Council of Educators in Landscape Architecture

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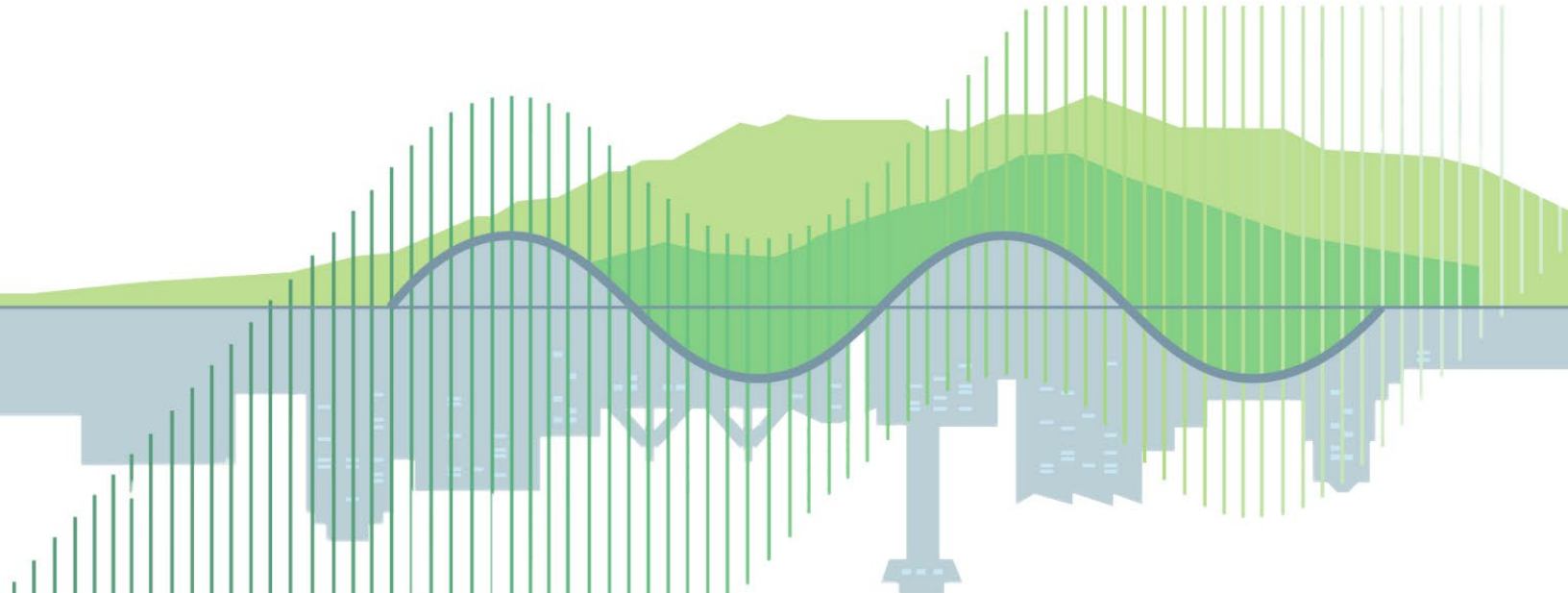
CONFERENCE PROCEEDINGS: ABSTRACTS OF PRESENTED PAPERS CELA 2023



Align | Realign

Conference Proceedings: Abstracts of Presented Papers
CELA 2023

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FOREWORD

ALIGN | REALIGN: DIALOGUES BETWEEN ACADEMIC PURSUITS AND PROFESSIONAL DEMAND

Landscape architecture, as an academic discipline and area of professional practice, has long been broadly defined as the integration of art and science. Both the profession of landscape architecture and its education have historically been dependent upon a constant dialogue between the arts and the sciences. Recently, the growing role of research within the practice of landscape architecture has created a shift in more scientific thinking to help reinforce evidence-based design decision making.

The degree to which scientific research is given emphasis in design and planning inevitably varies. This variance is generally dependent upon the values and findings within the given research and the specific goals and needs of a given project. Academics and professionals can also fluctuate in their locations along the art/science continuum, sometimes creating misalignments within what the landscape architecture profession demands and what is being researched or taught in landscape architecture education.

The 2023 CELA Annual Conference provides a forum and platform that explores these relationships, investigating the overlaps and misalignments between what is both taught and researched in academia compared to what is practiced professionally. This conference provides opportunities for scholarly dissemination and exchange of ideas related to research or scholarly inquiries related to gaps and synergies between design education and professional needs, collaborative research and/or design projects, design impact measurements and techniques, student placement or student skills vs. needs in the workplace, software taught vs. software used in practice, advisory board interactions and activities with programs, or other related phenomena.

After a wonderful return to a (mostly) in-person conference in 2022 (Santa Ana Pueblo, New Mexico, with virtual options), we are excited to, once again, gather in person, but this time for a fully face-to-face event. **The CELA Align | Realign Conference** is held at the beautiful Hilton Palacio Del Rio, right on the famous San Antonio River Walk. This year's conference has a theme which is well fitting with LA-based Professionals and Academics alike. The CELA Conference comes back to Texas after 25 long years (the last one in TX was in Arlington in 1998). Conveniently located in downtown San Antonio, the area offers opportunities for hiking and biking as well as the visitation of notable sites such as the Alamo and many other historic Missions, the Hemisfair Redevelopment District, the Hardberger Conservancy, the Tobin Land Bridge, the Pearl District, Brackenridge Park, the Botanical Park, Fredericksburg, Luckenbach, and many other amazing venues.

The CELA 2023 Conference also has two Keynote Sessions: (1) Research in Practice: Bridging the Gap between Professionals and Academics, and (2) an inspiring presentation by the CELA's 2023 Lifetime Achievement Award recipient.

The conference will observe the local, state, and national guidelines for wellness. Special networking opportunities including workshops with the editor of *Landscape Journal*, the research track chairs, fellow students, and participation in a now annual special session on Diversity, Equity, and Inclusion. As always, there is an administrators' session with the leaders of CELA, CLARB, ASLA, LAAB, LAF, and other allied organizations. This year's administrator's session is also much more interactive and engaging; you asked, and we listened. The conference comes to a close on Saturday, but not before celebrating our colleagues' successes during CELA's Annual Award and Recognition Ceremony on Friday evening. Afterwards, the CELA Past Presidents are asked to attend their first meeting as a newly formed Board.

While significant conference and organizational transformations are still occurring, we would like to continue to encourage more women and BIPOC members to seek leadership roles in CELA.

We look forward to your participation at The **CELA 2023 Annual Conference Align | Realign: Dialogues between Academic Pursuits and Professional Demand** and continuing discussions on the future of the organization, academia, landscape architecture and related professions.

Galen D. Newman
Past President, The Council of Educators in Landscape Architecture
Chair, 2023 CELA Standing Committee on Conferences and Events
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ALIGN | REALIGN

Align | Realign
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Global Solutions for Combating Flood Risk and Sea Level Rise

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Keywords: Resilience, Climate Change, Globalization, Engineering, Green Infrastructure

The appropriate mixture of integrated, multi-scalar flood protection mechanisms can reduce risks associated with flood events including sea level rise. The magnitude of flood risk is a function of a site's hazard exposure, the characteristics of a particular location, and the vulnerability of an area's people and property. The measures that have been taken to mitigate the potential impact of flooding play a large role in reducing or decreasing the associated risk. It is important for those located in the floodplain or future floodplain considering sea level rise and those responsible for land use, developmental, and population-related activities within these areas to strategically implement a series of integrated constructed and green infrastructure-based flood risk reduction mechanisms to adequately protect threatened areas.

Because sea level rise is a global issue, this research assesses innovative and practical measures for combating sea level rise from the profession of landscape architecture across case sites worldwide. Case studies are performed and compared across 18 unique locations worldwide (10 in the US and 8 outside of the US) using an identical framework to identify the structural (engineered), non-structural (nature-based), and hybrid mechanisms used to combat sea level rise and increase flood resilience. Alternative flood risk reduction mechanisms are extracted and analyzed from each case study to develop and explain a set of design-based typologies to combat sea level rise which can then be applied to help proctor new and existing communities.

We first discuss many of the current landscape architecture approaches to helping solve the myriad of issues related to sea level rise, laying the foundation through providing visualized scientific justification for the existence of sea level rise worldwide. We then discuss different climate change projections and their current and future impacts and integrate these findings into design and planning solutions related to green (non-structural) and grey (structural) flood control mechanisms. We then compare the 18 in-depth global case studies and their structural, non-structural, and hybrid mechanisms for combating flood risks and sea level rise. We then extract the utilized structural, non-structural, and hybrid mechanisms identified within the case studies, and define, visualize, and describe their characteristics. We by presenting a new term for landscape architecture: the urban periculum – a collection of areas that are at risk of flood hazards and sea level rise which constitute a landscape at risk in which the mechanisms showcased in this book should be integrated, mixed, and applied.

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A Machine Learning Tool for Assessing the Health Effects of Community Greenspace Design

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Keywords: Spatial pattern, Morbidity risk, Population health, R programming, Landscape metrics

Neighborhood greenspace morphology predicts public health outcomes, yet few tools are available for estimating the health outcomes of design alternatives, especially prior to their implementation. Herein we present a novel tool for predicting the morbidity of chronic diseases and unhealthy behavior based on landscape design master plans at the community scale. We achieve this based on data collected across five major metropolitan regions in the United States. Using high-resolution satellite imagery and remote sensing technologies, landscape design characteristics were extracted through spatial pattern analysis, allowing the measurement of verdancy, fragmentation, connectedness, aggregation, and shape of specified greenspaces. We estimated the prevalence of poor mental health, coronary heart disease, stroke, diabetes, chronic obstructive pulmonary disease, and physical inactivity at the census tract level by using the random forest algorithm together with spatial gaussian process models. Model accuracy was found to be significantly higher than ordinary regression models. The final model accounted for very high levels of variance in the specified morbidities; viz., poor mental health (97%), heart disease (93%), stroke (93%), diabetes (95%), COPD (94%) and physical inactivity (98%). This tool is implemented using a freely available and publicly accessible programming language (i.e., R). This tool enables designers to assess and compare the health effects of different landscape design plans prior to implementation, thus providing policymakers and designers with evidence-rich alternatives during the urban planning process.

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Artful Rainwater Design: Lessons Learned Over Time

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Keywords: Green Stormwater Infrastructure, Revelatory Design, Critique of Built Works

Background: Artful Rainwater Design (ARD) first appeared in the mid-1990s as a creative strategy to manage the rains up to about 2" that are typical of temperate climates: ARD uses gray and green stormwater infrastructure to manage and cleanse the first flush of rain events at the source, while making the rain's activity in the system quite visible.

But working with plants and soil to manage rain in a revelatory way is tricky business. The movement of water is surprising, sometimes unpredictable in volume, velocity, and even direction; the living systems of plants and soil frequently characteristic of ARD are changeable and evolving based on local site conditions. In sum, this kind of beautiful-AND-performative landscape design demands many more considerations—and a good bit more clever thinking—than standard landscapes.

Purpose: If we expect ARD to become a new normal in rain management, then designers, managers, and owners of ARDs must ensure that each installation works well both as a landscape amenity and as a rainwater management utility. A useful way to see how ARD is doing as a “landscape genre” is to return to the 20 case studies presented in a 2015 book on ARD (Echols & Pennypacker, 2015), all of which are now 10 to 20 years old. How are they holding up? The answer is varied: some are doing great, some not-so-great. This should not be a surprise--ARD is still a new and evolving strategy. Like any new strategy there are bound to be both successes and failures, and many lessons to learn from both. This project presents some of those very useful lessons.

Method: This study used key informant interviews as well as recent images of the sites (from the designers, from Google Streetview, and from our site re-visits in summer 2021) for 17 of the original 20 ARD case studies. The data were then coded using the three iterative steps (open, axial, selective) characteristic of developing grounded theory using qualitative data.

Findings: Coding was recorded using NVivo software and resulted in a useful set of themes that were parsed into “benefits” and “challenges,” as well as three simple “axioms,” and a set of practical recommendations for future artful rainwater design.

Conclusion: This study serves as a useful model to show how academic research can be structured to provide very direct benefits and useful information to landscape architecture professionals.

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State of the Education-Employment Symbiosis Today: Ideological Conflict, Diverging Priorities, and the Need for Recalibration

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Keywords: Professional practice, Pedagogy, Curricular reform, Identity, Humanistic skills

The recent technological redirection of landscape architecture, evident in its pervasive computerization, poses a dilemma for educational institutions. In accordance with the profession's ideological foundation as a design discipline, they are primarily obligated to produce designers (creative thinkers, problem solvers. artists) with competence in visual, written, and verbal communication. Yet, in response to the industry's demand for computer literacy, their instruction often prioritizes applied and technical skills over intellectual, theoretical, and abstract subjects. While the cerebral and applied aspects had traditionally been in harmony, computerization now skews the balance in favor of technical skills with an ever-increasing number and complexity of software programs. Today's graduates typically demonstrate high levels of computer competence, but only superficial (and often inadequate) knowledge of humanities-centered capabilities like drawing, visual design, graphic composition, and communication. Although pragmatic in the short term, this restructuring undermines the profession's ideological identity and long-term health.

Through the shared lens of professional-academic knowledge, the authors discuss how this refocusing undermines the learning of more valuable capabilities. Their dialog engages distinct yet complementary perspectives (one is current practitioner/former academic, the other current academic/former practitioner), together representing 34 years of teaching and 53 years of practice, and personal identities which incorporate geographical, cultural and ethnic diversity, along with extensive international affiliation.

Outlining the implications of this divergence for the profession's future, they dissect the current academia-practice partnership to evaluate its efficacy and identify functional shortcomings. With the conviction that the discipline's true essence manifests in non-technical concepts (such as leadership, social engagement, environmental stewardship, creativity, design sensibility, communication and management, to name just a few), they call for pedagogical reprioritization to safeguard these profound dimensions and promote a substantive understanding of professional obligations. They frame their inquiry through the following questions: How should schools balance conflicting priorities, satisfying industry demands while protecting the profession's intellectual spirit? How can curricular reform support the objective of producing future designers (and not merely draftspersons) ready to be mentored by employers into leaders? How can philosophical notions equip students to succeed as visionaries and future trendsetters?

These inquiries are ultimately intended to resolve a greater question: If detached from its intellectual, humanistic, and artistic affiliations, can landscape architecture truly become the transformative, beneficial force it is philosophically obligated to be?

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Junior Faculty in Landscape Architecture: Exploring the Future of Academic Pursuit and Professional Demand

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Keywords: Design Education, Junior Faculty, Future of the Academy, Future of the Profession, Landscape Architecture Education

Recent studies have examined senior faculty in Landscape Architecture (Rolley, 2019), investigated the academic experience for Black landscape architecture faculty (Bohannon, et al 2022a), and spatially visualized locations of black faculty (Bohannon, et al 2022b). Rolley (2019) provided insight and empirical evidence for senior design educators' experiences, predictions of retirement and the potential vacuum created. Bohannon, et al (2022a, 2022b) investigated notions of diversity and equity and provided a benchmark for this particular under-represented demographic. This exploratory study seeks to broaden this knowledge base of landscape educators and fill a knowledge gap in the literature. It seeks to answer: who are the junior faculty teaching in accredited landscape architecture programs? What does this mean for the landscape architecture discipline (academy/design education and the profession), now and for the future? Currently, there is no information on junior faculty and the study expects to provide fundamental profile data and identify notional dialogues between academic pursuit and professional demand. One study objective is to explore, discover and reveal who are currently serving as junior faculty in accredited landscape architecture programs, and particularly if they are active practitioners. In this study, junior faculty are defined in terms of full-time appointments that include tenure-track appointments, (assistant professor, associate professor, research assistant or associate professor); Lecturer, Visiting Assistant Professor, and Postdoctoral researcher. Given time constraints, the study will prioritize the North American universities. Another study objective is to expand the study contexts of the previous studies (Rolley 2019; Bohannan, et al, 2022a, 2022b). In terms of methodology, this exploratory study entails a survey through an in-depth mining of open-source data available on "junior" faculty at various websites beginning with accredited landscape architecture program websites, individual faculty websites, LinkedIn online professional networking application, among others. In addition to general background information (gender, ethnic background, university degrees held, licensure, professional experience), the study will analyze research productivity, and teaching activities. Preliminary findings will be revealed at the conference presentation. The study will reveal who and where junior faculty are based, what they are teaching and their research including basic, applied and creative practice. It will provide clues for the future of academic pursuit and professional demand. It will also provide a contemporary 2022 benchmark of junior faculty and for future investigations of educators in landscape architecture. It also endeavors to provide a resolution to the potential vacuum created by retiring senior faculty highlighted by Rolley (2019).

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The Seed Pile Project - Using Wildflowers to Engage Communities

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Keywords: Urban Seed Dispersal, Community Engagement, Citizen Science, Applied Research, Urban Greening

The Seed Pile Project is a community science initiative by UC Davis Landscape Architecture faculty and Miridae Living Labs to better understand the dynamics of native plant seed dispersal in human-dominated landscapes like cities and roadsides. It invites community participants to drop small piles of native seeds (such as yarrow, California poppy, lupine, etc.) in urban areas where they live or work and then monitor the results through repeated observations. By researching the conditions under which certain species of locally native seeds spread, survive, thrive, or die in disturbed areas, we can gain a better understanding of which native plants to incorporate into the built environment and where to put them for the greatest ecological benefit and resilience.

The project addresses current knowledge gaps in the landscaping industry; specifically - *which native plants can tolerate the urban environment, be spread inexpensively by seed, and do not need to be trimmed, pruned, fertilized, or watered to survive?* In addition to helping inform the landscaping industry's decisions about what plants to use in urban spaces, research results and best practices can also be used by local public works departments and state agencies to support urban habitat design and environmental restoration without requiring large budgets for installation, irrigation, and maintenance. The project has also raised awareness about the importance of native plants, which promote biodiversity and tend to require significantly less water, fertilizer, or pesticides. Importantly, as a community science initiative, the Seed Pile Project educates, engages, and empowers individuals and communities typically left out of the traditional landscape architecture process by providing them with knowledge and resources to help promote healthy ecological development within their own neighborhoods.

This presentation will introduce the Seed Pile Project, talk about its impact to date, and explore some of our initial findings about the potential to directly apply academic research to local urban greening efforts using little more than native seeds and an actively engaged community.

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Beyond Form and Color: Planting Design for Ecological Connection, Landscape Performance, and Improved Health

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Keywords: Landscape Architecture Education, Curriculum and Pedagogy, Urban Ecology, Landscape Performance, Design for Health

Throughout landscape architecture history, plants were intensively used to decorate a garden, form an art, symbolize and represent meanings, and to denote a space. Planting design instructional materials largely align with these purposes, and are reflected in many representative textbook resources currently used in academic programs. These publications include, but are not limited to Planting Design (Walker, 1991), Elements of Planting Design (Austin, 2002), and Planting: A New Perspective (Oudolf & Kingsbury, 2016). Today's landscape architecture professionals were trained to rely on these materials to conduct their daily practices. However, scholars have recently begun to raise questions about the utility of traditional planting design methods and are proposing new ways to transform its principles. This paradigm shift includes the consideration of biodiversity and ecology (Hunter, 2011), climate change adaptation (Teixeira, Fernanades, & Ahern, 2022), and the therapeutic value of landscapes (Marcus & Sachs, 2013) as important factors in planting design. At a theoretical level, landscape architects are ready to take a leading role in dealing with rising societal and environmental challenges, such as habitat decay, changing climate, and increasing mental stress in urban populations. In practice, however, essential skills are lacking. As long as planting design pedagogy and its outdated reference materials remain unchanged, the gap between academia and applied practice will continue to widen.

The aim for this presentation is to call for pedagogical transformation and a critical examination of traditionally used materials, and to propose new thinking and directions of foundational practice strategies. Three landscape architecture educators who have actively retrofitted their planting design pedagogy to include these new theories and concepts will present this panel. During this interactive panel discussion, each presenter will provide a summary of their instructional work within the realm of planting design and share how the three realms, urban ecologies, landscape performance evaluation, and therapeutic value need to be interwoven into course content. Three case studies of planting design education, respectively from University of California Davis, Purdue University, and University of Washington Seattle, will be introduced as examples of the paradigm shift. Course structure, sample exercises, and student feedback will be included in the presentation and final paper. The three case studies shed light on the future of planting design education, one which will maintain its historical values, but will actively seek new perspectives to meet current environmental and societal challenges.

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Trial by Fire: Testing the 5 Models of Knowledge Generation Between Practice and Academia

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Keywords: Collaborative Models, Knowledge Integration, Practice-based Research, Wildfire Risk, Community Resilience

In 2016, XL Lab was established as SWA Group's firm-wide platform for practice-based research and innovation. Lab projects are intended to create knowledge that reaches beyond any one site to inform contemporary design practice, and to help cities, communities, and environments address emerging complexities and face unprecedented challenges. As a part of this work, the lab has frequently collaborated with academic research partners and institutions to carry out projects and/or disseminate findings.

As a way of evaluating the success of these collaborative efforts, and to help steer the formation of future partnerships, the lab has recently identified five distinct models of knowledge generation between practice and academia. Each model is characterized by different degrees of integration between project partners, and by different levels of applicability to the field at large.

This panel will convene a group of academic researchers and practitioners to illustrate each of these models through recent and ongoing examples of collaborations between institutional scholarship and applied, client-driven project work. As a lens through which to explore these collaborative models, and compare them against each other, each featured example will showcase projects related to one of today's most pressing environmental challenges – wildfire and its effects on the built environment.

Landscape architects are well positioned to help communities mitigate risks related to wildfire, many of which are explicitly linked to elements like vegetation, topography, and site design, yet the discipline at large has been slow to respond to this growing crisis. This panel will bring together thought leaders who are involved with filling this disciplinary knowledge gap by leveraging synergies between design education and professional needs.

The panel moderator will introduce the five models of knowledge between practice and academia, and discuss the potential applications of each model for deepening the discipline's engagement with wildfire risk and resilience. Panelists will then present their recent or ongoing collaborative wildfire-related projects. The panel will conclude with a public Q+A session.

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Analog Antidotes to Derivative Digital Doldrums

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Keywords: Professional Practice, Design Education, Physical Modeling, Iterative Testing, Documentation Methodologies

Landscape architecture relies upon digital design methods more than ever. This emphasis risks the loss of tangible engagement with iterative design processes, fellow colleagues, physical materials, atmosphere, and construction methods. This panel offers a variety of analog design approaches, asserting their foundational role in creating quality built work.

This session is intentional in its content to deliver a series of ideas and outcomes that evoke a better way to facilitate inclusive and positive contact with the built environment through design and the creative design process in conjunction with fundamental skills and knowledge of materials. The act of physical making, creating, and testing relationships throughout the design process by designers and stakeholders demonstrate a commitment to action - and a promise that we are deeply knowledgeable about the land while also empowering users to “see” and “experience” a space well before it is constructed. The strategies and techniques covered in this session are replicable in their design and representation. By testing of ideas through progressive, iterative physical and digital modeling as new information and ideas come to light and the approach evolves, designers can be thoughtful about how people use space, how they interact with others in the space, how to construct the space, and how those interactions arise. This session also optimizes the foundational aspects of creating and making; using tools and materials that are familiar, user-friendly, and accessible.

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What Is Next? How Ten Years of U.S. Environmental Protection Agency RainWorks Challenge Helps Academia, Profession, and Community

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Keywords: Green Infrastructure, Climate Action, EPA RainWorks Pilot, Multidisciplinary Design Competition, Landscape Performance

The Campus RainWorks Challenge is a Green Infrastructure (GI) design challenge for American colleges and universities organized by U.S. EPA. It engages with the next generation of environmental professionals, foster a dialogue about the need for innovative stormwater management techniques, and showcase the environmental, economic, and social benefits. Since 2012, this challenge has invited multidisciplinary faculty, students, staff, and professionals to produce evidence-based ideas to promote nature-based solutions. Campuses are used as incubators of future design professions, and the testing ground for innovative GI and climate action design practices.

In its tenth year, EPA invited two institutions to run a technical assistance pilot to realign its objectives with the next generation of GI practices to address issues beyond just water quality like heat mitigation and climate resilience. The assistance involved an on-site charrette, facilitated by EPA's design team, for each campus where participants explored how GI practices could be adapted to meet the specific site conditions and prevalent issues such as stream erosion. Faculty advisors highlighted past Campus RainWorks submissions and involved alumni who are now design professionals. Facilities staff for each campus were involved throughout to assess feasibility of specific practices and explore how GI could address multiple campus and community development goals. EPA will use the "lessons learned" from the assistance to re-imagine the future of the Challenge and development a GI resource specific to campuses.

This panel bring an EPA representative, faculty advisor, and consulting team members together- who have extensive experience in EPA's activities as well as GI, climate resilience, community engagement, and campus planning - to discuss questions including:

- What is EPA's mission with GI Initiatives? And what is achieved within the past ten years?
- What is faculty advisor's experience to teach, research and serve through this challenge, and the pilot?
- What are the findings of the professional experts from the challenge and the pilot?
- What is next? How can GI and EPA's Rainworks initiatives be implemented and scaled up on and off campuses?

Due to increasing complexities with climate change, built environment, and urban growth, innovative ideas, evidence-based practices, and renewed synergies are needed among multidisciplinary teams of institutions, professionals, and agencies in GI practices. This panel will review the lessons learned from EPA's RainWorks initiatives within the past ten years while highlighting what is next for GI and climate action research, education, practice, and service in landscape architecture.

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What Are the Impacts of Landscape Architecture Education Not Aligned With Professional Practice? What Are the Opportunities and Challenges of Realigning Education to Practice?

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Keywords: Alignment, Realignment, Curriculum, Pedagogy

This study explores the impacts of landscape architecture education not aligned with professional practice. As often noted, even in this call for abstracts, the practice of landscape architecture in most academic programs is significantly different from what students will do when they graduate. How does this lack of alignment impact graduates? Does it alter their career paths? Their rate of success? Their perceptions of their academic programs or the profession? To begin to explore these questions, the authors interviewed a majority of the last ten years of graduates from the North Carolina A&T landscape architecture program. The authors are both faculty members of the program and one is also an alumnus. As of this abstract submission date, the interviews are in progress. Preliminary results show that alumni see the lack of alignment as a significant barrier to their success. Many graduates report the misalignment leading them to question their program or the profession and eventually to take a different career path. Completing the interviews this fall will support more detailed qualitative and quantitative analysis. The early interviews already illustrate impacts that call for change. The authors have begun to make this change, realigning the NCA&T program to directly reflect practice—from RFPs to CDs. This study will report both the evidence of the impact of the lack of alignment that the authors have collected, and the successes and challenges of the authors' attempts to address this issue in the NCA&T curriculum.

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Professional Licensure of Landscape Architects: The Role of Education, Educators, and Allied Organizations

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Keywords: Landscape Architecture, Licensure, Professional Practice, Education, Faculty

Professional licensure, a highly desired outcome of earning a degree in landscape architecture, helps to ensure competency and further prepare a person for general practice. The standards for landscape architecture education established by LAAB require key values, knowledge, and skills areas such as environmental and human health and protection, resiliency design, materials and construction, and professional ethics that prepare individuals for general practice and for examination leading to licensure. Recently, serious threats across the U.S. to landscape architecture licensure coupled with questions regarding the value of licensure among educators have created weaknesses in supporting licensure. Meanwhile, the practice of landscape architecture is changing to meet the interrelated crises of climate change, failing infrastructure, and social and environmental justice. How do the structures of education and licensure align in response?

In this context, a moderated panel, consisting of representatives from the American Society of Landscape Architects (ASLA), the Landscape Architectural Accreditation Board (LAAB), the Council of Landscape Architectural Registration Boards (CLARB), the Council of Educators of Landscape Architecture (CELA), and the International Federation of Landscape Architects (IFLA), share recent discourse and efforts concerning licensure and the role of education and educators in preparing students for practice and licensure. The panel will review and discuss: 1) recent threats to licensure of landscape architecture across the US and how the ASLA and allied organizations are responding; 2) the recently updated and proposed uniform licensure standard by CLARB, its purpose, and the tiered education requirement within that standard; 3) the outcomes of a survey by CELA of faculty on the value of licensure and institutional support for licensure; 5) the most recent data on faculty licensure from the 2022 LAAB Annual Report; 6) an analysis of current LA job task initiatives (undertaken nationally and internationally) with implications for both education and licensure; and 7) the value of licensing to the future of the profession.

The purpose of the panel is to generate dialogue and productive debate among educators on the alignment between education, practice, and licensure in a profession taking on increasingly complex areas of design and planning practice in the 21st century. Considerations include updating curriculum and licensure standards to meet new job task analysis outcomes and addressing DEI in both education and licensure processes. The panel will continue strengthening cross-organizational collaboration and publish a white paper on its efforts including outcomes of the panel discussion at CELA 2023.

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Department of Radical Implementation: Innovative Practice in Local Government

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Keywords: Nimble Innovation , Design Thinking, Social Infrastructure , Local Government

Landscape Architects have long been poised to address our society's most pressing challenges with innovative solutions, particularly in leadership roles in local government, where they may influence policy, funding priorities, design and implementation. Decades of research on the value of design thinking (also termed "divergent thinking") in advancing innovation, focused primarily on Silicon Valley technology start-ups, has foregrounded strategies like rapid prototyping and intrapreneurship in business. Myriad case studies advocate effective frameworks for innovation practices within large organizations. In spite of this evidence, experimentation remains the exception, not the standard within the public sector. The tendency of a bureaucracy to maintain the status quo is a consistent barrier to integrate this research into landscape architecture practice within government.

As landscape architects and civil servants, we are guardians of the public realm. Our task is to uphold the quality and resilience of civic space in the face of climate change, failing infrastructure, social injustice, political upheaval, and other challenges. While the need for innovation is widely recognized, putting these ideas into practice is mired in bureaucratic processes, overlapping jurisdictions, competing priorities, and limited resources. This is where academic research and theoretical frameworks can be misaligned with design practice in the public sector, particularly in the implementation of built works of landscape architecture .

These practitioners will share their ongoing research and applied practice integrating innovation models from the technology sector into their design and project management processes as landscape architects within local government agencies. Their study probes significant questions that align conceptual ideals with practical applications: When is innovation possible in the course of a project? What prevents designers/landscape architects in government from taking a risk? How does the structure of billable hours limit the capacity to innovate? Because innovation often comes through cross-collaboration, how can landscape architects break out of their silos within the structure of a project to interact across disciplines? Through this investigation these practitioners will share challenges and successes in bridging the gap between evidence-based innovation practices and government status quo to provide radical outcomes in the delivery of public service and high-quality civic space.

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Incorporating Research Methodologies in the Landscape Architecture Design-Based Curriculum: Lessons Learned from the Design Processes and Outcomes of Two Research Studios

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Keywords: Academic Research, Knowledge Production, Design Pedagogy, Evidence-based Design, Scientific Methodologies

The past 20 years have seen an increase in research papers exploring the incorporation of research into the landscape architectural design process (Milburn L., Brown R., 2003; Newman et al., 2020), and how research contributed to an expansion of the scope of knowledge produced in the field of Landscape Architecture (Chen, Zheng et al., 2017). However, as a practice-led discipline, Landscape Architecture is challenged when facing the design of academic research and the selection of appropriate methods in professional practice (Van Den Brink & al., 2017). In the literature, distinctions are made between conventional definitions of research methods for Landscape Architecture and the conceptualisation of design as a form of research, referring to a research method in which spatial design plays the leading role (Nijhuis S., De Vries J., 2020). There is a direct relationship between the incorporation of research methods and methodologies in the LA academic curriculum and how the students will perceive the relevance and need for research in their field when becoming professional Landscape Architects, whether in the practice or as LA academics (Sleipness, O. & al., 2019).

This paper will reflect on lessons learned in the University of Washington Landscape Architecture Department's pedagogical approaches to integrate a scientifically grounded, mixed methodological research approach into their design-based curriculum over the past three years. We will explore opportunities for providing students with the capacity to engage an array of relevant research methods within the Landscape Architecture curriculum and analyze more in depth their Advanced Research Studios series which "employ a design as research approach to examine contemporary issues in Landscape Architecture", balancing the delicate articulation between research and design within a studio limited time frame. Using studio's syllabus, production and faculty interviews, we will compare and contrast two of these studio's processes and their types of research methods to answer the following question: how defined the degree to which scientific research is given emphasis in a design project during the studio time frame in order to encourage evidence-based design decision-making. We will also reflect on how this studio format contributed to the integration of systematic knowledge production in the field of Landscape Architecture. We will then investigate, via a department's alumni and PAC (Professional Advisory Council) survey, to what extent these methods, if any, became useful and generated interest in a broader use of research methods in alumni's early professional practice or academic career.

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Designing Effective Public Outreach Post-Covid: Tools, Strategies, & Lessons from Practice

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Keywords: Trails and Greenways, Public Engagement, Community Outreach

This session focuses on the development of public engagement activities for public landscape projects. In particular, the session will use three trail and greenway projects led by Alta Planning + Design as case studies. The COVID-19 pandemic presented a challenge to typical approaches to community and stakeholder outreach. Projects presented here will showcase adaptive strategies to reach the public and stakeholders during the pandemic. This session presents a framework for engagement and coordination that can be applied to landscape architecture projects broadly. Further, implications for educators in landscape architecture will be discussed.

For practicing landscape architects working on public landscapes, community outreach and engagement is a critical part of the design process. In order for outreach and engagement activities to be maximally beneficial to both the designer(s) and the public, they must be developed. This presentation sheds light on an important part of the landscape architecture practice: engaging with public audiences. Engagement is a two-way street. Successful engagement educates and disseminates information that the designer has discovered, and it also makes space to collect information and local knowledge from people impacted by a proposed design or plan.

A major challenge of the COVID-19 pandemic was a rapid shift to online and virtual community outreach. During this time, landscape architects quickly acquired new tools and skillsets for engaging with public audiences. As concern about COVID subsides, designers have access to a growing number of strategies for public outreach. Whether in-person or remote or both, outreach activities should be deployed like any other skill in the landscape architect's skillset: use the right tool for the job.
In the spirit of aligning academic landscape architecture with the current needs of practice, it is important for academia to understand and convey to students public outreach as an important component of practice. A case-study approach compares several strategies used for outreach for three greenway projects during the pandemic: the West Maui Greenway, the Sonoma Valley Trail, and the Russian River Parkway. A comparative analysis of covid-era outreach strategies, such as interactive web-mapping, live-polling, and recorded presentations, are particularly effective. For both virtual and in-person meetings and outreach materials, practitioners should focus on equity and accessibility. It is recommended that future outreach activities adopt a hybrid approach, using both in-person and remote strategies.

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The Defining Roots of Landscape Architecture: Documenting Design and the Tree Learning Metaphor

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Keywords: Design Education, Professional Market Demands, Design Projects, Landscape Design Education, Student Skills

Some of the fundamental questions we are asking at Align | Realign include: how do we prepare students for a dynamic and unstable future while at the same time positioning them to advance and elevate society through their chosen profession? What do practitioners want from students? What do students want from their vocation? We are not alone in these manners of questions; however, unlike other professions, landscape architects draw strength from the openness with which we define ourselves and consequently have, at times, struggled with an existence free of a finite identity.

For the purpose of this meditation, the following assumptions and clarifications serve to add context:

- As a faculty that serves first professional degree graduate students in a 2-year and 3-year track program out of a college of Design, our curriculum continues to evolve to meet the cultural, economic, and technological evolution of a global society.
- What if we focus on a narrow definition of landscape architecture in the first half of an individual's education, focus on the core, structural roots of landscape architecture, and let the branches form to collect light and distribute the nutrients that individual needs to follow their bliss?
- As licensed designers of the built environment, landscape architects have a legal, moral, and ethical responsibility to the health, safety, and welfare of the general public. Contemporary Design solutions require a concerted professional decision-making process that is precise, thoughtful, and often multi-disciplinary. To do that in conjunction with an ability to create built work that accurately reflects a higher ideal or public good is critical to how we as a profession start to define success.
- From a functional standpoint, landscape architects directly produce drawings, plans, reports, and guidelines that describe, in an abstracted form, how that environment should look, feel, and function. There is an essential and direct relationship between the quality of documentation and the quality of the implementation of those documents.
- Advancing an idea into built work requires a process that is as careful and methodical as it is creative and iterative. It is of the utmost importance that a sustained level of rigor is applied in executing a design concept.

This Oral Presentation will cover an approach to entry-level design studios that are roots-based, imaginative, and ascending. The keystone studio is a deep dive into the construction documentation where design concepts are expressed at multiple scales from concept to detail design.

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Disenchantment of Landscape Architecture: Achievements, Limitations, and Necessity of Re-Enchantment

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Keywords: Enchanted Garden, Rationalization Culture, Scientificalization, Max Weber

Disenchantment (Gaerman: Entzauberung) is first used by sociologist Max Weber to describe the effects of rationalization culture in modern society (1920). Science, economic rationalism, information, etc. have overridden supernaturalism, religious belief, myths, and legends, aiding the world with clarity, efficiency, and equality while stripping “the magic” out. Weber interprets the opposite of the disenchanted society, by analogy with landscape architecture that "the world remains a great enchanted garden". This article argues that disenchantment has taken place in landscape architecture, both culturally and methodologically. Using a three-pilar practice-education-research framework, the author presents an ambivalent disenchantment-centered assessment of landscape architecture history from 1920 to 2020, from reviewing and reinterpreting about 300 most representative writings, project narratives, and drawings.

The study found, first, disenchantment occurred irrefutably and inevitably in landscape architecture. When scientific understanding was more highly valued than belief, disciplinary knowledge and techniques grew by developing and utilizing processes more oriented toward rational goals. Evident in the development of evaluation Indexes, enactment of best practice standards, codification of ecological discoveries, elaboration of pedagogical strategies, gave rise to greater accuracy of information, more efficient design process, and built environments of improved eco-functionality and social equality. Second, the spirit and quality of enchantment diminishes with the betterments disenchantment brought about. The notions of wonder, imagination, enchantment, myth, transcendence, interpretation, resonance, sacredness, and so on -- the mesmerizing notions that are crucial and Intrinsic to appreciating and designing a landscape but have no place in a scientific worldview -- were gradually displaced. Prescriptive processes oriented towards rational goals dominate practice and classroom communication. Designed projects present increasingly virtuous quality as well as high similarity, in graphics and as built.

Third, recent research norms further encroach the magic left in landscape design. Researchers tend to embrace the topics and methods suitable to the ‘completely intelligible’, while distancing those that resist scientificalization. Academic assessment methods favor high outputs of refined research within rigid social and natural science frameworks rather than those exploring myths.
An actionable agenda of re-enchanting landscape architecture is proposed. Rather than reversing the disenchantment trend, re-enchantment should be built by respecting all rationalization betterments while purposefully embracing magical thinking. To pursuit wonder should be legitimized at multiple levels, as design goals and concepts, as research topics and areas, and as academic assessment criteria. Ultimately, enchantment is an inexhaustible source to maintain a permanent disciplinary relevance in landscape architecture.

