable populations. Street trees are an effective method of providing cooling on public sidewalks. Based on current policies and practices substantially fewer large trees are being planted in many historic neighborhoods where streets were built without objectives for large shade trees. The USC Urban Trees Initiative research team investigated physical constraints, regulatory restrictions, and agency practices in the City of Los Angeles that lead to wide spacing, smaller tree species, and other obstacles to creating a dense, high-quality canopy Our study compared policies across the state of California that determine street tree spacing and setbacks including common elements and infrastructure to better understand local shade deserts leading to urban heat islands. Mapping the City of Los Angeles tree inventory data we found that many vulnerable neighborhoods in Los Angeles have low canopy potential due to streets with overhead utilities and narrow planting conditions. Increasing housing density in older neighborhoods and replacing single-family residences is also a factor in decreasing the potential

locations for street trees. Through interviews with agency personnel and a review of regulatory polices we found that there are a range of setback standards (Messier 2024), based on a narrow vein of transportation research Macdonald 2006) and publications, access to infrastructure for service, and practices based on safety and liability concerns that lead to limited tree planting locations, especially near intersections. We used the geospatial data of the inventory and made field visits to locate on-site constraints. With this data we tested adjustments to required setbacks, implementation of on-street parking demarcation, and adding tree bump outs to explore surgical strategies for planting large, high-value shade species to maximize shade and cooling benefits with reasonable maintenance practices on typical existing street conditions. The research demonstrated how numerous constraints, the sequence of decisions, and the lack of coordinated infrastructure decisions lead to compromised urban canopy. This work has the potential to provide urban planners and designers with contextual regulatory data and potential solutions to increase shade canopy value without redesigning the entire street to achieve shade and cooling objectives.

Service Learning and Community Engagement

48 “F*ck the smokers!”: Navigating community engagement and collaborative design in public housing landscapes

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Keywords: Participatory Action Research; Co-production; Capacity-building; Reflective practice; Case study

Bounded on three sides by freeways and rail lines, the City of South Tucson is nestled within the greater south side of Tucson, Arizona. Known as “The Pueblo within a City,” this vibrant community possesses a unique character and rich cultural heritage. However, residents of this 1.2 square-mile minority-majority enclave face significant economic challenges. With over 75% of the population identifying as Hispanic, the city’s median household income is less than 42% of the state’s average. Strikingly, incomes for over 35% of households fall below the US federal government’s poverty threshold, including more than 50% of children and nearly 25% of adults over 65. These challenges are compounded by a lack of affordable housing available to the city’s lowest earning households. Though access to affordable housing remains an ongoing challenge, public housing facilities, like the South Tucson Housing Authority (STHA), provide some relief. While such facilities are not nearly enough to meet the overwhelming demand, they provide stable, cost-controlled housing for some of the city’s most vulnerable residents, including fixed-income seniors and lower-income families. This case study explores processes of community engagement and collaborative design in the context of the STHA. The project team worked with STHA residents, administrators, and staff to collaboratively envision green space improvements for common areas on the STHA grounds, emphasizing positive health, safety, and quality of life outcomes. The team employed a community-based participatory approach to build trust and guide meaningful engagement with STHA stakeholders throughout the planning and design process. Results of the endeavor were mixed. Overall, the inclusive approach enhanced access to the planning and design process by integrating engagement efforts into established community programs and events. However, unresolved tensions between residents and the STHA administration, and interpersonal conflicts between residents, often created an environment unconducive for collaboration. Ultimately, these unforeseen community dynamics limited the efficacy of the engagement effort and inhibited co-production of design proposals for green space improvements. Despite these shortcomings, the approach provided opportunities for residents to share their concerns and priorities related to improving outdoor common areas at the STHA. These perspectives were documented, and some have been integrated into design proposals created by the project team, while others may guide future landscape improvement efforts. The challenges encountered offer valuable insights which, assessed using reflective practices, can be applied to improve engagement and participatory design efforts in communities facing significant challenges. Revised Abstract Bounded on three sides by freeways and railways, the City of South Tucson is nestled within the greater south side of Tucson, Arizona. Despite its vibrant streetscapes and unique cultural character, residents of this 1.2 square-mile minority-majority enclave face significant economic challenges. With over 75% of the population identifying as Hispanic, the city’s median household income is less than 42% of the state’s average. Strikingly, incomes for over 35% of households fall below the poverty threshold. These challenges are compounded by a lack of affordable housing in the city. Though access to affordable housing remains an ongoing challenge, public housing options like the South Tucson Housing Authority (STHA), provide some relief, offering stable cost-controlled

housing for some of the city's most vulnerable residents. This case study explores community engagement and collaborative design in the context of the STHA. The project team worked with STHA residents, administrators, and staff to collaboratively envision landscape improvements for common areas on the STHA grounds, emphasizing positive health, safety, and quality of life outcomes. The team employed a community-based participatory approach and engaged STHA residents via design charrettes, focus group discussions, and community capacity-building events to identify opportunities and constraints for implementing improvements to the STHA grounds. These efforts helped to build trust and identify community priorities that were included in planning and design outcomes. A reflective assessment of the process revealed mixed results. Overall, the approach enhanced access to the planning and design process for residents by integrating engagement efforts into established community programs and events. However, unresolved tensions between residents and the STHA administration, and interpersonal conflicts between residents, often created an environment unconducive for collaboration. Ultimately, these community dynamics limited the efficacy of the engagement effort and inhibited co-production of design proposals for green space improvements. Despite these shortcomings, the approach provided residents opportunities to share their concerns and priorities related to improving outdoor common areas at the STHA. These perspectives were documented, and some have been integrated into design proposals created by the project team, while others may guide future landscape improvement efforts. The challenges encountered offer valuable insights that can be used to improve engagement and participatory design efforts in public housing landscapes.

51 Hartford Urban Migrations

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Keywords: Agricultural History; Labor History; Conservation; Justice; Co-Design

Landscapes are inextricably tied through labor and material practices (Hutton 2020), by capital flows, where the municipal boundaries of an urban area belie to true extents of urbanization (Brenner & Schmid 2015). Working landscapes feed the city, connected through the people working the land, the crops being produced, and the capital exchanged. And yet these connections are largely invisible, their toxicities buried in the denuded soil left behind. This project seeks to make explicit these links (Cronon 2003), to render the labor underlying the landscape visible (Franco 2022) and to imagine land-based reparations that address the health of the exploited land and people (Tunstall 2023). Specifically, this service-learning project interrogates potential reparative futures for two linked landscapes with deep significance for Connecticut's agricultural, cultural, and labor history as well as the State's contemporary challenges around land conservation, regenerative agriculture, climate adaptation, and food insecurity. This project investigates (1) the deep history of the Shade Tobacco Industry in the Connecticut River Valley (Dunlap & Hellerman 2016, Tobacco Growers Association) using the Meadowood Site in the Town of Simsbury and (2) the impact this industry has had on neighborhoods in the Cities of Hartford and East Hartford (Cruz 1998, Perlman 2002, Vernal & Koch 2023) to (3) test viable alternative futures for both the Meadowood property and the urban public realm of specific neighborhoods where former laborers and their descendants reside. The focus is on fostering landscapes that address ecological performance, human health, justice, and cultural interpretation. The methodologies include mapping migrations and changes to the land over time across scales, from the watershed to the site, using technical tools to understand the land potentials and risks, and service-learning and engagement opportunities to co-create design visions. The presentation will highlight the ongoing work, focusing on the research as well as the design studios that have engaged the community in the process of imagining an entangled future for the agricultural lands of the Connecticut River Valley and urban neighborhoods of greater Hartford. The following themes will be addressed (1) Archival Research and Historical Mapping; (2) Partnership Capacity Building (3) Data Visualization and Landscape Mapping (4) Service Learning, Co-Design, and Assessment (5) Expanded Engagement and Next Steps.

74 Adapting a co-design methodology for community education in the Korean Seowons toward a sustainable cultural landscape practices

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Keywords: UNESCO World heritage; Seowon, Korean Neo-confucian Academies; Community engagement; Co-design approach; Cultural public outreach

This study outlines a recent heritage landscape revitalization project in Seowon, Korean Neo-Confucian Academies, a UNESCO World Heritage site since 2019 (hereinafter the Korean Seowon). By addressing the structural issues on site and designing a long-term plan for an integrative public outreach program, this project conducted a six-month education program for the Korean Seowon associates through co-design workshops focusing on the values of the cultural landscape and authenticity to create a viable environment that fosters community-led public outreach opportunities. While this project is the first of a multi-year plan, it demonstrates the importance of combining the concepts of cultural landscape, co-design approach, and public engagement to create a strong foundation for sustainable cultural landscape practices in the future. Since the expansion of UNESCO's definition of authenticity in 1992, we have witnessed an increased diversity in the world heritage sites (ICOMOS, 1994) as well as an increased interest in the community's efforts to maintain their tradition in terms of heritage management (Ducci et al., 2023). While not recognized as cultural landscapes in terms of official inscription criteria, the fact that the natural landscape surrounding the buildings is heavily integrated into both the original architectural designs of the Korean Seowon and the Neo-Confucian doctrine that form the basis of these sites, both physically and conceptually, requires a cultural-landscape-approach to fostering sustainable cultural practice on site. In other words, the planners and heritage experts must consider the regional situations and the community practices beyond the confines of the Korean Seowon sites (Kim, 2021; Lee & Kim, 2021). Based on the existing literature, this project mapped out several issues with existing revitalization efforts on site, such as the disparity between the local community and the seowon associates, the aging population in the region, and limited use of the Korean Seowon properties in public programs (Integrated Management Center for Korean Seowon, 2023). Hence, the goal of this project was to foster a collaborative framework from which the seowon associates can collaborate with the local community as well as artists and cultural organizations beyond the immediate vicinity of the Korean Seowon. Through co-design workshops and interdisciplinary education programs, the Korean Seowon associates were encouraged to design collaborative programs that can bolster public interest in the Korean Seowon's significance. The outcome of this project shows that a landscape-based co-design approach is a viable option for maintaining ancestral traditions in cultural landscapes. Revised Abstract This study explores a recent heritage landscape revitalization project involving 'Seowon, Korean Neo-Confucian Academies', a series of nine sites included in the UNESCO World Heritage list since 2019 (hereinafter the Korean Seowons). After addressing the structural issues on site and designing an integrative public outreach program, this project conducted a six-month education project that aimed to promote the values of the cultural landscape and authenticity to create a viable environment that supports community-led public outreach opportunities. This project demonstrates the importance of combining the concepts of cultural landscape, co-design approach, and public engagement to create a strong foundation for sustainable cultural landscape practices for the future. Since the expansion of

UNESCO’s definition of authenticity in 1992, we have witnessed an increased diversity in the world heritage sites (ICOMOS, 1994) as well as interest in the community's efforts in terms of heritage management (Ducci et al., 2023). With the natural landscape integrated into both the original architectural designs of the Korean Seowons and their Neo-Confucian doctrine, Korean Seowons require a cultural-landscape-approach to foster sustainable cultural practice on site. In other words, the planners and heritage experts must consider the regional situations and the community practices beyond the confines of the immediate boundaries of the Korean Seowons (Kim, 2021; Lee & Kim, 2021). In terms of methodology, the project was two-fold. First, to define structural issues, interviews with the Integrated Management Center for Korean Seowon and the associates from each Korean Seowon were conducted. The interviews showed disparities between the local communities and the Korean Seowons, the aging population, and limitations in the current promotional programs that fell short of delivering the authenticity of the sites (Integrated Management Center for Korean Seowon, 2023). Based on the interviews, the project aim was refined with a greater focus on the regional conditions and a hybrid education program of online lectures and on-site workshops was established. For example, the workshops focused on the facilitation of the discussion between the Korean Seowon associates and the resident(s). A total of eight teams participated in the program and designed tentative plans for future cultural programs based on the regional opportunities that can promote the significance of each Korean Seowon. The outcome of this project shows how the co-design approach can be applied to community education in remote regions suffering from population decline to foster stronger regional collaborations, which will contribute to maintaining ancestral traditions in cultural landscapes.

98 A Resources-Sensitive Approach to Riparian Management in Connecticut's Towns and Watersheds

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Keywords: Riparian management; Riparian forest density; Landcover relationships; Riparian sustainability; Wetland management

Riparian trees provide essential filters and buffers between anthropogenic development and wetlands and watercourses in developing areas. They minimize runoff, protect water quality, and provide food sources for essential aquatic and terrestrial species. However, increasing trends in riparian disturbance adjacent to wetlands and watercourses seriously threaten Connecticut's water quality, human welfare, and wildlife. Recent EPA Integrated Water Reports reveal approximately 60% of Connecticut's estuaries are impaired, compared to 26% nationwide (U.S. Environmental Protection Agency, 2020). The sources of Connecticut's impairments are varied. However, opportunities exist for municipalities to make significant gains in reducing nonpoint source pollution from entering Connecticut's inland wetlands and watercourses draining into Connecticut's estuaries. UConn CLEAR researchers recently reported an 18.9% increase in the relative rate of development in Connecticut's riparian areas between 1985 and 2015, illuminating the far-reaching impact of the cumulative effect of design and management on water quality across the state (Arnold & Gibbons, 1996). This paper focuses on tree removal practices for new construction adjacent to wetlands and watercourses at the interface of wetland management, town planning, and landscape architecture in Connecticut. The relationship between stream impairment and varying degrees of riparian tree cover is poorly understood in developing areas. This research aimed to fill data gaps that have historically impeded sustainable decision-making regarding riparian tree removal, or protection, for new construction in Connecticut's municipalities, where wetlands and watercourses are managed. The research aimed to answer the question: What relationships exist between tree canopy density and wetland and watercourse integrity within Connecticut's riparian zones? The presenter, a landscape architect, teacher, and volunteer wetland manager, used 30-meter Landsat landcover data and ArcGIS spatial statistics tools to identify relationships between Connecticut's tree canopy density and watercourse integrity within 300-foot riparian zones offset from Connecticut's wetlands and watercourses in 2006 and 2016. The results identified positive relationships between Connecticut's riparian tree cover density and the condition of its wetlands and watercourses. Riparian tree cover next to impaired streams was roughly 15% lower than tree cover adjacent to unimpaired watercourses in both 2006 and 2016. Just as imperviousness rates have guided municipal stormwater policies, professionals, designers, and municipal agents can use riparian tree density to inform riparian management in Connecticut.

123 Recovering Maintenance: Rapid Response and Slow Evolution

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Keywords: Maintenance; Construction disturbance; Soil and erosion control; Plant protection; Temporary art installation

Amidst shelter-in-place orders following the emergence of the novel coronavirus, the essentiality of maintenance was made visible. These infrastructural services continued through government-imposed shutdowns and maintenance tactics were used to quickly adapt spaces for increased social-distancing. Simultaneously, maintenance took on new importance to those trapped at home as mundane, repetitive chores took on the choreography of ritual. In making do, the subconscious art of care became the guiding force in existence. While often overlooked as a design instrument, this crisis presents a window into the capacity for maintenance to guide alternate forms of urbanism in stark contrast to the neo-liberal mega-projects of contemporary planning and design. The twin modes of maintenance (rapid response and slow evolution) directly translate everyday spatial practices and specific site changes into matters of care. As the new climate regime destabilizes both the local and the global, recovering maintenance becomes a political action – and a highly improvisational one at that. Without a normal to return to, “survival systems and operations” steer the ship. This paper describes the theory and inspiration that gave rise to the "Oregon Experience Laboratory" exhibition at the University of Oregon North Campus Riverfront and led to the founding of the Fuller Initiative Land Lab (FILL). In preparation for the 2022 World Athletics Championships, the City of Eugene invested in several infrastructure improvements along the Willamette River. Unfortunately, construction disturbance significantly impacted the site and early revegetation efforts failed. As UO faculty and students, the principal design team adopted six acres of riverfront to trial an alternative approach to "soil & erosion control." Their response to construction disturbance centered creative field work, land care, and the aesthetics of thrift during the establishment period, leading to flexible, incremental innovation. Early plant protection prototypes evolved into temporary art installations and were distributed across the site based on the spatial organization of maintenance. Through this process, the identity and culture of the FILL was established, which continues to operate as an experimental landscape, outdoor instructional area, and demonstration garden.