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Mind the Gap: How to Bridge the Gap Between the Academia and Practitioners

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Keywords: Professional practice, Academic Practice, Bridge, Gap, Future of practice

The existence of an academic-practitioner gap has been talked in various academic and professional settings. In fact, there seems to be a consensus about the existence of an academic-practitioner gap in not only in the disciplines of planning and design (such as landscape architecture, architecture, planning and urban design) but all disciplines in general. Moreover, current and emerging challenges such as more resilient design and planning to climate change, require interdisciplinary collaboration among multiple disciplines and professionals. Therefore, the challenge is no longer the gap among to academics and practitioners of a single discipline but among a number of disciplines such as landscape architecture, engineering, social sciences, economics, et.al. Despite noted challenges shared by other disciplines, the main focus of this panel will be on landscape architecture, architecture, planning and urban design.

Although most people agree in existence of a gap, views diverge about the nature and extend of the gap and how to bridge it. It is also agreed that the gap is dynamic in its nature and widens and closes over the time based on emerging trends and practices in academia and practice. Finding ways to better integrate both education and practice is of paramount importance not only because doing so will better equip students and emerging professionals to step into practice with confidence and set them up for success but also better prepare future professionals in disciplinary and interdisciplinary endeavors.

Three of the panel members are practicing professionals in international multi-disciplinary firms. Based on decades of experience at leading planning and design firms, they can share specific examples and from initiatives and programs through which their practices worked to bridge gaps with academia through collaborations with faculty and students, and other research partnerships. The final two members are full-time educators who also practice as professional consultants. It is hopes that this panel initiate avenues for a dialogue between the academia and practitioners based on their own experiences both in education and practice. Participants will share their suggestions to bridge the experienced gaps toward generating an informed dialogue toward a future research endeavor. It is also desirable that this panel presentation and interaction with the attendees would help recruiting more educators and practitioner involvement for the future voluntary collaborative research.

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Effects of Visual Cues on Depth Perception in Virtual Landscapes

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Keywords: Virtual Landscape, Visual Cue, Depth Perception, Spatial Perception, Landscape Architecture

Nowadays, with the development of computer technologies, virtual landscapes' volume and quality have been developed dynamically. Therefore, the related industries seek professionals who can effectively design virtual landscapes. This subject has the potential to be a new field for landscape architecture. Research to investigate this new rising domain must be done to let landscape architects adopt it. To start the series of investigations, this paper focused on the perception of space in a virtual landscape because the concept of perception will underly every future research related to this topic. It has been indicated that when the presence of visual cues is restricted, the deterioration in perception increases. (Loyola, 2016) Although the effect of visual cues on perception was partially revealed before, a study could not be reached on the effect of their application rates. The importance of depth perception, which has components such as perceiving objects, navigating, reaching, and performing size judgments, has been revealed to understand spatial perception. (Ng et al., 2016) This study aims to reveal the effect of different visual cues (Linear perspective, Texture gradient, Occlusion, Familiar size, Relative size, Lighting and shading, Retinal blur) on the perception of depth in virtual landscapes. A sphere is designed in a virtual landscape and presented by a monitor to 40 participants. The effects of seven visual cues are visualized on the sphere without changing its size. While doing this, five different versions are produced for each cue. This process is created by 20%, increasing the effect of visual cues. Participants decide the sphere size shown from each stage by comparing it with the previous spheres. Regression analysis is performed on the obtained data, and the data are presented in comparison graphs. As a result, this paper could reveal the effect of depth perception in virtual landscapes. This study presents preliminary data for virtual landscape designers by revealing data that will strengthen the perception of depth in virtual landscape designs. The methodology and the result from this research will be a strong future reference for landscape architects who will investigate the new domain of landscape architecture.

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The Hopes and Perils of Cultivating Emergent Youth-City-University Partnerships for Climate Justice

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Keywords: Community-city-university Partnerships, Community Resilience, Extreme Heat, Climate Justice, Youth Participatory Action Research

The landscape architecture (LA) profession has a critical role to play in youth climate justice movements. These movements have the potential to restructure institutions and decision-making related to urban ecological infrastructure (UEI) for climate mitigation and adaptation. A particular worrisome climate justice crisis, escalating rapidly, involves degraded UEI and high urban heat and vulnerability (Hamstead et al., 2020). This intergenerational crisis moves slowly at times, with small impacts, and is coupled with dramatic waves of heat causing harm to human bodies, livelihoods, wallets, and communities. The root causes of heat vulnerability are similar to other environmental injustice challenges related to lack of UEI investment including impacted communities' power and representation deficiencies in decision-making (Hoffman, Shandas, & Pendleton, 2020). Thus, organizing and sharing decision-making power with underrepresented communities, such as youth, may advance landscape architectural design processes for more than just UEI to reduce heat vulnerability. This case study describes an emergent youth council in Tempe, Arizona related to the City's climate action planning. In particular, our talk focuses on the establishment of a youth-city-university partnership (with over 50 members including LA students) and lessons learned. Justice scholars and artists support youth in building their own knowledge through Youth Participatory Action Research (YPAR) (Mirra, Garcia, & Morrell, 2015). The activities were designed to support structural co-creation of transformed institutions, practices, policies, and actions related to UEI for heat reduction. Since 2020, we collected data from participatory observation, process documentation, and reflection sessions. So far, we've learned that hopes of rapid youth participation were tempered by COVID-19, tensions over school justice conversations, institutional rules, and partners differences in degrees of familiarity in intergenerational collaboration. Perils during the process involve youth-adult dynamics, differences in power and privilege, and discussions of patience in the light of calls for urgent action. In addition, youth members were at very different levels in their understanding of root causes and needs of UEI strategies for heat reduction. Despite challenges, the City remains committed to transitioning toward a more just futures approach for community resilience and learning how to conduct intergenerational work. This study identifies novel lessons for LA scholarship and practice for creating greater procedural and spatial justice in placement of UEI. Lessons extend LA intergenerational thinking from landscapes to people as a foundational aspect of scholarship and practice. Our landscape projects take decades to mature – representation in our design processes need similar intergenerational-thinking.

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Cross-Disciplinary Urban Design Studio Project: Landscape Architecture and Architecture Students in Collaboration

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Keywords: Multi-Disciplinary Collaboration, Cross-Disciplinary Instruction, Collaborative Design Process

Urban designers are called upon to establish the built framework (building massing, building footprints, and orientation) that in turn shape, an urban form and fabric that provides essential open spaces and corridor connections to the broader urban context. Therefore, urban design projects must necessarily involve direct collaboration between teams of architects and landscape architects working together and engaging in responsive interaction.

In the context of a university that houses multi-disciplinary fields of study including landscape architecture, architecture, urban planning, interior design, construction management, and historic preservation this author felt compelled to engage in cross-disciplinary collaboration with an equally dedicated partner in the architecture department. As a long-time practicing landscape architect entering the rich multi-disciplinary academic environment, this author is acutely aware of the value of collaboration especially between landscape architects and architects. It was intended that a collaborative site design process would yield fresh interpretations of urban design and architectural typologies.

To date, the author has engaged in two iterations of collaborative projects involving upper-level undergraduate landscape architecture and architecture students. After the initial attempt at collaboration this author was intent on engaging in a collaboration using a reconfigured academic framework in an effort to respond to apparent weaknesses in the first attempt and in general to improve the team dynamics, enhance student experience, and engage in a more typical professional design practice approach.

This presentation will describe and compare the two different pedagogical strategies and the successes and weaknesses in each approach. In both iterations students were asked to assume the role of a team member participating in a professional practice project scenario. What differed was the degree to which student teams were managed by their professors. In particular, how student groups were configured, how team roles were assigned, the degree to which students were informed and guided in their process and decision-making, and the degree to which a well-defined scope of work for each of the disciplines was established.

Assessment of the two approaches will be included in this presentation. The first assessment was primarily anecdotal based on observation of group dynamics, conversations with students, and a wide spectrum of success in terms of student output. In the second iteration assessment was more formalized including interviews with students and firmly established output criteria.
The second more structured approach yielded more integrated site design solutions and could provide a framework upon which to build even more successful collaborations.

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Moving From Interest to Implementation in the Climate-adaptive Design Studio

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Keywords: Climate Adaptation, Waterfronts, Engaged Scholarship, Resilience, Adaptive Capacity

Consistent with the CELA 2023 theme, we share a unique, studio-based partnership structure and methodology that links its community-engaged, design research agenda to public-private municipal action on climate change. The Climate-adaptive Design studio (CaD), a long-term, engaged scholarship program, has worked with municipalities on over ten urban waterfront projects since 2015 to catalyze action on climate adaptation (Cerra & Zemaitis, in press, Smith et al., 2019). The studio itself is motivated by an understanding that while there are growing examples of climate adaptation for large cities, relatively few case studies are scaled to the many smaller municipalities populating coastal estuaries. The key partner for the CaD studio, New York's Hudson River Estuary Program (HREP), shares this interest, as it is responsible for climate outreach with over 85 coastal municipalities in the Estuary. These municipalities are often interested in climate adaptation but lack the resources to build adaptive capacity in this area.

The result is the CaD studio, a unique partnership pursuing a trio of benefits- a) design research on emerging engagement methodologies and climate-adaptive techniques; b) instruction on these strategies with students; and c) communities inspired to adapt their growing waterfronts to a changing climate. Critical for this partnership is the understanding that the studio's impact shouldn't end with the semester itself. Rather, the studio is central to a formalized, extended approach where 1) HREP seeks municipal participation through a state-issued Request for Interest; 2) the studio works with stakeholders to build climate awareness through an engaged process; and 3) participant communities become eligible for state funding to develop design concepts inspired by the studio toward implementation through an RFP awarded to design firms who coordinate with a participating CaD community.

This approach has resulted in $500,000 being awarded to design teams partnered with four CaD studio communities amidst approximately $12 million awarded for projects influenced by CaD studio activities. Meanwhile, the CaD program has generated publications, student design awards, and professional awards for projects inspired by it. This interest-to-implementation agenda, within which an engaged studio sits at the fulcrum, is poised to be replicated in other parts of New York and beyond; we share the details of this approach as a longer-term, program model for others pursuing climate-based engaged scholarship or service-learning in hopes of building a 'culture of adaptation' led by municipalities and landscape architects who see the value of design ideas as a catalyst for change.

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Co-create Innovations in the Built Environment: Aligning Efforts Between Academia and Industry

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Keywords: Design Research, Research in Practice, Discipline Integration, Knowledge Co-creation, Theory and Practice

The built environment is facing unprecedented challenges such as systemic vulnerability and climate justice (Cheng, 2022). Nature-Based Solutions and green infrastructure have been identified globally as one the key strategies in climate change adaptation (IPCC, 2022). Landscape architecture is the profession of applying Nature-Based Solutions in the built environment. Design inquiry toward research in the built environment is applied science with expected outcomes that have implications for how they could be translated into practice. Climate change has increased the uncertainty in social, ecological, and economic structures which requires new theories to be applied in design practice (Mehta & Srivastava, 2019). The complexity and connectivity of global systems necessitate a collaborative effort to address these issues and prepare future practitioners to combat them.

There exists a gap between theories generated in academia and practices implemented in the industry. Research in landscape architecture has been primarily conducted in academia and stays in the academic tower as theories. In recent decades, an increasing number of consulting firms have established research positions to serve as engines for innovations in landscape architecture practice. Of late, university landscape architects have been increasingly engaged with research activities on campus aside from their primary roles in campus design, construction, and maintenance. The Landscape Architecture Foundation (LAF) has built a bridge between academic research and industry through collaborations on landscape performance case study investigation (CSI). However, those innovative results and practices do not always become new theories in academia.

To what extent and in what ways do the research activities between academia and industry align for advancing landscape architecture innovations in theory and practice? What are the successes and challenges of conducting research in the industry and what impacts have they brought to the field of landscape architecture? What kind of collaboration could be established between academia and industry that has advanced current practices in addressing pressing current issues and preparing for future challenges in the built environment? This panel invites research practitioners from industry and within universities, as well as academic educators and researchers who have been involved in the LAF CSI and have collaborated with university landscape architects to share their research experiences and have open discussions to answer those questions.

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Blind Spot: Business in Landscape Architecture Curricula and Research

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Keywords: Practice, Profession, Scholarship, Accreditation

Landscape architecture has a blind spot. The blind spot is not new. In fact, it may have been seeded by Olmsted Sr., albeit unwittingly. More significantly, this blind spot may pose the greatest intrinsic and ongoing threat to our profession's future.

This blind spot is not a cause célèbre such as climate change, data visualization or social justice. It is not a topic you will find headlining Landscape Architecture Magazine, or being debated at conferences that leading scholars attend. Yet ironically, it is discussed daily in firms, is a non-negotiable requirement for practices to survive and succeed, and thus may constitute the greatest potential opportunity for our profession's future.

The blind spot is business.

More precisely, the blind spot is academia's apparent tradition of ignoring business in landscape architecture curricula and research. While omnipresent for practitioners, "business" remains a blind spot of gargantuan proportions for landscape architecture students and faculty. Although every practicing landscape architect either succeeds or fails—month after month, year after year—based upon whether theirs is an effective business, academic programs today give minimal attention to this core skillset.

While accredited landscape architecture programs must respond to Landscape Architecture Accreditation Board (LAAB) Professional Practice curriculum standards, therein lies a dilemma: professional practice is a catchall term. The subject spans the entirety of what it is to operate as a landscape architect. Rogers's (2011) The Professional Practice of Landscape Architecture illustrates this breadth, outlining subject matter that could easily constitute a dozen credit hours of semester-long course work. Instead, professional practice coursework constitutes a fraction of LAAB-accredited programs' curricula (Rice & Licon, 2016). Moreover, a content analysis of professional practice course syllabi by the author illustrates the minority role business plays in such instruction.
In comparison, scholarships on the subject of business practices in landscape architecture is altogether absent. Numerous studies of scholarly topics in the discipline (e.g., Powers & Walker, 2009; Newman, Li, Tao & Zhu, 2019) have revealed the blind spot that business in particular, and professional practice in general, has been for decades among leading researchers. This presentation demonstrates the paucity of business-related subject matter in landscape architecture education, the absence of knowledge generation by scholars, shares the evidence that practitioners and peer professions (e.g., Gensler & Lindenmayer, 2015; Michael, 2022) have called for greater responsiveness from faculty, and argues for business practices as a strategic topic for our discipline to embrace.

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Pattern Analysis of Space Interaction Level in VTube Contents

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Keywords: Virtual Landscape, Virtual YouTube, Classification Methodology, Space Interactivity, Virtual Characters

Currently, undoubtedly, the digital game industry is leveraging the virtual landscape the most aggressively and widely. However, we can easily assume that in the near future, the public will adopt VR technology in more advanced and diverse industries like any other technology we have adopted throughout history (Kim, 2017). Essentially, to improve the sense of place in mentioned environments, the virtual landscape design benefits the methods of physical world landscape design, such as cognitive ratio perception for a sense of enclosure (Françoise, J., & Bevilacqua, F., 2018; Korkmaz, S., & Kim, I. 2022). Therefore, we cannot be sure what that new industry will be like, but it is possible to take a glimpse at the new market rising recently. Nowadays, Virtual YouTuber is a new market that includes Virtual YouTubers (VTubers) who broadcast while using computer-generated characters as real-time masks or costumes and engage in activities on various platforms (Lufkin, n.d.). The annual market size of this content is estimated to be between 46.2 million to 92.4 million USD in 2020 (Nagumo, 2020). Although this industry is promising and aggressive development, sufficient research has not been provided to maintain interactions with user experiences in spatial use. With a lack of basic understanding of the space and contents, it is difficult to ask for any participation from landscape architects. Following Kim (2017), one of the most challenging aspects blocking this participation is the different levels of interaction between the virtual landscape and users. We need to comprehend how the level of interaction is different and how it will evolve in the future. Thus, we chronologically examine the gradual change in the interaction level of virtual landscapes in the VTube content. Accordingly, 100 cases of Vtuber channels were collected from Hololist's report (HoloList, 2022) and classified with Kim's (2017) virtual landscape classification methodology; this research evaluates each Vtubers and categorizes them into three interaction levels; "none, partial, all." The research results present how the non-interactive channel has been extinct dynamically and how the interaction level has become sophisticated. This indicates that the first generation of VTubers was character-oriented, but now it has become landscape oriented. With these findings, we can understand that VTube is an in-growth market requiring the participation of landscape architects to produce more interactive and immersive content. Hence, education in the virtual landscape will be critical to prepare future landscape architects for coming innovations and expanding their domain.

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Making the Switch: Understanding the Transition of Mid to Late Career Landscape Architecture Practitioners into Tenure-track Positions

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Keywords: Professional Practice, Practice Experience in Teaching, Practice Experience in Research

Recent developments in landscape architecture point to a growing need for "know-how (professional knowledge)" as well as theoretical and scientific knowledge (Ozdil, 2020). While literature suggests increasing numbers of professionally licensed tenured and tenure-track faculty, the degree of practical experience held by those faculty is unclear and little empirical evidence exists documenting the preferred professional credentials of landscape architecture faculty (Ozdil, 2020). It is common to see experienced practitioners serve as "non-traditional" instructors whose practice-derived knowledge offers students valuable practical insights supplementing the efforts of the more traditional career academic faculty. However, the lack of pedagogical training and teaching methodologies among such non-traditional faculty may present challenges when teaching the theoretical background of necessary subject matter (Anderson, 2016).

Literature suggests the relationship between research and practice is complex and indicates a misalignment between the research questions perceived to be most valuable to practitioners and academics, and in the ways answers to those questions are broadly shared (Chen, 2013). Action-based knowledge produced by practitioners, such as construction and judgmental design knowledge, is not typically shared beyond the limits of a select group of co-workers, as opposed to the environmental and human systems knowledge advanced and more widely published by academics (Chen, 2013). Inclusion of practice-informed teaching in educational curricula and the broad dissemination of practice-derived knowledge should be of significant importance to the profession. Therefore, increasing the diversity of landscape architecture faculties to include more career practitioners in full-time tenure-track positions should be a valuable aim of academic institutions.

This 2-phase, mixed-methods exploratory research study seeks to uncover considerations affecting the ability of landscape architecture academic programs in the United States to recruit, support, and retain mid-to-late-career practitioners to full-time academic positions. This paper shares the results of the phase one survey component. Full-time, primarily tenured, and tenure-track academics whose position includes a research component, having at least ten years of professional practice experience prior to starting their academic role were identified via the snowball sampling method (n=30). The survey consisted of demographic, Likert-type and open-ended questions with results illuminating the barriers and challenges faced in hiring, retention, and support of experienced practitioners transitioning to full-time academic roles. Phase two will include semi-structured interviews with the purpose of interpreting and clarifying survey data and identifying opportunities for change.

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Advisory Boards: Bane or Boon to Your Program?

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Keywords: Practitioner Engagement, Alumni Relations, Advancement

Higher education has, for centuries, sought the insights and support of esteemed alumni and peers, welcoming their involvement through advisory boards. Often utilized by universities and colleges, smaller academic programs often overlook this valuable asset. However, these groups can play numerous valuable roles. Specifically, their interactions, influence and investment have potential to help less prominent disciplines like landscape architecture to gain respect and resources.

This panel will present examples of how different landscape architecture programs have incorporated boards as strategic means to improve and protect their programs. Topics discussed will include curricular guidance, jobs/internships, fundraising/campaigns, political support, instructional support, accreditation, board structuring, and establishing membership (requirements, recruitment, leadership). Panelists will reflect on the pro's and con's of developing and maintaining an effective board, and will differentiate between advisory and advancement boards.

For programs considering creation of a board, or for those already sustaining one, this panel will provide a rich dialogue of considerations and lessons, and will include opportunities for discussing questions from the audience. Panel participants represent a variety of schools, program types, and board models.

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Mind the Gap: Understanding the Challenges and Obstacles in Knowledge Transfer Between Academia and Practitioners in the Field of Landscape Architecture

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Keywords: Landscape Architecture Professionals, Landscape Architecture Educators, Evidence Based Design, Knowledge Integration and Transfer

In the early 2010s, several iconic articles were published within the academy of landscape architecture arguing that the discipline must urgently advance its methodology and basic research in order to generate new knowledge; to identify the causes, effects, and solutions to important issues; and overall, to strengthen the academic status of landscape architecture (Lenzholzer, Duchhart, & Koh, 2013; Brown & Corry, 2011). Education and research experts laid out research strategies (see Swaffield & Deming, 2011; Stokols, 2011) and proposed the incorporation of new concepts and theories (see Termorshuizen, Opdam, & Van den Brink, 2007; Ahern, Cilliers, & Niemela, 2014), calling for more evidence-based thinking, research, and practice in the field of landscape architecture (Brown and Corry, 2011).
Ten years later, the approaches of evidence-based design is increasingly practiced in the academic world of landscape architecture, however, the gap between the academy and the practice of landscape architecture is still wide. The profession's future is uncertain if evidence-based research is minimally adopted by select firms and practitioners, while the critical mass still struggles to locate available resources and makes little effort at the necessary transformations to the landscape architecture industry. Moreover, larger leading firms and small to middle-sized companies appear to have very different attitudes and strategies towards research integration and academic collaboration, leading to intensified resource inequality. These have been represented by the dramatic differences experienced among landscape architecture students serving as interns at various firms, as well as the uneven professional awards recipients at the national and state levels.

This research is a preliminary study of reasons that prevent firms from adopting research discoveries or integrating research into design and planning processes. An online survey, focus groups, and in-depth interviews are conducted to capture the depth and width of this question. The outcome of this study is an examination of the current status quo of research integration for small and mid-sized groups, and recommendation guidelines for future improvement strategies for a better and smoother knowledge transfer between academia and professionals.

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Landscape Design Studio as a Tool for Tribal Co-Decision Making and Eco-Cultural Literacy

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Keywords: Tribal Engagement, Decolonizing Methodologies, Indigenous Worldview, PlaceKnowing, Dispersed Recreation

The ancestral lands of the Jemez (Hēmish) People overlap with the present-day Jemez Ranger District of Santa Fe National Forest in Northern New Mexico. However, in this sublime landscape, highly sacred sites are being “loved to death” by increasing numbers of recreational users, leading to an urgent call for action. In 2021, the Indigenous Landscape Studio at the University of New Mexico initiated a collaboration with USFS and Jemez Pueblo to address concerns regarding dispersed recreation and focus on the most heavily impacted site, a unique roadside geologic feature known as Soda Dam. In a novel approach to tribal engagement, the studio brought together key stakeholders to learn about the deep cultural significance of the site, discuss challenges in situ, and explore options through design studies. To date, this collaboration has led to a deeper understanding of the cultural and geological significance of Soda Dam while exploring a spectrum of potential solutions.

To ensure continuity across this multi-year project, additional coordination is necessary at the client level and studio. Project management has involved the studio instructor maintaining communication with the Jemez Tribal Preservation Officer and USFS while also participating in expanded stakeholder meetings with surrounding Pueblos regarding the challenges of dispersed recreation. Coordination of studio activities required tailoring the objectives and learning outcomes to specific project needs and deliverables. However, to expand eco-cultural understanding and decolonize methodologies, students each semester engage in two prerequisite grounding exercises. This grounding includes a personal land acknowledgment exercise exploring where they are from and the land they live on and inquiry into the concepts of PlaceKnowing and indigenous worldview. For the place-specific task, the students traveled to the site to collaborate with key stakeholders, expand upon the shared understanding of place, and discuss potential design solutions. From this collaboration, students advanced the project deliverables for the semester.

For the core stakeholders, the simple act of coming together and sharing ideas represents a much-needed departure from the traditionally ridged tribal engagement process. However, for tribal leadership not directly involved in the studio, there was concern that things were advancing things too quickly without approval. Therefore, in 2022 the studio deconstructed the ideas from 2021, organizing the content for future meetings and engagements. This effort today is leading toward an informed conversation with Jemez Pueblo Tribal Council for validation and discussion of the next steps.

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Landscape Dialogue as an Alternative to Site Analysis - A Case Study From New Mexico

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Keywords: Practice, Assessment, Timeline, Relationships, Forensic Architecture

In landscape architecture, site analysis is the dominant framework for assessing a landscape in research and design (LaGro 2013). It has two challenges: 1) a spatial reliance on site or property, containers of established powers, and 2) the process of analysis – the idea that you can separate a landscape into disparate parts and then put them back together. If instead, the landscape is seen as a dynamic network of relationships, then landscape assessment can be framed as landscape dialogue – an engaged methodology of place as a conversation with its past, present conditions and future possibilities through listening and speaking (Parker, forthcoming). This presentation will assess the process used in the design of the Oñate memorial(s) in Albuquerque, New Mexico and then argue for a landscape dialogue approach.

During the Cuatrocentennial celebrations of New Mexico's founding, the city of Albuquerque decided to erect a monument to Juan de Oñate, considered the founding father of the American Southwest by Hispanics (Trujillo 2008). Because of centuries of conflict, the community could not agree on one monument; it was split in two, resulting in a bronze statue to Oñate next to a Tewa earthwork installation where visitors descend in a spiral into the ground. Initial site analysis for the monument did not consider the history of violence or the relations between people groups. These were not just landscape elements to be added as a layer, their absence indicated an unwillingness to confront conflict, to wrestle with past violence that still "spoke" from the ground. In contrast, a landscape dialogue approach would engage with place over significant periods of time by identifying stories, constructing timelines of conflict and re-creating past events virtually. Weizman (2017) designates this "forensic architecture," recreating an event using standard architectural tools, such as three-dimensional rendering software and GIS. In the last phase of the approach, designers weave past event(s) into the ongoing landscape story as an opportunity to heal. Let the landscape speak and then speak into the landscape (in a critical manner) through engagement and design.

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Academic Inquiry to Address Opportunities in Professional Practice

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Keywords: Intentional Practice, Studio to Office, Critical Reflection, Place Connection, Values in Implementation

Through the intentional practice of balancing professional firm-based-work and graduate-level studio teaching, the authors developed a series of questions that sought to elevate both student learning, and professional projects—this occurred at Studio Outside, a firm that values practical design solutions, beautiful built work, and employee satisfaction. This paper will focus on areas where a traditional landscape architectural practice was limited by professional responsibilities (legal/client/relationship) or did not have the time or resources to develop new techniques to engage with landscape architecture in generative ways. Much of this work took place during the rise of the Black Lives Matter movement across the country and in part reflects deeply on how individuals working in Dallas, Texas could materially change the outcomes of practice and learning.

The paper will engage two primary questions:

1. How can teaching and engagement lead to a deeper understanding of, and an increased connection to, the landscape where you work? This is investigated through the leadership of a Blackland Prairie-based MLA studio and a series of hikes, Outside Studio Hikes. The studio and the hikes were designed to engage young employees (many brand-new to Dallas) and students to deeply know a place through landscape experiences and focused observation. These experiences lead to improved strategies for new employee onboarding that introduce individuals to a broad range of ideas that consider place and culture.
2. How do young employees find meaning and satisfaction in the day-to-day tasks of project execution, can we create more meaningful linkages between the big ideas/aspirations of a project and documentation? This is investigated through studio prompts that sought to answer questions such as: can you create an anti-racist design detail? Are there methods to ensure project principles and values are embraced from planning to implementation? What can be included in specifications to ensure project values are followed?

The authors created new ways to engage both students and co-workers in critical reflections on practice and place. The value of this work was not only displayed in the feedback and success of those groups, but in the application of new thinking being applied to directly impact the firm's success in pursuing projects, creating partnerships, and implementing built projects.

This paper will formalize these processes and practices, including establishing a teaching agenda that the authors will continue to develop in their new roles as fulltime landscape architecture faculty.

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Inducing Change in Design: From Technicity to Ontopoetics

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Keywords: Mathematization, Applied-Philosophy, Ecological Mutuality, Sensorium, Social Issues

While acknowledging the benefits of technology over the last three centuries, this research takes a critical look at the consequences of technology's pervasiveness: technicity. It points out how technology has long been formatting human beings' approach to reality (Heidegger, 1949), bringing manifold opportunities of progress in society, but also triggering over time a non-versatile mindset that has been mathematizing the world, reducing life to problem solving (Boutot, 2005). While it magnified "human making," it suffocated "human doing," harming the human being's conditions (Arendt, 1958). Today, when many contemporary social issues remain unresolved, and when new systemic, everyday more complex societal problems arise, one can question whether technology fulfills people's aspirations (Borgmann, 1984), and whether its supremacy should not be opposed. In fact, "we are faced with the slow agony of rationality, technicity, and individuality" (Maffesoli, 2021). Our time is one of transition between socio-political paradigms. At such a moment of readiness, when understandings of agency are reformulating the meaning of expertise, and power is being transferred significantly to social agents (NGOs, skilled citizens, social subsystems), the impetus for action among landscape architects should result in the transformation of the design approach, opposing the supremacy of technology and incorporating postmodern views. Hence, this research explores an approach to design, inspired by phenomenology and an applied-philosophy model (Champagne, 2022) that integrates "idealects" along the creative process (Vial, 2015). Breaking from technicity – the holistic embodiment of technology-as-process – this new approach focuses, instead, on developing an ontopoetics of space (Heidegger, 2012; Timieniecka, 2005) based on notions of ecological mutuality, signifying persons and sensorium, as well as philosophical ideas of selfhood and togetherness. To illustrate this change, I show the significance of technicity and ontopoetics in two design projects of different scales: a private garden in Pacific Palisades, CA, and a three-block neighborhood in Van Nuys, CA. The first project focuses on a simple design question to present Heidegger's view on technicity and raise questions on modernity, territorialization, and the danger of the essence of technology. The second project attempts to bridge theory and practice by prescribing strategies to inform change in a neighborhood. I conclude that, by breaking from technicity and by finding inspiration in an applied-philosophy approach based on ontopoetics, designers can better shape well-being, organize common values, and remake socialites as a response/strategy to 21st-century social issues, insomuch as the academic design curricula incorporates postmodern philosophical topics.

COMMUNICATION & VISUALIZATION

Communication and Visualization

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Landscape Architecture as Storytelling

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Keywords: Narrative, Storyboarding, Analogy, Experiential, People-centered

Landscape Architecture as Storytelling realigns the typical relationship between designers and those left to live with their designs through a unique design process, the goodness of which is easily replicated from project to project. Presented here the realignment process introduces the teaching and learning of design based upon how we learned to read, write, and tell stories.

A realignment of how landscape architecture education is taught sees the design process made more people centric than it currently is. Bringing people to the forefront of design problem solving occurs naturally when we replace the language of geometry and design jargon with storytelling and storyboarding. Initiating the design process with a first- or second-person narrative uses people's anticipated experiences to a proposed design as the design's starting point. This approach takes to heart John Simonds' epiphany that we design "...not places, spaces, or things [but] *experiences* (my italics). The places, spaces, and things take their form from the planned experience" (1961, 225).

Much of my 40 years as a landscape architecture educator focused on finding a way to make learning design characterized less by assumptions and more by a mutual experiential understanding between designer, client, and end-user. Contrary to what incoming design students are subtly and not so subtly led to believe, design problem solving is not new. Most students may not have previously applied their problem-solving skills to landscape architecture, but they are very familiar with storytelling. Building on their taken-for-granted, understanding of language, the storytelling approach is introduced in three phases. First, the fact that we all read landscape narratives daily. Second, the unpacking of design fundamentals through a three-tiered analogy that interrelates language, basic design, and landscape design. Another way to think of this is to consider the designer-as-author, the landscape-as-text, and the end user-as-reader.

The final phase is an application of the analogy's fundamentals through a design process that has the designer write a short first-person narrative of someone experiencing the design, turning that narrative into a storyboard, and then interpreting the storyboard into a final design. In this way the likely end users of a design and their anticipated experiences lead us through the design process. The places, spaces, and things we come to see as the final design emerge as the end-users' experiences gain clarity through the narrative-storyboard-design process.

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Representing Landscapes: From Student to Professional

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Keywords: Visualization, Landscape Representation, Drawings, Visual Communication, Renderings

'Representing Landscapes' publications document a curation of an international collection of landscape architectural drawings from students across the globe. Visual communication is an important aspect of the landscape architectural education and the profession. The original “Representing Landscapes” book was published over ten years ago. This study examines drawings styles and techniques used by ‘then’ students and what components and techniques, in terms of visualizing the landscape, are carried through in their 'now' practice. This research specifically investigates four students’ visualization techniques and styles from their education ten years ago (pulled from the first edition of Representing Landscapes book) to their visualization styles in their current practice. The selection criteria of the students is based on their position at their firm and the success of their practice, i.e. principal of their firm, and awarding-winning projects such as ASLA awards. Why is this important? The research observes changes in modes and styles of visual communication in education and in practice.

The investigation highlights common elements, styles, and ‘special’ techniques used in the drawings by ‘then’ students and carried into professional practice. What are the modes of visual communications used in school that are carried forward into practice, and what are the changes? For example, the visualizations of a 'then' MLA student from Harvard’s GSD from ten years ago are examined, and also examined in her current award-winning practice. This former student is currently a principal at SCAPE Studio. Some of the styles, techniques, and elements used in her drawings as a student, are evident in some of the visualizations crafted at SCAPE Studio today. What modes and styles of communications learnt in school are utilized in the profession? Part of the methods includes ‘pulling out’ and documenting specific elements and techniques that highlight the design intent. For example, SCAPE uses ‘enlarged’ butterflies to advocate for ecologically rich designs in some of their projects. The drawings highlight the 'value' of rivers by ‘sunbeams’ to capture the importance of these landscape features. A summary will be provided, listing the communication techniques and elements used in these successful practices.

'Dramatizing’ landscape elements, including 'out of scale' habitants or ‘sunbeam’ techniques seems to capture the audience’s attention. The future of graphic communication has evolved over the past fifteen years. Design studios are teaching more immersive visual representation, including virtual and augmented reality representations, to capture the audience’s attention and the importance of the landscape.

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Earthen Tectonics: Material Explorations in Rammed Earth Fabrication

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Keywords: Digital Fabrication, Parametric Tools, Workshop, Interdisciplinary, Alternative Materials

Recent years have seen a revival of interest in earthen building practices, using materials such as cob, adobe, and rammed earth. These techniques offer less extractive and carbon-intensive alternatives to conventional material assemblies, as well as providing tangible benefits to health, comfort, and air quality (Ben Alon et al. 2018). This research builds upon aspects from several recent precedents, notably the Common-Action Wall exhibited at the 4th International Architecture Biennial of Antalya, Turkey developing innovative formal approaches to modular earthen components (Özsel et al. 2017), and research at the Vitruvius Fablab at the Instituto Universitário de Lisboa creating variable forms and patterns in earthen materials (Varela et al. 2013).

A four-day workshop in Spring 2022 with graduate students at the University of Minnesota's College of Design combined an experimental rammed earth material practice with an iterative parametric design and digital fabrication process, melding digital and analog workflows. Students used Grasshopper (Robert McNeel & Associates 2022), RhinoCAM (MecSoft 2022) and a 3-axis CNC router to develop and fabricate parametrically driven surface patterns as a methodology to structure hydrological and landscape change (M'Closkey 2017). To understand rammed earth as a material practice, students created a series of samples to test both traditional (clay, cement, sand, soil) and experimental materials (coffee grounds, seed, vegetation, recycled paper, cardboard). Workshop products included rammed earthen material tests, RhinoCAM process renderings, custom CNC wooden form liners, cast modules, speculative collages, and an explanatory animation.

While the wooden modules could be precise due to the high-fidelity capabilities of the CNC router, rammed earth is a low-fidelity and imprecise material, which led to unanticipated outcomes in the casts. The lost textures, imprecise forms, and emerging geometries became a source of inspiration for students, informing areas of water collection, decay, impermanence, permeability, and other ephemeral landscape qualities at multiple physical and time scales.

Outcomes demonstrate how new surface geometries, landscape functions, material assemblies, and speculative futures can emerge when viewing fabrication as integral in the design and iteration process, rather than simply replicating a digital model in a physical form. Other outcomes from this workshop demonstrate the potential for future exploration of rammed earth as an innovative material assembly for use in large landscape scales. Further integration and experimentation could extend to explore impacts of time, collection, materials, and water flow on variable and highly articulated surfaces, material details, furniture, and large-scale territorial landforming.

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Comparing Sense of Scale and Depth Perception Between Virtual Reality Renderings and Traditional Representation

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Keywords: Virtual Reality (VR), Sense of Scale and Depth, Spatial Perception, Design Communication, Comparing Sense of Scale and Depth Perception between Virtual Reality Renderings and Traditional Representation

Spatial scale and depth are essential attributes of physical space in landscape design. People's perception of spatial scale and depth reflects how well they understand the space and decides how they design the space. Therefore, design participants' better sense of scale and depth perception can improve the design development. This research studies how people's sense of scale and depth perception in landscape design projects using Virtual Reality (VR) renderings can be different from using traditional design representations. In this research, spatial scale stands for the area of a designed space and depth tells the distance from one designed object to the observers. Traditional design representation methods may prevent design participants from efficiently understanding the spatial scale and depth in the designed space. As an advanced visualization technology with interactive and immersive visual experience, VR technology can bring design participants vivid spatial experiences and help them build a better sense of scale and depth perception. This research aims to compare the impacts that VR renderings and traditional design representations have on people's sense of scale and depth perception in landscape design projects. It examines people's perceptions of space using three design representation methods: VR-based simple renderings (rendered model with basic geometry and abstract plants), VR-based realistic renderings (rendered model with material, texture, and realistic plants), and traditional representation with illustrative plans and eye-level renderings. 36 people with design education and practice experience participates in this research. Their age is between 18 and 50 years old, 20 of them are females and 16 of them are males. Research participants are divided into three groups, and every group used one design representation method to estimate the spatial scale and depth perception. To assess different groups of participants' sense of scale and depth perception, this study chooses spaces from a landscape design, and asks participants the scale of the spaces and the distance from objects in the scene to the viewer. The answers are statistically analyzed, and the views of participants are investigated through additional interviews. This research examines the role of VR technology in establishing sense of scale and depth for design participants in landscape projects, it also explores the differences between VR technology and traditional design representation in design perceptions. Overall, this research enriches VR-related studies from the perspective of spatial perception and awareness. It inspires the diverse possibilities of the future design representation in design industry and education.

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From Liability to Asset: Engaging Radical Imaginaries to Unveil the Transformative Impact of Landscape Planning & Design in Distressed Urban Communities

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Keywords: Public Communication, Community Engagement, Speculative Imaginaries, Visualization, Creative Scholarship

Effective communication with collaborators, clients, and a broad range of additional stakeholders is a critical aspect of the professional practice of landscape architecture. Indeed, effectively communicating site-specific concepts of form, function, meaning, or understanding – through narrative and graphic explanation, and subsequent dialogue – is how imagined changes to the built environment garner stakeholder support and eventually become reality. Traditionally, for the practitioner or student of landscape architecture, this explanatory communication typically occurs throughout the life cycle of a given project and is used to describe and encourage discussion of design processes, approaches to decision-making, design intent/the relationships between form and function, programming, and desired uses/benefits.