163 An Exploration from "Government" to "Governance": Case Studies of Non-governmental Community Planners in Micro-regeneration

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Keywords: Civic Engagement; Collaborative Planning and Design; Community Planner; Micro-regeneration; Social Governance

As China is transitioning toward a “social governance” model and a national scheme to promote “People’s City”, urban regeneration efforts have increasingly focused on fostering civic engagement and capacity building (Zhao et al., 2023). However, conventional urban planning and public participation approaches in China have posed challenges to this socio-spatial development, such as limited institutional frameworks, varying levels of public awareness, and the need for more comprehensive mechanisms to ensure meaningful civic engagement (Tan & Altrock, 2016). Some research suggests that non-governmental professionals can play a crucial role in bridging these gaps by facilitating connections among stakeholders (Yuan et al., 2021). Meanwhile, many Chinese cities have been developing their respective Community Planner Systems to provide institutional support for both local communities and professionals, to promote effective collaborative practices as a form of civic engagement (Liao et al., 2019). Micro-regeneration, which emerged as a strategy to address issues associated with large-scale urban regeneration projects, focuses on revitalizing small-scale everyday spaces through low-cost and less-intrusive interventions. Such an approach emphasizes the importance of civic engagement and co-production throughout the planning, design, and decision-making processes (Ma & Ying, 2016). Informed by the scholarship on collaborative planning (e.g. Healey, 1997, 1998, 2012; Innes & Booher, 1999; Watson, 2014), this study seeks to understand the various Community Planner frameworks and their implications on the approaches that non-governmental professionals adopt in micro-regeneration projects. Two case studies - Everyday Projects by People in Guangzhou and Blooming Dongming in Shanghai - are examined based on textual analysis and ethnographic research. Although the two projects differ in context, challenges, and objectives, the Community Planner Systems for both cities seek to engage community planners with diverse backgrounds and emphasize the goal of serving the people rather than the plan/design. Here, non-governmental community planners are essential in overcoming challenges of conventional urban regeneration approaches. Their roles extend beyond providing technical expertise to include facilitating communication among and capacity building for stakeholders, and coordinating diverse interests. It further highlights the importance of leadership and companionship as a foundation for building trust and capacity, as well as opportunities for interactions and collaborative activities for building connections and mutual understanding. Many of these were facilitated by community planners. In this sense, collaborative activities of micro-regeneration projects can also be considered as a proactive effort to enhance civic engagement in not only the (re)making of urban spaces but also broader public affairs.

178 Community Based Design for Green Infrastructure: An Investigation into Local Perception of Johnson Creek Floodplain Mitigation

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Keywords: Green Infrastructure; Urban Watershed; Stormwater Mangagement; Community Engagement; Environmental Justice

Johnson Creek, a vital waterway in Arlington, Texas, is under strain from surrounding entertainment centers, a local university, and residential areas. As Arlington's second-largest watershed, it is one of two most prone to flooding due to urbanization since the 1950s. Increased development has altered the creek's flow, leading to more pavement and rooftops that divert rainwater into the creek. This contributes to higher water velocity, erosion, sedimentation, and flooding, which pose a growing threat to nearby residents. Flood-prone areas along Johnson Creek, particularly in lower-income neighborhoods, face significant environmental challenges. Properties in these regions often lack separation from the creek, leading to gradual land loss and increased vulnerability to property damage. According to the EPA, residents in these areas are at greater risk of financial hardship due to potential flood-related damages. Research Questions: This research explores how green infrastructure can enhance Johnson Creek's water quality, stormwater management, and connection to the local community. The main research questions focus on understanding how the creek's condition affects residents, identifying green infrastructure projects that best serve the community, and developing sustainable land-use strategies to restore and preserve the area. Methods: To address these questions, the research team designed a survey-based needs assessment, drawing from historical data and scholarly literature. The survey consists of two parts: Community Impac: This section gathers information on how long residents have lived near Johnson Creek, their historical knowledge of flood issues, and their experiences with government responses to flooding. Green Infrastructure Education: This segment educates residents about potential green infrastructure projects, using scenario-based descriptions to gauge community support for implementing these solutions along the creek. Results: Results from the survey highlights the top-rated green infrastructure projects based on precedent imagery and Master's of Landscape Architecture studio project scenarios, identifying those that align with community needs. This information is to be used for a pilot project along the creek. Discussion/Conclusion: This research builds on the principles of UT Arlington's Sustainability and Climate Action Plan and the American Society of Landscape Architecture's Climate Action Plan. It will guide the selection of a pilot project for green infrastructure improvements along Johnson Creek. In collaboration with the Army Corps of Engineers and the City of Arlington, UT Arlington aims to develop strategies to improve ecological restoration, wildlife habitat, and recreational opportunities along the creek. Revised Abstract Johnson Creek, a vital waterway in Arlington, Texas, faces challenges from urbanization driven by nearby entertainment centers, a university, and residential areas. As Arlington's second-largest watershed, it is particularly prone to flooding, a situation worsened by the city's development since the 1950s (Jacobs et al., 2017). The increase in impervious surfaces like pavements and rooftops has altered the creek's natural flow, causing higher water velocity, erosion, sedimentation, and flooding. These issues threaten nearby residents, especially in lower-income neighborhoods, where properties often lack adequate separation from the creek, leading to land loss and heightened vulnerability to flood

damage. The EPA highlights that residents in these areas are at greater financial risk from flood-related impacts. This research investigates how green infrastructure can improve Johnson Creek's water quality, stormwater management, and community integration. Key questions include understanding the creek's impact on residents, identifying green infrastructure projects that best serve the community, and developing sustainable land-use strategies for its restoration and preservation. To address these questions, the research team designed a survey-based needs assessment informed by historical data and scholarly literature. The survey targets individuals living or working near Johnson Creek and is familiar with the creek's condition. It includes two main sections: Community Impact Section gathers information on how long residents have lived near Johnson Creek, historical flood knowledge, and experiences with government flood response. Green Infrastructure Education Section educates residents on potential green infrastructure solutions, using scenario-based descriptions to gauge community support for implementing these solutions along the creek. Results from the survey highlight the top-rated green infrastructure projects based on Master of Landscape Architecture studio project scenarios, identifying those that align with community needs. Survey respondents recommended green infrastructure improvements, such as bioswales and rain gardens for flood mitigation, as well as tree preservation along the creek. This research aligns with UT Arlington's Sustainability and Climate Action Plan and the American Society of Landscape Architecture's Climate Action Plan. The findings will guide the selection of a pilot project for green infrastructure enhancements, including tree preservation, riparian zone planting, rain gardens, and bioswales along Johnson Creek. In collaboration with the Army Corps of Engineers and the City of Arlington, UT Arlington aims to develop strategies for ecological restoration, wildlife habitat improvement, and enhanced recreational opportunities along the creek.

190 Planting Design Guidelines to Enhance Carbon Absorption in Outdoor Spaces of Apartment Tower

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Keywords: Carbon absorption; Climate crisis; Landscape performance; Carbon calculator; Planting design guideline

In recent efforts to reduce carbon, there has been a growing demand for carbon absorption in the outdoor spaces of apartment towers, which have been under less pressure than public spaces. This study aims to quantify the carbon absorption of landscape trees and establish planting design guidelines for optimizing carbon absorption in the outdoor spaces of apartment towers, which account for 63.5% of the majority of housing types in Korea. Unlike previous carbon absorption studies that focus on forests, groves, and street trees, this study aims to quantify and data the carbon absorption of specific landscape trees by species and size to provide realistic solutions for increasing carbon uptake in spaces that residents use on a daily basis. The study consists of five steps (1) calculate and data the carbon absorption of landscape trees, (2) select the design target space, (3) calculate the existing carbon absorption of the target space, (4) apply the optimized planting design, and (5) calculate the carbon absorption increase rate. 93 species of trees were classified through the i-Tree Eco model and their carbon uptake was calculated, while shrubs and flowering plants were based on previous studies by the National Institute of Horticultural and Herbal Science of South Korea. The spaces to be designed were categorized into central plazas, peripheral forests, waterfront spaces, children's playgrounds, and small gardens, which were based on the landscape design guidelines for apartment complexes and general contractor's standards. We analyzed apartment complexes both in city of Seoul and the Seoul metropolitan area and measured the existing carbon absorption of each space. Considering not only carbon absorption but also the aesthetics and usability of the space, we quantified carbon uptake based on the percentage of greenery, the percentage of shrubs and flowering areas, and the species of trees. The results of applying these guidelines yielded an increase in carbon uptake of approximately 5-63% over the initial target, when compared to a conventional design. This study demonstrates that the quantified plant material data and proposed planting design guidelines for each space type can be incorporated in the design and construction phase to enhance carbon absorption in living areas such as residential areas and promote the ecological performance of landscapes. Future research is expected to extend to other landscape materials to create a holistic carbon reduction strategy. Revised Abstract This study aims to develop practical planting guidelines to increase carbon absorption in outdoor spaces of apartment complexes, which account for 63.5% of Korea’s residential types. The guidelines focus on addressing climate change, achieving carbon neutrality, and enhancing urban sustainability. Unlike existing research on forests and street trees, this study quantifies the carbon absorption capacities of landscape trees by species and size, offering actionable solutions for residential environments. The research involves four steps. 1. Quantifying the carbon absorption capacities of landscape trees 2. Selecting target spaces and calculating existing carbon absorption levels 3. Applying optimized planting designs 4. Calculating the increase in carbon absorption after implementation Carbon absorption for trees was calculated using the i-Tree-based tree carbon calculator(Ha Ji-A), while data from prior studies were used for shrubs and herbaceous plants. The study targeted central plazas,

peripheral forests, waterfronts, playgrounds, and small gardens in apartment complexes. These spaces were selected based on landscape-related regulations and design guidelines, focusing on complexes with over 1,000 households in Seoul and the metropolitan area that received the "Best Apartment Award" since 2021. Results showed that peripheral forests had the highest average carbon absorption per square meter (1.900 kg/yr), while playgrounds and fitness facilities had the lowest (0.942 kg/yr). Spaces with higher green area ratios and dense vegetation achieved greater carbon absorption efficiency. Based on these findings, tailored planting guidelines were proposed to maximize carbon absorption by considering space characteristics, green area ratios, planting compositions, tree species, and densities. After applying the guidelines, the average carbon absorption capacity of spaces increased as follows (kg/yr/m^2) Central Plaza: 1.631 → 1.96 (+20%) Peripheral Forest: 1.900 → 2.25 (+18%) Waterfront: 1.142 → 1.78 (+56%) Playgrounds: 0.942 → 1.33 (+41%) Small Gardens: 1.202 → 1.25 (+4%) The recommended plantings include Zelkova serrata and Prunus × yedoensis for central plazas, Abies holophylla and Diospyros kaki for forests, Metasequoia glyptostroboides and Fraxinus rhynchophylla for waterfronts, and Cercidiphyllum japonicum and Chionanthus retusus for playgrounds. Flowering shrubs and ornamentals were suggested for small gardens. These guidelines, with quantified metrics, provide practical strategies to improve carbon absorption. This study proposes practical planting design guidelines to enhance carbon absorption in apartment complex outdoor spaces. It demonstrates that incorporating these guidelines in design and construction stages can boost carbon absorption in living environments and improve the ecological performance of landscapes. Future research aims to extend this approach to landscape materials, establishing a comprehensive carbon reduction strategy.

226 The University of Oregon Urban Farm Expansion: A Design Methodology for Community Engagement in a US campus setting

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Keywords: Design Methodology; Campus Planning; Urban Farm; Community Engagement; Service Design

The University of Oregon Urban Farm project began in 1976 as a student-led initiative to grow food on unused campus land. Spearheaded by landscape architecture professor Richard Britz, who outlined his theories in the publication "The Edible City Resource Manual" (Britz, R., 1981), the initiative continued to this day thanks to the efforts of Ann Bettman (Bettman et al.; 2011) and Harper Keeler, current Urban Farm director since 2007. Over the years, the space allocated for the Urban Farm has significantly varied, alternating periods of growth by agilely occupying leftover spaces to respond to the increasing student demand, with periods of shrinkage due to campus development (Keeler, H., 2011). Since 2022, affected by the construction of a new adjacent research facility, the Urban Farm lost 30% of its productive land (including 34 trees, multiple berry bushes, and raised beds), leading to an uproar from the UO community and uniting students, faculty, and related allies beyond the University boundary. As a result, a new 1.9-acre site along the Willamette River was secured in 2023 by the College of Design, in addition to a one-million-dollar donation to develop this land (University of Oregon, 2022). However, the complexity of the project and its contentious nature, with the UO community still mourning the recent loss, put the initiative on hold for almost a year until professors Ignacio Lopez Buson and Mary Polites led a collaborative studio in the summer of 2024 to create a visioning master plan for the new site with the help of students and local stakeholders. This 6-week studio was an ideal opportunity for developing and implementing an experimental co-design methodology with landscape and architecture students. By combining principles of spatial and service design (De Rosa, A., 2022), public engagement, rapid prototyping, and multi-media communication, this initiative aimed to rekindle a necessary dialogue while honoring the community-centric legacy of Christopher Alexander's work at the UO campus through his seminal work: The Oregon Experiment (Alexander, C., 1975). In addition to shedding light on the unique campus planning system of the University of Oregon implemented by Alexander and how it influenced the evolution of the Urban Farm, this presentation aims to describe the innovative co-design methodology and process that successfully helped bring the UO community and leadership back together for the future expansion of its nationally recognized Urban Farm program.