To be sure, both narrative and graphic communication undergird much of the work landscape architects engage in on a day-to-day basis. However, these communication methods, which landscape architects rely on to successfully complete project-related duties, also offer broader opportunities to examine the transformative and positive impacts provided by the field of landscape architecture itself. As an example, this case study explores an innovative engagement activity involving aspirational visioning and radical imagination as applied to a speculative planning and design challenge in a fictional community, Anyhood, USA.

Originally developed for presentation at the 2022 South by Southwest festival in Austin, Texas, the creative work reviewed here was developed as a tool for communicating and visualizing the transformational impact landscape architectural solutions can have as part of broader neighborhood planning efforts. Leveraging an immersive presentation mode, comprised of three screens which enveloped the audience, presenters and participants worked together to simulate an inclusive and compassionate visioning process for open space improvements. Audience members were encouraged to empathize with fictional neighborhood residents facing a variety of barriers, both physical and socioeconomic, negatively impacting their quality of life and restricting participation in public engagement related to planning and design. Audience members also played the role of landscape planner and were prompted to strategize and describe different approaches to community engagement that could support inclusion in the planning process for neighborhood residents. Through interactive polling and discussions, participants shared their ideas for landscape interventions, some of which were visualized in graphics prepared prior to the event.

This case study highlights how the same communication methods used to convey information about design to stakeholders can also be used by landscape architects to educate the public on how landscape architecture as a professional field can create positive impacts in communities.

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Design at the Edges: A Transdisciplinary Approach for Nature Connection

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Keywords: Ecotones, Interdisciplinary, Relationships, Biophilic, Indoor/Outdoor

For educators and practitioners of landscape architecture, cultivating connections is a primary goal. Through design and planning, we link people to places, people to each other, and ideally, people to the natural world. We strive to find common ground and design systems within which humans and nature thrive together. Now, with people in the industrialized world spending 90% of their time indoors (Allen & Macomber, 2020), the task of truly connecting people is more challenging than ever. In addition, our recent anxieties over extreme weather conditions and social dissonance have created more tension than connection overall. Building sustainable and equitable connections in the face of these challenges requires innovative approaches that transcend disciplinary boundaries.

This study proposes a model of transdisciplinary design in the built environment that is based on principles of landscape ecology. A transdisciplinary approach suggests that we move a step beyond multi or interdisciplinary approaches to truly connect people and places in a way that will increase the health and stewardship of environmental and social systems. “Transdisciplinarity occurs when two or more discipline perspectives transcend each other to form a new holistic approach” (Caldwell, 2015). As opposed to simply combining disciplines, the true integration of how we treat the edges of indoor and outdoor space can go further.

The model considered here applies the landscape ecology concept of "ecotone" in an examination of the edges between indoor and outdoor spaces. Through examples of productive and rich ecotones found in nature, we will examine how design can emulate these environmental edge conditions to connect spaces and build relationships. Utilizing case studies of unique interventions occurring at distinguishable edges of the built environment, we will examine how those treatments begin to set the stage for a way of designing that transcends our traditional siloed methods to more fully support the human connection with nature. Drawing upon biomimicry and biophilic design, this approach has the potential to increase human health and create a real synergy between landscape architecture and other design disciplines for the benefit of all (Kellert & Calabrese, 2015).

Biomimicry and biophilic design have become specific methods used by other disciplines to incorporate nature into the built environment for the improvement of human health. As landscape architects, we are equipped to design with nature as an integral part of our work and we can utilize our expertise to lead this new transdisciplinary approach.

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Common Sense: Re-Making Landscapes Through Atmospheric Encounters

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Keywords: Sensing, Measurement, Visualistion, Design, Climate Crisis

PURPOSE
The disciplinary responsibility is to explore rapidly emerging sensing technologies to understand how they might extend design agency in relation to the global climate crisis. Sensors are explored here for their capacity to identify and measure dynamic processes of change in the landscape to greater accuracy and point toward new opportunities for design intervention. This explores the production of precise approaches to measuring, analyzing, visualising, making, and evaluating new environments.

BACKGROUND
Sensors have the potential to extend our degree of observation and measure beyond that which is visible to the human senses to make the invisible visible. The global activity of humans understood as their interaction with technology and the intertwinement of scientific and technological development 'to create new nature-culture hybrids' (Latour1987) reflects the 'continuous folding of science, technology, and the everyday into each other.'(Papadopoulos2018).

METHODS
The paper describes new modes of analysis enabling the visualization, modelling and simulation of complex atmospheric conditions exploring the material relationships at the intersection of natural systems and the built environment. Form is understood as a 'stable moment in the system's evolution.'(Alan1992) The complex material, spatial, and temporal relationships that describe the phenomena of form-making are engaged in a perpetual exchange of information engendered within their parameters in negotiation with external conditions. Sensors enable a description of phenomena, from the mundane to the extraordinary, by translating the material registration of force as information to reveal the 'motor of matter, the modulus that controls what it does.'(Kwinter2006).

RESULTS
'Common Sense' landscapes move toward a 'world of ambient intelligence, happening around us on the periphery of our awareness, where our environment is not a passive backdrop but an active agent in organizing daily lives.'(Crang2007) Agency resides in the challenge of not thinking of the socio-political and the ecological as separate and divided worlds, instead 'seeks to explore how humans and nonhumans collectively and in emergent ways construct a region of objectivity by being implicated in networks of connectivity.' (Papadopoulos2018), situated relative to the ecology, form, and process.

CONCLUSION
Encourage the assessment of the value of the ecological work of nature, shifting our perception of it being an amenity to plunder, to being an active agent accounted for as natural capital, which ultimately equips the landscape architect with tools to observe and design alongside change in ways that inform new forms of agency and practice.

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Communicating the Impact of Green Infrastructure in Landscape Architecture Applications Using 2D and 3D visualization. Case Study: Green Infrastructure at Syme Hall, NCSU, Raleigh, NC

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Keywords: Flooding, Simulation, Communication, Animation, Agreement

Climate change is challenging our time, and more extreme weather phenomena happening including intense flooding, Green Infrastructures (GIs) have been proven can significantly mitigate the negative impact of flooding. Digital technologies exploration has been engaging more intensively in landscape design process and management. Design process and decision-making do not merely come from the decision of landscape design practitioners, it is the process of communication to gain agreements of stakeholders and education in both institutions and communities. This research's goal is to examine if using 2D, 3D landscape visualization can enhance the capabilities of communicating to targeted audiences which are professionals, students, and educators, neighborhood community members when working on GI projects. A 2D,3D animation video was done in March 2022 to serve research purposes. The content of the video includes the impact, the construction process of GIs, and how GIs work. The priority of the video is to be informative and easy so everyone will be able to understand the positive impact of GI. Since audiences of any project are often highly diverse in terms of demographics, backgrounds, and health conditions, so the easement of visual assessment was emphasized, especially for disadvantaged community members, and people with conditions like Dyslexia. The method used in the research is experimental experience and questionnaire to testify to the teaching and simulation effectiveness of the video. The bio-retention at Syme Hall was built in 2018, the video was done by 2022. This created an opportunity to testify about the experience of 50 participants between visualization versus on-site visits. This experiment will examine the pros and cons of the method based on analyzing some features. First, in which ways does 2D-3D visualization ease the information accessibility process? Second, comparing simulation versus onsite visit in terms of cost, commute distance, mobility ability, and time of experience like in the past, current, and future. Third, comparing traditional static images versus 2D-3D animation with aspects like showing project phases; people, animals and traffic movement; weather effects; soundscape; and light changes; water movement. Also, research will consider experience exclusively only offered by VR like the ability to walk into the project with real-life scale. Last, make a general evaluation of the effectiveness of using 2D-3D visualization to communicate and support GI projects. By far, an unofficial survey shows the video effectively teaches viewers about GI's impact and successfully simulates the visual experience of the site.

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Analog Eidetic Photomontage for Narrative Storytelling

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Keywords: Image Transfer, Collage, Place Theory, Image-Making, Analog

Using photomontage as a generative method for creativity early in a design process is well documented. As an abstract form of representation, open to interpretation and providing multiple readings, eidetic photomontage invites dialogue amongst diverse voices about design potential. Photomontage also provides opportunities for designers to creatively ideate while exploring design concepts individually. (Amoroso 2012, Belanger and Urton 2014, Cantrell and Michaels 2010, Corner 1999, Iliescu 2008, Kingery-Page and Hahn 2012, and M'Closkey 2012). Less explored, however, is the role photomontage can play in visually expressing narratives of lived experiences; as a reflective method instead of a projective one. The intent of this paper is to present student work generated during the spring semesters of 2020 and 2022 as part of a seminar course taught to American students while studying abroad in Italy. The paper finds that eidetic photomontage created using analog image transfer techniques is a highly effective method for documenting lived experiences.

The author is a landscape architecture professor who taught studio and seminar courses as part of a study abroad program in Italy. The seminar course, which focused on place theory, landscape narratives, sensory perceptions, and image-making, was structured to teach students to elevate their awareness of their own lived experiences and express them through mixed-media analog photomontages. The first half of the semester focused on teaching various artistic techniques of image transfer within a supportive environment where experimentation was encouraged, and students felt safe to fail. Each week students shared photomontages documenting their own personal experiences and presented them to the class in a conversational setting for everyone to learn from each other. Later in the semester, once students had refined their skills, they created a poster documenting one memorable experience from the semester overseas. Students primarily used image-transfer photomontage techniques in addition to other methods including sketch and watercolor.

The paper finds that photomontage provides an abstract and creative method for documenting and expressing one's own lived experiences. Students visually expressed their individual stories in great detail and reflected on the group's collective experiences. Furthermore, exhibited work drew praise from Italian and American viewers alike for its aesthetic appeal and capacity for storytelling. Future research will focus on the potential for leveraging abstract imagery to bridge cultural and language barriers for design stakeholders. The analog techniques taught in the course also provided students with opportunities to work outside the established norms of computer-generated imagery.

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Convergent Plate Boundaries: Using a Case Study to Understand the Efficacy of Public Art as a Tool for Sea Level Rise Communication

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Keywords: Climate, Engagement, Embodiment, Impact, Landscape Installations

Convergent plate boundaries, where tectonic plates meet, are areas of potential friction, change and promise. Similarly, scholarship in landscape architecture is at the nexus of intriguing and at times challenging "plates" including art, ecosystems, scientific research methods, communication, and public policy. With public institutions and agencies increasingly funding art projects that include climate change messaging, how can we assess the efficacy of this means of communication? With this question as a foundation, this presentation uses a case study of a temporary landscape installation to inquire into the larger issue of using social science research methods to assess the efficacy and impact of climate communication through public art installations.

FutureWATERS/AGUASfuturas, created by one of the authors, was a site-specific temporary art installation in the vulnerable and highly diverse neighborhood of East Boston. To investigate how the installation contributed to public understanding of local impacts from sea level rise, researchers used social science research methods including paper and online surveys (n-114) and interviews (n=5). The survey and interview questions sought to understand participants' attitudes, knowledge, and perceptions of local climate change-related flooding; awareness of community planning efforts related to climate change and flooding in East Boston; impressions of the FutureWATERS installation; and demographic information. Descriptive statistics were calculated from the survey results and interview data was analyzed using a qualitative descriptive approach to identify patterns and themes (Vaismoradi & Snelgrove, 2019). The results of the study were framed using the conceptual framework of cognizance, attentiveness, and salience for climate change communication (Baum (2003); McDonald, 2009).

This case study suggests that public art installations can potentially increase salience and improve accuracy in knowledge of projected flood levels and activate awareness on local issues of sea level rise. However, the results also suggest that additional methods are needed to assess public engagement, especially among traditionally underserved and under engaged populations. Ideas for future research include comparing alternative communication methods with randomized assignment to various treatments, such as printed text, versus messages embedded in lived experience, as was the case in FutureWATERS/AGUASfuturas.

The study provides the impetus to think critically about the methods and processes researchers can use to assess the efficacy of climate change messaging. The plate boundaries of art, research, and communication create novel and generative environments with intriguing emergent properties as well as challenges. This presentation seeks to contribute to this highly charged and important nexus in landscape scholarship.

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From Clouds to City Models: Visualizing Urban Topography Through LIDAR

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Keywords: Point Clouds, 3D Printing, ArcGIS, Infraworks, Urban Fabric

Within the last fifteen years, the proliferation of high-resolution LIDAR (Light Detection and Ranging) elevation datasets has greatly empowered landscape architects with the capability to accurately visualize topography of large-scale urban sites. LIDAR is defined as a georeferenced point-cloud dataset of the earth's surface captured via aircraft-mounted laser scanners and global positioning systems. The resulting point data captures the horizontal (x,y) and vertical (z) position of exterior surface features, that can be viewed, processed, and analyzed within geospatial modeling software such as ArcGIS or Autodesk Infraworks.

LIDAR has been harnessed by geographers, designers, and other related disciplines to acquire elevational data (such as contours or spot elevations) of the earth's surface. This usually takes the form of a DEM (Digital Elevation Model), a cartographic representation of the bare earth terrain. LIDAR can also be used to create a DSM (Digital Surface Model) which integrates all elements of the exposed surface of the earth, including buildings, bridges, powerlines, and tree canopies. A DSM, when creatively processed with other widely available GIS datasets (such as building footprint shapefiles), makes possible the creation of large-scale digital city models. These models are scalable and bridge the gap between cartographic 2D mapping and 3D site modeling. These models visualize the urban fabric of cities while also reducing the need for custom-modeling of buildings, bridges, and infrastructures. For designers, this presents an opportunity to conceptualize design more efficiently within urban contexts while avoiding oversimplification of topographic data. Landscape architects, who are educated to be proficient in GIS software (ArcGIS) and modeling software (Rhino), are uniquely positioned to study the application of LIDAR data in city models. Additionally, the rise of rapid prototyping and 3D-printing in the design disciplines has made possible the fabrication of physical city models with relative ease.
This presentation will illustrate how LIDAR can be utilized to explore urban topographic visualization, the potential it provides to enhance both practice and teaching, and examples of the work. The presentation will include 3D-digital models rendered within Autodesk Infraworks, as canvases for presenting landscape architecture concepts to clients. The author will also provide examples of physical city models fabricated from the data with intro-level 3D printers, and the workflow used to create such models.

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Communicating Landscape Architecture: Research-Backed Framing Strategies to Increase Public Understanding

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Keywords: Public Awareness, Science of Framing, Knowledge Translation, Metaphor, Recruitment

Public awareness about landscape architecture is a long-standing challenge. The lack of familiarity or surface-level perception limits society's utilization of landscape architects and their expertise. Increasing public understanding of the discipline and its value is critical to all aspects of the field, from recruitment and university program budgets to licensure and the scope of professional services to advocacy and influence. In 2018, a group of the heads of key capacity organizations for landscape architecture – ASLA, CLARB, LAAB, LAF, and CELA – engaged the FrameWorks Institute in a multi-phase applied communications research and knowledge translation process to uncover the most effective ways of communicating about landscape architecture.

Using their multi-method Strategic Frame Analysis® approach, FrameWorks' staff of PhD-level sociologists, psychologists, and linguists identifies widely held assumptions and mental shortcuts that people use to make sense of an issue. They then empirically test ways of communicating that "reframe" the issue by building from the pre-held assumptions to activate more productive ways of thinking and overcome core misunderstandings. The process occurs in three phases:

- Phase 1: Descriptive Research - Mapping the gaps between expert and public understanding
- Phase 2: Prescriptive Research - Developing and testing frames to shift public thinking
- Phase 3: Application - Training and dissemination

Phase 1 was completed in July 2019 with the delivery of a "Map the Gaps" report that outlines public understanding of landscape architecture and key areas of agreement and divergence. Phase 2 involved developing potential framing elements and then testing them through online interviews with a national sample, peer discourse sessions, and usability trials. This phase finished in November 2021 with the completion of the research brief "Putting People at the Center: Reframing Landscape Architecture for Maximum Impact."

Phase 3 got underway in 2022 with discreet activities to facilitate frame dissemination and mobilization. For the evidence-based reframing strategies to be most effective in catalyzing significant shifts in public thinking, they need to be adopted by entire fields of practice and implemented consistently over a long-time horizon. In this panel session, representatives from LAAB, LAF, and academic practice will provide an overview of the FrameWorks research and findings, followed by a discussion of how the recommendations can be applied to the specific contexts of university educators and researchers. Resources will be shared to help attendees get "on frame" to effectively communicate about landscape architecture and build a bigger constituency for its role.

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Assessing the Visual Impacts of Offshore Wind Farms Post-Development

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Keywords: Simulation, Renewable, Energy, Evaluation

Part of the construction planning requirements for offshore wind farms requires visual impact assessments [VIA] which estimate how the introduction of wind farm infrastructure will alter the visual experience from communities along the coast. Pre-construction documentation requires the development of these visualizations; however, absent from the process is an evaluation post-construction of accuracy or effectiveness in impression. This paper will explore existing VIA visualizations, evaluate the methodologies for creation and use, and suggest a post-construction process to evaluate the effectiveness of visualizations.

The first offshore wind farm was commissioned in 1991 in Denmark and the growth has been fairly slow since. However renewable energy initiatives are expanding rapidly across the world. Currently the United States has only two small offshore wind farms in operation, but there are 30 or more leases currently in the planning stages along the coasts slated to start construction in the next few years. The majority of these wind farms will contain between 70-100 turbines, covering thousands of acres of seascape and visible along much of the coast.

Several guidance documents for creating VIA have been developed over the years, most of them with few alterations. The current methodology for creating simulations involves 3D modeling the terrain and prospective wind farm, taking a photograph from a key observation point, and then montaging the photograph together with the 3D model, simulating atmospheric and lighting conditions. The visualizations are presented with the development plans to inform the public of possible effects on viewsheds and experience of the landscape. This is particularly of value to cultural heritage places and historic sites that rely on context for definition.

Missing, however, is post-development guidance for evaluating the simulations at approximating experiential impact. At minimum, this would require field visits to key observation points used to create the simulations to re-photograph and compare the simulation with current construction. A survey of public impressions from both simulated and constructed landscape images could help determine their similarity and divergence. Further, a post-construction evaluation might point to more effective simulation technology.

Landscape architects and environmental illustrators are positioned to take the lead in developing visualizations and should also take the lead in assessing their effectiveness post-construction. With the rapid timeline of development and the increasing call for green energy, it is instrumental that we develop guidance for how to evaluate whether or not these visual impact assessments are effective.

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Artificial Intelligence as a Design Process

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Keywords: Digital, Technology, Process, Adaptation, Methodology

Trends in landscape representation explode and dissipate. Previously, movements in design communication have been linked to the contemporary theory of the time and the available production tools. Currents in aesthetics, process, and mediums were often isolated to certain schools, or portrayed through publications such as *Landscape Graphics* by Reid or *Digital Drawing for Landscape Architecture* by Cantrell/Michaels. With the continual expanse of social media, designers are bombarded with trending examples of landscape visualization. This phenomenon is not an inherently negative occurrence. It allows for those experimenting with novel representation approaches to have a forum for exhibition and feedback. Anything that receives enough 'likes' and 'reposts', trends. This is the moment where such a resource can become problematic through overuse and misuse of representation strategies. The newest trend to hit social media for designers is image generation from text prompts using artificial intelligence.

This method of rapid, iterative spatial representation with little input has mass appeal to designers. Any idea can be 'typed in' with a supplied aesthetic preference, and in a minute an image is produced. An enticing method of working, especially for students who are asked to constantly iterate to further design proposals. Ai streamlines image production with minimum time commitment and use of skill. As free platforms, such as 'Midjourney' and 'Dall-e 2' are becoming available, there has been a large presence of their use on social media and early emergence into design schools.

The algorithms deployed by ai platforms are as intelligent as they are unsophisticated. Within the seemingly 'black box' characteristic of the process, an image is created by referencing 1000s of images that match the supplied text prompt. The produced synthetic images are credited to be original but are merely a construction of what already exists. It becomes necessary to address how ai is used within the design process. Depending on how these tools are interpreted, they have the ability to generate originality, if not viewed to be an end product, or to stifle originality through handing over design control. The study curates and compares student projects to depict the influence of ai in final aesthetic and spatial sensibilities to generate discourse on the ethics of using ai in the design process. In alignment to the legacy of landscape architecture as a profession that is constantly evolving, it is crucial for educators and practitioners to adapt to and become critical of such emergent tools.

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The Greatest Single Thing: Overcoming Pesky Challenges in Achieving Great Urban Forests

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Keywords: Urban Trees, Pedestrianization, Underground Design, Resilient Design, Climate Change

This FILM is a compilation of video vignettes presenting the approaches and strategies to overcoming challenges in achieving impactful forest coverage in difficult urban environments.

Students enrolled in a landscape architecture program at a southern state university interpret James Urban's seminal work: *Up by the Roots* through video compositions relating implementation strategies to designer's personal attachment to specific tree species and to the prospect of introducing these into challenging urban environments.

The collection aims to make accessible the specialist knowledge developed by landscape architects like James Urban and arboriculturists including Ed Gilman that have enabled works like The Glade (Lincoln Road) by Raymond Jungles and is oriented towards an audience of specialists including landscape architects, arborists, urban foresters, and town planners.

The film is in the editing stage with copyright clearances obtained. Anticipated duration 15:00 minutes. Digital.

Directed by cited first author with significant 5th year undergraduate landscape architecture student contributions.

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Entourage Automaton: Making 2D Visual Assets with AI Image Generators

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Keywords: Artificial Intelligence, Design Representation, Machine Learning, Image Generators

This presentation examines the functions, potential workflows, and implications of using AI image generators in conceptual design representation. In some form or another, artificial intelligence (AI) now pervades the way we work, travel, legislate, recreate, engage with information, and even design. AI-driven applications have been surreptitiously creeping into design practice for more than a decade. Recent advancements have made this creep markedly less subtle in the field, highlighting the possibility of disruption to the way we may conduct site inventory, landform modeling, and urban design (Barbarash et al., 2022; Brütting, 2020; Johns et al., 2020; Liu & Tian, 2022; Raman et al., 2022). While these processes require expertise, skills, cognition and creative agency, new advances in AI may be able to offload some of these designer-centric activities. For instance, the releases of descriptive image generators such as DALL-E 2, MidJourney, or Stable Diffusion represent possible disruptors to the process of landscape representation. With descriptive prompts from a human user, these generators utilize machine learning models trained on millions of images to produce two-dimensional renderings in nearly any conceivable artistic style in less than a minute.

We introduce a specific use case of AI-generated imagery as a tool to aid in the creation of 2-dimensional representations of design concepts. AI image generators were utilized by students to create an image library of unique plants and entourage across a wide spectrum of species, forms, poses, and artistic representations. These images were then utilized in the creation of 2-dimensional visualization materials beyond what is typically available with purchased entourage assets. Current methods present an opportunity cost between finding or creating necessary visual assets and engaging in iteration and creativity, sometimes resulting in sub-optimal final products. While there is an upfront investment of time to generate the AI-generated library, the ability to rapidly create a large spectrum of custom visual assets suggests that the use of AI may become an integral part of the visualization process in the near future. This is especially true for projects that involve more accurate representations of obscure elements not typically available in commercial asset entourages, such as cultural representations, native plants, or unique settings. Our work contributes a practical use case to ongoing reflections about the future of AI in landscape architecture (Cantrell et al., 2021; Fernberg & Chamberlain, 2021) in which the benefits of implementing it significantly outweigh the costs.

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“Saying it Worse” – Re-Focusing the Lens

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Keywords: Photography, Landscape, Culture, Representation, Conceptualism

As Robert Frost responded to a question from the audience asking the meaning of the poem he had read, he asked – “Do you want me to say it worse?” Photography can be expressive beyond words. A generation of photographers – including the “New Topographics: Photographs of a Man-Altered Landscape” artists Stephen Shore and Robert Adams – tell us photography can be a tool of inquiry and knowledge generation. For example, Shore explores how the three-dimensional landscape can be translated into two dimensions through distillation of structure and form. Always interested in our commonplace landscapes, Shore interpreted and created photographs for Robert Venturi and Denise Scott Brown’s 1968 exhibit “Learning from Las Vegas.” Robert Adams, focused on the American West and its changing landscape, turned his camera onto an increasingly suburbanized and auto-dominated west, exposing the homogenizing and efficiency-driven aspects of the domestic and vernacular landscapes. Richard Misrach, in his collaboration "Border Cantos", captures the arbitrary nature of a jurisdictional boundary, the surreal beauty of a singular line in the sand, and the inherent cruelty of contested territory. Photography can be a vehicle in telling us stories of our places, and our values expressed through our imprint on land.

While photography has been a ubiquitous tool in design practice, this presentation will contribute to the critical examination of the photograph and photographer’s role in interpreting and understanding landscape. In a world saturated with readily available and easily produced imagery, many landscape architects lack discipline and deliberate practice in the creation of photographic images. Both the images themselves and the attendant acts of their creation are often merely a reenactment of what was seen before or is designed to manipulate an audience into appreciation. Instead of ‘awing’ the viewer, photographs can offer a view and an understanding of the aspects and dimensions of landscape that are often invisible but central to the deep understanding necessary to imagine intentional place change, revealing the cultural and natural processes, conditions, and phenomena.

This paper will review work of landscape photographers of the past 70 years, the author’s own work and the work and experiences of students, demonstrating techniques in the deliberate practice of photography and the power of the photograph in understanding, representing, and revealing cultures and landscapes. In an age of visual excess, photography, when practiced with discipline and rigor, can offer a powerful insight to places we live in and create.

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Folded Section: A Conversation About Geology, Art, and Design Through Drawing

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Keywords: Visualization, Community, Collaboration, Interdisciplinary, Geography

This presentation is a review and analysis of a wall drawing project executed by the author at Penn State's Woskob Family Gallery in State College. The subject of the drawing is an interpretive bedrock section through Nittany Valley, location of Penn State's University Park campus and a unique geological setting connecting the Ridge and Valley Province and Appalachian Plateaus. The geology of Nittany Valley and its surrounding ridges are at the heart of the region's ecological, economic, and cultural identity. The drawing was designed to express this important but largely invisible condition intuitively for viewers and especially for those who participated in its creation.

The section was translated from the original survey to the gallery walls at 1"=100': zoomed out enough to show the large-scale structure of regional bedrock formations, but close enough to understand the scale relationship to a human body. The total size of the drawing is approximately 100 feet long by 8 feet high. The creation of the final drawing was a collaborative activity involving college and graduate students from landscape architecture, earth sciences, and art, as well as other community members. Participants in a 4-hour charrette developed a unique texture in charcoal or graphite for each surveyed bedrock formation based on reference packets with USGS descriptions and images. The drawing was later used as a teaching tool at college and elementary school levels.

Regional bedrock geology is part of the curriculum for landscape architecture students at Penn State, including a field-based "Ridge and Valley" course and a 4th-semester "Systems Studio" operating at the scale of a local watershed. Design studios rely on increasingly powerful GIS tools, but interpretive bedrock sections like the 1980 USGS document referenced by the author are no longer distributed: digital resources are more sophisticated and accessible than ever before but are overwhelmingly plan-based. The importance of interpreting landscape not just through plan data but deep section has been a theme in the work of firms like MVVA and Nelson Byrd Woltz. In landscape education. University of Pennsylvania faculty have been proven the pedagogical value of experiential drawing at large scales, as evidenced by the work of Anne Spirn, James Corner, and Anuradha Mathur; balancing the legacy of McHarg and large-scale geographic analysis. This presentation argues for the continuation of immersive, tactile forms of visualization in landscape education as an essential complement to GIS-oriented design.

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Landscape Storymaking: Multimedia Storytelling as Critical Landscape Practice

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Keywords: Communication, Representation, Diversity, Digital Storytelling, Storytelling

"Landscape is loud with dialogues, with story lines that connect a place and its dwellers." (Spirn, 1998)
"Stories are among our most potent tools for restoring the land as well as our relationship to land. We need to unearth the old stories that live in a place and begin to create new ones, for we are storymakers, not just storytellers. All stories are connected, new ones woven from the threads of the old." (Kimmerer, 2013)

"From the vertical, design exceptionalism-dominated, and author-driven models of landscape practice we move towards horizontal exchange and collaborative partnership wherein authorship is shared across many modes of worldbuilding." (D. Carlson and M.C. Arias, 2021)

The urgent crises facing our planet--all of them tied to the ways humans inhabit the Earth-- call for new tools for communicating our work as landscape practitioners. This presentation will explore the potential of alternative methods of landscape inquiry and communication as powerful tools for critical landscape practice. It builds on Carlson and Arias's conception of a new "critical landscape practice" that is no longer solely the domain of designers, but one that is instead, "embedded within the ever-shifting processes and relationships that constitute landscape." (Carlson and Arias, 2022). While traditional communication and representation methods such as the written word, still image photography, and two- and three-dimensional graphics remain vital tools, they are often limited in their impact and ability to connect with diverse audiences outside the scope of the academic discipline and profession. Focusing on examples that range from oral history and digital storytelling projects to multi-media projects that investigate landscape questions, this presentation will make a case for embracing an increasingly diverse set of approaches to studio practice, moving away from traditional modes of engagement towards one that is more collaborative, evocative, and which can be more readily embedded in contemporary public discourse.

DESIGN EDUCATION & PEDAGOGY

Design Education and Pedagogy

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Exploring Alignments Through a Hybridized Model of Design Collaboration

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Keywords: Design Collaboration, Landscape Architectural Design Processes, Creative Thinking, Hybrid Pedagogical Approaches

The provocation for the theme track of this conference suggests the possibility of misalignments between the landscape academe and discipline on one hand, and practice and vocation on the other, while also expressing concerns as to the correct balance between the poles of instrumentality and expression in landscape architecture. This paper explores a mutual space for collaboration that the authors believe somewhat negates these concerns by hybridizing modes and bringing the rigorous and the intuitive together. We hope this reflection will be of interest to other design instructors, and especially in the collaborative enrichment of traditional design studio approaches. Two of the very few benefits to emerge from the COVID-19 pandemic has been an increasing facility with online and remote collaboration and a sense that, as a global and networked community, we all ultimately share the same fates. For the landscape architecture discipline and allied areas, this has framed recent dialogue around a number of important areas such as remote teaching and learning, and the global green recovery, and there has been a sense that the academe is largely – though not exclusively – leading the way for practice to follow. Here we look at another opportunity where the academy can perhaps offer some models while, again, taking advantage of the aforementioned global and interconnected culture of post-pandemic collaboration. This paper reports on a case study of international design collaboration, largely defined by a series of dichotomous or contrasting characteristics or, perhaps, misalignments. The students and faculty occupy different continents and time zones; and only some of the collaborators entered the design with a full grasp of place, attained through normative site immersion and documentation. The collaboration also represents an interplay between the full, rigorous design process that is familiar in most design studios, with the intense, free form exploratory play of a quickfire design charrette. This case study draws on the faculty authors' commitment to reflective teaching praxis and reports the alignments of student experience, stemming from this hybridized collaborative approach. From the reinforcement of clear, concise verbalization of design dilemmas and technical information to the generation of effusive and contagious energy and joy through the sharing of stories and drawings, we posit that this kind of approach begins to offer not just an effective mode of landscape architectural production, but a rewarding and stimulating experience for collaborators.

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Growing Conformity

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Keywords: Planting Design, Aesthetics, Pleasure, Diversity, Extinction

This paper presents a critical study of the plant species listed by the American Society of Landscape Architects (ASLA) award-winning student projects in the general design category from 2005 until 2020. The student awards program is open to all ASLA members enrolled in an accredited full-time landscape architecture program. Submitted projects are eligible for consideration if they meet the requirements, including not more than 16 images and 1300 words of descriptive text. Including plant material is not a requirement for eligibility. These images and text served as the basis of this study. Primary data analysis generated a cumulative plant palette of 965 species by recording each written or annotated incidence of a species across all 103 award-winning projects. While individual projects proposed plant material to meet specific aims, this research studied the summative plant list to reveal trends and overlaps in plant species selection.

The dataset reveals several significant findings. First, plant selection is not necessary to achieve design excellence in the study of landscape architecture, evidenced by the finding that 30 of the 103 projects reference no plant species. Second, students specifying plants are very selective among species, leading to limited choices in common between projects. For example, only 30% of the 965 species appear in multiple proposals. However, plant selection shows greater conformity at higher taxonomic levels, with 40% of genera and 64% of families appearing in multiple projects. This situation is consistent across all levels of classification. Finally, since there is a low overall agreement between students on species, it is significant when selections overlap between projects.

This research reaches conclusions by evaluating the most common plants listed across multiple projects and directing attention to the types of plants that were not selected. In the first instance, the results show that students favor plants that conform to a savannah-type landscape, first defined by Gordon H. Orians as scattered trees among grassland and near water. Secondly, the overwhelming majority of students who have achieved design excellence, according to the ASLA, show no concern for promoting endangered species. Only 2% of the species listed qualify as threatened by the International Union for Conservation of Nature (IUCN). The evidence shows that award-winning student projects express a limited aesthetic and ecological diversity. Correspondingly, this paper highlights a disconnect between desirable outcomes in the training of landscape architects and the role that plant material plays in defining design excellence.

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Reclaiming Ideological Equilibrium: Teaching Landscape Architecture as a Creative Art Amidst Increasing Curricular Computerization

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Keywords: Design Education, Pedagogy, Hand Graphics, Drawing, Visual Communication

After a prolonged history of seamless congruence, Landscape Architecture's artistic and non-artistic halves have been distanced by a recent redirection which threatens to endanger the profession's foundational identity. Ever-increasing computerization has devalued intellectual, creative, and philosophical aspects while emphasizing technical capabilities (Author, 2020), subverting established value systems to disenfranchise the sublime and privilege the mundane. Although beneficial in the workplace for enhancing efficiency, productivity, and communication, computerization's effects within pedagogy are rather insalubrious, devaluing profundity, artistry, craftsmanship, and individuality. It also promotes superficialities such as speed and flexibility, which, although valuable in practice, are of little value in the educational process.

This paper analyzes the consequences of this educational reprioritization, which was a pragmatic move by institutions to ensure graduate employability. This decision has proved to be problematic for educators who interpret (and want to represent) landscape architecture as a philosophical, artistic, and humanities-based discipline rather than a technical, computer-centric enterprise. The emphasis on computer skills expropriates both importance and time from subjects such as history, theory, art, and hand drawing, thus unintentionally (and incorrectly) implying that they are obsolete, irrelevant, or valueless. It also raises questions about authenticity, with future landscape architects possibly misled about the paramount obligations of their chosen profession.

Incorporating theoretical research and empirical data from 16 years of design teaching in an accredited landscape program, the author counsels a curricular reformulation to convey the discipline's genuine essence while addressing both professional and pedagogical needs. While equipping students with the technical competence demanded by employers is reasonable, it must not occur at the expense of more substantive manifestations of the true identity of the discipline. Indeed, an informed curriculum can accommodate both considerations, providing applied skills while transmitting core values and artistic, historical, and cultural traditions (Langley et al., 2018) which underlie landscape architecture's categorization as a design field.

Beginning with an overview of the contemporary ideological disconnect between pedagogy and practice, the author will identify shortcomings in current curricular offerings, and propose remedial strategies to make education both practically relevant and philosophically representative. For broader, comprehensive contextualization, the stance will be located within parallel societal trends (Carr, 2011), with gadgets and social media increasingly jeopardizing humanistic values while perpetuating superficial and often-detrimental consequences.

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Virtual "Desk" Critique for Online Design Classes with Synchronized Digital Tools

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Keywords: Desk Critique, Online, Technology, Interactive, Virtual

Desk critique is one of the key instruction methods that benefits student critical thinking in design classes (Goldschmidt et al., 2010). It involves the professor sitting down at each student's desk and reviewing their work progress displayed on the desk. An effective desk review consists of giving verbal feedback and, more importantly, marking students' designs to offer ways of improving and exploring further the design problems (Al-Qawasmi et al., 2000).

Professors could not conduct the traditional, close-distance, in-person desk critique for online design classes. Marking and sketching over student work during a class would have become a challenge without technology's assistance. With the advancement of video conferencing technology, Zoom Annotate and other creative digital drawing tools were used in design classes instead of in-person critique to provide an equivalent level review for students. This accomplished a live digital review with the ability to mark student work, which the traditional desk critique can offer.

Students have reported the benefits of having valuable visual feedback time via a computer screen at any location. The implications for using digital crit to teach online design class include: 1) providing a more confident and effective tool for online design classes, 2) offering flexibility for both synchronous and non-synchronous crit due to the recording and all-in-one function, and 3) allowing faculty to expand a valued and effective paradigm to technology-enhanced learning for design.

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The Joys and Challenges of Academic Leadership

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Individuals fulfill a variety of roles within a university. Most academics in landscape architecture have been trained as designers and researchers. In addition, many of these individuals have worked in the private sector and run design firms. However, very few have formal training for management or leadership roles within the academy. We often learn as we go and learn from our mistakes and successes.

Panel participants bring to the discussion more than sixty years of experience in academic administration. They have served as program and institute directors, Department Heads and Chairs, Associate Deans for Research, International Studies, and Academic Affairs, and as College Deans. The goal of the panel is to present and discuss some management and leadership issues that could prepare or assist individuals to serve as successful academic administrators. The panel will draw on insights gained from their experiences and from a survey of active and emeritus academic administrators in the discipline.

Topics discussed will include:

- An overview of contemporary administrative structures and positions in LAAB programs.
- Successful leadership in the academic context.
- The interaction of administrative leadership and management functions.
- Academic structures and how these structures impact administrative roles.
- Encouraging change and progress in the academic environment.

The panel will begin with a management/leadership case study presented to attendees, who will then be asked to write down what they see as the true nature of the problem. Following this exercise each panelist will make a short presentation focusing on the above topics. The panel will then conclude with a participatory discussion linking the case study and perceived problems to the material covered in the presentations.

Panel attendees will receive an annotated bibliography of reading recommended by the panel.

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Teaching Contemporary Landscape Architecture History and Theory Utilizing Peer-Reviewed Design Typologies: Approaches to Aligning ASLA Design Awards and LAF Performance Case Studies

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Keywords: Landscape Architecture History, Contemporary Practice Examples, Design Awards, Landscape Performance

This presentation outlines the use of peer-reviewed professional design award winners and case studies for student review and analysis for an undergraduate contemporary landscape architecture history class. Contemporary has been defined as the last half of the 20th century to the 2010s. Using JSTOR access for Landscape Architecture magazine since 1976, student teams self-organize by preferred project types based upon the LAF Project Performance Briefs. Students then investigate professional award examples of their chosen project typology by combing the 45 annual awards issues in JSTOR and in bound copies of LAM in the university library. Weaknesses of the annual ASLA Awards lists become evident from the inability to search by any criteria: year, project type, location, firm name. LAF Project Performance Briefs are searchable by multiple criteria. For this assignment students discover that contemporary project types distinguished by their exemplary landscape performance are not easily identified in the 'peer-reviewed' national ASLA awards. They must examine and analyze from award descriptions whether projects represent their chosen typology. Contemporary project typologies become less identifiable the farther back in time the award lists are examined. Analyzing ASLA National Award winners over the past fifty years provides students with clear evidence of emerging criteria and changing performance expectations for contemporary professional design. Previous assignments have required project typology examples from each decade with two examples from the 2000s and 2010s. Examples of team project typologies from the 1970s through 2010s are provided with recommended discussion topics, analytic criteria, and successful/unsuccessful approaches to achieving learning objectives.