297 Reconceptualizing the Role of Landscape Architects: A Process Analysis of Xinxiang Garden, Jiangxinyuan Neighborhood, Wuhan, China

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Keywords: Community Garden; Role Transformation; Resident Participation

Landscape architects are pivotal in community building endeavors. They employ their design ingenuity, cultural acumen, and technical proficiency to enhance the quality of local living environments, while also fostering an ongoing, deeply engaging process of exploring and building public spaces. Therefore, this process transcends the conventional boundaries of engineering projects with set timelines and defined roles, necessitating close collaboration between designers and community residents. The collective aspiration is to develop a durable, efficient coordinative framework by elevating environment that preserves and promotes the dynamism and continuity of communal exchanges. However, landscape architects may become ensnared in traditional design paradigms that emphasize spatial form and aesthetic order, potentially overlooking the broader social context and the individual value needs of residents. This focus may inadvertently hinder community building initiatives. Furthermore, a perceived disconnect between residents and landscape designers can lead to diminished engagement and impede the success of community activities. Such challenges have prompted a reevaluation of the traditional roles and responsibilities of landscape architects. The "Xinxiang Garden" project Jiangxinyuan Neighborhood in Wuhan established a comprehensive framework of design process to improve the collaboration of designers, residents, society and the government. In this process, the needs and advices from locals were concerned before designing by interviews and surveys. In the phase of designing, Residents were invited to join the brainstorming sessions for revising design options of remediation of the garden. During the construction phase, community residents were also encouraged to be the main actors. Covenants were drawn up to ensure the protection of the environment. Although this project was progressing normally and completed, it revealed a spectrum of interests and concerns among both landscape architects and residents regarding site research, design adaptation, and participatory construction, as well as ongoing management and maintenance. This study will explore multiple roles of designers in the community engagement process, examining how to utilize the strengths and positions to enhance their social practice and amplify the societal influence of their designs. By comparing the deigned framework of the community building process with the interactions between designers and residents in the actual process in Jiangxinyuan Neighborhood, this research suggests that landscape architects should reassess their identity and role within the existing social network. They are poised to become coordinators both within and beyond the social system, leveraging spatial dynamics to facilitate and advance community development. *Corresponding authors of this article are Haiyan Xia and Yan Du Revised Abstract As China's urban regeneration shifts from incremental construction to quality improvement, the demand for "community gardens" and "participatory design" is growing[1]. Many studies advocate that designers should evolve from solution providers to collaborators[2-4], which implies a reversal of the traditional design process. This study explores how landscape architecture designers construct their social roles and actively respond in public participation. The Xinxiang Garden project in Jiangxinyuan community, Wuhan City, is taken as the research subject. Its renewal

scope includes the green space among buildings, with a total area of approximately 1,300m². To address aging facilities and population aging problems, the team determined the function of the site based on the community culture and resident needs. Residents were encouraged to participate in the co-construction. The project lasted for nearly a year, forming a cooperative model including the community, teachers and students, residents, volunteers and professional companies[5]. Drawing on project proposal text, occasional conversations and photographic documentation as primary materials, the study examines the way to involve the resident groups in the co-construction and interactions with the residents across research, design, construction and maintenance phases. A Process-tracing method is used to explore the operational mechanism. It reveals that the designers constructed the social role of collaborators in the project by "introducing, breaking and rebuilding" the identity of professionals. In the research phase, designers, as intervened by the government, build a professional identity with order and neutrality, connecting with residents mainly through interviews; in the design phase, designers receive feedback through formal and public meetings. Questioning and rebuttal subverts the professional authority, thus breaking down the boundaries between the designers and the residents and motivating residents to participate; During construction, designers transforming themselves into a laborer, joining residents in site cleaning, plants growing, and facilities decorating; in the maintenance phase, they become advisors, providing professional guidance to the local team. Meanwhile, the active responses are reflected in the strategies by designers like "compromise details", "collective action", "tangential direction" , which motivate residents to utilize their own skills and ideas, thus enhancing their autonomy. Briefly, the core of the role transformation lies in the direct "dialogue" in every phases. This kind of dialogue goes beyond the formalism of simply accepting opinions or handling needs based on assumptions, enabling residents to jointly focus on the same goal, thus achieving a flexible cooperative relationship.
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320 Engaging Older Adults in Landscape Design: Using Gamification to Identify Community Preferences at Clemson Downs Retirement Community

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Keywords: Gamification; Older Adults; Community Engagement; Landscape Design

Proven gamification strategies can increase engagement, activity, and retention for a given product (Deterding et al.). The technique often used in product marketing integrates game design elements into non-game activities. Although often used on digital platforms, analog equivalents create opportunities to expand the approach into more diverse contexts, including landscape design and planning. Additionally, gamification can uniquely engage underrepresented populations, including older adults. Community engagement is an established method for addressing environmental problems and is extensively used in development projects (Layson & Nankai, 2014). Engagement provides opportunities for all members of a defined community to influence a project or process (Aboelata et al., 2011). This presentation investigates gamification as a community engagement strategy that identifies the landscape preferences of residences at Clemson Downs, a retirement community in Clemson, SC. The research team conducted two gamification workshops between March and June of 2024 with a total of 15 Clemson Downs' residents older than 65. The workshops identified community members' landscape priorities for an open space within the community. The team organized a combined focus group discussion in June 2024, allowing residents to give feedback on the process and results. The research team developed a card game to be played over six rounds. We organized the rounds to begin with broad concepts and iteratively focused on smaller-scale programs, amenities, and site materials with each additional round. The team scored the game play and communicated the results to the participants at the end of each round, followed by a presentation of the aggregated results at the end of the workshop. The real-time results facilitated discussion and generated excitement through anticipation. The community's preferences highlighted a strong desire for inclusive spaces, emphasizing features that promote accessibility and interaction with nature. Key programmatic and site elements included pollinator gardens, sensory experiences, covered pavilions, and quiet places to sit, indicating a balance between environmental sustainability and personal experiences. Material choices favored concrete and pavers, suggesting a preference for durable and low-maintenance surfaces, prioritizing accessibility and safety. This study demonstrates the potential for gamification as an effective and efficient tool for engaging older adults in the landscape design process. By incorporating game-like elements into workshops, residents of Clemson Downs actively participated in shaping their community. Gamification created an atmosphere of fun where residents of all abilities felt comfortable identifying the landscape needs of their community.

362 Defending public educational landscapes through a living lab framework at Montana State University.

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Keywords: Living Lab; Experiential Learning; Community Engagement

The portrayal of the drama surrounding Montana's landscape in the popular television series "Yellowstone" may be exaggerated, but it indeed reflects the significant growth and development the state has experienced over the past two decades. Montana State University (MSU) in Bozeman has particularly felt this impact, with a 37% increase in student enrollment from 2003 to 2023 [1]. This growth, coupled with rising land prices and urban encroachment, has raised the question within the university's administration of how to defend the campus landscape against competing development demands. In response, a pilot project has been initiated to evaluate the feasibility of implementing a living lab model on campus as a strategy to help preserve its landscape function and character amid rapid development. This model promotes experiential learning through exploration, collaboration, and execution [2], and has proven effective in sustainable campus planning and stewardship [3]. It aims to provide a platform for place-based research and experiential learning, fostering creativity and engagement while aligning with the university's broader mission and vision. As a land grant institution, MSU has a rich history of utilizing its agricultural landscapes for educational and research purposes. The MSU Landscape Master Plan identifies the central Bozeman campus landscape as a vital component of the university's social, aesthetic, cultural, and facilities infrastructure but primarily serve practical or aesthetic functions only. Although the master plan was created to guide campus development, improvement, and maintenance it lacks a formal mechanism for faculty, staff, and students to participate in landscape development. This gap creates a barrier to engagement and reduces long-term landscape sustainability [4]. The pilot project's goal is to employ the living lab model to facilitate open communication among students, faculty, facilities, and administration regarding the campus landscape. A thorough inventory and analysis of the campus landscape, the administrative processes involved in its modification, and the key stakeholders will help establish a framework to preserve the unique landscape character amid ongoing community growth while providing consistent curricular opportunities for students to engage with real-world issues, potentially influencing future landscape projects.

373 Fuel(ing) the City: a DIY Energy Kit

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Keywords: energy; stewardship; storytelling; DIY; pollution

Energy production has reshaped landscapes globally, from microparticles in the air, soil, and water to networks of functional aesthetics. This project challenges the prevalent perception of the energy crisis as a solely technological or financial issue. We critically examine the role of landscape from both theoretical and practical perspectives, aiming to foster "energo-territorial" thinking through the co-design of postextrative energy infrastructures. We aim to contribute to community stewardship by exploring "energy sovereignty storytelling" (Castro et. al 2024) practices using DIY low-cost technologies with populations historically impacted by extractive activities and pollution. "Fuel(ing) the City: a DIY Energy Kit" proposes local experimental activities that aim to test and advance co-production techniques to sustainable landscape solutions. It is also a pilot program designed to empower underrepresented high school students in the "Contra Costa Refinery Belt" by offering them the tools to create affordable Arduino-based prototypes for renewable energy production in public spaces. The program's hands-on workshops aim to develop a replicable curriculum that fosters technical skills and community and environmental stewardship, encouraging young residents to reimagine their city through localized "energy sovereignty storytelling". Located in the San Francisco Bay, California, the "Contra Costa Refinery Belt'' is home to five refineries that stand around dense urban areas. These refineries have had significant repercussions on the community, biodiversity, and environment, with issues such as oil spills, explosions, and volatile pollutants historically affecting environmental and human health. Community-based monitoring programs such as Purple Air currently respond to the citizens' demands for air quality and accountability, but can public spaces encapsulate community aspirations for clean-energy landscapes while reducing dependency on fossil fuels as a form of social protest? In an interdisciplinary team – a designer, scientist, and curator – we created a kit that fosters play and imagination while offering valuable skills in accessible technologies. The kit examines the interplay between the environment and communities to speculate about place-based transformative solutions that can redefine energy production. Activating new modes of storytelling in relation to energy, we aim to embrace novel understandings of energy and energy infrastructure that can contribute to attaining a just and equitable energy transition. This project is funded by the Landscape Research Group Fund 2024, and it is created in collaboration with Philipp Simon, project scientist at Lawrence Berkeley National Lab, and Alejandro Ponce de Leon, editor, researcher, and PhD student at UC Davis.

394 Lansdowne Studio: Environmental Justice and Community Design in the City of Champions

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Keywords: Environmental Justice; Community Participatory Design; Landscape Resilience; Neighborhood Development; Floodplain Ecology

Community participatory design presents an enormous opportunity to build public facing research to support under resourced communities. Further, it allows students to participate in impactful work in a meaningful way. This proposal reflects on the Lansdowne Studio, a Spring 2024 vertical design studio course that centers a new landscape design and planting strategy for two brand-new housing development in East St. Louis, Illinois, designed to revitalize the Lansdowne neighborhood and bring in new residents to call the city home. East St. Louis – the City of Champions- has long been molded by its intersections with race, politics, heavy industry and natural and cultural environments, has long been centered for positive change. Local non-profit organizations such as the Jackie Joyner-Kersee Foundation and Lansdowne UP are actively driving positive change in the Lansdowne neighborhood. Over the semester, nine students in the upper division BLA and MLA cohorts performed a literature review of topics surrounding East St. Louis and environmental justice to build a working foundation of knowledge, conducted field studies, engaged with community members, and examined case studies of community landscape design projects that successfully incorporated place-based stormwater management, native plantings, and community development in collaboration with Lansdowne UP. The outcomes were the development of a set of actionable design guidelines that address the practical and cultural needs to sustain these new communities. These guidelines will inform the design of environmentally resilient and socially inclusive landscapes, that reflect the region's complex history and unique floodplain ecology. The design workshop built on the below prompts and invited students to consider the following: How do race, politics, and environmental factors shape neighborhood design? What design elements are crucial to attract former and new residents into the city? In what ways can landscapes be created that serve both environmental and social justice, in a community that has disinvestment over decades?

410 Physical Models as Complimentary Tools in Community Engagement

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Keywords: Community engagement; Interactive models; Language barrier; Inclusive planning; Service learning

Community engagement and service learning are core elements of academic curricula in the settings of design studios in landscape architecture. This paper describes procedures within the framework of an urban design studio that has been part of a long-time collaboration within the university and a mid-sized, former manufacturing city in the US. The studio has a record of tangible benefits including physical change, improvement of planning culture, and academic recognition through winning student design awards. The focus of this paper is presenting the process of a recent urban design studio that emphasized a more creative and inclusive engagement process through using physical models and materials at an advanced stage in the studio process. The studio assisted a regional planning commission in the public engagement for the creation of three neighborhood investment plans. All neighborhoods were disproportionately impacted by the Covid-19 pandemic and American Rescue Plan Act funds are used to develop and execute he plans. While the investment plans have a broad range of objectives – our design focus were improvements of the physical environment, street infrastructure for public safety, usability of public open space for recreation, and exploring the urban landscape as a catalyst for tactical pop-up economic development. Our studio was hired to develop specific, highly communicative, visual design typologies that would help reflect the needs of the community and steer and catalyze future development and revitalization. Three graduate-level studio design teams worked over the time span of fourteen weeks. The teams interacted with community leaders and residents and were supported by professional planners from the planning commission and a non-profit housing organization that assisted in running and catering envisioning community workshops. Two workshops were conducted for each neighborhood; the first one in the beginning of the semester with the goal of identifying priority areas and objectives through mapping and interviews along typological images; the second workshop discussed refined design solutions through presenting elaborated perspective renderings and plans, design typologies, and physical models. The models were built to encourage interaction with the participants and invite them to explore design solutions and alternatives. Notable outcomes: Two workshops engaged citizens over the whole semester Interactive, physical models reduce language barriers Models represent results more tangible than typical syntheses with words Students receive immediate feedback and experienced diversity and controversy of opinions Representation of final design less refined and more open than typical poster presentation Revised Abstract Community engagement and service learning are core elements of academic curricula in the settings of design studios in landscape architecture. This presentation describes procedures within the framework of an urban design studio. The focus of this study is presenting the studio process that emphasized a more creative and inclusive engagement process through using physical models at an advanced stage. Three graduate-level studio design teams worked over the time span of fourteen weeks. The studio focused on improvements of the physical environment such as: street infrastructure for public safety, usability of public open space for recreation, and exploring the urban landscape as a catalyst for tactical pop-up economic development. The teams interacted with community leaders and residents. Two workshops were conducted for each neighborhood; the first one in

the beginning of the semester with the goal of identifying priority areas and objectives through mapping and interviews along typological images; the second workshop responded to the first workshop, discussed refined design solutions through presenting elaborate perspective renderings and plans, design typologies. Renderings, plans and typologies were prepared in alternatives and demonstrated design solutions with professional graphic tools. In contrast, the models were used as a complimentary tool on plans and sections that only showed the spatial boundaries of the designable areas; the rest was left blank. Residents were asked to place elements such as trees, cars, pedestrians etc. in the model, and, if possible talk about the improvements of the design through their intervention. We observed that this method encouraged participants to talk and discuss their design proposals in a more open-spirited fashion and atmosphere. This applied predominately to demographics with English as their second language and even though that the workshops were all executed bilingually. The method encouraged also the students to interact more effectively with the participants. While professional drawings and renderings can be used in an advanced stage of community participation, other ways to continuously encourage participation and collaboration should be explored. The haptic nature of physical models could be one way of doing this and will be further tested. Notable outcomes: Two workshops engaged citizens over the whole semester Interactive, physical models reduce language barriers Models represent results more tangible than typical syntheses with words Students receive immediate feedback and experienced diversity and controversy of opinions Representation of final design less refined and more open than typical poster presentation

421 It's Always Sunny in Landscape Architecture: Understanding Stakeholder Values that Impact Rural Solar Energy Development and Mitigation Through Design

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Keywords: Solar energy development; Stakeholder values; Rural landscapes; Lone Oak Solar Energy; Climate policy

Landscape architects have the professional expertise to design solar energy farms, yet they are not privy to the debate and decision-making that occurs among all stakeholder groups during the development process. A thorough understanding of stakeholder values related to solar energy will help landscape architects design future solar developments more successfully and promote the profession in the energy sector. The realization of solar energy projects is important because the Federal Sustainability Plan enacted in 2021 set ambitious goals to reduce greenhouse gas emissions by 65% by 2030 and reach net-zero emissions by 2050. Renewable energy is an effective and readily available way to reduce greenhouse gas emissions. A combination of solar and wind renewable energy has the potential to achieve 3/4ths of the required national emission reductions set by the Federal Sustainability Plan. To understand the stakeholder perspectives that drive solar energy projects, a literature review was conducted using the search terms “solar energy development”, “landscape architecture”, “stakeholder”, “design”, and “potential impacts” on the Ball State University OneSearch database and Google Scholar. Multiple studies were found that discuss the economic, environmental, and cultural values of different stakeholders that affect the development of solar energy projects. A handful of studies were found that discussed how these differing values can be addressed during the design process of these projects. Beyond published research, a case study of the Lone Oak Solar Energy project in rural Madison County, Indiana, was undertaken to explore lesser-understood perspectives on solar energy developments. The Lone Oak project was highly divisive and stalled in 2022 due to a denied zoning request. To conduct a case study on the project, ethnographic research consisting of a review of state and county newspaper articles and public records from 2018 to 2024 was completed, as well as open-ended interviews with local governmental officials and residents who were personally involved with the project. Together these sources offer a valuable archive of primary sources that capture the events, persons, debates, and feelings that surrounded the Lone Oak Solar Energy project. A variety of potential land use compromises related to solar energy in rural landscapes is offered to help landscape architects tasked with designing solar farms. This research provides valuable insights into the complexities of solar energy development from multiple stakeholder perspectives that can inform decisions during the design process for landscape architects involved in solar energy projects at the local, state, and federal levels. Revised Abstract Landscape architects have professional expertise that can improve the design of solar energy farms, yet they are not privy to the deliberation and decision-making that occurs among all stakeholder groups during the development process. Solar energy developments see significant community pushback in rural American communities. A thorough understanding of stakeholder values related to solar energy can help landscape architects engage rural communities, government entities, and solar companies during the

design process to potentially reach more consensus for non-residential rural solar developments. The realization of solar energy projects is important because the Federal Sustainability Plan enacted in 2021 set ambitious goals to reduce greenhouse gas emissions by 65% by 2030 and reach net-zero emissions by 2050. Renewable energy in the form of solar energy is an effective and readily available way to reduce greenhouse gas emissions and help meet these goals. To understand the stakeholder perspectives that influence solar energy projects, a literature review was conducted using the Ball State University OneSearch database and Google Scholar. Multiple articles discussed the economic, environmental, and cultural values of different stakeholders that affect the siting and planting decisions of solar energy projects. A handful of articles discussed how these differing values can be addressed during the design process of these projects, as well as a variety of potential land use compromises related to solar energy in rural landscapes. Beyond published research, a case study of the Lone Oak Solar Energy project in rural Madison County, Indiana, was undertaken to explore lesser-understood community perspectives on solar energy developments. The Lone Oak project was highly divisive and stalled in 2022 due to a denied zoning request. A review of state and county newspaper articles and public records from 2018 to 2024 was completed to establish a valuable archive of primary sources that captures the events, debates, and feelings that surrounded the Lone Oak Solar Energy project. This research provides valuable insights into the complexities of solar energy development from multiple stakeholder perspectives that can inform design decisions made by landscape architects involved in renewable energy projects at the local, state, and federal levels. Additionally, this research opens new lines of academic inquiry about how community engagement relates to the revenue potential of solar infrastructure assets, how community engagement can positively impact other renewable energy developments aligned with policy goals, and how to promote the field of landscape architecture within the energy sector.