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Increasing Assessment Rigor, Clarity, and Consistency Through Specifications Grading

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Keywords: Evaluation, Curriculum, Standards, Alternative Grading

PURPOSE
Landscape architecture curricula entail complex, multivariate assessments that often include holistic evaluation and subjective judgement. Specifications grading, as described by Linda B. Nilson in Specifications Grading: Restoring Rigor, Motivating Students, and Saving Faculty Time, provides mechanisms to ensure assessments are meaningful for shaping curricular decisions and are clear for guiding student self-development. This trial gauges these impacts in two separate courses, each over two semesters.

BACKGROUND
Specifications grading modifies traditional ranked grading (averages or letter grades derived from percentages) through assessments that are individually graded on pass/fail criteria. Passing criteria satisfies minimum requirements for a student's degree path and correlates with quality standards for a professional office. Course-level grades are based on the quantity and/or difficulty of work a student completes. Each assignment has clear, two-level rubrics stating pass/fail criteria for a given assignment. In addition to promoting rigor and clarity, the scheme also aims to reduce time spent grading student work.

METHODS
In paired technology and design courses for first year students, the authors piloted the method over the summer and fall semesters of 2022. Learning outcomes were identified and framed considering minimum acceptable standards for advancement. These outcomes guided development of assessments (mainly exercise- and project-based work) and rubrics that measure these standards. These were used to develop additional assessments and/or more challenging criteria to advance to higher grade levels. Detailed specifications were included in the syllabi. Rubrics were provided to students at each assignment's inception. Observations include time spent assessing student work, initial quality of student work, and student development over a semester. We will conduct a student survey to assess their views of the system.

RESULTS
The pilot holds promise for rigor and student self-development. Time spent evaluating individual assessments is significantly reduced, but preparation time is increased due to rubric development and scaffolding of specifications across the grading levels. The method may help students prioritize efforts on intended learning outcomes; moreover, the specifications promote consistency between graded elements or between multiple evaluators using the assessment tool.

DISCUSSION
This ongoing trial suggests specifications grading may increase student agency in grade attainment, aid prioritization of effort, and reduce grade negotiation. The authors note that increased specificity in grading criteria also increases the potential for grading loopholes, requiring revision over multiple iterations. Finally, the specifications provide more meaningful feedback on course and assessment outcomes than averaged grades, promoting rigor and consistency.

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Exploring a Digital Mind Space: The Interplay of Traditional and Technological Approaches to Design Process

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Keywords: Drawing, Pedagogy, Cognition, Creativity

This presentation will share a documented account of an educational workshop hosted in 2022. The workshop introduced how digital drawing tools such as the iPad and Apple Pencil can be used to develop student ideation, concept development and problem solving. We will outline how the workshop reflected current research utilizing technology in the design studio and propose how this technology can be paired with more traditional design tools and processes. There is tremendous value in utilizing these tools for teaching, learning, communication, storytelling, and most importantly creative problem solving. Specifically, our research has found that the ever-evolving digital platform helps foster the association, combination, and imagination of ideas.

As creative problem solvers, students must be able to externalize, share, connect, and evolve ideas into rich narrative concepts and solutions. We will share supporting research evidence from various studios as students have been more willing to experiment, share, and transfer knowledge across projects. We frame this integrated approach as a foundation from which these future problem solvers will build an approach that enables them to imagine, see, conceptualize, and develop transformative ideas and solutions.

The highlighted workshop includes faculty and students from two universities with landscape architecture programs (one undergrad and one graduate), providing a lesson plan for how these tools may be utilized elsewhere in a similar capacity. The workshop also provided an opportunity to brainstorm on where this digital approach may be evolving in the future and how best to think about the marriage of digital and analog tools. During the workshop, a Climate Change and Adaptation Praxis studio field survey, students visited river adjacent urban waterfronts to explore, document and reflect on the implementation of resiliency design strategies. This type of field review and analysis lends itself to the introduction of new technologies that document and critically evaluate designs. Moving seamlessly from verbal observation, written annotation, photograph, video and sketch and the ability to share those across platforms in real time allows for a richness and depth not possible with a single mode of documentation. The iPad, as demonstrated, does exactly that.

Throughout the workshop and project simulation there was a series of qualitative (reflective statements) and quantitative (survey) assessments to gauge both the faculty and student experience. This data will be analyzed and presented.

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“Bringing Professional Practice into the Classroom”

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Keywords: Curriculum, Professional Practice, Exposure, Design, Landscape

PURPOSE

The purpose of this paper / presentation is to unveil the importance of teaching professional practice in the landscape architecture classroom. As an academic and a practitioner, I strive to balance practical knowledge with academic work. To this end, I have developed a professional practice course for Morgan State’s Graduate Landscape Architecture curriculum. This course focuses on the uniqueness of the field and reveals the broad array of professional options possible within the larger context of landscape architecture.

BACKGROUND

The professional practice course in the Graduate Program of Landscape Architecture at Morgan State University was typically taught in graduate architecture: by an Architect, about the practice of Architecture. Our landscape architecture students were not made aware of the differing contracts between ASLA and AIA, or of the broad scope of opportunities within our field post-graduation. This changed in the Spring of 2021 when I developed a professional practice course and tailored it specifically for the Landscape Architecture profession. I used as a reference a similar course, Professional Practice: InsideOut from Virginia Tech’s Washington-Alexandria Architecture Center. This course is now more relevant to Morgan State University, and the City of Baltimore, and it has become a successful outlet for program networking and the development of stronger alumni connections.

METHODS

The course is comprised of guest presentations and a variety of assignments. The curriculum encourages the students to expand their views of the field; The Forest Service, the Baltimore City Department of Recreation and Parks, and the Chesapeake Bay Foundation are some examples of places offering non-traditional job opportunities for graduating Landscape Architects. The course builds on students interviewing practitioners, and a number of these conversations have resulted in internships and permanent jobs, both at design offices and less traditional paths of ecological design and the Maryland Department of Transportation.

FINDINGS

It is important for our students to have exposure to the professional world, and for the professional world to understand what and who the Graduate Landscape Architecture program at Morgan State is. Students have found the course revelatory as it removes the mystery that surrounds subjects such as licensure, portfolios, CVs, and internships. The presentation will include student testimonials and feedback from the first two years. I am a vehicle for the exchange with other professionals, and this role supports my strong belief in the importance of professional immersion to a graduate education in landscape architecture.

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Fieldwork: Case Studies in the Initial Creative Process

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Keywords: Fieldwork, Visualization, Design, Process

How can we as Landscape architects make apparent the uniqueness of place and the environment, inspiring a creatively rich design process? This panel explores ways in which the initial on-site survey drawings and immediate reflective studies in the studio broadens the designers' creative potential.
In order to illustrate the full scope of the projects featured in this session, the panel is comprised of both academics and landscape architects with a diverse collection of expertise, experience, and backgrounds: in biology, art, architecture, and landscape architecture. Each panelist will describe how the role of fieldwork in the design process can lead to unusual—perhaps captivating—design solutions.
Case studies include: Sweet Olive Cemetery Louisiana, Seneca Meadows, New York, Waterman Farm, Ohio, Tillinghast Farm, Rhode Island, Saginaw Bay, Michigan and Green Bay, Wisconsin, Parsons Island, Chesapeake Bay, Taherpur, Bangladesh, Big Island, Hawai`i.

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The Role of Higher Education in The Development of Cultural Landscape Research in the United States

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Cultural landscape (CLA) is a term that describes the relationship between human activity and nature through time. It has been adopted and developed as a concept in many studies and research across different disciplines. Recently in landscape architecture, CLA has been the main topic for various academic research in higher education and has been playing a prominent role in advancing multidisciplinary academic research.

To explore the contribution of landscape architecture programs in advancing CLA studies, an investigation of the current trends of CLA research produced in landscape architecture programs in American universities and academic institutions was conducted. While higher education's main contribution to research is in the scholarly work illustrated in dissertations, theses, and research grants of staff and students, the focus here is to examine CLA doctoral and master's theses through a bibliometric study to understand the extent of the landscape architecture contribution to the research of the CLA.

The research utilized a comparative content analysis method on the abstract of dissertations and theses to examine the mainstream research regarding the cultural landscape and compare the results of research topics to the ones published within the landscape architecture program. A total of 902 published dissertations and theses on CLA were collected from different disciplines within the last five years (2015-2020) in the United States from the ProQuest database. The data were analyzed and compared to dissertations and theses on CLA published within landscape architecture programs from 89 schools that are members of the Council of Educators of Landscape Architecture (CELA).
The results provide 1) an empirical insight into the current status and main trends of academic research in CLA within landscape architecture programs, 2) help understand the role of scholarly work in higher education in developing CLA studies, 3) provide a whole image of CLA research in the field of landscape architecture and 4) suggest novel areas for future researchers to add new findings and knowledge in the literature on CLA studies.

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Research, Design, Build, Monitor: Material Tectonics & The Spotted Lanternfly

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Keywords: Applied Learning, Tactile Education, Post-Occupancy Review, Design Pedagogy, Habitecture

This paper discusses a pedagogical method used to combine ecological, material and design research through a design-build course taught at Rutgers University in New Brunswick, New Jersey. Using a student project as a proof of concept, we discuss the research, design, and installation of a project for the population management of an invasive and predatory insect, the spotted lanternfly (Lycorma delicatula). This 15-week senior-level material tectonics course took advantage of Rutgers' living labs tradition, using the campus to investigate digital and analogue fabrication methods for a site-and-species specific design-build project. Students built full-scale prototypes that investigated innovative material and assemblies research as design strategies to create, reimagine and reclaim materials. The course engaged in multi-disciplinary learning through collaboration with the Department of Entomology, where students learned about species ecology, which was used as a basis for developing informed habitat design proposals for their respective species.

Over the duration of the course students developed an understanding of material principles, building a working knowledge of traditional and contemporary building materials, applications, and limitations. Following a four-phase design workflow, students fabricated a landscape object for their selected species. Species research informed material selection, formal configuration, project siting and monitoring regimes. To this end, the spotted lanternfly project used tree of heaven (Ailanthus altissima) as a primary building material and siting method due to the species favouring it as a host plant. The university's fabrication labs were used to fabricate and assemble objects, with an eye to sitting and establishing future monitoring processes as the final step of the design process.

The course concluded with the development of a long-term monitoring methodology to evaluate the success of their fabricated projects based on established project goals. Research on species' life cycle was core to the successful sitting and monitoring of the objects. Once complete, the projects were geo-located and documented in a course booklet, which uses the installed projects as a living material lab to monitor outdoor entropy of varying building materials and tectonic strategies over time. On campus resources such as Rutgers Gardens were used to site and monitor projects based on pre-defined measures of success for their installations. These reflections, the initial species research, design proposal, fabrication process and an initial post-occupancy review four months after project installation are reported on using the spotted lanternfly student project as a primary case study for the course method.

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Design of Productive and Regenerative Food Systems Through a Landscape Architecture Studio Framework

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Keywords: Agricultural Landscapes, Food Systems, Pedagogy

Agriculture and food systems are foundational in delivering goods and ecosystem services. There are significant opportunities for landscape architects to engage in the planning and design of regenerative agricultural systems. Especially when conducted at a land grant university, design studio courses can help prepare future landscape architects who can work collaboratively toward more resilient and equitable food systems under a changing climate. The purpose of this paper is to present a studio course pedagogy for designing agroforestry systems in a rural county by linking research to extension through student design proposals. A central goal of the course is to establish reciprocity, in which new knowledge is generated collaboratively between students, landowners, extension, and agency-based landscape architects.

The course served as a platform for the landscape architecture program to connect university agricultural resilience initiatives such as Nebraska Regional Food System Initiative and the Regional Food System Summit to landscape architects working in government agencies. For students, the course provided practice in designing regenerative food systems and an awareness of professional opportunities in USDA, such as the Forest Service's Resource Assistants Program. For landowners, the students' work illustrated opportunities to integrate agroforestry concepts into existing operations in new and novel ways. Participating landscape architects also gain new perspectives and insights from engaging with the students and landowners. The findings from the course demonstrate how to provide skills and experience to pursue career opportunities in agencies, while strengthening sustainable food system research and teaching initiatives through collaboration between the university and partners.

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Using Social Media as Gallery ‘Walls’ to Engage Online Design Class

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Keywords: Social Media, Gallery Wall, Engagement, Peer Critique

Student peer critique is critical for learning in design school (Gray, 2018). It involves students hanging their drawings on exhibition walls for classmates to view. Then, they engage with each other by exchanging comments. Students clarify and improve their design from others’ feedback in this process. As a result, students learn considerably from one another (McDonald et al., 2018).

For an online design class, the peer crit process is often eliminated without the display spaces and a physical classroom. Students miss a vital element of learning. This is one of the reasons why it is so hard to offer a successful online design class compared with in-person ones. However, with the advancement of social media technology, a virtual exhibition ‘wall’ was established on Instagram for an online design class at OSU in place of the missing display space in a traditional classroom. Students can display their progress work on the virtual ‘wall’, leave their comments, and exchange questions and answers. Subsequently, hashtag technology accomplishes a virtual exhibition space for students to access with a straightforward click on Instagram.

Students were given a short questionnaire based on their perceptions of their likes, dislikes, relation to the virtual exhibition space, and potential to facilitate course learning. Student perceptions of this technology application were mostly very positive. Students have reported the benefits of having valuable feedback from each other while viewing others’ work without needing to be in a physical classroom. They also like the flexibility benefit as they can view the gallery at any time and any location.

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Winterized for Canada: Regional Adaptation Strategies for Technical Courses in Landscape Architecture

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Keywords: Winter Cities, Regionality, Weathering, Technical Curriculum, Construction Courses

Winter is a big deal in Canada; it gets colder, lasts longer, and can even happen during summer. It then follows that the curriculum should not only reflect but celebrate these regional differences. This presentation will document the measures taken to embed regional and winter realities into the technical curriculum at the University of Calgary – the northern most accredited program in North America. Examples of student work and course materials will be presented to illustrate how winter cities design strategies translate into learning outcomes.

The Calgary region faces additional challenges in winter due to Chinooks, which can cause temperature fluctuations of over 30° C in a 24-hour period, taking the city from deep freeze to rapid thaw and back again. Violent freeze-thaw cycles combined with tightly packed clay soils present local landscape architects with challenges beyond simply placing robust materials in public places. Readily available texts on materials and construction (Kirkwood, 2004; Holden, 2011; Yglesias, 2014) give winter city concerns no more than token recognition if they are mentioned at all. Furthermore, “winterizing” isn’t explicitly mentioned in the Canadian Manual of Accreditation Standards and Procedures (LAAC), yet winter has profound impacts on projects materials selection, maintenance, and life-cycles. As such, it is up to the instructors to underscore the importance of accounting for these factors.

The University of Calgary curriculum offers three technical courses where winter city realities can be expressed: Grading and Landform, Construction and Materials, and Winter City Design / Green Infrastructure. Within the technical courses offered, a combination of reviewing current literature / projects, field trips, field work / sketching, presentations by local practitioners, and subject area experts help bring valuable winter lessons to the foreground. Items as exquisite as using the latest materials and technologies to seemingly mundane topics such as winter landscape maintenance highlight the range of topics that impact projects. Field trips to project sites in winter allows students to witness firsthand that summer photos are misleading and that even robust materials can fail when subject to violent freeze-thaw cycles. Such conditions are of importance because outdoor spaces are used heavily year-round in many winter cities, therefore materials must succeed. The hope is that this explicit mention can start a more fluid dialog amongst winter city / region programs as we ready students to practice in these challenging environments.

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Setting a Foundation for Productive Exchange in Cross-Disciplinary Studio Teaching

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Keywords: Design Studio, Shared Teaching, Interdisciplinary Practice, Urban Design, Resilience

This paper presents the work of a graduate-level studio where second-year landscape architecture students worked in teams with post-professional urban design students. Developed and led by two instructors, one landscape architecture professor and one urban design professor, the course seeks to model cross-disciplinary collaboration on complex urban sites facing impacts of sea level rise. Today's challenges of climate change and economic inequity require design across multiple scales and across knowledge domains. The studio aims to model a disciplinary convergence (Kullman 2016, Beardsley 2000) as preparation for leadership in an expanded field of design (Meyer 1997). The course structure builds disciplinary expertise, alongside skills in collaboration and teamwork through structured exercises and pin ups.

To advance the policy changes necessary for large scale proposals, design leaders must be able to work across a variety of levels of expertise. In addition to cross-disciplinary dialogues, the studio serves as a model for working across a variety of skill levels, as the post-professionals urban design students bring experience from previous design degrees and work in professional practice. Exercises and pin ups aimed to engage this difference in design experience directly. Students learned skills of teamwork and project management, alongside a practice of self-reflection on how best to contribute to advancing ideas, and to critique the legibility of design visualizations for review by a range of audiences.

This studio is now in its third year of collaborative work, and this paper presents lessons learned for supporting studios taught across disciplines and across skill levels, building on feedback from students and outside critics, and reflecting on the outputs of this cross-disciplinary dialogue.

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A New Approach to Revealing and Assessing the Actually Existing Curriculum

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Keywords: Curriculum, Assessment, Knowledge Domains, Teaching, Accreditation

This presentation reports on the implementation of a novel approach to internal curricular assessment based on emergent patterns of teaching and learning. A simple, accessible two-question faculty survey of knowledge subject areas provides insights into student knowledge and subject matter delivery. Outcomes include assessment of ease of use and delivery, insights about faculty expectations, and reframing the direction of assessment.

Curriculum assessments often follow a common pattern. Knowledge areas are identified and associated with courses. Learning outcomes are defined and aligned with curricular levels. An overview schema posits scaffolding and student development. Finally, courses are assigned topics, levels, and expectations. At assessment, evidence of student achievement is reviewed. Changes are proposed, problems and opportunities considered, and the overall scheme is adjusted. Rinse and repeat.
This projective approach looks “downstream to achievement” with several limitations. 1) Levels of student knowledge and ability vary. 2) Faculty assignments change. 3) Faculty teach material other than that assigned to their course. 4) A lack of clear subject areas definitions leads to misinterpretations. 5) Student work may favor end-state accomplishment rather than process and development. 6) Putting one’s best foot forwards may obscure issues and challenges. While mapping a curriculum from source to delta provides a comforting sense of structure, it can also be blind to unrecognized strengths and patterns within the curriculum’s flow.

We have successfully implemented an internal curriculum assessment that complements the traditional pattern of looking “downstream to achievement” by looking “upstream” at mid-stream and proximal influences. Two queries across all topic areas are posed to faculty early in a semester: 1) perceived level of student ability; and 2) the level of faculty member’s engagement, regardless of formally assigned course topics. Repeated over semesters, these assessments strengthen “ought-to-be” strategic mapping with insights to “actually existing” patterns. 1) Faculty and student strengths and challenges are identified, allowing for adjustment. 2) Unexpected sources and flows are revealed, providing the opportunity to reconsider long held assumptions. 3) Mismatches can be addressed: for example, writing taught in introductory courses may not match that desired by upper-level studios.

The benefits of this complementary approach can aid others to strengthen curriculum, ensure good faculty fits, and support student learning. The key reframing is the upstream versus downstream approach to curriculum mapping coupled with a simple, accessible method.

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Character Acting - Pursuing a New Way to Approach the Art of Desk Critique

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Keywords: Critique, Studio Teaching, Teaching Roles, Communication, Design Education

The Desk Critique is one of the most critical processes for teaching design. Desk Critiques allow faculty to introduce different perspectives on a given design problem and help bridge student work with professional practice by illustrating alternate approaches to a design problem. Unlike other studio critique methods, such as peer critique, mid-point, and final reviews, the impact of a desk critique depends on the ongoing exchange between the faculty and student. Various models have been proposed, including the 'master and apprentice' and 'user and designer' methods. Within these roles, however, there has been little examination of the interaction to understand how it enhances instructional quality.

This research asks how the roles of faculty and students can be identified and communicated as participating actors in a mutual interaction intended to strengthen the impact of desk critiques in a studio setting. This presentation explains the theoretical framework for faculty and student roles. It identifies ways the roles change over time due to (1) the nature of the communication and (2) the degree of student engagement. This study began during the fall 2022 semester and utilized several communication modalities, including speech, written comments, and drawing, to test how each actor's contribution leads to effective learning.

This research is an effort between two faculty members from two academic institutions. One faculty member is a tenured associate professor with over two decades of experience, and the other is an instructor with significant experience in private practice. Participating students range from first-year students to senior undergraduates and second-year master's students. Both faculty, using self-reflection methods, will track their student interactions throughout the studio's duration. At the conclusion, questionnaires and structured interviews will collect qualitative and quantitative data. Questions will target replies that clarify the character and changing roles of the student and faculty member. Through this research process, the authors' goal is to help students better understand the desk critique process, then provide them with a quality course-long critique methodology through which they are active participants - intended to help them deliver an improved end design product.

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Implementation of Sustainability Principles in Landscape Architecture: An Examination of Faculty Surveys and Course Syllabi

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Keywords: Sustainability Education, Landscape Architecture Education, Instructor Survey, Syllabi Analysis, Higher Education

Education for Sustainable Development (ESD) in universities is reflected in curriculum design, course content, and institutional and faculty roles (Barlett & Chase, 2004, 2013; von Hauff & Nguyen, 2014). Given its complex nature, to integrate sustainability principles, universities have adopted various approaches. Within Landscape Architecture (LA), scholars often rely on interdisciplinary collaboration to achieve sustainability principles. Because of landscape architecture's capacity to address complex spatial problems (Gazvoda, 2002), the discipline is uniquely positioned. Our goal is to understand how the discipline has integrated ESD principles and teaching modes in the education process of future landscape architects in North American universities.

Using an online survey, we collected data from LA faculty (n=128). This survey asked instructors about applying sustainability principles, their pedagogies and teaching experiences, and the benefits, outcomes, and barriers to integrating sustainability into course delivery. To augment the survey data, LA course syllabi (n=62) were analyzed through direct content analysis to identify course structure, pedagogical strategies, learning objectives, and course outcomes. Data were then analyzed using correlation analysis and coding processes in grounded theory. This two-pronged research approach provided insights into the unique benefits and challenges of integrating sustainability into university LA programs.

The study revealed how sustainability is taught in studios and lecture-based courses, the types of learning assessments by faculty employed, how different teaching methods produced different learning benefits, and the challenges instructors faced. Additionally, this study shows how different pedagogical strategies use different teaching methods to deliver learning outcomes. Results provide insight into how ESD strategies are employed in LA education. For instance, a top benefit is to improve collaboration skills, which are critical for teaching sustainability in LA. Findings also show a high positive correlation between teaching methods and the benefits of gaining knowledge, improving design and planning skills, and increasing sustainability literacy.

In our presentation, we will outline how instructors teach sustainability in LA classes and reveal emerging ideas found in the course descriptions and objectives in the syllabus. By understanding how faculty incorporate sustainability into their curricula and current ESD content, this study provides practical knowledge for enhancing the integration of ESD into LA curricula.

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Experimenting with BIM in Landscape Architecture Construction Documentation Studio

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Keywords: Representation, Technology, Visualization, Learning, Research

Building Information Modeling, or BIM, enables dynamic inclusion of construction attributes of a landscape project such as material properties, structural data, elevation and slope, detailed information about plant species, and quantification. Yet in contrast to adoption of other digital technologies such as CAD, 3D modeling, and digital fabrication, BIM has encountered resistance to adoption by landscape architects due primarily to its architecture-centric modeling environment which focuses on uniform linear surfaces and architectural objects such as doors, windows, and floors. Although BIM adoption in landscape architecture practice appears to be growing, it may still be considered an emerging tool and much can be learned by researching its application in a design environment.

This research presents the introduction of Autodesk Revit into a landscape architecture construction documentation design studio. The class included BLA students in their fourth year and MLA students in their second and third years. Students were first taught the fundamentals of working with Revit for landscape design and construction documentation, followed by learning how to use Revit to develop terrain, vegetation, and hardscape. Students then worked on a semester-long site design project, iteratively creating a comprehensive site model which incorporated data about hardscape materials, soils, and vegetation. The students' final projects included a traditional construction document set created using Revit accompanied by each student's reflection on the ways Revit supported or hindered their design and representation process. Student surveys indicated that the majority of students felt they increased in their ability to learn and use Revit over the 15-week studio.

Our primary research questions concerned the effectiveness of using Revit in a construction documents studio. Our first research question was: can students using Revit to produce construction documents in design studio achieve the same level of learning and output as those using AutoCAD? Our second question was: does using Revit in a construction documentation studio offer tangible advantages over using AutoCAD? To address these questions, we will present an overview of the structure of the studio structure and projects, along with examples of the students' process and final project work. We will also present our methods for teaching Revit, our incorporation of studio consultants who have developed Revit add-ins for landscape architecture, and our survey results demonstrating student learning trajectories. As landscape architects continue to adopt BIM in professional practice, we hope that this research can contribute to ways of incorporating BIM into design education.

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Scholarly Production Among Recently Tenured Landscape Architecture Faculty; A Longitudinal Study

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Keywords: Scholarship, Faculty, Tenure, Academia, Productivity

The career development and success of landscape architecture faculty hinges increasingly on their scholarship. Research performance is emphasized by academic institutions, whose assessments of faculty productivity are based on quantifiable research behaviors. Landscape architecture education, often emphasizing the preparation of practitioners, does not easily fit the traditional academic department model. As a result, it becomes necessary for landscape architecture faculty to describe the academic context in which they engage in scholarship and may place them at a disadvantage when evaluated. The purpose of this study was to revisit prior studies of landscape architecture faculty scholarly productivity by replicating studies conducted over the 2008 to 2012 and 2012 to 2016 academic years, assessing findings for faculty tenured since 2016 to establish a more longitudinal understanding of the trajectory of faculty scholarly productivity.

The study employed direct content analysis of the curriculum vitas of landscape architecture faculty members who were awarded tenure at public universities in the 2016-17 academic year or thereafter. Common scholarly outputs, such as refereed journal articles, juried competition participation, reports, etc., were operationalized by the research team. Two researchers independently analyzed each vita, thereafter, comparing the individual results, and negotiating any discrepancies with a third researcher.

The results describe the mean scholarly productivity of landscape architecture faculty during the tenure evaluation period and after the awarding of tenure. The findings suggest landscape architecture faculty members' scholarly productivity continues to be relatively low in comparison with other academic disciplines. Scholarship among landscape architecture faculty continues to evolve to increasingly emphasize traditional academic refereed products. Landscape architecture as an academic field needs greater training in conceptualizing, acquiring support for, conducting, and reporting research to be successful in an academic environment and provide a much-needed foundation for current practice.

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Feedback-Based Teaching Improvement in an Interior-Landscape Design Studio

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Keywords: Landscape Design, Interior Design, Teaching, Feedback-Based Assessment, Interdisciplinary Approach

Since landscape architecture concerns a very broad and complex scale of analysis and understanding, it can be particularly difficult to offer this teaching in courses of study that are not specifically oriented towards the discipline of landscape and therefore where students do not already have a background in the subject. Landscape architecture has its own language, tools, scales of representation and references that generally need to be taught and assimilated by students throughout a well-structured two/three-year programme. The experience reported in this study concerns two consecutive years of teaching experience in a design studio of the MSc of Interior Architecture at Politecnico di Milano (Italy), in which the Interior and Landscape subjects are associated. The main challenge consisted in bringing students with a background in interior architecture (and therefore used to working mainly at the building scale) closer to the topics of landscape architecture through an integrated teaching experience. From a methodological point of view, we chose a “design by research” approach, where the traditional relation that links the two terms is inverted, turning design into the purpose and research into the method. This approach comes from the acknowledgement of the fact that particularly complex or urgent design issues require a tactical form of investigation that can individuate the most effective and locally relevant solutions by means of innovation. Additionally, the “design by research” approach provided the opportunity to combine the procedures and methods of generally unrelated research and design fields, such as landscape and interiors. The experimental nature of the course was assessed through the university's rigorous feedback system and adjusted accordingly. Indeed, between the first and second year, the course structure evolved from a linear process of scaling down to a circular process of continuous integration and exchange between the two disciplines. This contribution presents an innovative methodology of integration between the disciplines of landscape and interior architecture and discusses the importance of a system of continuous evolution of teaching methodologies based on the recording of student feedback.

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Prominence | Emergence of Computational Design in LA Teaching and Practice

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Keywords: Parametric Design, Algorithmic thinking, Coding, Technology

Applications of computational design have been emerging in landscape architecture over recent years (Buhmann , 2022). While it has provided some designers with innovative solutions and new perspectives, the persistent gap between academia and practice has made it difficult for both sides to implement the methods effectively.

This pilot study aims to start the discussion of computational design utilizations in landscape architecture, build a platform for practitioners and researchers interested in the topic, and uncover the limitless potential of what computational design can achieve. To identify the relationship between the two grounds, a questionnaire was separately sent out to 75 international award-winning landscape architecture firms, while another was sent to 50 notable landscape architecture programs in post-secondary institutions around the globe to seek insights and opinions. These two questionnaires collected data on the use of computational design methods in firms and their integration into pedagogy. With the statistics gathered from the two questionnaires, a clear gap in computational design implementation was depicted between academia and practice, with the respective percentages of 40% and 79%. The gap is even more evident between LA practice and teaching, with four times the former believing that computational design has been efficiently implemented in LA, compared to the latter. Following the completion of the questionnaires, nine interviews were conducted with the questionnaire participants from academia and practice to further discuss the past, present, and future of computational design in landscape architecture. In the interview with practitioners, they stated that only a very small population within the firm is knowledgeable in computational design. However, in most academia interviews, they have clearly expressed that landscape architecture students are more inclined to study computational if they see that this is a marketable skill in their career.

The findings are summarized in a series of visualizations that highlight the relative percentages. This pilot study, being one of the first of its kind, encourages the conversation and a discourse between academia and practice to be continued, with it providing a vision for industry professionals and educators to introduce this innovative and cutting-edge technology.

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Robotic Fabrication in Landscape Architecture Education

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Keywords: Industrial Robots, Landscape Pedagogy, Learning

Industrial robots have become popular tools in architecture education and professional practice in less than a decade (Sigrid & Johannes, 2013). Several robotic fabrication laboratories were launched. Several institutions, including ETH Zurich, Taubman College, TU Stuttgart, TU Wien, and SCI-Arc, have bought industrial robots to train their students in numerically controlled, multi-axis fabrication systems. The reason for this rapid growth is that industrial robots can be utilized for various manufacturing and form-finding activities (Stravric et al, 2016). Adopting these technologies in teaching provides a range of advantages. They can enhance learning, build skills, and boost student engagement.

However, the field of robotic fabrication has remained almost untouched in landscape architecture education. There is no thorough and easily available literature study of how robotic fabrication technologies are employed in landscape education. The typical landscape architecture education teaching paradigm is teacher-centered classroom lectures, which are ineffective in satisfying students' curiosity and stimulating their creative and computational thinking skills (Hsu & Ou, 2022). There is almost no landscape architectural program that integrates this cutting-edge technology into its curriculum.

Even as knowledge in this field becomes more common in practice and more demanded of graduates, the pedagogy of computational design in landscape architecture remains challenging (FRICKER et al. 2013). Considering the latest landscape architecture practices that require both the automation and innovative interactions of robotic applications, and that learning to operate such a machine is a long process that normally takes many years, it is logical to start learning this process in universities. This would also help reduce the misalignment between landscape education and professional practice. Even desktop-size robots that allow students to operate autonomously can be used instead of big robots that require continual supervision and must be handled in specialized robotic cells. Because small machines are programmed in the same manner as bigger robots, the findings may be quickly adapted to the larger machines for full-scale applications.

Therefore, the main objective of this paper is to develop a pedagogical framework to integrate robotic fabrication within the landscape architecture context. To do so, after addressing the role of robotic fabrication in landscape architecture, the study summarizes the main pedagogical environments in which robotic fabrication is being used and compares different techniques developed in educational programs of different universities. This approach would define where and how robotic fabrication can be used in landscape architecture education.

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Teaching the Professional Practice Class During the Pandemic and Beyond: A Comparison Study in Two Universities

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Keywords: Professional Practice Class, Pandemic, Post-COVID Era, Effectiveness, Challenges

Teaching the professional practice class in landscape architecture during the pandemic is challenging. This study compares two professional practice courses that were recently taught during the 2021-2022 academic year in two accredited landscape architecture programs in different geographical locations - the University of Massachusetts Amherst and Oklahoma State University. Each course has explored various constructive ways of teaching emerging landscape architects during the pandemic. Course content, schedule, methods, strategies, and especially the effectiveness of teaching during the pandemic are examined and evaluated. Both similarity and differentiation are found in the course offerings. Effectiveness has been measured from class participation, student homework, final project, post-graduate performance follow-up, etc. The two instructors met online and discussed at the beginning, middle, and end of the spring semester to align, connect, and contrast the teaching and learning processes of the two courses. Valuable lessons from teaching professional practice classes during this challenging time have been encapsulated. In addition, we will discuss how lessons gained via this experience can inform and influence future professional practice classes in the post-COVID era. This study also includes discussions of the alignment of landscape architecture education and real-world practice, as both courses include conversations with professional guest lecturers. It will provide insights and spur further discussion and research interest among faculty and students in other institutions across the geographic regions in this critical aspect of landscape architecture education.

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Educating the Whole Designer: Aligning the Academy with the Needs of a More Diverse Profession

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Keywords: Student-centered teaching/Culture, Shame/Production, Mental Health/Trauma-Informed Design, Evidence Base Design, Representation and Equity

Studio culture affects who succeeds and how students see themselves, their peers, their future, and the world they design. Nina Briggs, Claire Latané, and Jean Yang will share teaching strategies that support well-being and belonging for first-generation and under-represented, minoritized people.

The mental health crisis is soaring, particularly for young people. A 2019 CDC study found 37% of high school youth had experienced persistent feelings of sadness or hopelessness over the last year. Twenty percent had seriously contemplated suicide, including one out of every four girls and nearly half of those identifying as LGBTQ+. Design is notorious for burnout, mental health issues, isolation, and breakdowns. In a 2019 Dezeen social media discussion about design education, readers shared their late hours, chronic stress, lack of sleep and suicidal thoughts. This culture in education often translates to unhealthy working environments and is particularly alienating for those who have been historically under-represented in our field.

Historic systemic inequities in education and land planning practices call us to recruit, welcome, and support Black, Indigenous, Latin-a/e/o/x, Asian American, LGBTQ+, and other under-represented voices in our practice and our classrooms. If we don't actively create a nurturing studio culture, we unintentionally create an exclusionary experience unwelcome to minoritized people, despite our best intentions and diversity and inclusion hiring goals.

Lack of representation and unhealthy work situations can be directly correlated to a culture that begins in school. Creating a sense of belonging and nurturing students' individual identities are critical to improving academic and professional outcomes.

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GIS-Based Mapping: An Analysis of Environmental Affordances and STEAM Learning Behaviors of Preschool Children in Natural Environments

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Keywords: Early Childhood, STEAM Learning, Environmental Affordance, Nature, Behavior Mapping

Nature as a source of learning inspiration in early childhood has gained new attention in research and started a nature-based learning movement with a primary focus on children's spontaneous connections with nature rather than planned or structured activities. But very few studies have investigated how nature influences informal learning in early childhood environments. To prepare children as well-informed citizens for a digital tomorrow, it is important to plant the seeds of STEAM (Science, Technology, Engineering, Arts, and Mathematics) in early childhood. This research hypothesizes that nature-based outdoor learning environments can influence preschool-aged (3-5 years old) children's experiences and STEAM learning behaviors and compares environmental affordances and STEAM learning behaviors of children in a 'low-nature' outdoor environment with a nature-based outdoor using GIS-based Mapping. This research used a novel Environment and Behavior (EB) Mapping protocol (Monsur & Moore, 2019) using the latest GIS technology, which enables users to collect children's locational behavior data. The protocol employed cloud-based platforms like ArcGIS Online, and ArcGIS Field Maps, allowing seamless EB data collection by multiple collectors. EB mapping was focused on various play and learning behaviors of preschool-aged children related to STEAM. For observation and data collection, different coding was used, such as behavior locations, play behavior (play type), STEAM learning behaviors, loose parts play behaviors, social behaviors, sensory play behaviors, sensory explorations and open/descriptive coding for children. It was anticipated that the differences in observed behaviors of children between the 'naturalized' and the 'low natural' sites would reveal insights into the learning behavioral outcomes of a nature-based outdoor learning environment. A nature-oriented outdoor play area that children have regular access to has a significant impact on both their attitude and their perceptions toward nature. Through direct observation of children at work in both sites, their diverse skills were documented in this study. Results showed that the nature-based environment with a higher number and diversity of natural elements provided a greater number and quality of affordances in terms of play, learning, and social behaviors.

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Learning Opportunities Through Immersive Technology: A Comparative Analysis Between Traditional and XR-aided Learning in Landscape Architecture

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Keywords: VR, AR, MR, Extended Reality, Technology-Aided

Virtual technology related to immersive experience - collectively referred to as Extended Reality (XR) gained significant attention in recent years. XR applications are used in a wide range of fields for training and education, providing cost-effective solutions for experiential learning. Landscape architecture, as a discipline, requires a visual and experiential understanding of complex natural spaces and the relationships between them, which could benefit significantly by incorporating XR in its teaching and learning. However, XR-based landscape teaching is relatively unexplored and under-researched. Evidence shows that experiential projects induce a sense of ownership along with inspiration, motivation, and excitement among students, and meet numerous learning objectives such as real-world problem-solving opportunities, critical thinking, group interaction, and communication (Stearns, 1995). Some researchers also argue that “reading the landscape” is a skill that can only be acquired through experiential learning (Schroth & Zhang, 2014). In landscape architecture, experiential learning is usually incorporated with site visits, which is not always feasible in academia due to time and budgetary constraints (Caine & Caine, 1991). XR technology could come into play to meet these deficits.
This study explores Extended Reality (XR) technology to enhance the site visit experience, both before, during, and after the actual site visit. Participants consisted of landscape architecture faculty and students were randomly assigned into control and experimental groups. The experimental group received a VR (Virtual Reality) module regarding site analysis before the site visit, and AR(Augmented Reality) assistance during the site visit, whereas the control group visited the site without any XR assistance. Both groups were required to provide a site analysis presentation, which was a key measure of evaluating learning outcomes, serving as quantitative data. The control group received the VR modules after the presentation, and then both groups participated in a focus group discussion on general experience, the role of XR technology in landscape architecture pedagogy, user interface, ease of access, and visions about the future of XR technology in landscape learning. Data from multiple sources provided an in-depth understanding of the potential development of XR instructional tools for landscape education and enhancing experiential learning.

The quantitative data showed significant improvement in understanding after usage of XR technology, and qualitative data from the focus group and the survey showed a positive outlook regarding the application of XR for immersive and experiential learning in landscape architecture. The findings of this research will guide future XR development and applications in landscape teaching and learning.