422 Combining Healing, Art, Community Engagement and Garden Design into a Memorial

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Keywords: healing process, community-engaged design, memorial, participatory practices, artworks

This article examines the 2023 University of Idaho "Healing Garden and Memorial" project critically; propelled by the tragic death of four UI students in the fall of 2022, the memorial was built in spring 2024 thanks to donors' support.

Memorials' studies investigate their physical shapes – ranging from statuary to spatially complex sculptural works, installations, or memorial ephemera – and explore their meanings (what or who is represented), suggesting their historical narratives mark social and political interests (Hite, 2013; Doss, 2012). Memorials are contexts for grief, reflection and remembrance; their aesthetics and symbolism are "objects of emotion" (Knight, 2019).As art projects, they deal with processes and public participation, where the spectators' involvement is part of the artwork's purpose and outcome (Björgvinsson & Hansen, 2011). Memorials are scrutinized in light of changed cultural and social practices of mourning, memory, and public feeling, and how grief is mediated in contemporary commemorative cultures (Doss, 2008). The creation of memorials as art therapy has seldom been researched (Kalaba, 2009), nor have memorials on university campuses, whose studies mostly explore perceptions on representations of the students' diversity (Tichavakunda, 2022).

This study attempts an analysis of the UI "Healing Garden and Memorial" as a process rather than a product. In spring and fall 2023, UI landscape architecture and architecture faculty and students worked together to develop ideas for a healing garden and memorial space on campus. The multidisciplinary design studios' weekly workshops explored case studies, site analysis, master planning, and conceptual design alternatives, and organized activities (such as interactive artworks) for community engagement. Students gathered inputs in small-scale group meetings and discussions with alumni and employees, professionals, Moscow's community members, friends, and relatives of the deceased students. A university-wide charrette saw participants engaged in design explorations that served to gather feedback on design.

This paper considers how the "Healing Garden and Memorial" intersected artistic and design practices, and attempts to analyze it within broader literature concerned with the shifting over time of commemorative practices and memorial forms. It explores how the project engaged healing processes by using social and participatory practices (the project as conduit to active healing) and how those practices led to design parameters and defensible design solutions. To

measure the project's successes and limitations, informal feedback of participants was noted, and design outcomes were compared to this feedback, to evaluate if and how they reflected the voices, wishes, and concerns of diverse stakeholders.

439 Critical Design Factors for Creating Balance Between Environmental Footprint and Ecosystem Services of Green Roofs

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Keywords: Green infrastructure; Sustainable roofing; Environmental footprint

Green roofs, one type of green infrastructure, provide multiple ecosystem services, including air pollution reduction, urban runoff management, mitigation of urban heat islands, and carbon sequestration (Shafique, 2018). The effectiveness of green roofs in delivering these essential services is intricately associated with their design composition, such as plant selection, substrate type, drainage systems, and irrigation efficiency (Gong et al., 2018; Shahmohammad et al., 2022). However, improper design choices can increase the environmental footprint of green roofs. To maximize performance while minimizing negative impacts, a comprehensive understanding of the design factors is essential. Despite these benefits, current literature reveals a gap in optimizing green roof designs for high performance with minimal environmental impact. This study addresses this gap through a systematic literature review, following the five-phase method established by Denyer and Tranfield (2009). A set of inclusion and exclusion criteria was developed to define the scope of the review, focusing on literature published between 2000 and 2024. The search primarily utilized the Web of Science, Springer, MDPI, Scopus databases. The initial selection process identified papers containing the **Keywords** “green roof” or “green infrastructure” in their titles, abstracts, or **Keywords**. Additional **Keywords**, such as green roof material, plant, vegetation, substrate, growing media, water use, irrigation, sustainable practices, ecosystem services, and life cycle analysis, were then used to refine the analysis. A tiered screening process of title, abstract, and full-text reviews was conducted, ultimately leading to the extraction of data from 53 papers. The findings were systematically categorized based on the review outcomes. The results reveal the sensitivity of the environmental impacts of green roofs to their design materials and strategies, emphasizing the need to balance performance with sustainability. The use of locally sourced or recycled materials for substrate and drainage layers is identified as a viable solution for reducing environmental footprints. Careful consideration is necessary when evaluating the effects of these materials on leachate quality and plant survival. Moreover, key factors in plant selection, such as leaf area index (LAI) and water usage, are shown to significantly affect green roof efficiency. Perennial herbs are identified as the predominant vegetation type for green roofs. Sustainable irrigation techniques are also highlighted for their critical role in optimizing green roof performance (Dvorak & Volder, 2013). Overall, the findings underscore the importance of a multi-criteria approach in selecting design components, providing valuable insights for future research and practical applications in green roof design. Revised Abstract Green roofs, one type of green infrastructure, provide multiple ecosystem services, including air pollution reduction, urban runoff management, mitigation of urban heat islands, and carbon sequestration (Shafique, 2018). The effectiveness of green roofs in delivering these essential services is intricately associated with their design composition, such as plant selection, substrate type, drainage systems, and irrigation efficiency (Gong et al., 2018; Shahmohammad et al., 2022). However, poorly designed green roofs can inadvertently

exacerbate environmental challenges, including increased greenhouse gas emissions throughout their lifecycle, excessive water use, and stormwater runoff contamination (Fiorentin et al., 2024; Novotný et al., 2024; Gong et al., 2020; Farrell et al., 2013). To fully realize the potential of green roofs, it is crucial to not only enhance their ecosystem benefits but also address their negative environmental impacts. Current literature reveals a gap in optimizing green roof designs for high performance with minimal environmental impact. This study addresses this gap through a systematic literature review, following the five-phase method established by Denyer and Tranfield (2009). A set of inclusion and exclusion criteria was developed to define the scope of the review, focusing on literature published between 2000 and 2024. The initial selection process identified papers containing the **Keywords** “green roof” or “green infrastructure” in their titles, abstracts, or **Keywords**. Additional **Keywords**, such as green roof material, plant, vegetation, substrate, growing media, water use, irrigation, ecosystem services, and life cycle analysis, were then used to refine the analysis. A tiered screening process of title, abstract, and full-text reviews was conducted, ultimately leading to the extraction of data from 53 papers. The results reveal the sensitivity of the environmental impacts of green roofs to their design materials and strategies. The use of locally sourced or recycled materials for substrate and drainage layers is identified as a viable solution for reducing environmental footprints. Careful consideration is necessary when evaluating the effects of these materials on leachate quality and plant survival. Moreover, key factors in plant selection, such as leaf area index (LAI) and water usage, are shown to significantly affect green roof efficiency. Perennial herbs are identified as the predominant vegetation type for green roofs. Sustainable irrigation techniques are also highlighted for their critical role in optimizing green roof performance (Dvorak & Volder, 2013). Overall, the findings underscore the importance of a multi-criteria approach in selecting design components, providing valuable insights for future research and practical applications in green roof design.

446 Blood, Sweat and Stormwater: Field Notes from the Green Infrastructure Landscape Lab

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Keywords: Green Infrastructure; Pilot sites; Bioretention; Stormwater; Planting

This presentation will consider a “service learning” course entitled Green Infrastructure in Action, which was recently created and cross listed between the Departments of Landscape Architecture and Environmental/Civil Engineering. In this course, both graduate and undergraduate students studying landscape architecture or related engineering fields have opportunities to engage with local residents, organizations and municipal agencies while working on real-world projects. Throughout the spring terms of of 2022-23, students designed and distributed a community-wide survey, transformed 2 local residential properties into water-wise landscapes, and even pitched their design ideas to civic leaders at city hall. The city stakeholders were receptive and excited to see such shovel-ready solutions, providing signatures on several Memorandum of Understanding (MOUs) which will allow curbs near these sites to be modified with “curb-cuts” and other Green Stormwater Infrastructure features. Future offerings of the course will continue to build on the foundation set here to develop new resources and tools to empower local residents to modify their own streets and yards to increase multi-functional greenspace, while reducing flood risk in this flood-prone area.

491 Project Chimp: A Service-Learning Case StudyFor Designing A Forage-Browsing Garden

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Keywords: Service Learning; Project Chimp; Forage-Browsing Garden; Case Study; Community Engagement

In 2015, the USA listed all chimpanzees (including captive) as endangered. The Endanger Species Act's ruling gave captive chimps the same protective status as wild animals. The ruling intent is to protect the chimp population use in; research, entertainment, and pet shops (USA.gov, 2024). There are 1,700 medical research chimps and 300 in zoos-privately owned (USA.gov, 2024). Current research's chimps will continue until the research is concluded. Since 2015 research permits involving chimps are not granted. Lethally disposing of the chimps after research conclusion is not allowed. Research institutions/laboratories must preserve the life of the chimps' post-research conclusion. These research chimps are not conditioned to be returned to the wild; nor a zoo, nor to become pets. The creation of a sanctuary to place chimps post-research retirement became the most logical-humane solution. Established in 2014, Project Chimp Sanctuary in Blue Ridge-Georgia welcome the first chimps in 2016 (ProjectChimp.org, 2024). Teaching, research and service to society are the core mission statements of the University of Goergia. Service-learning design studios offer a way for students to learn how to engage the community as well as provide them with hands-on real world work experience that goes beyond the limits of a theoretical environment (Eyler, 2001). Partnership between academia and a non-profit is mutually beneficial since it allows for the development of ideas/design solutions to be used by the community while simultaneously providing a living lab for the students to learn and gain valuable hands-on experience/skills (Bringle, 1996). Two primary methods will infuse research into this service-learning effort to create a garden for Project Chimp. First, it will serve as a case study for how students can make an impact to a non-profit group who may not have the means to receive design services. Second, documentation method will be used, where students will be required to review articles, literature, and other sources. The students will use plants in their design that chimps naturally use for forage/browsing in the wild. The garden is not meant to be use by the chimps to forage or to provide daily nourishment to the chimps currently house in the facility, but rather serve as an outdoor classroom to educate visitors on the types of plants that the chimps use for forage/browsing on the wild. Documenting the student outcomes will fulfill pedagogical goals of this course along with the service component for a nonprofit partnership.

597 Engaged stewardship: Collaborations to develop civic capacity and build social infrastructure in Wilmington's Hilltop Community

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Keywords: community engagement; service learning; design pedagogy; social infrastructure; civic stewardship

Social infrastructure, as defined by Sociologist Eric Klinenberg, is "the physical places and organizations that shape the way people interact" (2018, p. 5) and stewardship of this amenity has been explored, notably by Campbell and others (2022, 2012, 2008) in the social geography space, as key to the health of communities. This paper will chart the path of the stewardship of a particular public space, reflecting upon learnings from a multi-year engaged community design process from the perspective of community partners, faculty, and students. In 2022, the City of Wilmington, Delaware revealed plans to develop a historically and culturally significant site in the Hilltop Community, the Rodney Reservoir, which was instantly met with catalytic action from neighbors and community gardeners, including the formation of the community group, Green for the Greater Good (GGG). Through their efforts, GGG were able to change the trajectory of the project. In collaboration with faculty from the University of Delaware Living Lab research group, a multidisciplinary entity that emphasizes research-informed design and service learning, GGG hosted multiple community engagement workshops and visioned a nature-based and community-engaged future for this site. In a sometimes contentious atmosphere, the community goals of an ecologically sustainable park were continually brought to the fore, resulting in the eventual design and funding of a $2 million dollar new park that incorporated many of the ideas of community and students. Efforts continue to further the design and create a green hub that is community led, inclusive, and expresses the community desires for the site. This effort included design workshops, community surveys to gain insights on community needs, and shared field and learning experiences to build relationships between community members, faculty, and students. Critics of service learning and community engagement by academic institutions cite the challenge of long term engagement, the lack of action resulting from efforts, survey fatigue, and lack of authentic relationships between students, faculty and the community (Mitchell, 2008). This project aimed to address many of these criticisms. Faculty and community partners engaged in open dialogue about community goals and transparency, continuing to refine the process to achieve a supportive dialogue that informed the engagement process. This paper will use the Rodney Reservoir project as an example to assess some of these criticisms, highlight the importance of social infrastructure, and consider the role of reflection on the design process as integral to the long term stewardship of a community resource.

624 Stashing Carbon, Supporting Thinning: Exploring the Diversity of Biomass Utilization Industries

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Keywords: Wildfire; Fuels Reduction; Forest Restoration; Biomass Utilization; Carbon Management

Across the U.S. West, a decades-long buildup of flammable vegetation has accumulated, the result of misguided U.S. federal policies of fire suppression that are now colliding with the increasingly flammable conditions of an expanding wildland-urban interface and a climate-changed world, resulting in devastating wildfires and massive carbon emissions. Across the West, fuels reduction thinning projects are racing to decrease the amount of fuels in these fire-prone forests, but facing economic headwinds, as they find that the market for small-diameter timber is weak, and as a result the expense of forest restoration treatments is high. Now, in the search for doing something—anything—productive with the excess wood in these fire-prone forests, a whole suite of once obscure industries have edged into the limelight, trying to produce higher-value products that can simultaneously store forest CO2 and support the economics of forest restoration. These include biochar production, synthetic fuels or hydrogen production, cellulosic fibers and fabrics, cellulosic resins and polymers, engineered wood products like cross-laminated timber, laminated veneer lumber, and mass ply, and good old lumber. Each of these industrial processes have their own chemical or mechanical constraints, their own supply chains and sourcing requirements, their own skilled labor and specialized machinery, and their own relationship to the forest products needed as inputs for their production processes. This paper will provide an overview of the variety of biomass utilization industries that are well-placed to play the off-taker role in the design of biomass utilization campuses, including their relative potential to provide carbon benefits and support forest restoration treatments, based on literature review. It will also explore some of the design opportunities that various of these industries have, for multifunctional facilities that include the public and make legible the production processes taking place inside their factory walls, based on speculative studio work from several studios that the author has run on this subject. Anecdotes and diagrams from these different biomass industries will make connections between the work done in these factories and the work done in the forest, producing economic opportunities and improved carbon storage through improved interactions between forest management and forestry industres. Revised Abstract Across the U.S. West, a decades-long buildup of flammable vegetation has accumulated, the result of U.S. federal policies of fire suppression that are now colliding with the increasingly flammable conditions of an expanding wildland-urban interface and a climate-changed world, resulting in devastating wildfires and massive carbon emissions. Across the West, fuels reduction thinning projects are racing to decrease the amount of fuels in these fire-prone forests, but facing economic headwinds, as they find that the market for small-diameter timber is weak, and as a result the expense of forest restoration treatments is high. Now, in the search for doing something—anything—productive with the excess wood in these fire-prone forests, a whole suite of once obscure industries have edged into the limelight, trying to produce higher-value products that can simultaneously store forest CO2 and support the economics of forest restoration. These include biochar production, synthetic fuels or hydrogen production, cellulosic fibers and fabrics, cellulosic resins and polymers, engineered wood products like cross-laminated timber, laminated veneer lumber, and mass ply, and good old lumber. Each of these

industrial processes have their own chemical or mechanical constraints, their own supply chains and sourcing requirements, their own skilled labor and specialized machinery, and their own relationship to the forest products needed as inputs for their production processes. Using interviews, observations from site visits, analysis of case studies, literature review, and research by design, this paper will provide an overview of this set of biomass utilization industries, including their relative potential to provide carbon benefits and support forest restoration treatments, as well as the bottlenecks currently limiting their growth. Quantitative context for the economic and relative carbon benefit potential of these industries will be drawn from ongoing work the author is engaging in with forestry scientists and environmental economists. The paper will also explore some of the design opportunities that some of these industries have for co-location and increased public legibility, presenting both actual proposals and case studies of Biomass Utilization Campuses that aim for precisely such a combination of biomass utilization industries, as well as research through design from several studios that the author has run on this topic. The projects presented will articulate connections between factory and forest, between forest management and forestry industries—a feedback loop that should inform policies aiming to grow the demand for carbon-smart wood products from fire-prone forests, and for the design of these Biomass Utilization Campuses.