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ASLA Award Precedents

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Keywords: Analyze, Trends, Image, Teaching, Design

Every year the American Society of Landscape Architects (ASLA) issues awards for exceptional designs and research in the field of Landscape Architecture. We introduce a study that analyzes over 13,000 images of these award-winning projects over the last 15 years in order to identify common trends that create award-winning projects. In it, the research team conducted a qualitative analysis of the creative flow, graphics, and styles in award-winning projects. We discovered several trends including types of images that occurred most frequently, the flux of most-used image types over time, and variation of image scale over time. We argue that knowledge of these trends can help guide decisions for strengthening landscape architecture programs to better prepare students for leadership in the profession. It also enables landscape architecture programs to tailor teaching methods around timeless standards of design and research excellence or create new standards better fit to the wicked problems of the moment which help students cultivate graphic and conceptual skills to transform or disrupt the profession in unprecedented ways.

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Designing the Implosion: Design Pedagogy as Situated Practice

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Keywords: Pedagogy, Situate, Site, Inclusion

In pursuit of developing more equitable design pedagogies and practices, this paper proposes treating design pedagogy as an explicit subject of design, engaging our expertise as landscape architects. This requires the development of design practices for pedagogies that are parallel to those we have for landscapes, beginning with an in-depth analysis of existing site conditions. Landscape architecture commonly employs site analysis as a generative design tool, using a variety of lenses to comprehend, and ultimately design sites as deeply embedded within their contexts, and established through their relationships.

In order to move from a design site to a design subject—such as pedagogy—while retaining the sitedness on which our discipline is founded, we need to utilize a parallel process for analyzing our design subject of pedagogy. This paper looks to Joseph Dumit's article, "Writing the Implosion: Teaching the World One Thing at a Time" for a method through which to reveal the complexity of our subject and its highly situated position within its context. Dumit's method, which draws on the work of Donna Haraway (Haraway, 2018), unpacks a subject's situatedness through a sequence of questions focussed on different dimensions—labor, epistemological, material, technological, context and situatedness, political, economic, textual, bodily/organic, historical, particle, educational, mythological, symbolic (Dumit, 2014). Collectively, these dimensions unpack a given object, asking "how is the world in 'it' and how is 'it' in the world?" (Dumit, 2014).

This paper applies this "Implosion Project" methodology to the subject of design pedagogy, asking: "how is the world in design pedagogy and how is design pedagogy in the world?" Building on an initial application of this approach in the seminar, Speculative Futures: Design(ing) Pedagogies + Practices at the University of Virginia School of Architecture, this paper proposes a series of dimensions applicable to design pedagogy and designs an implosion through both written and visual representations to develop a thickened map of design pedagogy—an essential representation through which to design new pedagogies and practices.

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The Design and Implementation of Pollinator Gardens as a Method of Transdisciplinary and Experiential Learning at the University of Kentucky

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Keywords: Sustainable, Collaborative, Biodiverse

This study provided students with a start-to-finish collaborative design experience of pollinator habitats at the University of Kentucky. Students identified areas in need of additional habitats based on their connectedness and estimated health and collaborated with university stakeholders to create pollinator gardens with differing sizes and desired outcomes to enrich the current habitat connectivity on campus. Pollinators are crucial to Kentucky ecosystems and account for the pollination of many floral and produce plants. Habitats must be healthy, proximate, and diverse to support a range of pollinator species and reduce some of the barriers of travel many species face to gather pollen, collect nectar, and reproduce. Designing with native plants allows landscape architects to have a role in making landscapes more sustainable and equitable. Emphasizing the importance of pollinators is a fundamental step in creating more ecologically minded designers and biodiverse landscapes. To instill these teachings, students examined a broad campus scale by participating in campus walks identifying pollinators in the campus landscape. Pollinator gardens were those determined to be at least 100 square feet and five distinct native pollen producing species. Garden location, size, health, and biodiversity was measured and used by the students to create comprehensive maps in ArcGIS. Potential sites for garden implementation were identified by the students using these maps. Students presented campus partners with their findings, leading to collaborations with the UK Medical School, UK Ecology Labs, Student Sustainability Council, and UK Recycling. These transdisciplinary interactions fostered a better understanding of the desired spatial uses and resulted in a client-like relationship between these stakeholders and the students. Students used AutoCAD to make a base map of their sites, Sketchup to create 3-D renderings of their planting plans, and Excel to budget their plans. The designs were then critiqued by the campus partners before the materials were purchased from local plant nurseries and the gardens were installed by the students. This approach provided a cost-effective way to implement pollinator gardens at the University of Kentucky and enabled students to utilize techniques from the classroom while interacting with a multitude of campus organizations. Their work exemplifies the importance of experiential learning and how interdepartmental collaboration can positively impact the success of student designs and learning outcomes. Encouraging similar projects at other educational institutions can provide students with tangible and professional designs that create a sense of pride for the lasting impact their landscapes will have at their university.

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Speculative Futures: Designing Design Pedagogies

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Keywords: Pedagogy, Inclusion, Equity

This article calls for students to be actively engaged in the critique and design of new and inclusive design pedagogies and proposes an approach to empower students to engage in this process. The approach was employed in a seminar at the University of Virginia School of Architecture, titled Speculative Futures: Design(ing) Pedagogies + Practices, in which students utilized their design skills to design new pedagogical models aiming to seed the emergence of the speculative futures that they envisioned. The course premised design pedagogy itself as a space of design, and current design students as its most well-equipped designers, and enabled students to use their design skills, methods, and techniques to radically (re)design plural pedagogies, practices, and futures. The course also sought to apply that methodology to itself, presenting a co-constructed pedagogical experiment which students took a highly active role in creating, within the following structure.

First, the course grounded design pedagogy in students' situated and embodied learning experiences—first individually, then collectively. Students were then exposed to histories and critiques of design education, which they wove together to develop a thickened conception of their learning experience as not coincidence, but as embedded within a designed structure that has been reinforced and perpetuated over time. Next, the class collaborated to define design pedagogy as a system that can be both mapped and modeled, identifying the many variables at play, and the levers available for those seeking change. The course explored how radical pedagogies of the past have torqued these levers and parameters to create novel systems. Students then defined their own critiques and core values and, using this operative model as a generative tool, designed alternate pedagogies that embodied and engendered their visions for the future. Students then constructed their own set of "Froebel's Gifts" as tools to facilitate their proposed pedagogies, and ultimately their envisioned futures, presented in an open-ended celebratory workshop that the students collectively designed.

Analyzing the approach, and the results of this course, ongoing at the time of submission, this paper seeks to promote critical conversations between the many students and educators rethinking pedagogy across schools of design and explicate one potential frame and methodology for those conversations.

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Specifying "The Rights To": A Method of Grounding Spatial Justice in Landscape Planning and Design in Studio

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Keywords: Equality, Landscape Planning, Public Amenities, Design Pedagogy, Delivery

Common practices in design studios have a range of training objectives but are usually more weighted towards the creation of forms, spaces, and general programming. There is a lack of directive and precise efforts to both elaborate and reinforce the interpretation of spatial justice, and as a result, they remain a vague idea and to various degrees are found missing-in-action or added on as an afterthought. What are, specifically, the "socially valued resources" (Soja, 2009) and what is their priority? In what ways can justice be "physical" (Jian et al. 2020). How are ecologies - the "more than human" (Brown, 2019) aspect involved? The inquiry goes on. It is essential to think specifically and think ahead, in order to "specify rights" in landscape spaces, just as landscape architects specify other things to ensure its delivery.
This paper proposes a method of “The Rights To…(TRT)”, used in a junior year undergraduate studio teaching to strengthen the delivery of spatial justice on a landscape urban design project. The TRT method is a trilogy of construct-enact-evaluate. Students first propose specific rights deemed important to them through research and a series of case studies of the communas of Medellin, Colombia (Schwab, 2018); they then develop a series of planning actions and spatial models needed to enact these rights; and finally, they begin their urban and landscape design with these actions and models ready for incorporation. Evaluations of effects of main design elements and key details run repeatedly through each step of the trilogy, first for understanding cases, then for directing efforts, finally for assessing outcomes.

This paper will present the TRT method, the process of applying it in studio environment, and discuss key findings as well as compare outcomes to previous studios before this method on the same site with a similar spatial justice narrative.

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Placemaking Pedagogy: Aligning Students' Social, Creativity and Leadership Skills With Professional Expectations for Success

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PURPOSE
This study reports how Batey's Inventory of Creative Behaviors (BICB), a self-reporting psychometric measure of peoples' everyday creativity, was modified to measure landscape architect students' engagement in activities essential to understanding the placemaking process.

INTRODUCTION
Placemaking is the collaborative design process that shapes our public realm, capitalizes on community assets, facilitates creative thinking, and contributes to a community's health and well-being. Placemaking is taught in the academy as a highly complex endeavor requiring students to engage in multiple behaviors across the arts, sciences, and social science. When introducing placemaking concepts and design principles to students, it is important to align their everyday creative behaviors with professional expectations. Professional expectations include critical and creative thinking skills along with practiced communication and listening skills. Many of these skills align with everyday social, creativity, and leadership experiences.

METHODS
A mixed method approach was used to gather and analyze data. Students (n=120) participated in a semester-long placemaking project that involved community participation and preliminary design of actual sites. Half of the class was asked to provide conceptual designs for a small mid-western town park. The other half of the class was asked to provide conceptual designs for a culturally relevant gathering space for a Lakota community. The BICB was administered as part of the pre-and post-tests along with open-ended reflections asking students to identify the little things that realigned their thinking and generated new ideas.

FINDINGS
Finding from the two groups showed significant change over the semester in social creativity. Some change was seen in Mechanical/Scientific Creativity and Artistic Creativity with a wider range of activities reported by the group working with the tribal community. High leadership skills correlated with the best projects.

DISCUSSION
The BICB provides educators with a reliable instrument for showing students the value of participating in everyday creative behaviors. Pre- and post-project reflective writing helped educators to better understand students' learning experiences. Students were able to recognize the value of their own everyday creative behaviors and understand how those behaviors can be used to advantage when participating in the placemaking process.

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Bridging the Gap Between Design Practice and the Built Environment Using Virtual Reality (VR) In Higher Education

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Keywords: Virtual Reality, Design Build, Design Process, Construction Methods, Pedagogy

There is a disconnect between design thinking in the studio and applied design in the construction stage. In academia, "students were designing projects that lacked clarity on how they would be used and were impractical to construct" (Winterbottom, 2003). Virtual Reality (VR) is a visualization tool with the potential to significantly alter the way that designers and clients create and experience design solutions. Accordingly, Landscape Architecture (LA) degree programs are starting to embrace VR during the design process to understand the spaces students are creating. A survey by ASLA in 2018 showed that "82% of firms have adopted or intend to adopt VR soon" (Hill, George, and Johnson, 2019). What are LA programs doing to hasten the adoption of emerging digital tools to catch up with practice? The Department of Landscape Architecture and Environmental Planning at North Carolina State University has introduced VR in the second-year Design/Build studio. Using VR Sketch and Oculus Rift, students were asked to draw their designs using SketchUp, a three-dimensional software program, and then evaluate their structures using VR before fabrication began. This process allowed students to test their prototypes in an immersive environment pre-construction. In addition, the pilot study determined how VR can enhance learning opportunities, especially regarding scale and proportion of details. The methodology used during this pilot study consisted of surveys, observations, and user interviews. Evidence shows improved learning outcomes through construction detail modifications, material selection, and changes to scale/proportion, which equated to cost-saving benefits. Findings align with the need to embed VR earlier in the curriculum, which could significantly affect the sequence of courses taught in LA programs. Experiential learning could alleviate the current disconnect between design and construction practices through the use of emerging technologies by integrating VR during the design process.

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Understanding Student's Mental Health in Design Studios and Impacts of Therapy Dogs

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Keywords: Stress, Health Interventions, Well-being, Architecture, Landscape Architecture

More than one in three college students struggle with poor mental health. Psychological and physical stressors exacerbate the risk of anxiety and depressive symptoms as well as mental disorders (Block, 2019). Students majoring in design-related degrees are particularly at risk of poor mental health (e.g., AIAS 2002; Eskin et al. 2016; Stead et al., 2022). Despite growing evidence highlighting these problems, few studies have examined interventions that can help mitigate stress.

Therapy dogs joining design studios are a promising but understudied mental health intervention. Therapy dogs have been shown to increase contentment, happiness, and energy levels while decreasing cortisol, heart rate, blood pressure, stress, anxiety, and irritability (Barker et al. 2005; Brisson et al., 2021).

We studied the mental health of students in a School of Architecture (SoA) to understand if the therapy dog program would lower stress and improve mental health. Undergraduate and graduate students in architecture and landscape architecture (N=399) participated in a survey that measured mental health with the Depression and Anxiety Stress Scale (DASS-21). During this same period, another sample of students (N=301) completed a survey of the factors that elevated stress levels, adverse effects of stress, and coping strategies. We then implemented a program where therapy dogs visited studios once a week during lunch hour. Students were encouraged to interact with and pet the dogs. To understand student perceptions of the program and its impact on mental health, a survey was given to students in April 2022.

Survey results suggest that mental health issues were widespread amongst design students. Almost 40% of students had moderate to extremely severe levels of stress. The major contributors included school deadlines and schedule, workload demands/amount of work outside of class, inadequate sleep, and time spent at work. Negative effects of stress include neglect of self-care, inability to focus, emotional instability and social withdrawal.

Students expressed overwhelming support for the therapy dog program and exhibited a positive benefit on their mental health and well-being. The top perceived benefits included cheering students, offering comfort, providing visual and tactile stimulation, bringing back pleasant memories, giving students something to look forward to, improving mood, and decreasing feelings of negativity.

In summary, we observed the need for improvements in mental health and lessons on the feasibility and efficacy of implementing a therapy dog program intervention in design studios. We conclude by discussing this initiative and others being employed by our School.

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Learning to Prevent: Development of a Set of Pedagogical Tools for Architects, Landscape Architects and Environmental Designers to Assess Sites' Susceptibility to Mass Movements

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Keywords: Landslides, GIS, Site analysis, Educational

Our project concerns the development of a set of analysis tools for environmental designers, architects and landscape architects to assess site susceptibility to mass movements (landslides, mudslides, rock falls, etc.) at different scales. According to the Government of Canada (2017), terrestrial landslides account for an estimated $200 to 400 million in direct and indirect costs annually in the country. This poses significant threats to infrastructures, natural systems, and human safety. Though fatalities related to mass movement events have decreased in the past decades, increasing climatic events that may trigger landslides (such as heavy rainfall) are expected due to climate change (Jakob & Lambert, 2018). Little information exists to sensitize environmental designers, landscape architects and architects to the problem of mass movements, thus empowering them to respond in more apt design solutions. This lack of specialized resources may prevent designers from being at the forefront of projects that are climate-resilient, safer for human and non-human populations, as well as aesthetically and culturally relevant for the communities they serve. The objective of our research is to develop a set of accessible, easy-to-use, and geographically adaptable tools to support and empower design professionals in the initial stages of site analysis in areas prone to mass movements.

The first proposed tool is an interactive susceptibility map for preliminary site analysis, created using publicly available data that can be easily interchanged depending on the geographic location of the surveyor. The second proposed tool is a site visit questionnaire to be completed by designers with no training in earth sciences or geology, and which uses a multi-sensory method to assess the site's susceptibility to landslides. These tools, in addition to their pedagogical value for newly trained designers, allows for a more rigorous and holistic site analysis process. This enables more adequately designed interventions in susceptible areas, with the potential to save infrastructure and human lives.

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Long Live the Sequence

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Keywords: Topology, Cultural Landscape, Sequence, Event, Urban Design

In his essay “Sequences”, Bernard Tschumi has argued the importance of “sequence” in architectural space, and that it a string of events in a designed space activates and changes the space. He also states that, “The route is more important than any one place along it.” (Tschumi, 1996, p. 163)

As educators, we argue that this is especially true in landscape architecture and that it is imperative for students to understand the concept of sequence within spatial design. We also embrace the temporal importance of climate, light, weather, and programming on the landscape and that students need to consider the ever-changing nature of place in their understanding of landscape. It is also imperative that they understand that the events within space contribute to the inscribing of meaning onto space. Students are taught that the dialogue between a space and an individual becomes richer with an understanding of the myriad other meanings, materials and histories within a given space. Annemarie Bucher stated that, “The current space of landscape is therefore no longer merely physical and geographical but also cultural and social. “ (Bucher, 2013, p. 35)

On September 8th, 2022, Queen Elizabeth II passed away. This set into motion a preplanned, culturally symbolic sequence of events that take place throughout the city of London and the English Isles. Students from several courses at Ball State University, both undergraduate and graduate level. Students will begin with a topological approach and use interpretive strategies to understand this contemporary event that has the potential of writing a cultural landscape in real time. This project is a unique study of public life, overlapping the spatial, historic, cultural phenomena, all conducted by students who will not be physically present at the event. We will therefore engage in an ad hoc use of remote data to draw conclusions including analysis of film, news broadcasts, webcasts, social media, radio broadcasts, video and primary accounts of the event. Students will employ their graphic and written skills to communicate their findings in plan, section, transect, imagery, photomontage, and narrative.

This in situ approach facilitates the methodology of understanding cultural landscape presented by J.B. Jackson “…it states the facts, provide examples and only at the end presumes to draw conclusions.” (Jackson, 1980, p. 12). This paper will present the work of students during the Fall 2022 semester and the conclusions the students drew from this experience.

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Analysis of Professional Practice Curricula in LAAB-accredited Programs

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Keywords: Accreditation, Pedagogy, Business

In 1911, James Sturgis Pray, successor to Frederick Law Olmsted as chairman of Harvard University's Department of Landscape Architecture, described the founding curriculum of the discipline. In it, he remarked, were necessarily 12 professional courses intended to yield practice-ready graduates. Olmsted's attention was, concurrently, making the case for what professional practice entails. Vernon (1987) chronicled his and others' turn of the century efforts to define and nurture the new profession, and to codify its practice and ethics. Today, articulating the practice of landscape architectural practice is largely assigned to courses routinely bearing the title "professional practice". Beginning with the earliest professional curriculum standards established by the Landscape Architecture Accreditation Board (LAAB), such instruction has been required. Requirements for the LAAB's Professional Practice standards have seen minimal change for decades, and this central knowledge area was reaffirmed in the revised 2021 accreditation standards. Despite the pivotal and long-standing place that professional practice has in accredited programs, little is known about how the subject is being covered in the 76 academic programs currently offering LAAB-accredited degrees. Over a decade has passed since Brittenum, Loon and Cox (2011) conducted a review of 25 such programs' professional practice courses.

Rice (2017) found "professional practice" to be among the fifty terms most frequently used in course titles among accredited BLA/BSLA programs, yet it constituted a minor role in the degrees' total credit hours. To better understand the content, delivery, and instruction of professional practice subject matter today, an analysis was conducted on courses that are specifically intended to cover professional practice were requested from North American BLA, BSLA and MLA programs. All LAAB-accredited programs were contacted, with the majority providing current syllabi and instructor information. Syllabi were analyzed for multiple variables, including title, credit hours, required and recommended course text(s), learning objectives, sequence in curriculum, and instructor demographics (e.g., practice experience, title, licensure). A content analysis examined key words and themes. Data were examined for how the revised 2021 LAAB Standards for Professional Curriculum are evident in curricula. Results indicate that approximately 2% of BLA and 4% of MLA curricula are composed of professional practice courses. Course content, resources and emphases varied more widely, and were categorized to define major and minor subject areas, suggesting the relative coverage of subjects necessary for this foundational topic.

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Cultivated Wild: Algorithmic Plant Communities Design

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Keywords: Algorithmic Design, Plant Communities, Planting Design

This poster presents a student research project on algorithmic computational approaches to planting design. “Cultivated Wild” is a term borrowed from the book title of Raymond Jungles works, who designed ‘the Urban Glade’- 1111 Lincoln Road, Miami. The project brings the South Florida wetland ecosystem into an urban promenade, offers lush greenery to the city, a dynamic environment for the users, and diverse habitats for wildlife. Planting design is an important aspect of landscape architecture, it shows the designers' way of thinking with plants. A successful planting design can define the success of the site design. While Raymond Jungles’ book applies his planting design knowledge using the traditional two-dimensional design approaches, this research will focus on learning from that knowledge and applying it with a more dynamic design approach using algorithmic computational tools.
Despite the immense growth of algorithmic design in Landscape Architecture professional practice, there are only a handful of small experimental projects that try to deploy algorithmic computational approaches in the planting design process, such as the Sony Forest, designed by ANS studio. Designers use an algorithmic model to create a ‘natural’ distribution of plants based on the given local conditions. Algorithm planting design can help designers in understanding the changes and evolution of each plant at different microclimates of the site, as well as the physical changes plant communities go through with time and seasonal changes by inputting key characteristics of the plants and adjusting the site conditions. The model could also be used as a testing ground for the future success of the site prior to the actual design implementation.

This research identifies the current algorithmic plant communities' design models from practitioners and parametric design tool developers and then reconstructs the design model using Rhino + Grasshopper for educational use. One of the outcomings of this research is introducing students to an algorithmic planting design model, which optimizes planting design by respecting and analyzing the complexity and diversity of natural systems and plant communities. This will be a great addition to our current parametric design course syllabus. Furthermore, the research continues to explore the application of this model to one of the North Florida native plant communities.

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Acequias in Northern New Mexico: A Historical, Cultural, and Ecological Approach for Teaching the Ecology of Place

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Keywords: Ecological Design, Cultural Landscapes, Regional Design, Traditional Irrigation, Vernacular Landscapes

Land, water, and community blend in the centuries-old acequia (ditch) irrigation systems visible on the landscape in Northern New Mexico. Owned and managed by self-organized farmers they provide community-based flood irrigation to deliver water to agriculture. Acequia operations sustain the culture heritage of water distribution, and their yearly use and maintenance creates and sustains community cohesion.

Designed places that express a vernacular aesthetic in harmony with cultural values of individuals and societies are known and disseminated by case studies in landscape architecture history, land use, planning, and cultural geography courses. However, in the pedagogy of the undergraduate LA curriculum there lacks a systematic method to develop skills to discovery, document, distill, and apply critical thinking about the cultural, physical bioregions, and appropriate design intervention. Although teaching LA includes curriculum on sustainability, landscape performance, green infrastructure, and integration of technology to inventory, analyze, model, and communicate design, it lacks a method for the study of the ecology of place.

As the discipline itself, pedagogy is both an art and a science. This paper presents a holistic on-site method for a place ecology study. By knowing a place and naming its constituents, students discover responsibilities and interdependencies. This acequia study increased students' knowledge and understanding of links between historical and contemporary cultural, visible landscape features, the values of conservation, and the preservation of people and their relationship to the earth. The intent is to direct attention towards the need for more rounded theoretical discourse covering human activity and history that contributes to place making.

The framework provides a curriculum of lectures, readings, discussions, and site observations that cover human culture where landscape and the environmental aspects of place relate design form and expression and teaches a comprehensive exploration that includes art, literature, and poetry to understand environmental and ethical creative expression of art and design on the land.
Active and non-active acequias reveal cultural information through the usual venues: photographs, maps, site orientation, materials, building techniques, location, orientation and adjacency to rivers and the surrounding landscape context. The place study focus was to understand how the acequia systems provide a mechanism for continued community resiliency that develops and preserves the cultural heritage landscape design patterns.

The paper concludes that the context of human and natural ecology--along with the application of cultural and ecological landscape principles--can be deeply associated with the understanding of place to guide the design and maintenance of new landscapes.

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More Than a Vocational Tool: A Strategy for Teaching the Development of Meaningful Construction Document Sets

Nicolette, Matthew Clemson University

Keywords: Construction documents, Design implementation, Curriculum

PURPOSE
This presentation will introduce a strategy that combines studio design work with an implementation course resulting in higher resolution of both studio deliverables and an abbreviated construction document set.

BACKGROUND
Construction documents are the bridge between the design and the finished project (Design Workshop, 2016). For built projects to reach full potential they must be well designed and constructed. Construction documentation is a challenging topic to teach. Success requires students to use design, graphic, organizational, and vocational skills in a short window of time. The project must progress quickly through the design and documentation phases incorporating many skills required to be an impactful practitioner.

METHODS: Students enrolled in my design studio also enrolled in my implementation course that focuses on design synthesis and construction documentation. In studio, students develop a schematic design for a project prompt 'to create a mission driven design focusing on the user experience.' This requires attention to the detail and the physical realities of the design. Concurrently, students learn topics related to construction documentation in the implementation course. The schematic design developed in studio is used for the final implementation project taking the studio project though design development and into an abbreviated construction document set. Students are given the freedom to evaluate ideas for the design and the documents in both the studio and lecture. Lessons learned during design development are used to revise studio deliverables and the abbreviated construction document sets.

FINDINGS: Students enrolled in both courses were able to spend more time refining the initial schematic design than those that were not enrolled in studio. Students were able to focus on design resolution without sacrificing time for the vocational elements of the documentation process. Going through the documentation process in the implementation course resulted not only in a more refined construction document deliverables but also improved the resolution, reality, and experiential detail in the studio projects. Student comments suggested a better understanding between design and synthesis as well as more thorough portfolio projects.

DISCUSSION: This strategy allowed students to experience the fundamental relationship between what we draw and what we build. The process does offer challenges. Program curriculum must be organized in a manner that would allow such integration, and the courses must be coordinated to align lessons, tasks, assignments, and deadlines. This approach to documentation reinforces the idea of iteration and that design is a continuum from concept through synthesis.

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Grading for Equity in Design Studios

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Keywords: Assessment, Pedagogy

In the last few years, most academic institutions have witnessed a wide-spread surge of collective interest in addressing systemic inequities. Proposed solutions on how to promote equity for students are multi-faceted and include considerations for accommodating students' diverse needs and backgrounds, facilitating a sense of belonging, and proactively mitigating biases. We know conceptually the end goal of equity, but there remains much interest in understanding what we must do to get there. To further such interests, this paper explains the inherent inequity of traditional grading and assessment practices and discusses 9 "grading for equity" policies as alternatives. These grading policies were implemented in a combined 3rd year undergraduate and 2nd year graduate community design studio at The Pennsylvania State University. In reflecting on the pedagogical challenges and opportunities discovered throughout the semester, this paper presents findings on best practices for implementing equitable grading practices within the specific needs of a design studio context.

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Best Practices for Implementing Virtual Reality in Landscape Architecture Education

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Keywords: Virtual Reality, Landscape Architecture, VR Implementation, Best Practices, VR Integration

The past decade has witnessed an explosion of interest in virtual reality (VR) in the design fields. This is primarily from the popularization of mainstream VR platforms, increasingly user-friendly VR hardware, and decreasing costs associated with both consumer and professional-grade equipment. In the field of landscape architecture, VR is expected to experience one of the widest adoptions of emerging technology (George & Summerlin, 2021). Some higher education landscape architecture programs are integrating virtual reality into the teaching curriculum, and faculty are also independently incorporating these technologies into the classroom. For example, students have used VR for site design (Hill, George, & Evans, 2019), rapid design assessment (Fernberg et al., 2022), spatial evaluation (George, Fernandez, Summerlin, 2022), virtual site visits (Oprean, Verniz, Zhao, Wallgrün, Duarte, & Klippel, 2018), cultural interpretation (Sahbaz, 2020), and several other use cases. Currently, multiple landscape architecture programs have developed VR-specific labs for instructional purposes, while others integrate the technology in more directed learning interventions. While it is an exciting time to pioneer VR efforts in a landscape architecture program, few best practices and shared pedagogical methods exist for these efforts.

This panel draws on nearly twenty years of combined VR experience from landscape architecture educators to share experiences and best practices for incorporating VR into landscape architecture education. The discussion will include the implementation of VR at four different landscape architecture programs in the United States and China, communicating lessons learned during the process. Specifically, the panel will address 1) how VR is incorporated within the programs' curriculum, 2) challenges and opportunities of VR implementation in the higher education context, 3) information on VR equipment and setup for different purposes, 4) personal experiences with VR in academia, 5) the student perspective of VR in landscape architecture education and practice, and 5) predictions for where the intersection of landscape architecture and VR is headed in higher education. The panel discussion will also address implications for landscape architecture practice. The audience will leave this panel discussion with the knowledge and resources to begin implementing VR in their courses and department curricula from both a practical and pedagogical perspective.

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Maintaining Public Land: Design for Mutualistic Inhabitation

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Keywords: National Forrest, Public Infrastructure

The 1891 Forest Reserve Act allowed the President to "set apart and reserve … public land bearing forests … whether of commercial value or not, as public reservations." These forests were set aside not just for the protection of timber, but as a way to "preserve the fauna, fish and flora of our country, and become resorts for the people seeking instruction and recreation". In 1918 the National Park Service (NPS) founding mission describes its role “to conserve the scenery and the natural and historic objects and the wildlife therein and to provide for the enjoyment of the same in such manner and by such means as will leave them unimpaired for the enjoyment of future generations." Nowhere in these discussions were the implications of the carbon footprint of traveling to enjoy these places and the significant investment required for maintenance. Furthermore, the importance of these lands, not as a resource to be enjoyed, but a resource for carbon sequestering and global environmental security was not considered. These lands have seen an incredible increase in use, increasing wear and putting more pressure on these fragile lands. How do we “enjoy” these places in a way that allows them to persist? Understanding that petroleum-based modes of transportation will continue for some time, how can designers engage these sensitive places to have a significant impact on our long-term sustainable occupation of these lands? Can our occupation and enjoyment of these places shift from the mentality of “leave no trace” to one of mutualistic benefit? Can our presence improve the sustainability of not just the ecosystem, but the economic system that supports it? Can we move beyond site net zero towards a new model for our occupation of the West that is carbon negative?

This paper presents the studio framework to develop design strategies that address how the infrastructure of occupying and maintaining these lands can improve the ecology through mutualistic inhabitation. Projects were situated in fragile and remote places that require infrastructure because of our visitation as a means of examining the larger context of inhabiting the rapidly growing Mountain West. Students confronted issues of increased visitation, inevitable forest fire and climate change through the lens of all that is required to maintain our public lands. The studio pedagogy provided an agency to the students to realize performative space making can be mutually beneficial to the environment.

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MLA Curricula Patterns, Trends, and Expectations

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Keywords: Graduate Education, Curricular Analysis, Accreditation Requirements

PURPOSE
This study identifies elements, trends, and strengths of 3-year Master of Landscape Architecture (MLA) degrees at accredited programs in the US. The comparative analysis of MLA programs can help clarify specific curricular offerings, provide a context and background for program development and curricular adjustments, build from strengths in program contents, and develop degree offerings consistent with program and institutional goals.

BACKGROUND
We start this inquiry under the assumption that we know well what we do and why especially at the individual program or course level. This presentation explores how programs implement accreditation requirements and how curricula compare among accredited MLA programs. Away from the destructive competition associated with the ranking of programs and the associated meaningless bragging rights, this study tries to understand how our course structures create alternative paths for MLA education. The aggregated results also indicate trends and emphases of our collective offerings.

METHODS
The analysis is based on the classification (double-blind) of courses and credits into the LAAB accreditation categories. The outcomes include graphic visualizations of individual programs' composition, showing different emphases in design, planning, practice, and research. A comparison of program completion options describes alternative paths to graduation such as project-based, thesis, additional course work, etc.

FINDINGS
A summary of findings will show multiple graduation paths common among MLA programs. The study also highlights significant differences in emphasis (design, technology, environmental education, etc.). The presentation also covers the differences in curriculum composition, ranging from a clear focus on a specific area of knowledge to a more even distribution of credits and emphases. New questions emerge in light of the professional expectations of graduates: what is the role of technology? Is the 3-year option enough to achieve master's and professional competencies? What about the issue of scale in learning environmental planning and design?

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Site Grading Instruction: A Hands-On Approach

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Keywords: Grading Education, Technical Design, Technical Skill Demonstration

Site grading is a technical design skill recognized as a core component of landscape architectural professional degrees (LABOK 2004). Considered simply, grading involves manipulating the earth's surface to intentionally direct water. That manipulated surface contains the complex interactions of highly detailed three-dimensional at and below-grade elements. Despite the clear correlation with design and engineering details and grading practices, and the value of the skill in education and practice, technical grading in an educational setting is a challenging task given the constraints within educational programs of time, faculty expertise, and especially previous student experience.

Site grading design and documentation constitute an intricate visuo-spatial set of problems requiring complex internal and external visualization capabilities. Educational programs commonly combine the use of 2D and 3D analog and digital, and static and dynamic (animated) displays to facilitate these visualization processes. However, how effective these displays are in the educational context of solving the complex problems associated with site grading interactions is less clear. Hegarty, Smallman & Stull argue that successful use of such complex displays requires considerable prior experience to both construct and interpret (2008). Additional studies indicate that more simplified displays may be better suited to novice learners because demands on their internal working memory are significantly reduced (Kaluga 2008), and 2D drawings (such as plans and elevations) may contribute to significantly better learning of structural relationships than 3D models (James, Humphrey, and Goodale, 2001).

This study explores the relationships between the minimal technical experience of novice landscape architecture learners and the use of graphic displays in grading education. The paper reviews two distinct approaches to instruction in a site design implementation studio containing a heavy site grading component. The control instructional approach is the method by which the course has been historically taught, with a task-oriented, technique-focused process. The modified approach involved a reorganization of the task deliverables and content delivery to reflect a more holistic, project-level and design-focused process, requiring students to develop understanding regarding the interface between design, and the technical aspects of materials selection, site grading, and site detailing through intentional interaction with their design process. Outcomes suggest that thoughtful and deliberate use of simple 2D displays, linked to intentional development of metacognition of individual design process supports more robust assimilation of grading skills.

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Peer Assisted Learning and Student Coaching in Landscape Architecture Education

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Keywords: Design Learning, Pedagogy, Design Education, Peer Assisted Learning, Coaching

Many college students struggle at some point with one or more courses. Often, these struggles extend beyond a single course to their major whereby broader sociocultural expectations form another type of curriculum that must be learned. This is especially true for first year students in design-oriented, studio-based majors (Powers 2016). For these students, it can be challenging to acquire the requisite professional knowledge and skills while simultaneously navigating the unfamiliar and sometimes unnerving sociocultural learning environment. One way to alleviate these challenges while enabling student social cognitive learning is through peer assisted learning (PAL) and academic coaching. K.J. Topping (1996) defines PAL as people from similar social groupings who are not professional teachers helping each other to learn and learning themselves by teaching. Numerous studies have shown that PAL benefits both peer-teacher and peer-learner. It can also complement direct teaching by professionals. PAL includes peer modeling, peer monitoring, peer assessment and coaching (Furmedge et. al. 2014). PAL has been studied extensively in fields like medicine where studies have shown that medical students can contribute significantly to the design and delivery of the undergraduate curriculum (Loda et. al. 2020). To date, very little research exists related to PAL in design education. Therefore, this study explores PAL in landscape architecture pedagogy through a case study focusing on a peer coaching program at one BLA program.

Two research questions guide this study. First, how do peer-teachers and peer-learners characterize their PAL experiences? Second, what is the relationship between PAL and design learning outcomes in first year landscape architecture students? To answer these questions, a multi-method study of over 100 landscape architecture students representing three academic year cycles was used. Methods include surveys, interviews, and reflections with both peer-learners and coaches. Data was analyzed using standard statistics and content analysis.

The study's results show a positive relationship between PAL, especially framed as coaching, and design learning outcomes. Detailed instruction and modeling were specifically reported as valuable by peer-learners. Peer-teachers reported being more engaged with their own projects and the BLA program itself. Overall, study results support PAL and peer coaching as effective and engaging pedagogic additions to design studio education. As such, this study provides a new framework that landscape architecture educators can use to further explore the range of possibilities apparent in this unique, but powerful pedagogic approach.

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Developing Visualization Techniques to Make Scientific Study More Approachable

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Keywords: Epistemology, Representation, Visualization

PURPOSE: In collaboration with KALAstudio for the Lisbon Architecture Triennale 2022, we designed a series of experiments for the purpose of visually communicating scientific studies demonstrating effects of microplastics on soil ecologies. As part of an exhibit displaying the potential impact of plastics from the microscopic scale (soil ecologies) to the regional scale (glaciers), we took an epistemological approach to experimental design focusing on visualization strategies making the topic more approachable to a more diverse audience.

BACKGROUND: Previous studies have demonstrated that microplastics are changing soil ecologies by interacting with mycelium and plant roots effecting plant growth, heavy metal contaminant uptake, and soil structure (de Souza Machado, 2019; Wang, 2020; Azeem, 2021). In this study we focus on the visualization of epistemological artifacts to better engage viewers in the complexities of the scientific process (Evagorou, 2015). Rather than focusing solely on presenting the content of the experimental results, we hope to introduce the process and representation of scientific study as a creative endeavor that both clarifies understanding of scientific phenomena and promotes future lines of inquiry across disciplines.

METHODS: Using earlier studies as a guide, we designed a series of controlled experiments evaluating the effects of three types of microplastics, a mycelium mix, and three soil types on the growth of corn plants. The experiments were constructed for optimal visualization and representation throughout the process. Germination and growth were measured daily, while plants were photographed at predetermined intervals. A second round of experiments evolved from information gleaned from the original study. Plants were harvested for stereo microscopy, fixing the specimens in resin, and pressing the plants to visualize root structure.

FINDINGS: Although admittedly a small sample size, our initial results were consistent with previously published studies by others showing a synergistic relationship between microplastic and mycelium on plant growth. In addition, we produce a series of artifacts from the microscopic to macroscopic scale representing various phases of the experiments. The artifacts complement studies and research by KALA.studio who are focusing on potential effects of plastics on receding glacial fields.

DISCUSSION: Visual representation techniques can be employed to teach complex phenomena and topics to a variety of audiences. Focusing on the epistemology of the process instead of concentrating narrowly on representing the results can make complex topics approachable to a more diverse audience thus expanding the reach of the study and more thoroughly promoting future scientific and/or artistic exploration.

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Innovative Model of Cooperative Education and Professional Practice at the University of Cincinnati

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Keywords: Epistemology, Representation, Visualization

The University of Cincinnati is well known as the founder of cooperative education. Students in the Master of Landscape Architecture program at UC have one mandatory semester long co-op during summer semester between their first and second year. Co-op is at the center of professional practice instruction at UC, providing students with a real-life professional work experience, and it demonstrates the value of subsequent classroom professional practice courses. As a co-op advisor, I provide classroom instruction, one on one advising students before, during and after the co-op, and I work with employers that hire co-ops.

In the fall semester of the first year, they take a course to prepare for the co-op, with a focus on resume and portfolio preparation, mock interviews, and the use of UC's online system that links student resumes and portfolios to employers and their co-op positions. In spring semester, students search for a co-op position using internal (specific to UC) and external (internet) sources to connect to employer. The co-op lasts the entire summer semester, May 1 to August 15. While on co-op, students complete a detailed ten-page student report that is a self-reflection of their work experience. Students choose two broadly defined workplace goals for the co-op semester and work with their employer to meet their goals.

In the fall semester, students begin the first of two semester long professional practice courses. Students are especially engaged with the course because they have experience working in a professional office and can easily see the connection between theory and practice. In these two courses, I have students make connections between their co-op experience, and the professional practice textbook (Rogers).

In summary, the innovative model can be summarized in these five phases: 1. classroom preparation for co-op, 2. co-op job search, 3. co-op work semester, 4. post co-op self-reflection and professional practice (theory) course, and 5. completion of the second part of professional practice (theory) course.

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SITES + BIM: A Model for Landscape Architecture Education to Embrace the Solar Decathlon

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Keywords: Interdisciplinary, Modeling, Net Zero Energy, Sustainable, Competition

The U.S. Department of Energy (DOE) has been sponsoring their collegiate Solar Decathlon (SD) Design Challenge and Build Challenge worldwide for years now. They leverage the work of students and universities to inspire homeowners and the building industry to pursue high-performance, healthy, and affordable housing solutions. They also provide students with opportunities for real-world, hand-on learning in preparation for sustainability-related careers in design and construction fields. The SD Challenges are focused on designing and building a net-zero energy building, but with little to no attention paid to the building site. Many believe this is acceptable, but many landscape architecture educators and practitioners would certainly disagree. Landscape architecture (LA) students and faculty should be active participants in more SD Challenges.

To that end, this session celebrates the work of LA students and faculty who competed in the SD Challenges as part of an interdisciplinary team from architecture, interior design, construction management, urban planning, and business. Along with the community partner (Englewood Community Development Corporation of Indianapolis, IN) serving as the client, the team worked to design a high-performance, innovative demonstration house powered by renewable energy. The house is complemented by an equally high-performance site design that unifies structure, land, and surrounding context while promoting the sustainable use of water, vegetation, soil, and material resources.

The SD gets its name from the 10 Contests (or design criteria) by which each project submission is evaluated. The SD Challenge outcome is a multi-page conceptual design submission evaluated against submissions worldwide to determine which will move forward into construction documentation and ultimately the final design competition. The unique aspect about this competition is that the LA students participated in the context of an advanced engineering course that emphasized Building Information Modeling (BIM), the SITES v2 Rating System, and outdoor lighting. These topics and the pedagogical intent of the course aligned well with the SD Challenges. Specifically, the SD project was designed to achieve SITES Certification and was constructed using BIM 3-D intelligent modeling.

This session highlights how SD teams were formed, how interdisciplinary collaboration worked, design deliverables were produced by the team, what and how course objectives were met, various successes and failures, what the LA students learned and contributed to the SD project, and what value the SD experience adds to LA education. The session will make a compelling argument for incorporating SD Challenge experiences in LA education.

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A Pedagogy of Care: Minority Faculty Approaches for Educating Diverse Students

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Keywords: Diversity, Pedagogy, Empathy, Care, Inclusivity

The United States Census Bureau projections indicate that the US is becoming more racially and ethnically pluralistic. The racial composition of the population is projected to change such that one in three Americans—32 percent of the population—will be a race other than White by 2060. The nation is also becoming more gender diverse. As part of a recent study, researchers from Pittsburgh found that nearly 1 in 10 students in over a dozen public high schools identified as gender-diverse — including transgender, nonbinary and genderqueer—five times the current national estimates. While the racial, ethnic, and gender composition of the students in our classrooms is dramatically changing, how can we align our pedagogies?

In this panel, five minority faculty members from four different US institutions will: 1) discuss the critical role that minority faculty play in connecting minority students to their institutions; 2) critically examine the needs of today's diverse landscape architecture students within a range of institutional demographics; 3) elaborate on the tools and methods they utilize for caring, supporting, and mentoring their students; 4) discuss faculty sensitivity based on their own ethnic background and experience; 5) assess how their presence on the faculty can impact struggles of minority students.

In the context of the DEI strategies that have been discussed in departments and shared by CELA, which place emphasis on "how," this panel takes the approach of "who." Importance will be put on the empathic tactics used by the panelists to foster a sense of belonging, most notably among students of color. The focus will be on explaining the discovery of strategies for increased student success, establishing trust, fostering a sense of belonging in a diverse student body, and developing pedagogical approaches to broaden the scope of traditional design education.

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Landscapes in Drift

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Keywords: Atmosphere, Climate Futures, Landscapes in Drift, Pedagogy, Design Methodology

INTRODUCTION

"Like earth, the atmosphere is neither homogeneous nor self-same. It is instead layered and multileveled. It has, in short, its own kind of 'geography' or more exactly aeolian zones such that we can even speak of airsheds – regional 'basins' without determinate physical boundaries where pollutants move and collect." (Macauley 2010).

Weighing more than five trillion tons with a diverse vertical section, the atmosphere is rife with life and activity. The increasing toxification of the atmosphere has become palpably manifest in human bodies through chronic and acute illnesses that disproportionately impact poor communities and nations of color. Most obviously, the atmosphere is what determines weather and climate. Atmospheric intensities of airborne moisture and wind flows determine weather patterns and events, as well as phenomena such as atmospheric rivers and lakes. In terms of climate, emissions of carbon dioxide into the atmosphere by industrial nations have caused the warming of the planet and put the world's peoples and species under imminent threat.

RESEARCH

This research addresses how landscape architecture might consider atmosphere as a "site" of investigation and intervention. For the past three years, my studios have held a sustained focus on distinct landscape matter (soil, water, atmosphere) - tracing each across planetary, ecologic, biologic, and microscopic scales. Leaning on feminist new materialist theory and posthuman phenomenology, the pedagogical prompts designed for the studio asked students to make space to think about a singular medium and its entanglements across sites and scales – structured through specifically curated assignments.

Specifically, this paper will introduce both the theoretical framework and a methodology to study and engage a range of atmospheric phenomena in the design of landscapes across scales. It will use several student projects developed in an experimental studio to demonstrate a range of atmospheric considerations and methods of engagement. These case experiments will index a range of atmospheric analysis and techniques that can broaden the disciplines engagement with something as critical to planetary survival as the atmosphere.

From novel coronaviruses to mass species extinction, our existential crisis has forced a radical rethinking of what and how to teach students of landscape architecture increasingly working at regional and territorial scales. This research provides a means with which to engage with such complexity in less deterministic/solutionist ways. As a planetary system, imagining the future of our atmospheres is essential to understanding how to live (and die well) in the crises we have created.

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‘Leadership’ in Academia: Fifteen Year Review of Administrative/Leadership Position Openings in Landscape Architecture in North America

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Keywords: Leadership, Position Openings, Qualifications, Academic Trends, Academic and Professional Needs

It is often discussed in landscape architecture (LA) circles that leadership is a critical quality one should possess in LA practice (academic and professional). We often narrate ‘leadership’ as part of our core values and find it essential to the education of future landscape architects (LAAB, 2021). We often aspire to be practitioners to influence and guide followers or other members of an organization or profession. That said, there is very limited scholarly knowledge produced in LA scholarship that offers greater understanding regarding the leadership qualities, present or sought after in academia.

This research is an empirical inquiry on administrative/leadership position openings in LA Programs to report on the existing and anticipated leadership qualifications perceived by academics in LA in North America. The number and content of position openings for the past fifteen years along with publicly available LA administrator profiles offered an opportunity to conduct data classification and content analysis that is essentially a snapshot of the state of LA (Deming et.al., 2012; Ozdil et.al, 2021, 2017). Two sets of publicly available data; nearly 150 full-time academic administrative position opening descriptions collected between 2007 & 2022, and over 75 current administrator profile information (CELA, 2022; ASLA, 2022) are analyzed using word frequencies and descriptive statistics. The themes that emerged then recorded as findings. The permanent positions openings (i.e., chair, head, director, coordinator, or other administrative, leadership, and management positions) that became available in 100 accredited LA programs in North America created opportunities to document and report on the status and future trends for academic administration/leadership.

This research reports on the academic and professional credentials needs, as well as administrative, teaching, research, or service requirements anticipated while illustrating the evolving leadership needs of LA Programs. A growing interest for PhD recipients and increasing demand for professional experience in contemporary practices and issues suggests the possession of a diverse set of skills for scholarly inquiry, management, and leadership. The findings also suggest that topics such as raising funds and seeking external grants, working for diversity are becoming essential tasks that LA academic leadership to handle more than ever in the coming decade. In conclusion, the presentation allows a look at not only what qualifications are in greatest demand for LA leadership but also who is likely to lead the mission, faculty composition, curricula, or conformance with professional standards as well the direction of LA academy and perhaps the future professionals.

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TREEscape: Building, Thinking and Learning at 1:1 Scale

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Keywords: Design-Build, Embodied, Scale, Fundamental, Installation

This study explores the relevance of a first-year landscape architecture design-build project as preparation for professional practice. Studio investigations for beginning design students are typically viewed as conceptual explorations that introduce students to the fundamentals of design, one of the most critical being the understanding of scale. Since such projects may not be site-based design projects their connection to work done in a professional setting may seem somewhat far removed from real-world applications. Student design portfolios typically highlight the more advanced upper year studio work in order to demonstrate competence in the skills necessary for working in the profession. However, this excludes and undervalues the earlier academic work that is formative in shaping a student's development as a designer. Exposing professionals to the work of beginning design students gives weight to these fundamental concepts and offers a deeper consideration of them at later stages in a designer's career.

TREEscape is a first-year landscape studio project that asks students to design and build a 1:1 installation on campus using 2x4 lumber. Through the process of building, students learn about scale by using their own bodies in relationship to the landscape as a means of measuring and understanding spatial relationships. With digital technology being the primary tool in most professional offices today, the need to use the physical body as a form of thinking and learning is more essential than ever. The opportunity to work at 1:1 scale is rare in professional practice but can be offered as an embodied academic exercise providing lessons that will endure long after the student graduates.

As a collaborative project where students work in small teams, TREEscape is based on an earlier 2-dimensional figure-ground exercise which is then adapted into a 3-dimensional landscape where a single tree becomes the 'site' for the installation. The area surrounding the tree including vegetation, buildings, topography, people, and views also plays a significant role in the analysis and design of the TREEscape. Students are also asked to consider the interaction and experience of humans and other living beings with and within the TREEscape along with relationships to sky and ground.

Landscape architecture professionals will be invited to the final presentations of TREEscape and asked to provide feedback through a survey and discussions. Reviewers will be asked to comment on the relevance of this pedagogical approach to the profession; results of this feedback will be analyzed and presented.

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Defining Curricula: A Case Study of Oppositional Methods

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Keywords: Curricular Assessment, Mission Statement, Strategic Planning, Programmatic Reputation

Too often, academic curricula can get away from the original programmatic intent. This can be due to changes in technology and methods, professional trends, shifts in faculty expertise, or outside factors impacting course credits and contact hours. Understanding a current curricular plan of study can both define strengths and weaknesses within a program, and aid in proposing changes to better align with mission statement goals or accreditation standards.

There are two ways to assess a curriculum: from the top-down or from the bottom-up.

The top-down approach is mission focused and forces faculty to ask whether course content and processes align with expected end-of-semester outcomes for eventual mission statement competencies. Focusing on core competencies and program-wide goals first forces courses and faculty to fit content into a proscribed series of steps that lead to pre-determined areas and levels of student achievement. The bottom-up approach assesses existing course offerings and faculty expertise to determine at-graduation expectations and areas of specialization. This approach is topical content and individual skill driven before determining inter-course alignments and skill development scaffolding.

This presentation will describe a 6-year longitudinal case-study (Barbarash 2016, 2018) and lessons learned from following both approaches in Purdue's landscape architecture program, with impacts on graduation knowledge and skill competencies balanced by measures of student and faculty satisfaction and perception of achievement. Student perception of learning outcomes achievement were assessed annually and faculty perception of course and curricular content is gathered bi-annually. Comparing response sets showed areas for improvement which were discussed by faculty, led to curricular and course structural changes, and resulting impacts were assessed through the same survey sets. Effectiveness and lessons learned from both bottom-up and top-down methodologies were explored, with both demonstrating positive and negative outcomes.

The processes through which a design program can define their curriculum, course content, course order of operation, and faculty loading are illustrated and discussed, to assist design programs in asking similar questions of their curriculum and faculty processes. Purdue University's landscape architecture program has used these investigations to guide faculty hires by understanding the current programmatic need for incoming faculty skillset(s). It has also allowed the program to quantitatively advertise and celebrate its curricular reputation to drive recruitment efforts for both students and faculty.

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Where do Concepts Come From?

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Keywords: Concepts, Landscape Architecture, Design, Conceptual Design, Design Pedagogy

Ideas can spring into being with the speed of bold and limitless imaginations. They can also come on slowly, in fits and spurts over periods of reflection and contemplation. They can form quite suddenly or through intellectual strain and dedicated rigorous experimentation and study. According to Psychologist Liane Gabora, “it is widely assumed that this process of initial conceptualization involves searching through memory and/or selecting amongst a set of predefined candidate ideas.” In her mind - like that of many creatives - the creative process is inherently heuristic (e.g. Simon, 1973, 1986). An approach in other words, to problem-solving or to self-discovery that navigates through somewhat practical but less than optimal methods or techniques. So in effect when we design, we’re loosely recalling aspects of our own lived experiences - feelings and emotions brought on by environmental cues - and transmitting the character of those memories into new representational territories. Results in early/conceptual design are hardly perfect, nor are they typically expected to achieve perfection, but it is often useful for a conceptual design process to unfold with a relative degree of structure, bias, and determinism. This paper compares eighteen unique approaches to conceptual design in landscape architecture. Describing the earliest stages of ideation across a range of techniques, scales, subjects, and geographies, the results are summarized to illustrate, 1. How initial criteria and constraints are determined and set, 2. How lines of inquiry are prioritized and invested in, and 3. How foundational decisions can be made to identify an intended direction and build momentum toward design excellence.

DIVERSITY, EQUITY, & INCLUSION

Diversity, Equity, and Inclusion

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Status of Women in Landscape Architecture: A Study of ASLA and CELA Career Success Metrics

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Keywords: Leadership, Diversity, Education, Profession, Recognition

"Landscape architecture has limitless possibilities for public service, it is exceedingly interesting, and it should be fairly well paid. It is a splendid field of work and women are particularly well fitted for it... As there comes and there will come a gradual awakening to the stupidity of the present situation and as women come more and more into view as city housekeepers, their popularity, and their opportunities in this field of service will rapidly increase." as Julia Lester Dillon (1871-1959) notes in 1922 landscape architect for Sumter, SC. Landscape Architecture has a long-standing history of being a male-dominated field. More recent data collected by LAAB indicates a heavy presence of females in landscape architecture programs across the country. However, females who have achieved more advanced career success, such as awards, fellows, or leadership are not as prevalent. This panel investigates current perceptions of male and female representation in the landscape architecture profession and compares this with actual data on the journey women take from education to the profession.

The panelists, who served on CELA's Executive Board, became concerned about a lack of female representation on the CELA Board after their terms had ended. They developed a survey that was sent to all CELA members. The survey captured perceptions of male and female representation across various sectors of professional achievement. Historical data was then collected from CELA and ASLA including demographics in academia and the profession on leadership, awards, and fellows. For example, enrollment numbers show that over 50% of all LA students are female, but rosters indicate that from 2005-2021, 43% of CELA Presidents were female and from 1901-2018, only 12% of ASLA Presidents were female (VELA project).

This research aims to identify best practices of diversity, equity, and inclusion, and assess the degree to which these practices are incorporated throughout a career in landscape architecture. The panelists envision that the survey findings, primarily those originating from open-ended questions will provide valuable insights into exploring issues related to women’s representation. In addition to collecting participant profile data, the survey also included questions relating to perceptions of struggles and opportunities affecting women’s unequal representation within professional leadership and landscape architecture education.

This panel is important to educators in landscape architecture because it focuses on the experience and contributions of women as educators in landscape architecture and encourages discussion on advanced careers of women in landscape architecture.

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Connections Through the Black Agricultural Landscape

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Keywords: Farming, Food, Community, Mapping, Storytelling

The number of independently owned farms in the United States is declining, as large-scale, commercial, and corporate farming take over rural landscapes. These changes bring a monoculture of plant and domestic animal production practices that decimate the current surrounding landscape and ecosystems. The number of minority farmers are disappearing just as rapidly and disproportionately, with the current numbers of black owned farms in particular hovering around 1.4% (Hegeman). In the state of Illinois, the number of black-owned farms is less than 100, with the largest population located in and near the city of Pembroke Township, Kankakee County, Illinois.

Despite these alarming statistics, independently owned farms have cultivated an ever-growing presence nationally through the increase of farmers markets, while simultaneously acquiring physical space in grocery stores, food banks, and on campus communities, to name a few. Here, local farmers connect by sharing their life, experiences, and beautiful farming yields with the public, all through the food. This simple, radical act nurtures desire and awareness of where our food comes from, and who grows it. This work seeks to expand upon the knowledge of connecting where our food comes from, in a technically rigorous, yet playful, exploratory way. Through the lens of landscape architecture, the rural and urban built environment, and the stories of the Illinoisan black farmers, a series of mappings document the current, existing black farms in the state of Illinois to emphasize the important connections they have across the state. The mappings document physical connections such features as history, ecology, wildlife, people, soils, plants, food, and landscapes. The mappings further underscore the physical routes including as roads, highways – both current and historic – across the state of Illinois that connect these farms and farmers, while also attempting to visually describe the grounded-ness and connectedness such spaces have within their surrounding context. This work is an important section of a larger project that captures stories, develop imaginary regional-scale landscape proposals, and curate a collection of recipes containing foods grown and collected from participatory farms across the state of Illinois, gently reminding us of our connectedness to each other and the earth that sustains us.

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An Analysis of Google Street View Images Using Deep Learning to Improve Access to Yongsan Park

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Keywords: Park Accessibility, Deep Learning, GSV, Yongsan Park, Vulnerable Population

Most studies on pedestrian-friendly streets and accessibility focused on determining the distance from nearby convenience facilities or measuring walking time to destinations (e.g., network buffering methods). Nonetheless, the study suggests that people's experiences may differ from the starting point to the destination, resulting in different routes to the parks depending on the conditions on each street. Particularly in the case of leisure walking, people choose a route that feels psychologically comfortable (Nagata et al., 2020; Bongiorno et al., 2021).

Around the world, inequality and income polarization are increasing (Suh, 2020; Wilson et al., 2020). Recent studies have been conducted on park accessibility in terms of park inclusivity and welfare, as well as environmental inequality issues worldwide. This study therefore aims to improve the accessibility of parks to the economically and socially disadvantaged in a microcosmic manner.

A significant amount of attention has been paid to Yongsan Park, which has been used by foreign military forces for over 100 years; in view of the relocation and opening of the US military base in South Korea, it is imperative that Yongsan Park is made more accessible.

To make a street walking environment pedestrian-friendly, street components were determined, including senses of openness, green visibility, and sidewalk width. To analyze the walking environment of Yongsan Park, we used Google Street View (GSV) image analysis. By extracting pixels representing the sense of openness, sidewalk width, and green light rate, and measuring the ratio of these pixels, the visual pedestrian environment was analyzed.

Among the streets near Yongsan Park, we identified streets with excellent pedestrian environments. Following this, we proposed pedestrian-friendly streets in the top 30% of the area near Yongsan Park, where people can enjoy an exciting experience in the area near Yongsan Park. Next, we propose unpedestrian-friendly streets for each of the six districts, along with a space improvement plan for the district where most people walk, but the street is highly unpedestrian-friendly. As a final point, this study presents temporary landscaping strategies that will enhance disadvantaged community access to Yongsan Park.

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Environmental Justice and Children: Analysis of Outdoor Environments for Different Ethnic Youth Groups

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Keywords: Air Pollution, Environmental Pollution, Parks, Tree Canopy Coverage, Environmental Injustice

Today, out of the world's 4 billion people living in urban areas, nearly a third of them are children ("Growing Cities," n.d.). Studies show that urban outdoor environments play an essential role in the development of children's physical and mental health and social relationships (Owens, 2017). However, environmental injustice affects park accessibility between white and ethnic minority youth communities in the U.S. (Rigolon, 2017). Poverty and household income levels also affect the living environment of young people. Children living in low-income neighborhoods are more likely to be exposed to hazardous environments (Evans, 2004). Environmental degradation and low access to urban green spaces can limit young people's time spent outside in nature and affect their well-being (Bai et al., 2013). This study aimed to investigate the issue of environmental injustice by exploring the connection among youth demographics, neighborhood socio-economic status, and children's outdoor living environment such as green space accessibility, air quality, and proximity to environmental pollution.

To address these issues, we investigated the relationship between outdoor living environments and the youth population in Prince George's County, Maryland. We collected zip code level youth racial/ethnic demographics, socio-economic backgrounds, and environmental data such as air pollution (e.g., PM2.5, Diesel PM), environmental pollution (e.g., hazardous waste proximity, traffic proximity), and green environments (e.g., parks, tree canopy coverage). We ran multiple linear regression analysis ($Y = \beta 1X1 + \beta 2X2 + \beta 3X3$) to reveal how children's different racial/ethnic backgrounds and economic status link to those environmental indicators.

Our findings show that zip codes with a higher percentage of Hispanic children and lower median household income had a higher level of air pollution. For environmental pollution, the percentage of Hispanic children had a significantly positive association with lead paint indicator and hazardous waste proximity while median household income was negatively associated with traffic proximity. Moreover, areas with a higher percentage of Hispanic children and lower median household income had lower tree canopy coverage. These results suggest that Hispanic children and children from low-income families are among the groups most affected by environmental injustices in PG County. More investment in green infrastructure and maintenance of outdoor facilities may be needed in their communities to support children with access to higher-quality urban green spaces. The findings may also help to guide the decisions planners and landscape architects make to design more accessible and inclusive green spaces for underserved communities.

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Understanding the Political, Economic, and Social Determinants of Environmental Justice in Urban Green Space: Urban Political Ecology Perspectives

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Keywords: Urban Geography

Various greening programs are being adopted worldwide as research shows the benefits of urban green space. However, scholars from Environmental Justice, Urban Planning, and Geography have argued that there exist also potential inequities regarding access to urban amenities by different groups of people. While studies mainly focus on quantifiable patterns of inequitable urban green space distribution, less efforts have been made in revealing the complex--but dynamic--roles of political, economic, and social processes in green space inequity. Therefore, we ask, what, and how are multi-faceted forces shaping and reshaping urban green space, both in time and spatial domains. This longitudinal case study examines urban green spaces in Austin, TX, which is one of the fastest growing cities in the U.S., both in population and park expansion, and undergoing segregation and gradual relocation of minorities. We bring urban political ecology perspective in addition to environmental justice as it provides spatial frameworks and concerns about human agency simultaneously. The research analyzes the complex relationships among underlying forces that serve as the justification of capital for its social and environmental goals longitudinally and spatially. It utilizes parametric spatial data that captures the covariance of socio-demographic and socio-political models using US census data, Austin Park, housing, and other secondary GIS data. Local and global regression will be used to explore the spatial variation in the relationship between variables. The anticipated results will show whether the implementation of policies will accelerate or decelerate the tendency of the displacement of vulnerable residents.

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A Plan for Renewable Rikers: Connecting Landscape, Carceral Geographies and Critical Environmental Justice Studies

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Keywords: Climate Justice, Green Infrastructure, Energy and Food Systems, Carceral Geographies, Theory and Practice

When landscape architectural practice intersects with carceral environments, it is most often through the promise of greening as a therapeutic and rehabilitative tool (Stevens et al., 2018; Tidball et al. 2014). While horticultural and gardening programs have been shown to improve personal well-being and reduce recidivism rates among incarcerated individuals, these approaches fail to challenge the underlying root causes of mass incarceration (Hazelett, 2021).

Research, for example, has documented the entangled nature between incarceration and the injustices incarcerated populations face, including disproportionate environmental and public health threats (Pellow 2019). Pellow's concept of "critical environmental justice" offers a lens in which to trace the intersections of carceral geographies and the broader spatial and environmental practices in which landscape architects situate their work. He outlines a revised definition for *environmental justice* that includes "those spaces where we live, work, learn, pray, play, and *do time*" (Pellow 2019). While carceral logics permeate the boundaries of prison walls, correctional facilities themselves are sites of environmental injustice, as they are often situated adjacent to hazardous waste sites and other polluting industries (Prison Ecology Project; Campaign to Fight Toxic Prisons).

Rikers Island in New York City, built atop a landfill and surrounded by peaker power plants, waste transfer stations, and other noxious infrastructure, offers an emblematic case study, for examining these intersections, as well as a history of community organizing and advocacy resulting in legislation to close the jail complex by 2030. As a methodology, the author will draw from her participation as the design fellow with the Renewable Rikers Coalition and will discuss how the island's future uses benefit and respond to the wishes of the people and communities that have been harmed through its long, painful history. The presentation will discuss the lessons learned from working with the broad coalition of advocates and approaches for community-guided planning that center the most historically marginalized voices. Ultimately the presentation will also expand the lenses through which designers and planners consider and approach carceral geographies.

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Developing and Teaching a Latino/a/x Landscape History and Urbanism Course: Exploring a Pedagogical Foundation Around Ethnic Design & Representation

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Keywords: Landscape Architecture History, Latino Urbanism, Latino Studies, Ethnic Design Studies, Chicano Landscape History

The history, social traditions, struggles, contributions of Latino/a/x culture and its environments, are absent from the American landscape architecture history canon. The "Latino gap" obliterates and makes invisible Latino/a/x contributions at landscape architecture programs across the United States. There is no Latino identity without a historical body of knowledge in landscape architecture. Recognizing this problem, University of Nevada Las Vegas (UNLV) decided to invest in an original and first Latino/a/x landscape history and urbanism course in the United States. The framing of the prototype course was established for Spring 2022, led by a Latino/a/x landscape architecture history professor with administrative support from a Latino/a/x director at UNLV.

The rationale for the course was twofold.

- First, until a culture has its history represented in society, they will not have an intentional visible identity. In his book Chicano Manifesto, Armando B. Rendon states that until Latino culture, language, history, origins, and evolution in the United States are studied and recognized, there will be continued suppression or loss of Latino culture in the dominant American hegemony. (Rendon, 1971).
- Second, as the Latino/a/x population in the United States continues to swell, their traditions, ideas, and stories about the land are at risk of being lost due to assimilation in our landscape architecture and architecture programs to a homogenous occupational identity. (Thompson, 2019).

The presentation will cover the rationale and theory behind the topics, assignments, and the format followed by the course. Literature was provided from theories and history of the Chicano movement and various Latino studies programs. Works by well-known anthropologists, sociologists, geographers, planners, and historians were also integrated. (See Londoño, 2021, Walters, 2021, Diaz & Torres, 2012, Canclini, 1995, Acuña, 2011, Arreola, 2004, Tosh, 2009). The emerging findings from the course survey and discussion will identify lessening the "Latino gap."

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A Spatial Analysis of Award-Winning Greenways

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Keywords: Gentrification, Design Equity, Mapping, ASLA Awards

Parks and greenspaces are seen as spaces for everyone and contributors to healthy and sustainable communities (Rigolon, 2016). Yet, many studies have documented that greenspaces are not always accessible to all–where forces such as capitalism, white supremacy, and structural racism continually reinforce the marginalization of low-income and ethnic minority groups (Byrne, Wolch, & Zhang, 2009; Fernandez et al., 2021; Rigolon et al., 2022). Communities excluded from receiving proper greenspaces cannot experience the public health benefits and sustainable amenities that they provide (Dia, 2011). These injustices have raised awareness across many cities and government agencies to actively seek to acquire underutilized land to develop into new greenspaces (Wolch, Bryne, and Newell, 2014). Landscape architecture has also recognized these disparities and states that is a professional duty for landscape architects to improve human and environmental health in all communities. However, studies have shown that when public greenspaces are sited within low-income and ethnic minority neighborhoods, it often results in green gentrification (Kronenberg et al. 2020). This research is part of a larger project that aims to reveal the distribution and frequency of designed landscapes and their role in greenspace equity and green gentrification narratives.

This paper presents the first phase of research of a study of award-winning greenway projects recognized by the ASLA through their annual professional awards program. The ASLA has recognized outstanding projects in landscape architecture that have served as indicators of the profession's values and focus. This research collected award data from 1968 to 2021 and comparatively mapped 1,271 data points in the general design, analysis and planning, and residential design categories. From this master dataset, the authors classified 127 projects that fall into the greenway project type. Greenways were chosen because they offer a larger study area since they can traverse multiple scales, socio-economic regions, and urban boundaries. Because of data availability and scope, this paper surveys a sample size of 30 greenway projects in the United States awarded between 2005 and 2021. The authors relied on the use of “equity mapping” (Talen, 1998) to document several socioeconomic indicators such as ethnicity and race, income, educational attainment, and property values and homeownership across each project site. The authors will present the results of the mapping phase and discuss the potential of the research to inform future methods of evaluating landscape projects on an “equity” scale similar to projects being evaluated for their contributions to performance and sustainability.

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A Five-Year Nationwide Study Using the Bym Model Reveals Impacts of Green Space on Police Shooting: Developing an Environmental Theory of Fatal Police Violence

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Keywords: Police Violence, Firearm, NDVI, Built Environment, Bayesian Regression Model

Introduction: Police shooting is a severe structural violence issue, especially in the United States. While it is clear that the socioeconomic status (SES) factors could affect police shooting rates, classic criminology theories including the Broken Windows Theory (BWT) and Cognition Map Theory (CMT) have proven that built environments are highly associated with crime rates. Critical gaps still exist about how the built environments, especially the green spaces would impact the police shooting.

Purpose: By understanding the mediating performance of built environmental factors, especially the green spaces in different social deprivation (SD) levels with the BYM model, we aim to propose an Environmental Theory of Fatal Police Violence based on the Structural Psychological Model of Police Violence.

Methods: The study examined the relationship between built environment and 5135 police shooting cases over five years (from January 1, 2016 to May 26, 2021) across all 3108 counties in the United States at the county level. We conducted the deterministic Bayesian method applying a Poisson regression model with the INLA (Integrated Nested Laplace Approximation) package in R. The whole design includes four hierarchical BYM regression models. Model 1 examined the associations between county-level police shooting cases and SES factors. Then, we added the crime and behavior factors. The third model continues to add the built environment factors. Finally, we added the green space factor: Normalized Difference Vegetation Index (NDVI). We applied the DIC, WAIC and adjusted R^2 to compare the performances of different models. The study brings spatial autocorrelation into analysis to rule out the geographic bias.

Results: The results reveal that a higher green space ratio significantly correlates with fewer police shooting cases with spatial autocorrelation. Such negative association is consistently significant in all social deprivation levels, and the more deprived the social status, the higher significance of the green space ratio. The model's explanatory power promotes 213% by adding the "crime and behavior" factors and keeps promoting 83% to 0.521 after adding the "built environment" data and finally reaches 0.611 with 17.3% promotion by adding the "green spaces" factor.

Conclusion: As the initial effort to study the association between green space and police shooting cases, we establish an Environmental Theory of Fatal Police Violence to interpret the findings. The model could be the possible intervention the landscape and urban planning provides to reduce police violence by designing or redesigning the built environment.

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Urban Public Space and Adolescent Wellbeing in the Tenderloin

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Keywords: Youth, Photovoice, Inclusion, Observations

Environmental justice promotes park equity, open space that is accessible and large enough to meet the needs of everyone (Rigolon 2016). This is particularly critical in dense, urban areas where adolescents have a complicated relationship with public space. A group of international scholars is updating two benchmark adolescent studies coordinated in the 1970s by Kevin Lynch (1977) and Louise Chawla in the 1990s (2002). Growing Up In Cities III (GUIC III) involves over 15 countries where researchers in twenty-four study sites examine adolescent perceptions of urban space to better understand the impact the local environment on their young lives. The update focuses on lower income and minority communities and the effects of urbanization. In light of increasing urbanization in the U.S., how does access to public space influence adolescents' wellbeing? What are the urban issues that young people identify as impacting their quality of life?

Researchers connected with youth in the Tenderloin neighborhood, the most densely populated neighborhood in San Francisco with 57,000 residents per square mile. The neighborhood has a negative reputation due to the prevalence of homelessness and street drug use, and the median household income is the lowest in the city. This presentation focuses on two methods used: observations of young people in space and a photo-voice method. For observations, researchers noted where children were present (or not), what they were doing, and other characteristics of the place. For photo-voice, youth participants took photographs of places they liked and did not like, framing them with colored frame to indicate their preference. The negative features described included a street with drug dealers, denser areas where they experienced verbal harassment (cat calls), and weedy urban gardens. Spaces that promoted their well-being included places with colorful murals and indoor places where they can gather particularly social service organizations.

During the photo-framing walks, youth primarily focused on objects in the landscape (e.g., signs, murals) or buildings where they felt welcome. Accompanying discussions of the identified spaces provided insight into their place experiences and desires for change. Their preference for several interior spaces coincides with a desire for a larger, multi-use park in the neighborhood which they do not have. The streets themselves, except for areas around youth services, were seen as not friendly, and something to move through to get somewhere. The presentation shares these findings and discusses potential improvement to the street and environs so that youth feel more welcome.

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Addressing Inequities in Design Studio Pedagogy: Reflections on Strategies, Challenges, and Resources

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Keywords: Studio Pedagogy, Equity in Design, Design Education, Critical Pedagogy, Scholarship of Teaching and Learning

These past few years have been a time of reckoning in the American landscape with various societal inequities and environmental injustices becoming obvious to many. More than ever, landscape architecture faculty and practitioners across the country are grappling with how to address issues of diversity, equity and inclusion (DEI) in what they do on a daily basis. Landscape architecture organizations, institutions, consultancies, practices and programs are examining, reflecting and responding with multiple initiatives and actions. The task is as huge as it is important - in this climate it is imperative to take stock of what initiatives are being planned and how we can all create a community of collective disciplinary progress on such topics. The goal of this panel is to create a community space and culture of co-learning and sharing specifically focused on the design studio and on the topic of equity. Outcomes from the panel will reveal not only best practices but also what gaps and opportunities exist for further research and development in this important area of landscape architecture pedagogy.
The panel brings together diverse academic and non-academic speakers to reflect on opportunities, challenges and resources to engage with issues of equity in the landscape architecture design studio pedagogy. Speakers ranging from junior and senior faculty to institutional and organizational leaders will share their perspectives on 1) Teaching Equity & Creating an Equitable Studio 2) Administration and Equity across Studios/Courses 3) Accreditation Standards on DEI and the Design Studio 4) Organizational Endeavors & the LA Design Training Expectations.

The panel provides an open forum for aligning and realigning conversations on issues concerning equity as manifested and addressed in design studios across the country and is thus structured as an interactive session with live polling and group discussions, in which audience members will participate by sharing their own challenges, successes, and shortcomings in approaches toward addressing inequities in design studio pedagogy. Because the topic of how inequities are addressed is an evolving conversation in landscape architecture, the audience will help shape the conversations in the second half of the session. A concluding discussion on topics most pertinent to the audience will help anchor future conversations and directions for more discussion and development and will become a part of the Landscape Architecture Foundation’s Education Committee report.

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Illusory Inclusivity: On the Structural Barriers to Diversify the Professoriate in Landscape Architecture Programs in the United States

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Keywords: Diversity, Equity, Barriers, Recruitment, Retention

Landscape Architecture is still at a critical moment that calls for centering social justice, equity, and inclusion as core values, critical in our potential to help us re-imagine the future of our discipline and our world. The question then is where are we in this critical moment to re-define not only our professoriate, but also our research and pedagogical practices that can disrupt systemic and structural racism in our society and institutions? We argue that if discipline is to authentically embrace justice, equity, and inclusion that intentional and sustained approaches and practices that diversify faculty in Landscape Architecture are needed.

A diverse faculty with varied perspectives benefits student learning and success by broadening what is taught and how. A diverse faculty is especially beneficial for the recruitment and mentorship of BIPOC (Black, Indigenous, and people of color) students, helping foster a culturally welcoming and inclusive learning environment (Collins and Kritsonis 2006). Yet, less than 2.0% of some 996 faculty in landscape architecture programs in the U.S. are Black (Solano 2021). However, for programs wanting to increase faculty diversity, systemic and institutional barriers in recruitment, retention, promotion, and support for success must be addressed (Matthew 2016; Williams 2021; 12 Women Scholars 2021).

To understand the various challenges that landscape architecture faculty, especially BIPOC faculty, face in terms of hiring, retention, promotion, and overall success, we developed a two-phase mixed methods exploratory research design. Phase- one included a nationally disseminated online survey for landscape architecture practitioners and academics. The questionnaire included questions about faculty members' personal experiences and perceptions of recruitment, hiring, and retention. Phase- two included semi-structured interviews that focused on personal experiences related to mentorship, gatekeeping, and challenges facing the landscape architecture profession if we do not diversify faculty. Overall findings from this two-phase study will support the development of the Landscape Architecture Foundation's Education Committee's paper, Confronting the Illusion of Inclusion. The paper will provide recommendations for re-imagining the academic department, pedagogy, and academic culture to ensure that diverse faculty can thrive and contribute.

In this panel, we will present key findings from both phases of our study, then dedicate the majority of the time to facilitating a discussion and exchange of ideas about DEIB programs and initiatives to set a path forward for re-imagining the academic climate and culture in Landscape Architecture programs towards a more diverse, equitable and inclusive future.

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Equity at Work: Designing an Inclusive and Equitable Workplace Culture

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Keywords: Racial Justice, Design Practice, Applied Research, Workplace Culture, Equity and Inclusion

Our built environments are designed and constructed on legacies of racism and white supremacy. This is partially due to built environment design professions (Architecture, Interior Design, Landscape Architecture, Urban Design + Planning) that are historically and currently non-representative of national racial demographics. To move towards equitable and just built environments, design practices must be anti-racist in all aspects including 'who' is designing and 'how' they design. 'Equity at Work,' explores the intersections of racial justice and design practice to better understand how workplace culture affects the retention of professionals of color.

This research advances knowledge about anti-racist design practice by centering professionals of color and their perceptions of workplace culture. This research asks: How do perceptions of workplace culture differ among racial and ethnic groups; and What workplace cultural changes would better support professionals of color? Twenty-three workplace cultural factors were identified through an initial literature review. A survey collected the perceptions of these factors along with demographic information. The survey was distributed nationally and received 575 responses, 26% of which came from self-identified professionals of color. Ten survey participants volunteered for semi-structured interviews and provided invaluable anecdotal data about their lived experience.

Through various methods of survey data analysis, three primary findings emerge. The first shows respondents, independent of racial and ethnic identity, identified similar cultural factors that require the most improvement. The second describes an uneven experience of the workplace between white respondents and Respondents of Color, based on statistically significant differences in survey responses. The third finding characterizes two different types of cultural factors, tangible and intangible, and suggests that intangible factors are more closely associated with longer employee retention rates. These findings demonstrate that tailoring workplace culture to the needs, safety, comfort, and inclusion of professionals of color benefits everyone. The findings also suggest that the complex social and emotional aspects of work, particularly for professionals of color, be emphasized to improve workplace culture and increase employee retention.