Urban Design

52 Lighting and women's perception of safety at night in urban areas

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Keywords: Women's perceived safety; Lighting height; Correlated Color Temperature; Virtual Reality

This study investigates the impact of lighting on women's perceived safety, with a focus on the effect of bollard and pole lighting as well as cold and warm color temperatures. The effect of color temperature on perceived safety is debated within the lighting research community; some believe warmer colors improve safety (Saad et al., 2021), while others believe the opposite (Knight, 2010). Additionally, while pole lighting is the most common method of illuminating streets, growing evidence suggests that bollard lighting can enhance perceived safety (Scorpio et al., 2020). However, most studies focus on vehicle safety, considering bollard lighting as an alternative to pole lighting. Because it is well known that women's participation in nighttime activities drop significantly after dark (Boomsma and Steg, 2014), our goal was to discover ways to increase their perceived sense of safety. Enhancing perceived safety is important because it can improve human health, walkability, and the livability of urban environments, which is crucial for the overall quality of life in urban areas. In this study, we used a 2x2 factorial design with four lighting scenarios: bollard vs. pole lighting and cold vs. warm color temperatures. Fifty female participants with VR headsets navigated a simulated residential street with a variety of lighting conditions and then completed a survey to report their perceived safety in those environments. Quantitative methods, including ANOVA and post-hoc tests, were used to analyze the data and identify factors influencing perceived safety. Our findings revealed that bollard lighting significantly enhanced perceived safety compared to pole lighting. However, contrary to some previous research, color temperature did not significantly impact perceived safety scores. Participants felt safer when bollard lighting was combined with pole lighting. This preference may stem from the fact that bollard lighting is more human-scaled and can convey a sense that the environment is more thoughtfully designed and that the place is well-maintained and valued. Meanwhile, although color temperature can influence mood, it does not dramatically change perceived safety. Future research could benefit from qualitative methods, such as focus groups, to complement the quantitative data. This study highlights the importance of designing lighting to increase perceived safety in cities. More welcoming environments that improve public safety, livability and walkability can be achieved by incorporating bollard lighting alongside pole lighting.

129 Resilient Infrastructure: Reconsidering the Historic Marshes of Charleston

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Keywords: Resilient Infrastructure; Nature Based Solutions; Ecological Function

We find ourselves confronting significant challenges because of previous human decisions, impacting the global ecology. While there is significant discussion of the implications of sea level rise due to human activity, there are many other aspects of the anthropocene that define our urban existence. The anthropogeomorphological condition we currently find ourselves in continues to reveal the consequences of defining the allowable space for nature. This mentality is best exemplified by the inscription on the Engineering Building at the University of Wyoming “Strive On - The Control of Nature is Won, Not Given”. This quote became the title for a collection of essays by John McPhee who described his book as “not an editorial. It is a description of people defying nature. They may have no choice.'' This is an important distinction as it frames the condition we find ourselves in; one that is reactionary and prioritizes human desire over a mutualistic ecosystem. Peninsular Charleston, first settled by non-indigenous people in 1680, has witnessed a radical and continuous redrawing of the water / land interface to serve human needs and desires. The peninsula has doubled in land area, primarily through filling in of tidal marshes, as the city grew. This continues today with elevated roads and buildings over unstable grounds while portions of the city sink due to decomposing landfill. The implications of filling marsh and a rapid increase in development have a significant impact on the ecology and are disproportionately detrimental to historically black and low-income communities which are the most flood prone and hottest neighborhoods due to lack of tree canopy. Peninsular Charleston is at an inflection point of determining how the city can exist on land that is or will be below sea level and largely defined by marshlands and tidal creeks full of trash. This paper presents design proposals working mutualistically with the ecology, not against it, to address the critical needs of resilient infrastructure that restores and enhances ecological function. The paper evidences design strategies that critically examine how we can exist in a way that is holistically sustainable. The strategies address the critical needs of a space for water that builds on the community and culture of Charleston and responds to the ever-increasing impacts of climate change. In a city where most residents' relationship with water is negative because of flooding, these strategies restore a positive relationship with water by creating the appropriate space for nature. Revised Abstract We find ourselves confronting significant challenges because of previous human decisions, impacting the global ecology. While there is significant discussion of the implications of sea level rise due to human activity, there are many other aspects of the anthropocene that define our urban existence. The anthropogeomorphological condition we currently find ourselves in continues to reveal the consequences of defining the allowable space for nature. This mentality is best exemplified by the inscription on the Engineering Building at the University of Wyoming “Strive On - The Control of Nature is Won, Not Given”. This quote became the title for a collection of essays by John McPhee who described his book as “not an editorial. It is a description of people defying nature. They may have no choice.'' This is an important distinction as it frames the condition we find ourselves in; one that is reactionary and prioritizes human desire over a mutualistic ecosystem. Peninsular Charleston has witnessed a radical and continuous redrawing of the water / land interface to serve human needs and desires. The peninsula has doubled in land area, primarily through filling in of tidal marshes, as

the city grew. This continues today with elevated roads and buildings over unstable grounds while portions of the city sink due to decomposing landfill. The implications of filling marsh and a rapid increase in development have a significant impact on the ecology and are disproportionately detrimental to historically black and low-income communities which are the most flood prone and hottest neighborhoods due to lack of tree canopy. Peninsular Charleston is at an inflection point of determining how the city can exist on land that is or will be below sea level and largely defined by marshlands and tidal creeks full of trash. This paper presents design proposals working mutualistically with the ecology, not against it, to address the critical needs of resilient infrastructure that restores and enhances ecological function through Nature-based Solutions (NbS) for a sustainable future. The paper evidences design strategies that critically examine how we can exist in a way that is holistically sustainable. The strategies address the critical needs of a space for water that builds on the community and culture of Charleston and responds to the ever-increasing impacts of climate change. In a city where most residents' relationship with water is negative because of flooding, these strategies restore a positive relationship with water by creating the appropriate space for nature.

160 Programming EntropyThe design strategies of Parque Fundidora, a comprehensive case study for large-scale North American urban parks

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Keywords: Parks; Parque Fundidora; Large-scale urban developments; Landscape Architecture programming; North American cities

Increasing demand for new urban landscapes in most major North American cities pushes local governments to identify ways to assess this situation and avert a major crisis. In cooperation with the private sector, cities are betting on comprehensive development mechanisms allowing them to urbanize major portions of their cities, setting a pace that traditional piecemeal development strategies cannot meet. These new developments are located adjacent to the urban core and benefit from the availability of large parcels that once housed industrial yards. Furthermore, stakeholders are growing ever-conscious of the value public spaces and parks provide for the existing and incoming communities. One key element in their design is the socially-oriented programming of their landscapes. However, the lack of an objective design framework for these landscapes, aimed at benefitting these development's social performance, jeopardizes cities' efforts and the private sector investments to create uplifting urban landscapes. This research aims to introduce a comprehensive design framework concerned with programming parks and public spaces for large-scale urban developments in North American cities. My work thoroughly assesses the unique and effective programming design strategies within the landscapes of Parque Fundidora, a high-performing, large-scale park in Monterrey, Mexico. (1) A series of walking tours covering all the landscapes in this park are undertaken to assemble a photographic memoir detailing its multiple programmatic strategies. In addition, interviews with experts on this park were conducted to extract valuable data highlighting the programmatic qualities of this project. The photographic memoir highlights distinct design strategies deployed within Parque Fundidora's landscapes. These include strategies dealing with the programming of landscapes catering to particular age cohorts, programmatic design of landscapes for round-the-clock daily activities covering the park's performance during all seasons year-round, and the design of programmatic clusters, or the lack thereof, within distinct landscapes in the park. In describing each identified programmatic strategy through photography, my work introduces a socially oriented design framework performing at multiple levels. First, as a design tool for professional teams tasked with shaping parks and public spaces in large-scale urban developments, and, as a pedagogical tool training landscape architecture students how to operate within this scope. Second, as a community empowerment tool guaranteeing existing and incoming community groups be conscientious of the programmatic design strategies in performance at their parks towards consensus. Finally, as an urban policy tool for local city authorities to amend ordinances, ensuring such projects adopt best design practices. Revised Abstract Increasing demand for new urban landscapes in North America pushes local governments to assess a potential crisis situation. With private partners, cities are betting on comprehensive development mechanisms enabling large-scale urbanizations. These new developments are located adjacent to the urban core and benefit from the availability of large parcels that once housed industrial yards. There, public spaces and parks provide ammenitites for the existing and incoming communities, such as socially-oriented programs. However, the lack of an objective design framework for parks, aimed at benefitting a development's social performance, jeopardizes efforts to create uplifting urban landscapes. This

research aims to introduce a comprehensive design framework concerned with the social performance of parks and public spaces in large-scale urban developments for North American cities. My work assesses the design strategies concerned with programming the landscapes of Parque Fundidora, a large-scale park in Monterrey, Mexico. (1) Through walking tours covering the entire park, a photographic memoir was crafted detailing its programmatic strategies. Documentation sessions at Parque Fundidora were performed on two separate occasions, amounting to two distinct tours. Thus covering as much ground as possible and exhausting all the programmatic strategies within the park's landscapes. By conducting two distinct photographic essays, Parque Funididora was documented through two highly active moments of the day, the morning and evening. This highlighted the many strategies to be included in this design framework, performing under distinct conditions. Additionally, I interviewed experts highlighting the park's programmatic qualities. The photographic memoir highlights the design strategies dealing with the programming of landscapes catering to particular age cohorts, programmatic design of landscapes for round-the-clock daily activities covering the park's performance during all seasons year-round, and the design of programmatic clusters, or the lack thereof, within distinct landscapes in the park. This research establishes the success of the design strategies through evidence of the continuously increasing number of parkgoers. My work introduces a socially oriented design framework performing at multiple levels. First, as a design tool for professional design teams and as a pedagogical tool for training design students. Second, as a community empowerment tool guaranteeing existing and incoming communities be conscientious of the programmatic design strategies servicing their parks. Finally, as an urban policy tool for local city authorities to amend ordinances, ensuring such projects adopt best design practices, introducing new guidelines for current and future assessment efforts by local authorities for public landscapes in large-scale private developments.

188 Integrating Nature and Urban Life: Optimizing Green Streetscape Design in East Coast Downtowns with Deep Learning and Perception Studies

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Keywords: green street; urban streetscape; street image data; environmental perception; street design

This research explores guidelines for better green streetscape design in downtown areas of East Coast cities in the U.S., aiming to achieve a balance between nature and urban life. Traditional downtowns in these cities often hold historical significance and have limited space for new green infrastructure. Unlike suburban areas, these urban streets struggle to offer a natural experience. However, studies show that well-designed green spaces can enhance visual quality and improve well-being (Du et al., 2016; Ge et al., 2023). Considering urban streetscapes are vital for a city's identity, creating streetscape renovation guidelines for downtowns that evoke a sense of both nature and urban life is a crucial aspect of green street design (Fathi & Masnavi, 2014). A method integrating Street View Images (SVI) analysis, semantic segmentation, and related deep learning techniques are employed to establish the basic criteria for this downtown green street design guideline. Firstly, twelve downtown streets from Boston, New York, Philadelphia, and Washington, DC were selected for their good streetscape experiences based on Google and online reviews. The study then retrieves 10,632 SVIs along these streets using the Google Map API. Secondly, semantic segmentation using PSPNet pretrained by the Cityscape dataset is conducted for all the retrieved SVIs. Through sematic segmentation, four key elements of streetscape (greenery, building, road, and sidewalk) and their proportion are detected. The distributions of these elements and the Green View Index (GVI) are summarized as the essential criteria for city-nature balanced streetscape design in downtown areas. Finally, the study applied the criteria to redesign a poorly rated street in downtown Roanoke, VA. Four streetscape scenarios were created and 42 participants from Virginia Tech are invited to view the initial and redesigned streetscapes through VR immersive rendering. Their perceptions of visual comfort and aesthetics are assessed via survey and statistically analyzed. The results indicate that this criteria for city-nature balanced streetscape design in downtown areas can significantly enhance the visual quality of urban streetscapes and people's spatial perception. Building on the broader research of green streets, this study focused on traditional downtown areas in East Coast cities, providing a more targeted exploration of streetscapes and proposing the concept of city-nature balanced streetscape design. By employing innovative deep learning-based methods, the study enhanced the objectivity of its conclusions. Additionally, the inclusion of perception studies and surveys as a supplement to big data analysis further increased the practical relevance of the research. Revised Abstract This research explores guidelines for better green streetscape design in downtown areas of East Coast U.S. cities, aiming to balance nature and urban life. Traditional downtown areas often have limited space for new green infrastructure and creating natural experiences. Studies show that well-designed urban green spaces can enhance visual quality and improve well-being (Du et al., 2016; Ge et al., 2023). Considering urban streetscapes are vital for a city's identity, creating streetscape renovation guidelines for downtowns that evoke a sense of both nature and urban life is important (Fathi & Masnavi, 2014). Therefore, this research raises two primary research questions: 1) what are

optimal distributions of streetscape design elements in East Coast downtowns? 2) how can green streetscape designs be improved using these distribution patterns? A method integrating Street View Images (SVI) analysis, semantic segmentation, and related deep learning techniques is employed to establish the basic criteria for this downtown green street design guideline. Firstly, twelve downtown streets from Boston, Philadelphia, and Washington, DC, were selected for their good streetscape experiences based on Google and online reviews. The study then retrieves 10,632 SVIs along these streets using the Google Map API. Secondly, semantic segmentation using DeepLabV3 pre-trained by the Cityscape dataset is conducted for all the retrieved SVIs. Through semantic segmentation, four key elements of streetscape (greenery, building, road, and sidewalk) and their proportion are detected. The distributions of these elements and the Green View Index (GVI) are summarized as the essential criteria for city-nature balanced streetscape design in downtown areas. Finally, the study applied the criteria to redesign a poorly rated street in downtown Roanoke, VA. Four streetscape scenarios were created, and 42 participants from Virginia Tech are invited to view the initial and redesigned streetscapes through immersive VR rendering. Their perceptions of visual comfort and aesthetics are assessed via survey with Likert scale ranging from 1 to 5 points. Participants' responses are statistically analyzed through descriptive statistics and T-Test. The results indicate that these criteria for city-nature balanced streetscape design in downtown areas can significantly enhance the visual quality of urban streetscapes, especially from the perspective of visual comfort. Building on the current research of green streets, this study focuses on downtown areas in East Coast cities, providing a more targeted exploration of streetscapes and proposing the concept of city-nature balanced streetscape design by employing innovative deep learning-based methods and perception studies.