The synthesis of the primary findings informs ten recommendations to catalyze a more equitable and just workplace culture. Some recommendations include creating justice and equity committees, assessing workplace culture regularly, and addressing pay scale transparency. The findings and recommendations were distributed widely to support a paradigmatic shift in our understanding of workplace culture and to foster more equitable design practice.

This applied research benefitted from collaboration between academia and design practice and models the mutual benefit between study and practice.

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Teaching Equity in the Design Studio

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Keywords: Landscape Architecture Education, Equity in Design Education, Design Studio Pedagogy

The design studio is often the environment where students have an opportunity to practice a culmination of knowledge and skills learned in the landscape architecture curriculum, and express their ideas, identities and backgrounds to an audience of peers, reviewers and instructors. It is here where students begin to develop their voice and find their place within the field of landscape architecture. The design studio is also the environment where instructors have the greatest opportunity to influence design ideologies and methods of students, imparted by sharing their own images, precedent work, thoughts, and perspectives. Instructors have the power to define what topics and projects to focus on which impact spaces that are inclusive of diverse perspectives or create an environment that censors them.

The goal of this study is to shine a light on landscape architectural educators' understanding of how and to what extent inequities are taught/addressed in landscape architecture design studios. Per LAAB, equity is "the fair treatment, access, opportunity, and advancement for all people, while at the same time striving to identify and eliminate barriers that have prevented the full participation of some groups". This study uses surveys and focus groups that target current students, studio instructors, and program leadership to identify inequities found in areas such as studio topics, studio culture, readings, and more. These methods document programs' practices in design schools across the United States, including mandated teaching/training, what topics are addressed and the methods of how inequities are engaged with, various course instruction evaluations, among other criteria.

Arguably, the design studio has the greatest impact on landscape architecture students' careers by the hours spent focused on studio projects. As the field strives to actively attract, foster, and develop diverse and underrepresented students and instructors alike, it is most apparent and essential to examine studio instruction, specifically how inequities are communicated (consciously and subconsciously) and addressed through the content, methods and environments employed to teach design studios. Findings from this study provide us insight about instructional practices addressing inequities in academic design studio culture, to better serve students, instructors and program leadership who are seeking and demanding a better address of disparities and threats to justice. Such ongoing investigations have the ability to influence change in studio practices, from one-time initiatives focused on issues around equity to long-term sustained practices as the standard and norm.

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From Wasteland to a Cultural Landscape: An Examination of the Archaeological, Cultural and Ecological Intersection Khotale's Petroglyphs in the Konkan Region of Maharashtra, India

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Keywords: Climate Change Conflict, Bio-Cultural Diversity, Community Based Collaboration, Decolonization, Oral and Spatial Landscape Narratives

Strategically located along the Konkan coastal region of Maharashtra in India, are biologically and culturally diverse sites of petroglyphs, roughly 12,000 years old in the Neolithic Period (Dalvi, 1990). The sites are situated in distinct laterite plateaus called ‘Sada’ which hold a unique habitat known as rock outcrop. There are about 1000 petroglyphs in various sizes documented across 52+ villages. (Garge, 2021)

Khotale is one such remote village in Sindhudurg that stands as a model for the complexity that late-stage capitalism, colonialism and climate change conflicts have brought about. It is inhabited by goat herders (Dhangars), who are the guardians of the ecosystem of this rock outcrop landscape. Over the summer of 2022, I spent a month conducting original documentation of the Dhangarwadi of Khotale. One of the major findings of this visit 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. My research will examine the “thick” (Hirsch, 2016) archaeological, cultural, and ecological landscape intersections in this region.

The rock outcrop plateau is an ecosystem of unique landscape processes that involve very slow soil formation in the crevices and depressions of exposed laterite rock. The landscape undergoes a transformation from extreme hot-dry conditions in the summer, to continuous rainfall in the monsoon, resulting in the emergence of ephemeral wetlands and seasonal endangered species of ephemeral flush vegetation (EFV) (Watve, 2008). In the experience of walking and spending several weeks on the plateau, through community based collaborative methods, I mapped and documented using various media like drawing, video and photographs the changing landscape characters (both natural and manmade). My argument is that this greatly affects the perception of the archaeological sites that are situated within the ‘structures’ of the landscape - a point of view that is missing from the existing discourse around petroglyphs of Konkan.

This decolonial method of documentation is a critical narrative building exercise to bridge the community-based relationships between ancient history and unique biodiversity of Khotale which may be in the form of oral, spatial and landscape narratives to bring forth the landscape value of this region. This essay aims to bring together participatory action research, interdisciplinary methods of landscape architecture enquiry, the role of art and the maker in archaeology and positionality as feminist auto-ethnography in decolonial methods.

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Examining the Walking Environment for More Inclusive Metro-Park Integration

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Keywords: Metro, urban parks, barrier-free, walking sheds, pedestrian environment

Urban parks and green spaces afford salutatory place for the citizens 'nature exposure and social integration, thereby being recognized as ecological and cultural infrastructure in the recent decades. Promising functions and roles may be leveraged or even multiplied if combined with other infrastructure more closely. Metro, expensive and exceptional infrastructure promotes the city's livability and vibrancy with efficient and equitable mass mobility. Examining how the metro stations and urban parks are connected, particularly for the pedestrian including the disabled and senior, is critical to diagnose the inclusiveness of metro-park pedestrian environment and give some prescriptions. With a Chinese megacity Nanjing as case study, we investigated the physical and perceived environment of a metro line's all stations and the nearby parks, covering walking-shed, barrier-free facilities and accessible signs.

The research methods involve geo-data scraping, field work investigation, spatial analysis and interception survey in parks and neighborhoods. The results show that, first, the differentia of service area and population was significant either within 5, 10 or 15min walking distance. Urban form and sidewalk facility contribute to uneven accessibility. Second, the barrier free condition was generally acceptable although failure of design, maintenance and management all lead to some inaccessible portions dwindling the metro-park walking-shed for the disabled. Third, relevant perception, usage and suggestions were collected with survey conducted in neighborhoods and parks. Unexpectedly, many residents and visitors (including the disabled) were unaware to what extent the metro line can enlarge their park options, and where the metro-park walking environment were barrier free accessible. Also, the ubiquitously used navigation map APPs on smart phone were not always reliable in terms of shortest or barrier-free routes suggestion. These findings may unravel the mismatch or underused potential of the two infrastructures in the rapid urbanization and aging society, as well as shed lights on reinforcing TOD's benefits with more accessible parks integrated.

Aiming to calling on actions, we used first-person view and 360 degree cameras to capture the pedestrian environment for sharing with the public and policy-makers. To provide a more immersive and convincing narrative, we choreographed the investigation videos and visualized analysis into a short film, to present how inclusive is the "last mile" that may expand all the citizens' equal accessibility to the parks.

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Where are We? An Experiential Visual Analysis of Black Faculty in Landscape Architecture

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Black faculty only make up 5% of the total number of faculty in the United States which is approximately 832,119 people (2019, United States Department of Education). In the field of landscape architecture, the number of black faculty is far below the national average representing less than 2% of the total number of landscape architecture faculty in the United States. Where are We? Is a research project that investigates the career journeys and experiences of black faculty members in landscape architecture as they have navigated their degree programs, trajectories, and career advancements.

The research is divided into two critical phases. In phase one, the researchers focused on the results of a demographic questionnaire shared with 19 Black faculty in landscape architecture programs across the United States. Approximately, 78% (n=15) of the invited faculty participated in the survey that centered on educational and career migration patterns. The findings were visualized through a set of critical cartographies and infographics guided by the tenets of W.E.B Dubois' Data Visualizations, Space and Place, and Deep Mapping. Phase two of the research focuses on the results from 10 semi-structured interviews of faculty who participated in the demographic survey. This phase shifts from the spatial patterns of migration to the experiential qualities of an individual's career journey. The interview process is guided by the following questions: (1) What role does race, and racism combined with location play in the career journeys of faculty of color in landscape architecture? (2) How does our racial identity influence our research? (3) How do faculty of color make meaning of their career journey and their experiences? (4) What are the challenges and strengths of teaching landscape architecture at minority-serving institutions, predominantly White institutions, or historically Black colleges and universities (HBCU)? Furthermore, the interviews explore career experiences including job search processes, faculty roles, relationships, transitions, career decisions, and aspirations. Through Critical Race Spatial Analyses, interview results are cross-referenced with migration patterns from phase one to reveal the relationship between race, space, place, and the career experiences of Black faculty.

Through data visualizations, mapping, and narrative expressions, the authors anticipate that these findings will provide insight and call attention to experiential and structural apparatus that contribute to inequities experienced in academia. This study will have implications for diversity, equity, and inclusion research, practice, and policy for institutions of higher education, in particular those with landscape architecture programs.

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Improving Alleys in an Underrepresented Neighborhood to Promote Community Livability and Resiliency

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Keywords: Neighborhood Alley, Community Redevelopment, Environmental Justice, Resilient and Livable Community, Small-Scale Design

A small town in Sinwol-dong is located in the vicinity of one of the international airports in Seoul, South Korea. The community members have suffered from the noise as the planes take off and land on runways. Residents of the town are mostly tenants who are lower- and mid-income families. Like other underserved communities, the town is facing not only noise pollution from the adjacent airport but also degradation of infrastructure and unsafe community conditions including a lack of sidewalks and overwhelming traffic issues. They have complained about the noise, but residents have not been provided with proper compensation or any treatment for the noise. Some have been provided with reinforcement of windows and new AC units so that they can keep their windows closed to prevent the noise from planes. However, those amendments were not sufficient for the community to feel safe and livable in their neighborhood and their complaints continued.

In an effort to seek more sustainable methods of improving the living conditions of residents, the Korea Airport Corporation (KAC) has put out an RFP (request for proposal) for a small-scale improvement plan for the neighborhood areas. A non-profit landscape architecture organization focusing on neighborhood regeneration has been selected to work on the project. The first-year project, in which the author was involved, was a pilot project to test the effectiveness of the small-scale improvement plan. Their work with KAC continues until now with three additional projects for about five years. The small-scale interventions include alley improvement with a smart planter, solar-powered light fixtures, community gathering space with a garden, wall planters, wall and pavement remodeling, and more. The construction increased the amount of vegetation, reworked degraded infrastructure, and provided gathering space so that residents could feel safer and more comfortable living and walking in the neighborhood.

This study investigates the design applications of each project and post-construction evaluation by analyzing the five-year neighborhood alley improvement project through surveys comparing residents' feedback on the construction before and after the improvements. While the data is analyzed, the study will contribute to expanding the comprehensive knowledge of community improvement plans by revealing the importance of sustainable approaches that make a practical and meaningful impact on underrepresented communities that are suffering from surrounding living conditions regarding noise pollution and infrastructure degradation. The author will also discuss the importance of collaboration among different agencies and their roles to achieve successful community improvement.

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The Publicness of Space

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Keywords: Public Parks, Value of Design, Just Landscapes, Methodology

In the wake of social upheaval in the United States over the last half a decade and our national reckoning with a history of racial injustice and violence, we must as a field grapple with the ongoing role of designed landscapes in perpetuating the segregation of "public" spaces. While it is undoubtably true that landscape architecture can produce works that create unbounded joy, support community health, and regenerate damaged ecological systems; as a profession we must also learn to recognize the ways that our projects - from modest neighborhood interventions to our most celebrated works have contributed to the systems that perpetuate divisions and the racial and economic violence evident across the United States.

To do this, students and professionals must learn to identify the ways that parks serve/d to separate people and reinforce divisions, developing strategies to counteract this separation and redesign sites and systems to truly serve a broad public. This is a vital area of interaction between academic work and professional practice. This paper will examine one way that this process of critical questioning led to a research agenda about the relationship between parks and racial segregation in Dallas, Texas. The research in turn shaped my professional practice from project pursuit and framing to successful interviews, and ultimately to designed and constructed landscapes that actively seek to address historic inequities.

By developing the skills to uncover and articulate uncomfortable histories, landscape architects can frame design projects with a truthful recognition of a community's trauma. Learning to do this without deflecting blame and while acknowledging our role in a painful past will position the profession to not only rebuild trust but to also be the conveners and designers of a more just built environment. One that can truly act in the public interest.

This paper will review the research methodology, its challenges and successes, how it can be applied to varied circumstances, and ultimately the emergence of new questions whose answers are critical to the future of our profession: What value (environmental, social, recreational, economic, etc.) are we, as a profession, best at providing through landscape architectural design services? What era of public parks have we been in (for the last 30 years – Sustainable Parks?) and what era do we desire to initiate today (following Galen Cranz, Politics of Park Design approximate 30-year cycles)? Can we enter an era defined by the creation of Just landscapes?

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Historic Redlining and Pedestrian Safety in U.S. Cities

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Keywords: Pedestrian safety, Equity, Geospatial analysis, History

BACKGROUND
Pedestrian deaths continue to rise in the US, reaching the highest in 40 years with almost 7500 deaths in 2021 (New Projection: U.S. Pedestrian Fatalities Reach Highest Level in 40 Years, 2022), and certain groups (e.g., low-income minorities) are disproportionately affected. On the other hand, the legacy of historic redlining by the Home Owners' Loan Corporation (HOLC) still remains in many urban communities in the US. Significant relationships have been found between redlined neighborhoods and various urban and health issues/disparities. However, little research has been conducted thus far on the potential impact of historic redlining on pedestrian safety today.

PURPOSE
With an aim to contribute to better understanding disparities in pedestrian safety, this study explores the association between historic redlining and pedestrian safety in three major US cities. The study hypothesizes that the HOLC risk grades have influenced the process of urban development and maintenance of street environments leading to racial and spatial inequities in pedestrian safety.
Methods: Austin, TX, Los Angeles, CA, and Philadelphia, PA were selected for this study to represent diverse regional locations and different population sizes and because they had suitable open-source data (e.g., pedestrian crashes, Annual average daily traffic, and built environment data) needed for this study. Using descriptive statistics and negative binomial models, we examined the possible effects of historical redlining on pedestrian safety measured as the number of pedestrian crashes (total counts from 2015 to 2019).

FINDINGS
Results showed significant relationships between historically redlined neighborhoods and pedestrian crash counts in all three cities. From the bivariate analysis, the C and D-rated neighborhoods showed significantly higher correlations with crash counts than the neighborhoods with higher ratings. This relationship maintained the significance after controlling traffic volume, population, and street environment variables such as the number of sidewalks and crosswalks. Historically D-graded areas showed a significantly higher number of pedestrian crashes. Also, there was some significant association between the number of pedestrian crashes and race.

CONCLUSION
This analysis across three US cities suggests that the redlining legacy may still contribute to the chronic pedestrian safety inequities in urban areas. Although further analysis is needed, this study underscores the role of historical discriminatory guidelines on disparities in pedestrian safety and the importance of equity-based safe management policies.

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The Latino Academic Presence: Four Faculty Perspectives and Their Current Roles in Landscape Architecture Education

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Keywords: Landscape architecture education, Latino studies, Latino Pedagogy, Latino faculty, Diversity

Becoming aware of what is required of faculty members, learning to approach the subjects we teach, learning the needs and expectations of students and university, traversing the university tenure system, and accumulating university experiences are what fashion the life of any faculty instructor. How are these same issues experienced and perceived by "first gen" Latino faculty?

This panel hopes to engage the audience in presenting a Latino reference point in the landscape architecture academy. Four Latino presenters (a Latino administrator, a Latino PhD, a Latina faculty, and a Latino senior faculty) express how they are defining their roles and explain their participation in the "Latinization" of the discipline.

Latinos want to consciously be responsible for their own development and accountability in the production of their roles in landscape architecture rather than having roles imposed on them by others, especially by traditional White Anglo Europeans that drive most landscape architecture programs. Decolonization, diversity, and inclusion can mean different things in different situations but here on this panel, the diversity of the speakers positions in academia draws the discussion specifically around Latinos in academics. The panel intends to create a holistic emergent picture for re-aligning the current issues affecting Latino leadership, representation, and participation in academia.

Panel participants span various years of experience in the academic arena, and they serve in positions that exemplify the many typical faculty assignments. The panel will draw on insights gained from their experiences and each speaker will give their own perspective about their Latino identity and how it impacts them specifically in doing their work. Topics for discussion also include:

- What are the difficult academic situations Latinos encounter in their academic careers and in approaching teaching?
- What happens to Latinos in programs of landscape architecture?
- What are their methods and approaches in studios/classes and/ or their administrative implementation of a program.
- How and what is their role in representation of Latino culture to their students and in their program?
- How does a Latino presence provide plurality and the possibility of creating a pluralist landscape architecture education?
- What are some ways they are acting on and providing a push to full integration of Latinos as viable contributors to American landscape education and design.

GEO-SPATIAL & DIGITAL ANALYTICS

Geo-spatial and Digital Analytics

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Picturing Simmons Row: New Heritage Strategies for Interpreting Relicts of the Bottom in Wake Forest, North Carolina

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Keywords: Authorized Heritage Discourse, New Heritage , Black Vernacular Homespaces, Critical Visualization, the Bottom

The aim of this master's thesis was to propose an interpretive design strategy for Simmons Row, a demolished row of Black working-class tenant housing and relict of “the Bottom” in the Northeast Community of Wake Forest, North Carolina (Davis, 2018). Today, the Ailey Young House stands as the sole remnant of Simmons Row, with little other visible evidence to suggest its former landscape context. To address this problem, I employed abductive reasoning to ascertain what, if any, new heritage visualization approach might be merited (Kolko, 2010; González-Tennant and González-Tennant, 2016). After conducting baseline historical research to better understand the development and disappearance of Simmons Row as well as the lives of its rural, working-class Black residents, I compiled a detailed site history before describing and analyzing Simmons Row as a relict Black vernacular homespace (Battle-Baptiste, 2016). I then conducted a situation analysis in order to identify specific problems, contextual factors, and constraints pertaining to the digital visualization of Simmons Row and selected a representative sample of new heritage praxis centered on relict Black vernacular landscapes to analyze via the multiple case method (Stake, 2006). In each case, I articulated the specific design situations, grounding theoretical frameworks, and visualization methodologies employed by practitioners to visualize each site (Salustri, 2020). Summary results of this multiple case study were assessed for their relevance to the Simmons Row design situation in order to derive a suite of “smart” practices (Bardach, 2011). By synthesizing these “smart” practices under the VMOSA strategic planning framework, I arrived at a comprehensive strategic action plan for digitally visualizing Simmons Row (Nagy and Fawcett, n.d.). In this instance, I determined that a map-based solution building on an existing Esri Story Map would be ideal. More generally, however, while new heritage offers a useful framework and expansive toolkit for critically visualizing relict vernacular landscapes, its lasting efficacy lies in selecting the tools most appropriately suited to the task (Kwan, 2015). Ultimately, practitioners must reflect on the ultimate intent of their visualizations and the degree to which they serve to either bring marginalized histories to light or further obscure them. My hope is that the results of this research may not only equip a future project team with the tools needed to critically visualize Simmons Row but may also inform parallel strategies for other sites similarly undervalued by the authorized heritage discourse (Smith, 2006).

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Examining the Built Environment for Youth in Child Friendly Cities

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Keywords: Child-friendly Cities, Research Methods, Spatial Mapping, Open Space, Social Equity

Previous research shows that public outdoor spaces can play a critical role in ensuring that young people have access to environments that support their physical, mental, and social health (Owens, 2020). Growing Up in Cities (GUIC) is multinational effort to understand community environments from the perspective of youth and builds upon earlier findings of Lynch (1977) and Chawla (2002). Teams of researchers in more than a dozen countries are documenting how young people (aged 10 to 18) perceive and use their local environments and are identifying the urban environment indicators that promote youth well-being and quality of life (Deakin University, 2020). Societal and environmental factors such as racial disparities, climate change, reliance on technology, and urban growth impact these public landscapes. In addition, lower income communities and communities of color frequently receive lower investments of funding for public space allocations and improvements (Joassart-Marcelli, 2010). Conducted in two phases, the main objective of the research being conducted in the U.S. is to examine the availability and quality of outdoor environments available to youth in select neighborhoods in each of the four United Nations International Children's Emergency Fund's (UNICEF) designated Child Friendly Cities in North America – Houston, TX, Minneapolis, MN, Prince George County, Maryland, and San Francisco, California. Using the City of San Francisco as the prototype, this presentation focuses on the first phase of research -- the selection of neighborhoods for an in-depth analysis. This phase included the collection of three types of data (socio-economic, physical environment, and health outcomes), the mapping of this data, and spatial analysis. A geographic information systems (GIS) approach was used to examine disparities in access to open space and parks, and how this access varied between neighborhoods of different income levels and ethnicities and compared various health measures across San Francisco. The data mapping and analysis was performed at the zip code tabulation area (ZCTA) level. Preliminary findings indicate that ZCTAs with lower median income have fewer environmental amenities (e.g., park acreage, number of parks, and other open space). The findings of this phase will inform more in-depth data collection at the neighborhood level including qualitative assessments of the physical environment by local youth. Furthermore, other cities can use this framework to analyze disparities between neighborhoods and as a tool to inform policies that promote youth wellbeing and quality of life.

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Sponge City for Whom? Identify and Categorize the Vulnerable Neighborhoods in Zhengzhou

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Keywords: Sponge City, Social Vulnerability, Flood Risk, Stormwater Management

In 2015, China initiated the Sponge City program to address nationwide urban stormwater management issues caused by decades of rapid urbanization and land cover changes. However, after Zhengzhou's record-breaking flood hazard on July 20th, 2021, the tragic deaths and severe economic losses raised doubts and criticisms of Sponge City's rationality from a social perspective. How could planners incorporate the social dimension into Sponge City plans to prioritize the vulnerable communities? With Zhengzhou as an experimental site, this research introduces an interactive toolkit based on quantitative identification and categorization. It first identifies the neighborhoods prone to flooding hazards with flood risk and social vulnerability assessments. Then, it categorizes all neighborhoods in Zhengzhou center city into 8 groups based on demographic, socio-economic, healthcare, and living conditions. Results show a geospatial mismatch between the existing Sponge City plan and the socially vulnerable areas, particularly in Neighborhoods with Senior Care, Dense Low-rise with Culture assets and Opportunities, Dense Residential Communities, and Subway Concentration. The results are further presented as an interactive toolkit to help Sponge City planners understand Zhengzhou's social vulnerability. This paper contributes to planners, researchers, and policymakers from the social dimension by targeting the vulnerable communities, for whom the Sponge City program should be implemented.

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Delineating Three Types of Urban Seniors' Activity Spaces: A Preliminary Method of Better Understanding Activities in Residential and Non-residential Areas for Aging-In-Place Planning Bases

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Keywords: activity space, urban seniors, aging in place, residential area, non-residential area

In the recent discussions of realizing aging-in-place neighborhoods for the urban seniors' healthy and vital lives, most studies have explored residential neighborhood characteristics (e.g., neighborhood walkability) promoting active living of seniors [1-3]. Recently, however, a few studies have maintained that non-residential areas can also be a relevant context for health, social interaction, and well-being [4-6]. These studies have investigated daily activities or physiological symptoms of urban seniors. Yet, few studies focused on walking behavior which is a primary health-related activity in non-residential areas. To implement substantial planning for active and healthy aging, it is critical to better understand urban seniors' activities in non-residential areas, as well as those in residential areas.

This study aims to examine the role of non-residential areas in terms of urban seniors' active living and social interaction. We investigated daily activities of urban seniors such as shopping and socializing both in residential areas and in non-residential areas. We used the concept of activity space for identifying relevant spatial extents of individuals' daily activities based on location data rather than using administrative boundaries or home-based buffers [7-9]. To classify residential and non-residential activity spaces, we delineated three types of activity spaces: walking-based, public transport-based, and automobile-based activity spaces.

The data were collected by using the Day Reconstruction Method in 2017 from 66 urban seniors living in Mangwon-dong, Seoul. Mangwon-dong is a low-rise, high-density, mixed-use, and public transport-friendly residential area. The data included a week-long travel diary, walking routes (GPS), and step counts. We examined places visited, walking activities, and social interactions are examined for each of the three activity spaces. And activity patterns of urban seniors differentiated in those activity spaces are analyzed.

The major findings of the study are as follows. First, the results indicated differences in places visited, types of social interactions, and walking activities among the three activity spaces. Also, active activity patterns appeared in public transport-based activity spaces; meanwhile, automobile-based activity spaces often contain rather passive activity patterns.

Based on the findings, we could empirically identify how the urban seniors visited certain places, by either walking, using public transportation, or driving a car and how they engaged in physical and social activities in residential and non-residential areas. This study helps to provide new implications for more effective aging-in-place planning approaches by illuminating the physical activities and social interactions of urban seniors not only in residential areas but also in non-residential areas.

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Morphology / Ecology Mapping for Small-Town Lebanon

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Keywords: GIS, Vernacular Landscape, Middle East, Land Planning, Land Cover Land Use

This study proposes a methodology for creating a land use classification system for mapping small towns where zoning is either non-existent or unenforced. The pillar of this methodology is a site-specific land cover classification system that integrates the natural and the built environment. This methodology would especially be useful for areas with spatial data shortage and where land uses are intertwined. In Lebanon, there are few efforts that generate detailed maps for regions outside major cities. In fact, the national remote sensing center is one of the few institutions that aim to continuously generate a spatial image of the built (and natural) environments in Lebanon. The categorization systems typically deployed is largely inspired by existing international standard Land cover Land Use (LCLU) classification systems such as the International Geosphere-Biosphere Program (Loveland et al., 1999), the U.S. Geological Survey (Anderson, 1976), and the COoRdination of INformation on the Environment (CORINE) in 1985 (Kosztra et al., 2017). Tailored for natural resource management, these systems normally assume that built environments are homogenous with prescribed functions (single-family residential, commercial, industrial). However, this is rarely the case in Lebanon.

LCLU maps can be produced rapidly to satisfy regional – and to some extent local –planning needs in Lebanon. This study examines the existing LCLU classification system used by the national remote sensing center and proposes new categories for the built environment based on site-specific criteria. The aim for the new categories (or classes) is to reflect the different typologies in the built environment to inform planning efforts more thoroughly. The study investigates the Beqaa Valley, a region primarily inhabited by towns and small villages. Photos and field notes of 150 points were collected using ESRI Survey123. The points were then assessed using five criteria: 1) architectural heterogeneity; 2) land use heterogeneity; 3) density; 4) open space; and 5) street grid. Combinations of these criteria were synthesized into distinct classes.

Lastly, the study applies this classification system using an unsupervised classification process to generate a map to compare with LCLU maps currently in use.

In summary, this study questions how regional mapping efforts in Lebanon categorize built and natural environments in rural and small-town regions and proposes a categorization process that factors in specific land uses and place character, yielding a revised classification system. Lastly, the study applies the proposed classification system using remote sensing classification techniques.

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Developing a Workflow for Students to Perform Remote Walkability Data Collection and Analysis

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Keywords: CDC HOP Program, ArcGIS, Walk Audit

In 2019, UGA's College of Environment and Design began working in partnership with the College of Public Health on the CDC HOP Program. This program relies on partnerships between Land Grant Universities, their Extension Agents, and community stakeholders to improve the health of underserved rural communities. The HOP Program utilizes a two-pronged strategy for accomplishing these goals: nutrition and physical activity. The nutrition strategy attempts to improve the food system to increase access to healthier food. The physical activity strategy attempts to provide active routes to everyday destinations.

The CDCs physical activity strategy uses walk audits to identify opportunities and constraints in the built environment. Rural communities lack the resources to conduct large infrastructure improvement projects. Therefore, it is critical that proposed improvements follow a path of least site resistance to maximize resources. COVID-19 eliminated all travel to the subject communities. Travel restrictions required a new methodology for conducting the walk audits remotely.

A 3rd year BLA studio held a zoom meeting with community residents and stakeholders to determine needs, wants and aspirations for improving walkability. The stakeholder group identified areas in the community where they felt design interventions could have the greatest impact. Students began using Google Street View to conduct walk audits and record their observations about existing site conditions on an Excel spreadsheet. The spreadsheet was utilized to produce a graphically based composite inventory and analysis of opportunities and constraints.

The workflow was modified by importing the spreadsheet into ArcGIS. Students were then taught how to utilize ArcGIS to perform a graphical analysis using the imported data table. The final step was creating a workflow that allows the students to record walk audit data directly into GIS as they are using Google Street View. This enabled students to combine all their analysis data in a real-time, efficient manner. Analyses were used to propose design interventions for each subject community.

Through the incorporation of this workflow into studio pedagogy, students gained skills in navigating MS Excel, ArcGIS, and Google Street View programs. The workflow created new opportunities for developing skills necessary to operate various applications, and insight into evidence-based design.
Relaxed travel restrictions allowed subsequent classes to obtain in person feedback from the subject communities. The presentation will briefly review community feedback and subsequent goals for intervention.

The presentation will review research methodologies for conducting remote walk audits and suggest improvements and future implications.

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Identification of Landscape Preference Based on Geotagged Social Media Data at Atlanta, Georgia

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Keywords: Geotagged Data, Spatial-temporal Distribution Analysis, Landscape Preference, Atlanta, Data Mining

Over the past decade, research sources associated with big data and social networks have played a prominent role in geo-information research. Using social media platforms as data sources engages public participation and real-time analytics when considering landscape planning and design. Researchers have explored this approach through various lenses. For example, geotagged information from Twitter data was used to understand tourist flows in an Italian city (Chua et al., 2016); user-specific travel recommendations were created based on site users' geotagged Flickr data (Majid et al., 2012); use review data to explore the landscape preference in urban landscape projects (Song et al. 2021); and sentiment changes in tourist flows were identified from Sina Weibo data, where strong sentiment was found to be linked with attractions (Jiang et al., 2021). However, there is a need to tie these approaches more strongly to landscape design and planning. This study uses social media data to identify the users' spatial-temporal distribution and landscape preference in Atlanta, Georgia, by using ArcGIS. Geotagged photographs on Flickr serve as the resource for this investigation. The results reveal users' landscape preferences, uncovering the desirability of high-density commercial areas in mid and east Atlanta, near Centennial Olympic Park, Peachtree Center, and Martin-Luther King, Jr National Historical Park. Research analysis led to predictions for the future hot spots for the city. This study provides a new perspective on urban planning by analyzing social media data to identify the users' landscape preferences at a city-wide scale in Atlanta.

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Unmanned Aerial Vehicles in Visual Impact Assessments and Resource Management: Developing Standards for Landscape Architecture

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Keywords: Drone/RPAS, Fieldwork, Resource Analysis, Site Inventory, Spatial Analysis

UAV technology, also known as RPAS (Transport Canada, 2020), is increasing in popularity in many fields (Yang et al., 2020). Many industries are using UAVs to facilitate fieldwork, for photo interpretation, and to save time and money (Koh & Wich, 2012). UAVs can capture high-resolution photography and videography; some drones can be fitted with thermal sensors or LiDAR for specific purposes (Kullmann, 2018).

Visual Impact Assessments or VIAs use photographic simulations that may have a narrower field-of-view ranging from 40 to 60 degrees, whereas human field-of-vision ranges from 120 to 200 degrees (Corry, 2011). Smartphones in today's age are capable of panoramic photos which encompass a wider field of vision to mimic human experience. UAV cameras and sensors often have a wider field-of-vision and can easily capture a panoramic photo with stabilizers for camera/sensors (gimbal).

As more practicing Landscape Architects explore using UAVs in the industry (Cureton, 2021), it is essential to highlight how UAVs can be used to improve the VIA process and better understand site resources (George, 2016). For this project, a focus on Ontario, Canada is applied, and the Niagara Escarpment Region, due to its requirements for development projects to undergo VIAs.

The purpose of this research is to explore how VIA and resource management can be improved by using UAVs and how to incorporate UAV usage into a best practices guideline. This can lead to more accurate inventory and analysis of a project site as data is user-controlled and current.

Methods used in this research include: 1) Comparative Analysis of VIAs with UAV data and current methods, 2) Develop a Best Practices Guide for practicing Landscape Architects on Collecting Data with UAVs, and 3) Invite key informants from the UAV and Landscape Architecture industries to review the Best Practices Guide.

This research will demonstrate how the use of UAVs can effectively collect photo-data for VIAs and Resource Inventory and Analysis compared to present methods. A Best Practices Guide will be developed that has been reviewed by industry professionals, that is informed by UAV-assisted VIA case studies.

Some of the outcomes of this research will include: 1) Better awareness of UAVs in the industry. 2) Recognize opportunities for using drones to improve VIAs and changes from older methods, 3) a Reviewed Best Practices Guide for Landscape Architects: Collecting Data with Drones for Visual Impact Assessments and Resource Management.

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Using Social Media and Mobile Phone Data for Park Performance Assessments

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Keywords: Landscape Performance Assessment, Big Data Analysis

Assessing the social benefit of a project is becoming increasingly important in landscape performance assessment (Yang et al., 2016). While the survey is most commonly used, Big Data analysis offers a new and powerful way to study visitors' sentiment, urban park activities, and their impact on urban parks (Guo et al., 2022). To meet the needs of park users, planners and designers must know what park users want to do and how they want the park to offer different activities (Sim & Miller, 2019).

Similar to a consumer deciding what to buy, when people try to choose which park to visit for leisure and recreation, they often consult online sources where others that have visited these places share and rate their experiences. Such crowdsourced data are excellent sources for park researchers to quickly understand the most popular design features and areas of improvement in the park. Similarly, using mobile phone location data gleaned from park visitors, we can create spatiotemporal and sociotemporal profiles to demonstrate the inclusivity and diversity of the public space. While using ubiquitously available internet data has become very common in business analyses, its potential in informing park performance assessments has not been fully realized.

This study reviews previous research using social media and mobile phone data to assess the performance of public parks and other recreational spaces. It then showcases a case study of the Lewisburg Area Recreation Park, Lewisburg, PA, using data from Google Maps reviews and passively captured mobile phone location data. We focus on assessing the most popular features of the park and analyzing the visitorship and their profiles. For example, the visit age profile data derived from mobile phone location data shows that most of the visitor belongs to the age group below 18 years old or above 65 years old, which may conclude that the park is potential for an intergenerational bonding activity space. Finally, we discuss the technique’s strengths and weaknesses for assessing the performance of urban parks.

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Using an EXTRACTION, MATCHING, STITCHING, REFINEMENT (EMSR) Method in Generating Panorama for Site Inventory in Landscape Design Process

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Keywords: Panorama Images, Site Inventory, Landscape Design, Image Stitching, Image Refinement

A Panorama is a combination of images that has overlapping area, which are commonly used to improve the process of site inventory and analysis in landscape design. The existing panorama techniques on the landscape design are highly depended on the recognition of color, thus they fail to stitch individual images from different exposure or time series. This research proposes an novel EXTRACTION, MATCHING, STITCHING, REFINEMENT (EMSR) method to construct panorama images based on the recognition of the target's feature, including a sequential order of executing feature extraction, feature matching, estimation of homography matrix, C, and rectification of the assembled images. The proposed method generates panorama images quickly to show characteristics of the same site in different periods, and the method is applicable to both photos captured onsite and media captured using an unmanned aerial vehicle (UAV). We demonstrate the advantages of EMSR under dynamic environmental conditions and achieve a robust result by comparing it to traditional methods.

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Predicting the Impact of Shifting to Work-from-Home Paradigm on Urban Sprawl Using Agent-Based Model

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Keywords: Geospatial Analysis, Agent-Based Model, Complex Spatial Dynamic, Human Behaviors , Bottom-up Model

The working environment has undergone a paradigm shift in many nations around the world (Yu et al., 2019). Jobs became more flexible, allowing- partially or totally- to Work From Home (WFH). Covid-19 pandemic has influenced this working style to become more dominant, increasing the likelihood of a paradigm shift in the workplace for years to come. Living close to the workplace becomes less priority, causing the workers to relocate to outlying (suburban) for more affordable housing options with higher living standards. An intertwined scenario with a change in the cities' socioeconomic structures, the cityscape, urban sprawl, and a natural environment is expected. (Lennox, 2020; Liu & Su, 2021; Tomal & Helbich, 2022).

Several urban studies have tried to investigate the WFH impacts on urban sprawl in terms of the environment and human life quality using different methods (Paegelow & Camacho Olmedo, 2008). However, these studies do not frequently consider the distinctive characteristics of urban systems as social-environmental systems. There is a need to study the urban phenomena from the bottom-up style considering the essential influence of individuals' behavior and decision-making process at disaggregate and local levels(Brail, 2008, p. 89). Accordingly, the Agent-Based Model (ABM) approach will be developed to create a more realistic urban model that focuses on the evolving human behaviors and decision-making process. This could be accomplished by developing predictive scenarios that take into account complex spatial dynamic processes and interactions between various urban system factors on the one hand and their surroundings on the other.

In particular, artificial intelligence will be used to forecast the urban sprawl in a metropolitan area in Virginia to simulate the urban growth in three employment scenarios. Each will adopt a different future potential employment structure by changing the remote work ratios for each job. Also, a survey is conducted to obtain behavioral and social data. Participants from different occupations will be asked questions about the working method [remote or in-person] and its impact on housing location choice. Comparing the scenarios' output will help forecast and understand the residential development footprint trends, acceleration, and direction. This research could be used to adapt and modify design practices, hence, preparing for more resilient plans that mitigate the impact of the potential future paradigm shift.

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The Spatial Relationship Between Long-Term Vacant Housing and Non-communicable Diseases in U.S. Shrinking and Growing Metropolitan Counties

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Keywords: Long-Term Vacant Housing, Non-communicable Diseases, Spatial Heterogeneity, Shrinking and Growing

With the recent prevalence of non-communicable diseases (NCDs) and the increase in vacant homes, numerous studies provide evidence that a rise in vacant houses can increase negative public health outcomes and safety concerns (South et al., 2018). However, few studies have explored the impacts of the duration of vacancies on NCDs. Long-term vacant houses that expose residents to chronic violence are more likely to impact public health than others. Moreover, studies have yet to compare the relationship between the most health-impacting types of vacancy in metropolitan areas that have varying rates of development. The health effects of vacant homes can vary depending on the type of city, as vacant homes show despair in shrinking cities and positive images of prosperity in growing cities. To fill these gaps, this research examines the impacts of various durations of housing vacancy (of six months or more) on NCDs across three types of U.S. metropolitan counties: growing counties, shrinking counties, and fluctuating counties. Due to spatial autocorrelation, we used an MGWR (Multi-scale Geographically Weighted Regression) model for the vacant housing data (derived from the U.S. Postal Service) and the data for NCDs (obtained from the CDC's PLACES data). MGWR results show that short-term vacant housing (6 months to 1 year) is more likely to be negatively associated with NCDs, while longer-term vacant housing (more than 3 years) is more likely to be positively associated with NCDs. Longer-term vacant housing, as the most health-impacting type of housing vacancy, was further investigated for their non-stationary relationship between NCDs across different county types in the U.S. We find that the magnitude of the association varied slightly across county types for mental health, physical health, high cholesterol, and diabetes. Counterintuitively, mental and physical health are slightly stronger correlated with longer-term vacant housing rates in the West than in other regions. Counties affected by long-term vacant housing are primarily shrinking counties. As a result, the Northeast (the most shrinking region) was the region most affected by longer-term vacancies, while the West (the most growing region) was the least. These findings suggest that government officials and urban planners should urgently seek to regenerate longer-term vacant housing to help fight public health issues. Further, the primary focus of attention on longer-term vacant housing should be in shrinking areas, but growing areas should not be ignored, as the vacant housing growth rate in these areas was higher than in other regions.