251 Characteristics of Hardscape Details According to the Evolution of Urban Pedestrian Environments

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Keywords: Hardscape; Pedestrian environment; Landscape Paving; Terminology; Landscape Detail

This study begins with the hypothesis that the terminology describing the urban pedestrian environment in different periods reflects the cultural characteristics of the pedestrian environment at the time. Records of the walking environment can be found since 2000 B.C., and it has been transformed through the ages in the context of the evolution of urban civilization. Existing studies have tended to focus on individual topics such as walking volume, walking satisfaction, health, and barrier-free, with few attempts to analyze the evolution of the environment over time. In addition, studies interpreting the characteristics of pavements and streets from the perspective of the landscape field rather than urban or civil engineering are still lacking. Therefore, this study aims to identify changes in the status of the urban pedestrian environment and find landscape significance through the analysis of terms related to the pedestrian environment by era and the urban cultural interpretation implied by the terms. In order to select the terms to be studied by era, a literature study was conducted by setting various vocabularies representing the urban pedestrian environment as search terms. In particular, the time when the term was first used was viewed as a time when the status of the urban pedestrian environment changed, and this period was interpreted as a turning point in the relationship between the city and the pedestrian environment. The scope of the research included overseas articles, monographs, and research reports that describe the changes in urban pedestrian environments from ancient, medieval to modern, and contemporary times, including the cultural history of cities in the East and West, and not only the overall study of pedestrian environments, but also the aspects of landscape materials and construction methods. This study analyzed the relationship between cities and pedestrians by exploring how the terminology for the urban walking environment has changed over time and cultural context. In particular, various period-specific terms, such as semita, via, sidewalk, macadam, flâneur, ramp, shared-use path, and permeable path, provide clues to describe the pedestrian environment of the time, demonstrating that pedestrian paths have evolved according to the living, safety, human rights, and environmental needs of urban inhabitants. Furthermore, the close correlation between the pavement finish and the characteristics of the walking environment was found, which could be extended to the study of the relationship between the pedestrian environment and the pavement in the future. Revised Abstract This study examines how evolving urban pedestrian environments have influenced hardscapes in landscape architecture. Through this, the significance of Hardscape in urban culture is highlighted and explored by analyzing the origins of its main details through literature and pictorial materials. To understand shifting paradigms in urban pedestrian environments, we analyze key terminology that marked turning points across different eras—from Roman terms like semi-tà and via to modern concepts like shared use paths and permeable paths. These terms reflect values that have evolved alongside urban lifestyles and environmental needs: safety, health, environment, and human rights. Our analysis focuses on two concepts that have undergone significant transformation: porosity and multimodality. The porosity of hardscape has been closely related

to the durability of paving methods, paving finishes, and drainage systems. The stability of the foundation through the base layer of porosity established in the Roman period overcame the limitations of the open side ditch and laid the foundation for the hardscape system. Before wet-laid and cast-in-place pavements, surface porosity served both practical and aesthetic purposes—gaps from unfinished surfaces aided drainage while creating rhythmic patterns in gardens. While macadam improved durability, automobile-era pavements became unbreathable. Accelerating urbanization and climate challenges have renewed focus on porosity, leading contemporary urban squares to incorporate permeable paving as part of sustainable water management systems. Multimodality in pedestrian spaces has evolved significantly over time. In pre-modern streets, pedestrians and carriages naturally shared the same space. After the Industrial Revolution, safety concerns led to the separation of pedestrians and vehicles. The introduction of street trees and the rise of personal mobility devices have since fostered a new kind of multimodality in pedestrian routes. This evolution has created hardscapes that accommodate users traveling at different speeds and in different manners. In urban open spaces, the circulation systems now commonly recognize diverse pedestrian needs, including those of mobility-impaired users and age groups, resulting in more varied approaches to hardscape materials and finishes. This study illuminates the often-overlooked role of hardscapes in landscape research, examining their key characteristics and offering insights into the future of pedestrian environments.

271 EV Charging Stations: Urban Design Implications for Dispersed Communities in the Intermountain West

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Keywords: EV; electric vehicle; charging station; urban design; Intermountain West

Introduction & Background: This study examines the urban design implications and opportunities for integrating EV charging infrastructure in dispersed communities, with particular focus on the Intermountain West. Widespread adoption of personal automobile ownership in the 20th century disrupted previously conventional transportation norms, shifted activity from main streets to highways, enabling decentralized development on a massive scale (Bruegmann, 2019). The resulting automobile oriented infrastructural landscape includes ubiquitous gas stations and travel plazas, providing quick and convenient refueling. However, many developed countries and several US states have begun phasing out sales of new internal combustion engine (ICE) vehicles and mandating zero emission vehicles, predominated by electric vehicles (EVs). Following Norway in 2025; the EU and 12 US states will ban the sale of new ICE vehicles in 2035. Like their ICE counterparts, EVs have limited range. However, EVs require considerable time to fully recharge—from 15 minutes to several hours—depending on vehicle, battery size, and speed of the charging point. The conventional gas station model—designed for quick refueling—is less suitable for extended visits spent waiting for EV charging. Consequently, widespread adoption of EVs has the potential to disrupt the conventional travel plaza model, with urban design implications for communities near interstate highways. Methods: This NSF funded study examines the urban design implications and opportunities, with particular focus on how existing built environments of highway-adjacent communities can be leveraged and enhanced to facilitate EV charging while providing opportunities for other human activities. Review of federal and state-level EV charging infrastructure policies, land use criteria, and spatial design standards provided a baseline for site selection criteria. Employing these criteria, typological sites were selecting to showcase how existing built environments in dispersed communities in the Intermountain West can be retrofitted to accommodate EV charging infrastructure while enhancing other desirable urban design qualities through the landscape architectural design process. Results and Discussion: Analysis of resulting design vignettes provide multiple case studies for a variety of design typologies, illustrating the implications and opportunities for integrating EV charging stations into existing settlement patterns in the Intermountain West. This analysis provides guidance for decision making on suitability of site location, adjacent land uses, and potential for associated site improvements in existing development settings. Widespread EV adoption presents opportunities for landscape architecture and allied disciplines to leverage design of EV charging stations for integrating other enhancements to the built environment. Revised Abstract This study examines the urban design implications and opportunities for integrating EV charging infrastructure in dispersed communities, with particular focus on the Intermountain West. Widespread adoption of personal automobile ownership in the 20th century disrupted previously conventional transportation norms, shifted activity from main streets to highways, enabling decentralized development on a massive scale (Bruegmann, 2019). The resulting automobile oriented infrastructural landscape includes ubiquitous gas stations and travel plazas, providing quick and convenient refueling. However, many developed countries and several US states have begun

phasing out sales of new internal combustion engine (ICE) vehicles and mandating zero emission vehicles, predominated by electric vehicles (EVs). Following Norway in 2025; the EU and 12 US states will ban the sale of new ICE vehicles in 2035. Like their ICE counterparts, EVs have limited range. However, EVs require considerable time to fully recharge—from 15 minutes to several hours—depending on vehicle, battery size, and speed of the charging point. The conventional gas station model—designed for quick refueling—is less suitable for extended visits spent waiting for EV charging. Consequently, widespread adoption of EVs has the potential to disrupt the conventional travel plaza model, with urban design implications for communities near interstate highways. This NSF funded study examines the urban design implications and opportunities, with particular focus on how existing built environments of highway-adjacent communities can be leveraged and enhanced to facilitate EV charging while providing opportunities for other human activities. Review of federal and state-level EV charging infrastructure policies, land use criteria, and spatial design standards provided a baseline for site selection criteria. Employing these criteria, typological sites were selected based on their representation of various conditions. Through iterative analysis and design, resulting design proposals showcase how existing built environments in dispersed communities in the Intermountain West can be retrofitted to accommodate EV charging infrastructure while enhancing other desirable urban design qualities through the landscape architectural design process. Analysis of resulting design vignettes provides multiple case studies for a variety of design typologies, illustrating the implications and opportunities for integrating EV charging stations into existing settlement patterns in the Intermountain West. This analysis provides guidance for decision making on suitability of site location, adjacent land uses, and potential for associated site improvements in existing development settings. Widespread EV adoption presents opportunities for landscape architecture and allied disciplines to leverage design of EV charging stations for integrating other enhancements to the built environment.

279 Realizing The Chinese Gold Diggers' Footprint in Bendigo (1854-1869)

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Keywords: Chinese heritage; Gold rush; Bendigo city development; Settlement patterns; Urban growth

This article delves into the lost Chinese heritage of Bendigo, a city that was once home to a vibrant Chinese community during the 1850s and 1860s gold rush. Despite the significant contribution of this community to Bendigo's history, only five heritage sites currently reflect their presence. The destruction of Chinatown in the early 20th century, notably the Bridge Street settlement, eradicated much of the physical evidence of this once-thriving community. The article aims to reconstruct the settlement patterns of Chinese miners during this period by analyzing historical documents and maps, shedding light on their lasting yet overlooked legacy. The study identifies 39 potential Chinese camp locations across the Bendigo goldfields and employs pedestrian-shed analysis to better understand how these camps, along with European ones, formed a dynamic and evolving settlement network. These camps were not isolated, but rather intertwined with European miners in a fluid and mobile configuration. This network of camps, established by the movement of miners during the gold rush, contributed to Bendigo's urban growth in ways that are still visible today. The article compares maps from 1858, 1923, and the modern era, suggesting that Bendigo's current city layout may still trace the footsteps of the 40,000 miners, including 6,000 Chinese miners, who once flocked to the region in search of gold. A major focus of the article is the issue of heritage recognition. Only five tangible heritage sites connected to the Chinese community—such as the Joss House, White Hills Cemetery, and remnants of a Chinese market garden—have been formally acknowledged. However, 13 of the 39 potential camp locations identified in the study are missing from the heritage register, and several others remain uncertain or undefined. The Burra Charter stipulates that physical evidence is required for a site to be listed in the heritage register, which presents a challenge for these locations where much of the physical legacy has been lost. In light of this, the article suggests that alternative methods of heritage recognition be explored, even where traditional physical evidence may no longer exist. Acknowledging the historical significance of the Chinese miners in Bendigo is essential, and this research advocates for innovative approaches to celebrate their contributions to the city's history and landscape, ensuring that their legacy is preserved and remembered despite the loss of physical artifacts. Revised Abstract This article delves into the lost Chinese heritage of Bendigo, a city, situated on the northern reaches of the Great Dividing Range in central Victoria, Australia, and was once home to a vibrant Chinese community during the 1850s and 1860s gold rush. Despite the significant contribution of this community to Bendigo's history, only five heritage sites currently reflect their presence. The destruction of Chinatown in the early 20th century, notably the Bridge Street settlement, eradicated much of the physical evidence of this once-thriving community. The article aims to reconstruct the settlement patterns of Chinese miners during this period by analyzing historical documents and maps, shedding light on their lasting yet overlooked legacy. The study identifies 39 potential Chinese camp locations across the Bendigo goldfields and employs desire-Line analysis to better understand how these camps, along with European ones, formed a dynamic and evolving settlement network. These camps were not isolated, but rather intertwined with European miners in a fluid and mobile configuration. This network of camps, established by the movement of miners during the gold rush, contributed to Bendigo's urban growth in ways that

are still visible today. The article compares maps from 1858, 1923, and the modern era, suggesting that Bendigo's current city layout may still trace the footsteps of the 40,000 miners, including 6,000 Chinese miners, who once flocked to the region in search of gold. A major focus of the article is the issue of heritage recognition. Only five tangible heritage sites connected to the Chinese community—such as the Joss House, White Hills Cemetery, and remnants of a Chinese market garden—have been formally acknowledged. However, 13 of the 39 potential camp locations identified in the study are missing from the heritage register, and several others remain uncertain or undefined. The Burra Charter stipulates that physical evidence is required for a site to be listed in the heritage register, which presents a challenge for these locations where much of the physical legacy has been lost. In light of this, the article suggests that alternative methods of heritage recognition be explored, even where traditional physical evidence may no longer exist. Acknowledging the historical significance of the Chinese miners in Bendigo is essential, and this research advocates for innovative approaches to celebrate their contributions to the city’s history and landscape, ensuring that their legacy is preserved and remembered despite the loss of physical artifacts.

315 Mapping Air Taxi Infrastructure in Urban Landscapes: Developing Sustainable Vertiports Through Geospatial Analysis

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Keywords: Vertiport; Site analysis; Advanced air mobility; Geospatial tools; FAA guidelines

In the growing field of Advanced Air Mobility (AAM), utilizing compact aircraft for routine transportation is gaining traction. A key component of this vision is establishing 'vertiports', specialized infrastructure for aircraft takeoff and landing. While adding a vertical dimension to transportation enhances its supply, it also impacts land use, safety, privacy, and causes noise and visual pollution. Despite the importance, a comprehensive publicly available site analysis framework is absent. Notably, the Federal Aviation Administration (FAA) unveiled the Engineering Brief #105 for Vertiport Design in September 2022, offering provisional guidance. This study formulates a framework for vertiport site selection anchored in FAA guidelines. Our methodology combines insights from recent AAM design recommendations, environmental impact assessment, safety and risk assessment, visual assessment, geospatial analytics, and land use planning. Criteria from FAA guidelines on design, geometry, electronic infrastructure, site safety, and accessibility were extracted and supplemented with helicopter advisory and emergency landing zone protocols. Practical assessments in the Wasatch Front, Utah, identified the top ten sites with the highest suitability scores and considered repurposing federal parking spaces for vertiport development. We propose developing geospatial tools that integrate FAA guidelines with land use datasets for semi-automated vertiport site selection. Future research should enhance these tools with real-time data, machine learning, and community input, expand the framework to include international guidelines, and validate against new technologies and regulations. This effort will support the evolution of vertiport infrastructure, promoting safe, efficient, and sustainable urban air mobility. Revised Abstract The advent of air taxis promises to significantly transform urban landscapes, making vertiports—an infrastructure essential for their takeoff and landing—a pivotal component in Advanced Air Mobility (AAM). This paper presents a structured framework for vertiport site analysis grounded in comprehensive guidelines from multiple authoritative sources. Utilizing the Federal Aviation Administration (FAA) Engineering Brief #105 for Vertiport Design, Helicopter Design Advisory), and Emergency Landing Zone Protocols, we developed a set of criteria that assess operational, safety, and environmental considerations integral to vertiport site selection. Our framework incorporates detailed FAA specifications on vertiport design, including dimensions for Touchdown and Lift-Off Areas (TLOF), Final Approach and Takeoff Areas (FATO), and Safety Areas, ensuring operational effectiveness and safety. Additionally, the criteria address obstacle clearance requirements, electromagnetic interference management, and noise pollution mitigation—factors critical for urban integration and community acceptance. For emergency response, protocols ensure that vertiports accommodate necessary safety measures and environmental standards. To operationalize this framework, we developed a new geospatial tool using Python code in ArcGIS Pro. This tool is designed to recognize potential vertiport sites based on our established criteria and the specific dimensions of air taxis. By systematically applying these criteria using geospatial analysis tools and field assessments, we identified potential vertiport sites, evaluated their feasibility based on land parcel characteristics such as size, accessibility, and slope, and considered both natural and built environmental impacts. Our

approach prioritizes safety, efficiency, and minimal environmental disruption, setting a foundation for integrating vertiports into urban landscapes effectively and sustainably. This comprehensive methodology not only guides planners and policymakers in developing AAM infrastructure but also emphasizes the need for landscape architects to engage deeply with this transformative technology to shape future urban landscapes in a holistic and sustainable manner.

350 Associations between vacant urban lands and public health outcomes in growing and shrinking cities

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Keywords: Non-communicable diseases; Regeneration; Urban green space management; Vacant land characteristics

Vacant urban land, although not officially designated as a green space, often exhibits a semi-wild natural state due to being left open to colonization by nature. Attention to the effects of vacant urban land on human health has increased due to both rising urban vacancy rates and non-communicable diseases (NCDs). However, relationships between many vacant land characteristics (such as vegetation coverage, size, duration, and location) and NCDs have not been comprehensively examined, especially comparing shrinking (depopulating) and growing (populating) cities. This study evaluates St. Louis, MO (shrinking), and Los Angeles, CA (growing) to explore these relationships using ordinary (OLS) interaction analysis with a moderator approach. Results show that associations between vacancy rate, duration, location, and NCDs differ significantly between city types. Vegetation coverage and size are associated with specific NCDs, but there are no differences between city types. Unlike the largely dilapidated vacant lands in the shrinking city, which tend to harm public health, vacant lots in the growing city were more functional green spaces that can, in some cases, even mitigate NCDs. Interestingly, In St. Louis, the shorter the average duration of the vacant land, the greater the risk of NCDs in a shrinking city. This is because vacant land can be contagious to nearby lots if not treated, leading to more newly emerged vacant lands and reducing the average duration of vacant land. In such cases, census tracts with the lower duration of vacant lands in St. Louis tend to be areas facing persistent environmental degradation and high public health threats. Regarding location, vacant lands near industrial areas were linked to negative health outcomes in the Los Angeles (growing), while those near single-family and commercial areas posed higher risks of NCDs in the St Louis (shrinking). The findings aid decision-making for land supply regulation and regeneration as well as urban green space management to promote human health and well-being. Revised Abstract Introduction: Vacant urban land, although not officially designated as green space, often exhibits a semi-wild natural state due to natural colonization. Interest in the effects of vacant urban land on human health has increased with rising urban vacancy rates and the growing prevalence of non-communicable diseases (NCDs). However, the relationships between various vacant land characteristics and NCDs have not been comprehensively examined, particularly when comparing shrinking (depopulating) and growing (populating) cities. This study evaluates St. Louis, MO (shrinking), and Los Angeles, CA (growing), to explore these relationships. Methods: We employed ordinary least squares (OLS) interaction analysis with a moderator approach to evaluate how vacant land characteristics influence 12 NCDs. The dependent variables were NCD prevalence rates at the census tract level, sourced from the CDC PLACES dataset. Independent variables included physical characteristics of vacant land (vacancy rate, vegetation coverage as measured by NDVI, average size, and duration of vacancy). Duration referred to the time a parcel remained vacant, with shorter durations in shrinking cities

often indicating emerging vacancies described as "contagious," whereby untreated lots (i.e., no management interventions such as re-greening or repurposing) may influence adjacent properties through visible neglect and environmental degradation (Lee & Newman, 2019). Geographic conditions (proximity to single-family, multifamily, industrial, and commercial areas) and green space (percentage of parkland per census tract) were also included. The moderator variable was city type (shrinking vs. growing). Results: The results demonstrated significant differences between shrinking and growing cities. In St. Louis, high vacancy rates and short durations were positively associated with diabetes, asthma, and high blood pressure, particularly in census tracts near single-family and commercial areas. Shorter durations often signaled active environmental decline, amplifying health risks. In Los Angeles, vegetation coverage and larger vacant lots near industrial zones were linked to higher arthritis and cancer prevalence, potentially due to pollutant accumulation in densely vegetated areas (Nowak & Ogren, 2021). While vacancy rates in shrinking cities strongly predicted negative health outcomes, vacant lands in growing cities were occasionally beneficial, functioning as green spaces mitigating risks such as mental health issues, obesity, and hypertension. Discussion/Conclusion: The findings highlight the importance of contextualizing vacant land management. In shrinking cities, targeted interventions should repurpose long-term vacant lots into temporary, multifunctional spaces to mitigate health risks and foster community engagement (Moore-Cherry & McCarthy, 2016). In growing cities, strategies should emphasize pollution mitigation and maintenance to maximize the health benefits of vacant lands as potential green spaces.

360 Growing up in urban America: a comparison of four cities

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Keywords: Youth; Public space; Photo-framing; Belonging

Urban youth require healthy and supportive communities to further their growth and learning. However, the city's public realm may exclude (Owens 2002), may not offer adequate open space (Tillman et al. 2018), and may not provide safe spaces for social development (Peters, Elands, and Buijs 2010). This is particularly true of lower income neighborhoods which may receive lower investments of funding for public space allocations and improvements (Joassart-Marcelli 2010; Borunda 2020). We compare the youth experience in four cities in the United States with varying densities and income levels: Minneapolis, Minnesota, Prince George's County, Maryland, Houston, Texas and San Francisco, California. The research is part of Growing Up in Cities III, an international research effort to understand the link between young people's environment and their health and wellbeing. We ask the questions: In the faces of these urban challenges, where do youth go outside of the home to escape pressures, meet other youth and spend time in personal restoration? Conversely, which places in the city do they avoid to stay safe and comfortable? Using focus groups and photo-framing methods, youth participants highlighted experiential challenges of finding public spaces in which they felt safe and that they belonged. Like the broader population, urban youth in the four cities preferred maintained spaces and parks, rejecting "scruffy" or weedy landscapes. In addition, each city's youth highlighted concerns unique to each particular city, such as the need for sidewalks in some neighborhoods in Houston or the prevalence of adults loitering on the sidewalks of San Francisco. A comparison of the four groups suggests that physical differences in neighborhood type result in social differences in perceived urban challenges. We argue that while many of the themes discussed in focus groups were similar between cities, many of the specific challenges manifest in unique ways in each specific place. We provide examples in the urban landscape of potential ways to improve public spaces to provide a welcoming space for youth. Revised Abstract Urban youth require healthy and supportive communities to further their growth and learning. However, the city's public realm may exclude them (Owens 2002), may not offer adequate open space (Tillman et al. 2018), and may not provide safe spaces for social development (Peters, Elands, and Buijs 2010). This is particularly true of lower income neighborhoods which may receive lower investments of funding for public space allocations and improvements (Joassart-Marcelli 2010; Borunda 2020). We compare the youth experience in four cities in the United States with varying densities and income levels: Minneapolis, Minnesota, Prince George's County, Maryland, Houston, Texas and San Francisco, California. The research is part of Growing Up in Cities III, an international research effort to understand the link between young people's environment and their health and wellbeing. We ask the question: In the face of these urban challenges, where do youth go outside of the home to escape pressures, meet other youth and spend time in personal restoration? Using focus groups and photo-framing methods, youth participants highlighted experiential challenges of finding public spaces in which they felt safe and that they belonged. Like the broader population, urban youth in the four cities preferred maintained spaces and parks, rejecting "scruffy" or weedy

landscapes. In addition, each city's youth highlighted concerns unique to a particular city, such as the need for sidewalks in some neighborhoods in Houston or the prevalence of adults loitering on the sidewalks of San Francisco. A comparison of the four groups suggests that physical differences in neighborhood type result in social differences in perceived urban challenges. Income levels of youth did not influence the comments of participants, with the exception of Prince George's County who had higher levels of income and more of a focus on parks. Participants in denser neighborhoods focused on walkability and safety, while participants in neighborhoods of sprawl focused on finding a space to connect with others. We argue that while themes of safety, belonging and aesthetics manifested in unique ways in each specific place, the broader themes applied to each city. We provide examples in the urban landscape of potential ways to improve public spaces to provide a welcoming space for youth.

395 Boise Connections: An Integrated Public Transportation Approach to Mobility, Ecology, and Equity

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Keywords: Public Transit; Greenways; Ecological Corridors; Equitable Access; Resilience

Introduction: Boise, Idaho, faces rapid population growth, leading to traffic congestion, habitat fragmentation, and rising carbon emissions (EPA, 2024). To address these challenges, this project envisions a commuter rail system supported by bus rapid transit (BRT) aligning with the city's long-term sustainability goals (COMPASS, 2024), but with a critical addition: leveraging the public transportation network as a system of ecological corridors to enhance biodiversity and climate resilience. By creating transit-oriented, pedestrian-friendly environments, this project aims to reduce car dependency while promoting wildlife connectivity in the Treasure Valley region. Methods: Drawing from Boise's historical identity as a "trolley town" (Hester, J., 2024), the design utilizes existing rail corridors to minimize costs and environmental disturbance. Integrating landscape architecture principles, the project incorporates natural vegetation, wildlife crossings, and riparian buffers along transit routes to function as ecological corridors for species affected by urban sprawl. The BRT network links key urban and suburban areas while ensuring minimal disruption to existing ecosystems. Public spaces along the transit lines will be designed with native plantings and permeable surfaces to mitigate urban heat islands and manage stormwater, enhancing the city's climate adaptation strategies (City of Boise, 2024). Results: The combined commuter rail and BRT system reduces reliance on private vehicles, improving air quality and lowering carbon emissions. Simultaneously, it establishes a green infrastructure network that enhances habitat connectivity for threatened species. Walkable, transit-oriented neighborhoods foster both human and wildlife mobility, while pedestrian zones and greenways provide safe, inviting spaces for residents (Mattson, J., et al, 2021) (U.S. Department of Transportation, 2013). This multi-layered approach not only meets Boise's transportation needs but also strengthens the city's resilience to climate change through urban greening. Conclusion: This project demonstrates how public transportation infrastructure can simultaneously address urban mobility and ecological conservation. By integrating ecological corridors into Boise's commuter rail and BRT system, the city can reduce its environmental footprint while fostering biodiversity, offering a sustainable blueprint for the future of urban planning. Revised Abstract Introduction: Boise, Idaho, one of the fastest-growing cities in the U.S. (PNREAP, 2024), faces mounting pressures from population growth, including traffic congestion, habitat fragmentation, and rising carbon emissions (EPA, 2024; Shallat et al., 2011). Valley Regional Transit (VRT) has proposed plans to acquire the existing Union Pacific rail corridor for a commuter rail system supplemented with bus rapid transit by 2050 (COMPASS, 2024), but the plan lacks specificity and critical components for long-term success. This project builds on VRT's vision, addressing gaps in pedestrian infrastructure, mobility systems, ecological corridors, green infrastructure, active transportation, connectivity, and equity. By integrating these elements, the project aims to create a resilient, transit-oriented Treasure Valley that balances growth with sustainability and biodiversity. Methods: Drawing from Boise's historical identity as a "trolley town" (Hester, 2024) and leveraging the underutilized Union Pacific rail corridor, this project proposes a design framework that minimizes environmental disturbance while maximizing connectivity. Ecological enhancements such as riparian buffers, wildlife

crossings, and native vegetation are integrated with transit routes to function as ecological corridors. Mobility infrastructure like bike lanes and greenways are layered into the transit network to reduce car dependency and foster equitable access to transit. Permeable surfaces, stormwater management features, and native plantings are incorporated to address urban heat islands and support climate adaptation goals (COMPASS, 2024; Valley Regional Transit, 2022). Results: This master's project envisions a commuter rail and mobility framework designed to reduce reliance on private vehicles, improve air quality, and lower carbon emissions. The proposed ecological corridors aim to enhance habitat connectivity for pollinators and birds, while transit-oriented planning advocates for active transportation and equitable access to nature. By integrating pedestrian infrastructure and greenways, this conceptual framework demonstrates how the Treasure Valley's transit system could evolve into a multifunctional network that supports ecological health, community mobility, and climate resilience (Baldauf et al., 2013; Mattson et al., 2021). Conclusion: This visionary advocacy project underscores the need for public transportation plans to adopt a holistic, interdisciplinary approach to meet future growth challenges. By proposing an integration of ecological and mobility infrastructure into Boise's transit vision, this project serves as a conceptual model and a call to action for integrating transportation, equity, and sustainability. While speculative, the framework advocates for a paradigm shift, inspiring strategies to close current gaps and lay the groundwork for resilient, connected, and thriving mid-sized cities in the Western U.S.

430 Neglected to Vibrant: Urban Regeneration of Non-Conservation Historic Districts in Tongzhou's Nandajie, Beijing

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Keywords: Urban regeneration; Non-conservation historic districts; Multidimensional decision-analysis framework; Intervention strategies; Tongzhou's Nandajie

Non-protected historic districts in Chinese cities like Nandajie face significant challenges due to limited attention and the absence of legal protections. Non-protected historic districts, a concept first recognized in 2016, often lie outside conservation zones, making them particularly vulnerable to disruptive urban renewal practices that threaten their historic fabric and the well-being of their residents. This study focuses on the Nandajie district to analyze its architectural, green space, and traffic-related challenges and propose intervention strategies for renewing non-conservation areas. The results show that, firstly, residents perceive the district's architectural landscape as outdated (66.84%), confusing (48.97%), and lacking distinct character (37.97%). Adding new buildings has often disrupted the original streetscape, obstructing views of older structures and encroaching on public spaces. Streets and alleys are cluttered with debris, and public leisure spaces are scarce (64.43%), leaving little room for pedestrian interaction. In addition, inadequate drainage infrastructure (33.85%) worsens the problem of urban stormwater, especially after heavy rainfall. Traffic congestion is also a significant issue, with a noticeable imbalance between supply and demand (51.03%). Finally, while green spaces exist in the northern and western parts of the district, they are underutilized due to their small size and poor integration with the community. The scattered placement of plants and the lack of interactive green areas adversely affect environmental quality, with only 34.02% of residents feeling satisfied. To address these challenges, the study advocates for a holistic approach to renewing non-protected historical blocks, emphasising the importance of meeting residents' needs through small-scale, gradual, and sustainable interventions. These strategies can serve as a valuable reference for urban renewal practices in similar districts across China. By prioritizing the protection of historical memory and ensuring the continuity of the urban context, these recommendations aim to reduce the likelihood of total redevelopment and promote a more balanced, resident-centred approach to urban regeneration. Revised Abstract [Motivation] Non-protected historic districts, a concept first proposed in 2016, in Chinese cities like Nandajie face significant urban renewal threats due to limited attention, the absence of legal protections, and strong protection measures. These cities are undergoing difficult exploratory protection during urban renewal and urbanization. Despite their perceived lower historical value, non-conservation historic districts play a crucial role in the urban fabric. They offer affordable housing, small businesses, and social spaces that contribute to the diversity and vibrancy of urban life. Ignoring these areas results in the loss of potential cultural and historical assets and exacerbates social inequalities and urban fragmentation. However, comprehensive assessments of these districts are lacking, making it difficult to address their challenges effectively. [Objectives and Methods] This study proposes a two-step multidimensional decision-analysis framework to identify the most suitable intervention strategies for non-conservation historic districts. The first step focuses on the Nandajie district to analyze its architectural, green space, and traffic-related challenges for renewing non-conservation areas. On top of the intervention strategy, the most suitable urban regeneration strategies can be further tailored by considering

the regeneration constraint factors, including the requests for historical and cultural conservation and government financial capacity. [Results] The results show that residents perceive the district's architecture as outdated (66.84%), confusing (48.97%), and lacking character (37.97%), signaling a need to improve the district's aesthetic appeal while maintaining historical integrity. New construction has disrupted streetscapes and reduced public spaces (64.43%), crucial for community interaction. The strategy promotes infill development, respecting urban layout, and enhancing public spaces. Green space scarcity and weak community ties are identified (34.02%), requiring well-integrated green space creation and enhancement. Due to supply-demand imbalance, traffic congestion is a significant issue (51.03%), necessitating improved transportation infrastructure, efficient public transit, bike lanes, and traffic calming measures to reduce congestion and improve accessibility. The findings will inform the second step of the study, which will further tailor urban regeneration strategies by considering additional constraints such as historical and cultural conservation requirements and government financial capacity. [Significance] The study advocates for a holistic approach to renewing non-protected historical blocks, emphasizing the importance of meeting residents' needs through small-scale, gradual, and sustainable interventions. These strategies aim to reduce the likelihood of total redevelopment and promote a more balanced, resident-centered approach to the regeneration of non-protected historic districts by prioritizing the protection of historical memory and ensuring the continuity of the urban context.

460 Towards Spatial Justice in Urban Neighborhood Parks: How do Environmental Features and Community Demographics Influence Peak Utilization in Detroit

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Keywords: Inclusive park planning; Park visitation; Place-based equity; Mobile phone data; Human-environment relationship

Parks, as public open spaces, contribute not only to public health and ecosystems but also to fostering social interactions, aligning this research with the broader discourse on place-based equity (Jian et al., 2020; Larson et al., 2022). Mobile phone big data helps study park visitation patterns, revealing how well parks meet the diverse needs of different groups, which relates to social equity and environmental justice (Jay et al., 2022; Li et al., 2024; Song et al., 2022). However, few studies address whether mobile phone big data captures the needs of underrepresented groups and longitudinal changes especially in post-industrial cities. This research aims to evaluate the spatial and temporal patterns of how park environmental and landscape factors, accessibility, and community demographics influence peak hourly utilization, with a focus on socio-demographic heterogeneity in a post-industrial context. Ultimately, the study seeks to develop a predictive framework to identify the features that best cater to the diverse needs and preferences of different communities. This study utilizes longitudinal analyses with secondary data from multiple sources, focusing on 176 neighborhood parks ranging from 1 to 10 acres. A fixed-effects regression model is applied to assess how built environment features, landscape factors, and community demographics influence utilization patterns and interact to shape park utilization across diverse demographic groups over time. Preliminary results indicate clear spatial variations in park utilization across Detroit neighborhoods, with parks in higher-income areas showing more consistent monthly utilization, while those in lower-income or marginalized neighborhoods experience sharper fluctuations, often peaking during weekends or community events. Environmental and accessibility features including such as proximity to public transportation, presence of walkable sidewalks, and well-lit areas, along with community demographics including income and minority presence, significantly influence peak hourly park utilization, with better infrastructure and park management fostering higher usage. Socio-demographic factors like income, race, and neighborhood composition significantly influence the timing of peak park utilization, with higher-income and predominantly white neighborhoods seeing earlier peaks compared to lower-income or more diverse areas. The findings offer valuable insights for equity-based park planning, guiding future investments in open spaces to promote more inclusive and equitable park usage. The research also provides a context-based theoretical framework that encourages researchers and planners to consider both spatial and temporal dimensions when designing and evaluating urban neighborhood parks. Revised Abstract Urban neighborhood parks, as essential public open spaces, support public health, ecological sustainability, and social interaction, positioning this research within the broader discourse on place-based equity (Jian et al., 2020; Larson et al., 2022). Mobile phone big data helps study park visitation patterns, revealing how well parks meet the diverse needs of different groups, which relates to social equity and environmental justice (Jay et al., 2022; Li et al., 2024; Song et al., 2022). However, existing studies often overlook the temporal

dynamics of park use in urban neighborhood parks, particularly during peak visitation periods, and fail to comprehensively address the heterogeneity in factors influencing usage patterns across different times of the day. This study aims to examine the spatial and temporal dynamics of peak-time visitation in neighborhood parks, focusing on the influence of demographic and built environment factors and their variations across different times of the day. Ultimately, the study seeks to develop a framework to identify the features that best cater to the diverse needs and preferences of different communities. We conducted a longitudinal analysis of peak-time visitation in 69 neighborhood parks in the City of Detroit from 2021 to 2023 using Linear Mixed-Effects Models (LMM). The analysis incorporated demographic characteristics, spatial attributes, and park-specific features to examine the drivers of peak-time visitation across multiple time periods. Preliminary results revealed significant spatial and temporal heterogeneity across Detroit neighborhoods: demographic and spatial factors such as Black population percentage, car dependency, and income negatively impacted peak-time visitation, while park features like tree canopy, trails, and monuments positively influenced usage. The significance of these factors varied by multiple time periods, with unique trends such as trails being more influential in the afternoon and evening. The findings offer valuable insights for equity-based park planning, guiding future investments in open spaces to promote more inclusive and equitable park usage. The research also provides a context-based theoretical framework that encourages researchers and planners to consider both spatial and temporal dimensions when designing and evaluating urban neighborhood parks.

532 Advancing the Design of Shopping Malls for Environmental Benefits and Pedestrian Experience: A Vision for Irving Mall, Texas

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Keywords: Shopping malls; Pedestrian experience; Urban design; Stormwater run-off; Urban heat island effect

The evolution of shopping malls from retail-centric spaces to mixed-use developments reflects a contemporary shift towards holistic, community-oriented environments in growing metropolitan areas. While shopping malls can enhance well-being through the integration of natural elements (Anderson et al., 2016), the prevalent use of surface parking lots presents significant environmental and economic challenges (Evans et al., 2009). These challenges include contributions to urban sprawl, congestion, decreased land values, and hindered walkability (Kille, 2020). Furthermore, surface parking lots negatively impact the environment by increasing stormwater runoff, water pollution, and exacerbating the urban heat island effect (Greentumble, 2022). This research aims to assess conventional shopping malls and parking lot design principles in metropolitan regions by examining the negative environmental impacts of shopping malls and their parking areas. Specifically, the research focuses on mitigating stormwater runoff and the heat island effect while enhancing pedestrian experience in Dallas-Fort Worth (DFW) Metropolitan Region. The research will utilize these findings to redesign Irving Mall, Dallas, Texas, incorporating effective green infrastructure strategies to minimize environmental harm and create a more pedestrian-friendly environment. The research utilizes a mixed-method approach (Deming and Swaffield, 2011) to investigate the environmental and pedestrian challenges associated with shopping mall and parking lots in growing metropolitan regions. By combining literature reviews, case studies, secondary data analysis, and expert interviews, the study develops a comprehensive understanding of the issues and potential solutions. Analysis and synthesis of the data revealed that reducing impervious surfaces and incorporating landscape elements in shopping mall parking lots while revitalizing the mall itself can effectively enhance pedestrian experience and provide environmental benefits mitigating stormwater runoff and the urban heat island effect. These strategies contribute to a more favorable climate, attracting pedestrians to the space. The refined design serves as a valuable model for revitalizing conventional shopping malls in the DFW region. In conclusion, this study highlights the urgent need to redesign shopping malls as places that are both environmentally friendly and welcoming to pedestrians. By reducing the negative impacts of urban heat islands and stormwater runoff, we can create more sustainable and equitable cities. This research offers innovative ideas and design recommendations for DFW region in Texas. Revised Abstract The transition of shopping malls from retail-only establishments to multi facility or mix-use projects (Ozdil, 2018) is indicative of the current trend toward more comprehensive, neighborhood-focused, and pedestrian friendly settings. Shopping malls can improve well-being by incorporating natural aspects (Anderson et al., 2016), although the widespread reliance on surface parking lots poses considerable environmental and economic issues (Evans et al., 2009). These issues encompass urban sprawl, congestion, diminished land values, and impaired walkability (Kille, 2020). Moreover, surface parking lots adversely affect the environment by augmenting stormwater runoff, contributing to water pollution, and intensifying the urban heat island effect (Greentumble, 2022). This research seeks to advance the design of traditional

shopping malls by analyzing their adverse environmental effects in the Dallas-Fort Worth metropolitan region in Texas. It specifically aims to reduce stormwater runoff and heat island effect while improving the built environment and pedestrian experience. The study utilizes a mixed-method approach (Deming & Swaffield, 2011) to examine the environmental and pedestrian issues related to shopping malls and their parking lots. The research uses data from literature review, case studies (Marcus and Francis, 1997), secondary data analysis (GIS), and expert interviews (Berelson, 1952) to establish a thorough comprehension of the challenges and potential solutions for traditional shopping malls. The findings from each data set were analyzed and later synthesized to assess opportunities and challenges of such sites, while also revealing innovative approaches to improve their visioning and design. The findings suggest that optimizing building footprints with proper mix of uses, decreasing impervious surfaces, and integrating landscape features in shopping malls can effectively reduce stormwater runoff and urban heat island effect. These efforts along with additions of green nodes and points of interest with varying activities will foster resilient urban environment while enticing pedestrian activity in the area. The new design vision for Irving Mall informed by the findings of the research further demonstrates the implications of such advanced design ideas in regional settings. In conclusion, this research emphasizes the pressing necessity to reconfigure traditional shopping malls as resilient, sustainable, and pedestrian-friendly environments. The thesis specifically articulates that mitigating the adverse effects of urban heat islands and stormwater runoff can foster the development of more sustainable and equitable urban environments. The research demonstrates these objectives by presenting novel concepts and design proposals for Irving Mall, Texas, to influence design understanding and principles of shopping malls in the Dallas-Fort Worth metropolitan region.

564 Aesthetic Quality of Pedestrian Streetscape: A review of design policies from selected US cities

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Keywords: Pedestrian streetscape; Design policy; Aesthetic quality

Introduction: A well-designed pedestrian streetscape promotes physical activity and psychological wellbeing by creating a safe, visually appealing environment (Lindal & Hartig, 2013). The aesthetic quality of pedestrian streetscape is shaped by physical elements such as street furniture, buildings, pavements, and vegetation, along with their spatial relationships, like complexity and coherence . Public policies such as zoning codes and design guidelines regulate the placement and quality of these physical elements for the purpose of enhancing aesthetic quality, local identities, and safety. Research Gap: Previous review studies have targeted a few specific design policies such as complete streets policies and form-based codes and their applications in a single city or two cities . In addition, previous empirical studies have focused on limited attributes of the street environment, such as the exterior of buildings in residential areas and the street design of commercial districts . No prior reviews have investigated all relevant policies that can influence the overall aesthetic quality of pedestrian streetscapes.
Objective: This research aims to review the design and related policies that can influence aesthetic quality of pedestrian streetscapes. Pedestrian streetscape in this study is defined as modifiable physical and visual elements that pedestrians are exposed to while spending time on the street. Methods: We selected 12 cities across the US, using a stratified random sampling based on the city size (small, medium, and large) and region (Northeast, Mideast, South, and West). We will gather and review all relevant municipal policies including design guidelines, executive orders, legislation, plans, and resolutions, based on the following criteria: regulatory stringency, policy type, physical elements, and design goals. Results and Conclusion: Preliminary findings indicate that city-specific characteristics significantly influence regulatory approaches to streetscape aesthetics. Factors such as major industries, demographics, urban development, and transportation infrastructure shape streetscape designs. Cities focused on historical and artistic preservation, like Deltona, FL, and Santa Fe, NM, often enforce strict guidelines for building exteriors, regulating aspects such as color, materials, and architectural style. Larger cities, such as New York, NY, and St. Louis, MO, implement more comprehensive regulations that emphasize visual quality, while smaller cities tend to apply aesthetic regulations selectively, particularly in downtown areas. In residential neighborhoods, private subdivision ordinances significantly shape pedestrian aesthetics. Future research should explore regulatory strategies across both public and private sectors, incorporating detailed case studies to identify best practices. Revised Abstract Introduction: Enhancing streetscape aesthetics extends beyond mere visual appeal, contributing to physical activity and psychological well-being by fostering safe and engaging environments (Lindal & Hartig, 2013). Although aesthetic judgments are often seen as subjective, the universal recognition of the value and importance attached to aesthetics suggests opportunities to establish shared criteria for defining beautiful streetscapes (Kant & Walker, 2007). Public policies such as zoning codes and design guidelines regulate the presence, placement, and quality of the physical elements such as street furniture, buildings, pavements, and vegetation for the purpose of enhancing aesthetic quality, local identities, and safety. Research Gap: Previous review studies have addressed a few specific design policies that include

elements related to aesthetics, such as complete streets policies and form-based codes and their applications in a single city or two cities (Gregg & Hess, 2019; Talen, 2013). Prior empirical studies focused on limited attributes such as building exteriors in residential areas (Nasar, 1994) and the street design in commercial districts (Balasubramanian et al., 2022). No prior reviews have explicitly investigated all relevant policies that can influence the overall aesthetic quality of pedestrian streetscapes. Objective: This research aims to review policies influencing streetscape aesthetics, defined here as the modifiable physical and visual elements that pedestrians encounter on the street. Methods: We selected 12 U.S. cities, using a stratified random sampling based on the city size (small, medium, and large) and region (Northeast, Mideast, South, and West). We gathered and reviewed all relevant municipal policies including design guidelines, legislation, plans, and resolutions. We analyzed those policies using two approaches: quantitative regulations (e.g., zoning and form-based codes) were compared based on differences in elements like lot size, setback distances, sidewalk width, and tree placement, and qualitative regulations (e.g., comprehensive plans) were examined for overarching design goals, such as enhancing aesthetics, cultural preservation, and livability. We will conduct case studies to assess the real-world impacts of these policies. Results and Conclusion: Preliminary findings reveal that city-specific factors, such as demographics, industries, and urban development, significantly influence regulatory approaches. For example, Santa Fe, NM, prioritizes cultural preservation with strict architectural guidelines, while New York, NY, addresses aesthetic quality in multiple policy mechanisms (e.g. street design manual, active design guidelines, and zoning) emphasizing visual quality. Smaller cities often limit aesthetic regulations to downtown areas, and the aesthetics of residential areas are largely shaped by private subdivision ordinances.

565 Learning From a Student Competition

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In 1982, The Aga Khan Award for Architecture and the Turkish Chamber of Architects jointly sponsored a student competition to present a 25-year vision of development of Cumalikizik, a well-preserved historical Turkish village. The village was chosen as a scene where the students envision the future of the physical environment and its users, who had maintained their centuries-old cultural heritage in their day to day life and surroundings. The deliverable required a graphic poster presentation, with few words or textual elaboration of the visions. A large number of entries were submitted, and four finalist projects were published in Mimar, a quarterly international magazine exploring environments in developing countries. The three themes, Space, Time, and Life continue to be ever-present in discussions in architecture, landscape architecture, and urban design fields and education and practice. Through the author's interviews with the winner and three finalists, 42 years later, this paper will discuss the benefits of student competitions, the specific competition, and both specific and general contributions of competitions to students' education and overall careers. These experienced professionals explained their approaches to the competition, and the challenges for interpretation of the theme as students of pragmatic studio expectations; the assessments of what they had proposed after visiting the village in 2007; and how they would approach the same competition if they participated in it today. This paper will also present the finalists' proposals and the situation of the village in 2007. Revised Abstract In 1982, the Aga Khan Award for Architecture and the Turkish Chamber of Architects jointly sponsored a student competition to present a vision of Time, Space, and Life for a well-preserved historical Turkish village, Cumalikizik, in the year 2007. The three themes, Time, Space, and Life continue to be ever-present in discussions in architecture, landscape architecture, and urban design fields, and education and practice. The village was chosen as a scene where the students envisioned the future of the physical environment and its users, who had maintained their centuries-old cultural heritage in their day-to-day life and surroundings. The deliverable required a graphic poster presentation, with few words or textual elaboration of the visions. A large number of entries were submitted, and four finalist projects were published in Mimar, a quarterly international magazine exploring environments in developing countries. The competition exhibited the various approaches reflecting the culture of design schools and pedagogies. The proposals were generally in two categories: 1- Design proposals based on the familiar elements of the physical environment; 2- Abstract expressions of interpretations of ever-changing time, space, and life in the context of the village in the future. The results of the competition reinvigorated discussions about the alignment of design education pedagogies, since all finalists were selected from the second category. While student competitions that are visionary can be a positive influence on design programs and the accreditation standards that usually overlook creative inquiries, students who participate can also develop new ways of design thinking and communication. Through the author's interviews with the winner and three finalists, 42 years later, this paper will discuss the benefits of student competitions, the specific competition, and both specific and general contributions of competitions to students' education and overall careers. These experienced professionals explained their approaches to the competition, and the challenges for interpretation of the theme as students of pragmatic studio expectations; the

assessments of what they had proposed after visiting the village in 2007; and how they would approach the same competition if they participated in it today. This paper will also present the finalists' proposals and the situation of the village in 2007.