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Bridging the Landscape from Human to Regional Scale - Measuring the Built Environment in Human Scale for Systematic Landscape Design and Planning

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Keywords: Built Environment, Street Space, Human-Scale, Big Data, Geospatial Technologies

In condensed metropolitan areas, undeveloped land is always scarce. It has been a challenge for landscape architects, designers, planners, and community leaders to secure land ownership and other usable space to introduce land-based sustainable design and planning solutions while addressing critical environmental and social challenges of our time, e.g., climate change impact mitigation, environmental and social justice, public health, etc. Scanning and measuring human-scale landscape features become critical for inventorying transformable land spaces in congested built environment.

In the Big Data Era[2], given the wide availability of high-resolution remote sensing data from various sources, e.g., spaceborne, airborne, and those obtained with unmanned aerial vehicles (UAV), environmental researchers can now develop integrated, rule-based data processing procedures with computer software built with artificial intelligence capability. It allows us to measure and extract detailed landscape and land use data at the human scale to support systemic planning and design decision-making[3].

This study is focused on extracting detailed landscape and land use information of street spaces in large metropolitan areas using multi-source remote sensing data, e.g., high-resolution orthoimages, LiDAR data, and ready-to-use geospatial data from various sources. The authors processed such data with a data protocol automating data processing functions of GIS and remote sensing software, e.g., ArcGIS and eCogonition. As a result, detailed landscape measurements of street spaces, such as the number of street lanes, sizes of street islands, sidewalks, the cover of turf, trees, and other vegetation, were generated in ready-to-use GIS format and were used to support the Gateway Cities and Rivers Urban Greening Master Planning conducted by the Watershed Conservation Authority, Rivers, and Mountains Conservancy, California[4]. We also tested the detailed street space measurement data against other street space data generated through manual digitizing approaches to measure the accuracy of the computer-based automated measurement process and estimate the uncertainty of such an approach. The result of the study provides solid evidence that with the advancement in geospatial data, hardware, and software technologies, it becomes highly feasible to translate raw geospatial data to high-quality, ready-to-use GIS data for various environmental design and planning practices. AI (Artificial intelligence) based computer solutions may continue to have their quality limitation compared to human recognition. However, its vast efficiency advantages overshadow quality limitations. It has increasingly become a viable solution for researchers, designers, and planners who don't have solid institutional support to generate high-quality manual data for a large region under investigation.

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"Gray to Green" - Initiative to Lead Greenery

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Keywords: Green Space, Deep Learning, Geographical Analysis, Environmental Sustainability, Sustainable Development

The expansion of unplanned urbanization leads to the vast destruction of natural resources and green spaces which, in the long run, has repercussions for both people and nature. Most urbanites are unaware of how much green space their neighborhoods lose to urban development and local environmental attitudes. An easy-to-use tool to help individuals understand local land use and engage with potential green space development can be useful in addressing these challenges. In this poster, we present a web-based platform called “Gray To Green''. The website was created with the purpose of connecting individuals to engage with landscape systems as well as physical planning and design to identify potential areas to create new green spaces at neighborhood scale. One of the features on the website allows users to identify the overall ratio of green spaces in a given space as well as demographic and other relevant information. Through this tool, users can find areas to contribute to creating green spaces based on their locations and work around 2D and 3D data related to land characteristics provided by google earth and the National Aeronautics and Space Administration (NASA). We developed the algorithm based on a deep learning model, called Convolutional Neural Network that allows the evaluation of land and generates an array of land parcels that may be transformed into public green spaces. The model selects areas in Connecticut that have less than 30% green spaces which have potential to develop. This tool will help individuals to be more informed about their local environments and more actively engaged with decision making for public green spaces, which will collectively help build a sustainable community. It will also serve as a readily available tool to promote participatory planning.

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Development & Analysis of Virtual Complex Urban Environments

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Keywords: Virtual Reality, Environmental Psychology, Software Workflows, Eye-tracking, Geospatial Analysis

Spatial memory gist (SMG) proposes that elements of environmental composition (e.g. building densities or styles) provide cues that shape individuals' cognitive maps of a place (Bruns & Chamberlain, 2019). Current studies on related psychological constructs, such scene gist recognition and spatial memory, largely rely on static images or rudimentary virtual environments (Larson et al., 2014), and real-world urban environments are often too dynamic or random to systematically test the relationships between individual environmental composition variables and aspects of SMG. Consequently, one of the major challenges of validating this vein of research will be developing sufficiently realistic environments where elements can still be systematically controlled and evaluated.

This research demonstrates methods for developing, modeling, and analyzing complex urban environments and gaze tracking data (GTD) using a combination of Unity Game Engine, Blender, and ArcGIS. Specifically, we approach the use of virtual environments as a means to develop, model, and analyze user interactions in complex environments. We draw from theories in SMG to create a variety of virtual environments where variables, such as scale, time and road network complexity can be carefully controlled. To construct our environments, we drew from existing road networks from real cities around the world of both pseudo-gridded and highly complex street layouts using OpenStreetMaps. Blender provided a modeling platform for the environments, which were then transferred to Unity Game Engine for incorporation into a virtual reality experience. The workflow allows us to create fictional complex urban environments controlling all elements carefully. Participants are then able to be immersed in the fictional VR world using a head-mounted display with eye-tracking capabilities to collect GTD. Our analytical framework reverses these steps, where we conduct a cluster analysis on the GTD data to identify the buildings and objects from the environment that garner different levels of attention. The process requires passing object data back to Blender and then to ESRI ArcPro for a final analysis and visualization. Our workflow streamlines the creation of virtual environments using geospatial data. This workflow will expedite future SMG research by providing methods for rapidly generating realistic environments with readily available user observational data for statistical analysis.

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Predicting Scenic Highway Drives with an Advanced Viewshed (GRAVIA)

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Keywords: Viewshed, Landscape, Routes, Highway, Visual Magnitude

Scenic quality evaluations are conducted for a wide range of purposes, including for route planning and environmental impact assessment. A viewshed analysis is often used as part of the evaluative process. Numerous variations of viewshed analyses exist, including visualscapes (Llobera, 2003), visual exposure (Domingo-Santos et al., 2011), visual pollution (Chmielewski et al., 2016) and cumulative viewsheds (Wheatley, 1995). While there are several variations for calculating viewsheds, and some empirical validation of these (e.g. Grêt-Regamey et al. 2008, Bishop, 2002) viewsheds are typically produced using a very limited set of viewpoints which may not be an adequate proxy for a broader representation of a continuous visual experience. Thus, Chamberlain and Meitner (2013) proposed a technique to explore how viewsheds could be applied for route-based contexts. Recently, Openshaw and Chamberlain (2022), proposed a systematic means to develop these analyses. However, there have been no empirically validated studies demonstrating the extent to which an advanced viewshed could be used to predict visual quality.

In this study we investigate whether GRAVIA (Openshaw and Chamberlain 2022, Chamberlain and Meitner, 2013) can be used to predict scenic quality ratings. GRAVIA is based on a visual magnitude analysis and is an open-source publicly available advanced viewshed tool (Chamberlain and Čech, 2022). To conduct this study, we selected 16 one-mile segments throughout Utah. Sites were selected to vary topography and ecologically. GRAVIA was run for each cite. Simultaneously, an experiment was conducted where individuals rated the scenic quality of these highway drives using videos. Videos were derived by stitching together individual Google Streetview images from each highway segment. Statistics from GRAVIA were used to evaluate the distribution of visual measures across the visual extent of site. A correlation analysis was then conducted between these statistics and the survey ratings. Our results indicate a statistically significant, strong correlation between these measures. Drives that were skewed to a higher number of very small (visual magnitude) values predicted lower scenic quality compared with drives that were less skewed. The less skewed the visual magnitude analysis and wider the distribution of the standard deviation indicated higher ratings, with higher standard deviation providing the strongest relationship to scenic ratings. These results demonstrate the potential for GRAVIA to rapidly predict scenic quality ratings of rural highway dives, with a need to further test the generalization of this process to other drives and ecoregions.

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A Spatial Analysis of the Heat Island Effect and Green Infrastructure: A Case Study of San Antonio, Texas

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Keywords: Urban Heat, Community Health, Tree Canopy, Social Vulnerability, San Antonio

BACKGROUND: Climate change has contributed to high temperatures globally, creating concerns in urban areas where the surface temperature is typically higher than in rural areas [1,2]. As many large cities in Texas are experiencing rapid urban expansion in recent years, the risk of heat islands in urbanized areas has increased especially in socially vulnerable communities with little green infrastructure. San Antonio, which is one of the fastest growing cities in the U.S., is no exception to the increased heat risk and potential health concerns from heat exposure.

PURPOSE: We aim to explore the associations between the heat island effect, green infrastructure, and community health in San Antonio, Texas. Specifically, we question (1) if higher surface temperatures are associated with mental and physical health risks, and (2) if spatial heterogeneity exists in the heat island effect due to the limited tree coverage in underserved communities. In the context of environmental justice, this study sheds light on the disproportionate green infrastructure in urbanized areas and its impact on the long-standing vulnerable communities.

METHODS: To disentangle the interplay between surface temperature, physical/mental health, and tree canopy at the community level, we examined Census Tracts (n = 362) within Bexar County, where San Antonio is located. Remote sensing data (Landsat 8) is used in order to measure the level of surface temperature for the summer of 2019. Physical and mental health is measured using CDC Places data that was estimated with the Behavioral Risk Factor Surveillance System and the American Community Survey. Tree canopy is measured using the USGS 30m tree canopy data. Using these variables, we perform spatial error models to account for spatial interdependency between Census Tracts.

RESULTS: The preliminary results indicate that there is a significant correlation between higher surface temperature and increased mental/physical health risk in San Antonio, Texas. Also, low-income areas tend to have a 1.1 Fahrenheit higher surface temperature and a 48.6% lower level of tree canopy compared to higher-income areas.

CONCLUSION: While increased temperature is a global phenomenon, the effects are typically local. While the existing studies have shown that underserved communities can be more vulnerable to potential heat risk with their limited access to green infrastructure and lack of resources [3,4,5], our study further supports this notion with evidence of the lack of tree canopy coverage in lower-income areas, which could potentially contribute to the heat island effect.

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Dynamic Terrains

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Keywords: Computation, Modeling, Coastal Resilience, Infrastructure, Geomorphology

Approximately 40% of people across the globe are living within 100 kilometers of coastal and riverine environments. This means that three-quarters of the world's mega-cities and critical infrastructure are situated next to the ocean and will be required to adapt to fluctuating sea levels over the next century. This adaptation will be a monumental task, requiring huge adjustments in the physical location of cities and the construction of new forms of barriers and mediations through levees, sea walls, and control structures. The collaborative research outlined in this proposal posits that the energy, embodied in the hydrological systems that build coastal lands, can be choreographed to help mitigate the effects of sea level rise. The research focuses on sediment transport, the suspension and movement of sediment within the water column and how small modifications to the water system can be used to construct new land. This research also connects global sensing systems and models to the construction of coastal environments, particularly how real-time sensing can be used to choreograph the real-time construction of coastal landscapes.

The research advances a nascent form of design research that holds great promise for how humanity engages large scale environmental change. Engaging dynamic systems and utilizing their energy to curate terrains provides a mechanism for massive change with minimal input. The feedback between sensing systems and landscape modification creates a construction methodology that is modifiable and challenges current methods of complex systems simulation and infrastructure. The outcome of this research has been a stronger attachment to the science of sediment transport and rigorous design speculation.

The research focuses on the use of responsive technologies in landscape architecture and environmental sciences and is centered on the work of the Co-PIs in their respective disciplines. Previously Professor Cantrell used a physical geomorphology modeling table to simulate dynamic riverine and coastal systems. The research created sensing systems using ultrasonic range-finding sensors to create sectional measurements, real-time photogrammetry, image analysis, and capacitance sensors to create abstracted real-time models of the sediment behavior, surface morphology, and water flow. Using the real-time digital models, the work created devices that respond to changes in the physical model such as robotic sediment gates, repositionable sieves, and flow disruptors. The intent of this work was to develop prototypes and a language that enabled designers to create hydrologic landscapes that rely on real-time data and evolve through continual modification in relation to dynamic systems.

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From Myth to Byway: A Lack of Authenticity on the Natchez Trace Parkway

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Keywords: Representation, Mississippi, Diversity, Interpretation, Road

The Natchez Trace Parkway is a 444-mile scenic byway that connects Natchez, Mississippi with Nashville, Tennessee. Visitors are typically white, older, singles or couples, traveling without children. The Natchez Trace has a rich and diverse history that is not reflected in the contemporary landscape, interpretive elements, or in visitor experiences of place.

This study investigates contemporary narratives of the Natchez Trace and how these predominantly mythic accounts shape perceptions of the trail using primarily white, colonial, masculine experiences. Existing literature, signage, and imagery fail to include some of the rich and more diverse experiences of this historic route, including first peoples, women, and government agencies, for example the United States Postal Service and the military. The purpose of this work is to highlight these diverse histories and bring to light the opportunities that exist for inclusive interpretation.

Qualitative methods include a thorough review of contemporary literature, images, existing narratives, and interpretive sites presented by the National Park Service and the comparison of this rhetoric with documented landscape change over time, lesser-known stories (including fiction), and early historic accounts and experiences of the trace and evaluating the missing pieces of what could be a diverse interpretation.

Findings illustrate how the Natchez Trace Parkway experience is limited by a selective history and narrative. Sites of significant cultural interest are not adequately celebrated, the parkway lacks authenticity in its designed form (user experience and interpretive choices and elements), and travelers lose out on opportunities to understand the immense cultural and historical significance of the route. A more inclusive and diverse interpretive plan would attract a broader demographic of visitors and provide a comprehensive understanding of all the populations that are in some way connected to the Natchez Trace. This work is important because to sustain historic landscapes, particularly those that are contested, we need to ensure that equitable histories are represented to promote understanding, cultural exchange, and dialogue surrounding our richly layered past.

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Theatricality in James C. Rose's American Gardens

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Keywords: Performance, Metaphor, Client, Site, Self-Discovery

Gardens designed by James C. Rose are a perfect example to illustrate the theatrical dimensions often found in gardens, since they are not at all gardens in the popular meaning of the word. Rose embraces theater to explore how gardens act rather than how they look. This close relationship between garden and theater goes as back as in the late Italian Renaissance era during which gardens could be regarded as a theatrical stage in the wider sense of a setting on which every-day life is reflected, a milieu for real life drama. Rose's book The Heavenly Environment reads as a metaphor reflecting landscape architecture, as a setting for real life performances. In this book, Rose contemplates the philosophical relation of theater and garden to seek inspiration for meaningful garden design through analogy and metaphor. Garden, in Rose's view, is equivalent to the theatrical stage; it is an act, a staging of life. The landscape drama is a contest between Man and Nature, the chief protagonists, which in a landscape play are named client and site. Protagonists always have a conflict, and resolving this conflict is the essence of the play. Other components of the play include the writing of a script, a scenario, that conveys a sense of time and place, a desired goal, a mastery of means, and a capacity to evoke meaning to the performer as well as to the observer through skillful action. As for the structure of the garden, it entails a beginning (entrance), development (a series of scenes and events; linkages, transitions, thresholds), peak(s) (ceremonial places/functions), and end (exit), all of which are essential to grasp the reciprocal relationships among forces, materials, and meanings. Lastly, the quality of a drama, and subsequently a garden, depends on the quality of the sensory media and on the message it conveys.

This paper investigates gardens as an art of situation, of placing people in meaningful spatial relationships with one another. Rose models the experience of a garden with multiple, simultaneous scenes that both surround and are surrounded by the viewer(s). His gardens are deemed as juxtaposed performances and narratives which unfold through improvisation, creation of real situations, provision of poetic delight through the cultivation of mind, stimulation of body and mind through comfort, delight, and personal discovery to propose a paradigm for suburban gardens in a modern mid-50's American society.

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Learning From Las Vegas: 50 Years Later

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Keywords: Taxonomy, Case Study, The Duck, The Decorated Shed, Iconography

Architects Robert Venturi, Denise Scott Brown, and Steven Izenour, published in 1972, Learning From Las Vegas: The Forgotten Symbolism of Architectural Form. This book was a result of a Yale graduate research studio were a series of field taxonomy studies of Las Vegas' architecture, signage, and hardscapes were generated. The authors codified a series of visual typologies by their meaning and symbolism resulting with the coined terms of the duck and the decorated shed. The duck was the building that is shape and form as a duck. The decorated shed was the box building that was artificially covered with decorative imagery. Receiving a mixed reception from the critics, some welcome the authors bold criticism of the regurgitation of architectural icons as tourist attractions and others praise the descriptive modernism aesthetics of the mid-century.

The city of Vegas is a worldly tourism mecca on a perpetual state of transformation. This is deemed existential for a city whose main economic engine is tourism. Tourist taste and trends are ever changing thus the city need to conform to the latest trend. The public taste and style have evolved since 1972 and likewise the duck and decorated shed. This paper will re-examine the evolution of the duck and the decorated shed. A careful examination of the evolution of the original taxonomical studies along with scholastic research, peer review data, and case study methodology will provide a valuable tool in assessing the next development phase of the use of architectural iconographies in Las Vegas.

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Landscape Forensics - Towards a New Methodology for Just and Equitable Change

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Keywords: Landscape Forensics, Social and Environmental Justice, Participatory Design Methods, Equitable Design, Site Analysis

Landscape Architecture, concerned with making physical change in locations, has a long tradition in the investigation of location (site analysis), assembling hard "data". The selection, collection, analysis and interpretation of "facts" inevitably, though, operates within various contexts and biases that significantly influence what is perceived, investigated, and concluded. Arguably the most influential and insidious bias is (explicit or implicit) intent: The "reading" of current conditions is shaped by ideas about and arguments for future change and a-priori value judgments related to preferred outcomes. Any analysis of the inherent and intricate complexities of landscape, place and space as nested systems—shaped by the interplay of human and non-human actors and processes—must disentangle the connection between material conditions and these processes, particularly vis a vis challenges such as social and environmental justice and climate change.

I suggest "landscape forensics" as an alternative framework for the investigation, analysis and interpretation of landscapes, places and spaces. Analog to approaches in forensic science, it avoids a-priori hypothetication and focuses on events and processes over time that lead to current conditions. Central to landscape forensics is "evidence" as a concept that emphasizes that the social production of evidence refuses an easy separation of facts and interpretation. Any 'read' of 'what happened' is never just located in material evidence alone, but also comes from the ways in which interpretations of that evidence are situated within different and independent relationships. This challenges traditional demands on the quality of "evidence" which seem to leave "little space for reflexive and experimental field practices that entertain multivalency and dissonance or which encourage dialogue between conflicting viewpoints" (Crossland 2013: 127, see also Bender et al. 2007).

Landscape forensics proposes a framework for multivalent, dissonant, dialogic, experimental and reflexive practices and theories. It suggests to deliberately and critically employ and assemble multiple practices, methods, media, and interpretive frameworks, including the incorporation of local and non-expert knowledge. The goal is a thicker, deeper, slower and more expansive "read" (Marot 2003, Palmer 2012, Langhorst 2016) that reveals the hidden, invisible and unseen, as well as allowing to make new connections within and across layers habitually separated by traditional analytical processes. These "reads" then may reveal multiple simultaneous perspectives, contestations, and conflicts over time beyond past and current hegemonies of action and interpretation, critical and central to understanding the various actors, processes, materials and agents in the production and reproduction of landscape, place and space.

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Mister Rogers' Neighborhood (1968-2001) as a Utopian Landscape of Child Development

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Keywords: Mass Media, Television, Psychology, Gender, Sexuality

\The long-running television program *Mister Rogers' Neighborhood* was developed by public media pioneer Fred Rogers to support the psychological development of children. Landscape ideas played a key role in organizing and "naturalizing" that effort, but in so doing, they also facilitated work that was fundamentally biased and exclusionary, so they warrant critical attention.

Rogers believed that television could supply child-viewers with models of healthy thought processes and thereby help them overcome crises on the path to emotional maturity. Building on work by psychologists Erik Erikson and Margaret McFarland, he developed a structure for *Mister Rogers' Neighborhood* based explicitly on life in an ideal urban community and implicitly on the clinical practice of child psychotherapy. Those models coalesced through four nested concepts—personal, within private, within public, within ideal—mapped onto a parallel set of spaces—garden, within house, within town, within nature.

At the outer level of that system, an image of the "beautiful day," staged at the start of every episode, invoked nature as both a benevolent framing condition and a developmental ideal. At its inner limit, the system hinged on a model of the child-viewer's mind figured as an unusual garden and inspired by clinical practices of structured play therapy. Between those positions, private and public modes were represented by a small house—a stand-in for the psychologist's office—within an ideal town—representing larger society. In other words, *Mister Rogers' Neighborhood* presented a utopian landscape of child development made manifest and accessible through television technology. As writer, producer, and host, Rogers pursued the therapeutic mission of the program by structuring and revealing relationships among all four situations.

Contemporary studies by developmental psychologists suggested that watching *Mister Rogers' Neighborhood* had positive impacts on prosocial behavior of children, and the program became well known for its rhetoric of inclusivity. However, its content was rooted in Erikson and McFarland's gendered theories of normal development, which maintained the primacy of sex-based identities and relationships. The underlying mission of the program was to culture children into heteronormative society, and Rogers's use of landscape to naturalize and domesticate that agenda made it difficult for queer child-viewers to diverge. As such, *Mister Rogers' Neighborhood* offers a powerful example of how landscape is sometimes instrumentalized seemingly in support of human well-being but in ways that are fundamentally biased and exclusionary, exposing contradictions between the rhetoric of landscape justice and its practice.

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The Fascination and Delight of Wearable Cartography

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Over 30 million visitors have viewed the British crown jewels. They are objects of fascination and delight. Why? Is it their culturally assigned values of monetary worth or political signification? Is it their evident poiesis, their fineness and craftsmanship? Is it, quite simply, that their limpid beauty attracts and entrances through scintillant color? And (how) does this matter to landscape architects?
This essay proposes wearable cartography as a mode of environmental communication and describes the potential of wearable cartography to communicate complex environmental issues. While wearable cartography is not limited to jewelry, the British crown jewels are one example of the form: they re-present agency over lands and peoples, they are a clear visual reminder of colonial land control, and their ritual use embodies a particular, hierarchical cultural understanding of lands and peoples. Roberto Burle Marx's jewelry designs provide a more subversive counter-narrative, positing a non-hegemonic Brazilian cartography written in gold and sapphire.

This study uses three frameworks to analyze fashion objects as landscape communication: cartography as subjective communication; knowledge and memory construction through physical action; and miniaturization and scale shift as a mode of engagement. Cartography is, to borrow Toni Morrison's eloquent description of writing, "thinking and discovery and selection and order and meaning, it is also awe and reverence and mystery and magic." Wearable cartography combines this meaning and magic with the reciprocal world-building of memory work, in which the "body creates thought and thought creates body" (Martinez); experience and cognition are mutually reinforcing. Biocognition theory recognizes that perception precedes cognition; this essay posits the value of embodied perception fostered through enfolding oneself within a cognitive map. And finally, the specific wearable cartography of jewelry engages scale manipulations and the reverie inspired by miniaturization and delight, the oneiric worlds of Proust and Bachelard.

Through the analysis of textile and jewelry examples, including designs by Roberto Burle Marx and Maya Lin, this essay proposes three categories of wearable cartography. Representational cartography uses generalized ideas of a place such as colors or patterns to indicate a larger geographic identity. Locational cartography uses a more specific mapping technique in which one might be able to identify specific latitudes and longitudes. And cartographies of synecdoche use emblematic individual elements to represent a larger landscape whole. These examples show that the meshing of body, beauty, and cartography is understudied and undervalued in its role in environmental communication.

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Clinton N. Hewitt, African American Campus Planner and Landscape Architect

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Keywords: Campus Planning, African American Landscape Architects, Minnesota, Higher Education

The purpose of this research is to introduce the campus design and planning contributions that Clinton N. Hewitt (born 1935) made in his career as an African American campus planner and landscape architect from 1965-2009. Mr. Hewitt's papers were recently organized by the University of Minnesota Libraries into an archival collection. These works include renderings, papers, presentations, and photos from Mr. Hewitt's forty-four-year career. This collection of accomplishments and contributions position Clinton Hewitt among African American leaders in landscape architecture and planning during the latter half of the 20th century. However, this work is largely unknown and unrecognized by the landscape architectural community today.

Clinton Hewitt received a B.S. in Ornamental Horticulture from Virginia State College (1956), and B.S. (1963) and Masters (1965) degrees in Landscape Architecture from Michigan State University. This paper focuses mainly on Mr. Hewitt's career as a landscape architect and planner for the University of Minnesota from 1972-2009, where he attained the positions of Assistant Vice President of Physical Planning and Associate Professor in July of 1973. In this role, Mr. Hewitt directed the Office of Physical Planning, which coordinated and managed the design and planning of all of the University of Minnesota's campuses and properties (5 distinct campuses and over 56,000 acres of total land area in 2010).

Mr. Hewitt's work included long-range development plans, campus master plans, planning for the construction of new buildings, remodeling existing facilities, and planning for all aspects of physical infrastructure. His scope of work included transportation, long-term maintenance, landscape design, environmental quality/compliance, accessibility, and historic preservation. His contributions to these areas resulted in long-lasting, high-quality campus landscapes for the University of Minnesota's students, staff, faculty and the larger public communities that interact with these landscapes.
This paper also explores the challenges Mr. Hewitt faced as an African American pioneer in landscape architecture and planning and how that influenced his approach and accomplishments. Campus planning was overwhelmingly dominated by White men during this period, as were the professions that campus planners engaged with including engineering and university administration. There is minimal scholarship on the accomplishments of African American landscape architects and nearly no scholarship on the contributions of black landscape architects to the areas of campus design and planning. The Hewitt archive presents opportunities for building this knowledge and this paper will also highlight opportunities for further archival work.

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Carnal Infrastructure: The Biopolitical Landscapes of Animal Breeding

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Keywords: Biopower, Landscape Infrastructure, Animal Agriculture

regulates the sexual behavior of animals in order to satisfy our collective appetite for meat, eggs and dairy. Animals are made to mate, directly or indirectly, with other animals, so as to produce new animals and their edible by-products. Farmers, ranchers and breeding technicians, often funded by industry conglomerates, manipulate external environments and anatomical architectures to optimize and maximize reproductive output and efficiency. The infrastructure of modern animal breeding spans multiple geographies and spatial scales. Environmental conditions are precisely designed to maximize the bodily performance of the animal at each stage of production. Different light, temperature and humidity conditions are modulated to slow or advance reproductive maturity, to accelerate weight gain and to influence temperament and behavior.

Central to the operation of this productive system is biopower - that is, the power to “make live and let die.” As described by French philosopher Michel Foucault, Biopower operates at both the scale of the individual and that of the population. At the individual or anatomo-political level, biopower reduces the body to a machine, focusing its power on “the optimization of its capabilities, the extortion of its forces, the parallel increase of its usefulness and its docility, [and] its integration into systems of efficient and economic controls.” (Foucault, 1976, p139). At the population or herd scale, the biopolitics of the population focuses on the body of the species “... imbued with the mechanics of life and serving as the basis of the biological processes: propagation, births and mortality, the level of health, life expectancy and longevity, with all the conditions that can cause these to vary” (Foucault, 1976, p139). Across its multiple scales, the animal protein sector comprises the economic, social and biological transformation of life (farmed cows, pigs, and chickens) into exchangeable commodities (harvested meat, milk, and eggs).

This essay explores the spatial and biopolitical infrastructures that facilitate contemporary animal breeding and the historical trajectories that gave rise to them. A subsection on breeding trajectories describes the ways in which stylized representations of the ideal animal directed breeding practices as well as the cultural outlets through which these images were disseminated. Next, the trend of consolidation, both within breeds and across the breeding industry, is then presented. The paper concludes with an exploration of contemporary breeding typologies, from the territories and systems of genetic control to the specific spatial and material techniques for controlling puberty and copulation.

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A Trail for the People: History of the Columbus Indiana Parks and Recreation People Trail

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Keywords: Outdoor Recreation, Park, Community, Connection, Van Valkenburgh

Recreational trails are trails that provide close-to-home recreation opportunities to users. They promote social, racial, gender, and economic equity. They provide transportation alternatives thereby reducing traffic and promote healthy lifestyles through the encouragement of walking and cycling. They serve as an important element to any urban area as they also promote safe and livable communities. Recreational trails, such as the Columbus Indiana Parks and Recreation People Trail, located in Columbus, Indiana, added to the uniqueness of this already architectural gem of a city and paved the way for outdoor recreation in south-central Indiana, USA. This study reveals the history of efforts to create and establish the People Trail within the city of Columbus. First conceptualized in 1984 with the formation of the People Trails Committee and community surveys, the People Trail was born. During Phase I (1985-1987) construction began and linked Lincoln Park, Donner Park, to Noblitt Park creating the first 1-mile section of trail. Phase II (1987-1988) connected Mill Race Park with Noblitt Park's trail. Phase III (1988-1989) connected the existing trail to the northern portion of the city, expanding its range dramatically. Phase IV (1990-1992) completed the long-awaited connection of the eastern portion of Columbus to the trail. Additionally, this research mentions the Van Valkenburgh Mill Race Trail which was, for this research, included with Phase IV of development of the trails. With the in-depth look this research provides in the formation of recreation trails in a small Midwest city, this information can be viewed as useful and be applied to cities of similar size that wish to establish similar recreation trails. With each recreational trail system built, the potential for a connecting trail system is created which could lead to a larger trail network. Larger trail networks connecting nearby cities and towns lead to increased outdoor recreational opportunities and overall more walkable, social, and livable communities.

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Beyond the Bagel: A (New) Case for Pop

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Keywords: Representation, Pop Art, Olmsted, Contemporary Criticism, Aesthetics

2022 was the bicentennial of Frederick Law Olmsted's birth. By the time of the CELA conference, there will have been dozens of events concerning his influence as a designer—and the coupling of design, democracy, and social reform. Thaïsa Way argues that the endurance of Olmstedian values in the 21st century need not be burdened by Olmstedian aesthetics: "While Olmsted offers many lessons, one that we can reject is his assumption that an English-style landscape of pastoral composition was the best form for public parks."[1] This paper takes on Way's challenge through one stylistic current in landscape architecture—that of the "pop" aesthetic descended from pop art of the 1960s. Characterized by vivid colors, synthetic materials, and bold geometric forms, designed landscapes with a pop sensibility gained attention in the 1980s through figures such as Martha Schwartz, who self-identified as working across art and design.[2] Often described as postmodernist, these projects were open to interpretation but reflected the vision of a single person (often ironic and in stated opposition to naturalistic or pastoral traditions). I explore projects that carry forward the stylistic tendencies of the pop landscape in new ways. This includes the work of designers Barbara Stauffacher Solomon, Claude Cormier, Studio Zewde, and Topotek; artist Nina Chanel Abney; and collective projects such as Black Lives Matter Plaza in Washington, D.C. I argue that these projects engage issues of social concern to a broader public through a pop sensibility. When supergraphics and articulated surfaces are used to define space, they can elide the "visual-discursive and material-embodied. . .[that] provides the basis for cultural power."[3]
I claim that critical readings of pop music, rather than pop art, offer a more potent way to consider manifold relationships between the creative professional and the public. The relatively recent rise of serious cultural criticism on pop music has given proper credit to once-marginalized art forms like hip-hop; songs can be explicitly political, adopted by social movements, embody a particular cultural zeitgeist—or all of the above. Although legibility and interpretation are intertwined with culture and class, I argue that landscape projects of the pop aesthetic can invite lively, active forms of public engagement. This sensibility aligns with contemporary aspirations for landscape architecture and the publics it convenes: the synthesis of accessibility and craft, the joyful and the political, the public and the personal, the familiar and the new.

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Walking in the Anthropocene: Pilgrimage and Landscape in an Age of Crisis

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Keywords: Climate Change, Green Infrastructure, Environmental Grief, Public Space, Film Representation

The concept of “pilgrimage” offers a compelling design typology in landscape pedagogy and practice, one that potentially augments urban green infrastructure, and provides a robust conceptual framework in cultivating critical discursive and material spaces for collective exploration, expression, encounter, and even survival in the wake of the COVID global pandemic and the precarities of climate change. “Pilgrimage” does not merely construe a sacred or religious journey, but as importantly entails secular endeavors. It is defined as much by notions of journey, homecoming, and transformation as by the mechanics and metaphors of walking itself. And walking, whether a mundane kinetics, or an exalted voyage, is a deeply foundational human act. Such movement is evolutionarily inscribed at the molecular level in our DNA; embedded at varying scales in the environments we inhabit, navigate and shape; and variously projected onto the symbolic worlds we imagine and represent. In an era that privileges speed and efficiency, the slow landscapes of walking are deceptively subversive, ones that both witness the unseen and inculcate deep knowledge, and at the same time, resist conformity, resignation, and appropriation by private interests or repressive regimes. As such, walking is never a neutral act. This necessitates scrutiny of scholarly and sometimes overly romantic fascination with the experience of walking and assumptions of walking as a universally accessible activity; and merits highlighting the threats to BIPOC communities historically and today within built environments. Using historic and contemporary examples to parse “pilgrimage,” this preliminary exploration argues that ritual walking and path design in green and/or urban space offers therapeutic and ecological benefits. This exploration employs case studies drawn from student projects in landscape studios focused on the Anthropocene, urban walking infrastructure, environmental grief, and the use of video and virtual space in design communication. Pilgrimage—an act of encounter, resistance, solace, connection, and survival—manifests not only as historical phenomena but contributes to current understandings and experiences of mobility, access, attachment to and resilience in landscape.

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Landscape Architecture in a More-Than-Human World

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Keywords: Novel Ecologies, Design Research, Multispecies Collaborations

As a term, the wild has inferred a moment of certainty, a transcendent temporal reference point from which everything that comes after can be apprehended. Such wildness has faltered in an aesthetics of absence and loss. More recently, another wildness has begun to emerge, as the unruliness of nature discovered in our negotiations with everyday landscapes. In this sense, wildness resides in the entangled relationality of the material world we live and design in, and which we navigate, for instance, as stone and non-stone, forest and non-forest, human and non-human. In these landscape architectures all is wild.

In doing so, we find conceptual purchase in the works of anthropologist Anna Tsing and multispecies theorist Donna Haraway, whose positioning on nature, wildness and landscape moves beyond the human. For Tsing, landscape is a multispecies collaboration in which both people and non-humans work together in a process of unintentional design. As she describes: 'Landscapes in formation show humans joining other living beings in shaping worlds' (Tsing: 2015, 198) Similarly, Haraway reveals ways that humans are always becoming with other forms of life, as together we materially and meaningfully craft such worlds. Hence for her, 'natures, cultures, subjects, and objects do not pre-exist their intertwined worldings' (Haraway: 2017, 13).

In this paper we interrogate the explorations of our design and research group, WildLab, within this ascendent reality. This involves four separate New Zealand-based projects, centred on moving mountains (Taranaki), expansive forests (Marlborough), falling stones (Otautahi/Christchurch), and sand laden soils (Punakaiki). For design, this transformation of wildness is a moment of liberation, not into the ad hoc or the baroque, but rather, a movement into the midst of new entanglements with emergent social and ecological materiality.

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Invisible Agora

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Keywords: Public space, Open space, Canopy cover, Politics, Surveillance

The term “open space” describes a park’s physical and political condition interchangeably. As a physical ideal, openness purports to create empty space within an urban fabric, facilitating airflow and sunlight penetration. As a political ideal, openness describes a universally accessible site without barriers. This paper draws attention to the ambiguity in the term “open space” and argues that the physical property of openness is not coterminous with a political ideology of openness. Correspondingly, this research develops a method to assess patterns of canopy coverage in the parks of a mid-sized North American city to evidence consistency in spatial distributions of open space. Ultimately, this research suggests that “closed space” may have advantages in supporting democratic engagement and empowering oppressed groups.

Point-cloud vegetation data was simplified to generate a binary data set (open versus closed), used to determine the most visible point within a park and subsequently calculate the area visible from that location. Despite limitations, such as negating topography, this method yields a comparative spatial syntax of open space and canopy coverage, irrespective of a park’s scale or shape. Findings suggest that parks often share a spatial-ecological configuration characterized by a central space, open to above and ringed by a peripheral canopy. This definition matches Frederick Law Olmsted’s characterization of open space (Sutton, 1971), suggesting enduring consistency in the formal organization of canopy coverage in public parks.

Rather than supporting an expansion of the public, this paper posits that openness, as an attribute of park design, functions more commonly as a tactic of pacification and exclusion via unrestricted surveillance. Notably, having a central open space establishes a hierarchy of visibility and supports the democratization of policing (Newman, 1972). Moreover, surveillance, a function of visibility, is a martial tactic of control (Foucault, 1975). Significantly, the public sphere only emerged from spaces not subject to state surveillance, such as coffee houses (Habermas, 1962). Moreover, while being observed restricts the emergence and development of political and individual differences, the possibility of anonymity supports the formation and empowerment of minority groups (Young, 1990).

Understanding that a relationship between visibility and freedom of expression exists and given the digital domain’s emergence as a democratic town square simultaneous with the intrusion of social networks into private space, this research speculates a shifting role for parks in a democratic society from a space of appearance (Arendt, 1958), to a space of political formation.

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Mapping the Complex Social Geography of 19th-Century Public Parks and Colonialism in South Korea

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Keywords: 19th Century Public Parks, Colonialism, Korea Park History

This study is part of a larger research project aiming to advance an understanding of 19th-century public parks as an international phenomenon by investigating the dissemination of urban parks and modern recreational culture, which originated in 19th-century Europe and North America, to the Pacific East. As an initial attempt to provide an answer to the question of how public parks spread and influenced people and places outside the Western birthplace, this provides a case study analyzing the emergence of public parks in South Korea during the open-port period (1876-1910) and colonial period (1910-45) and the role of colonialism and its complex cross-cultural process in shaping the landscape of the first public parks in the country.

The 19th-century public park emerged as a result of modern city-building endeavors in Europe and North America. In the United States, rapid industrialization and the expansion of cities fueled park development. Park designers, administrators, sanitary experts, and cosmopolitan elites played an important role in shaping parks in a distinct style rooted in the 18th-century English pastoral landscape and picturesque aesthetics (Kowsky and Library of American Landscape 2013; Lasdun 1992; Szczygiel and Hewitt 2000; Nadenicek 1993; Heckscher 2008). The 19th-century public park based on the British models was emulated internationally, not only transforming urban landscapes on a global scale but also creating a new culture of leisure and conflicts in park use and perception between park promoters and the local people who used the parks (Schenker 2009; Duempelmann 2013; Rosenzweig and Blackmar 1994; Blodgett 1976; Taylor 1999; Evelev 2014). To encapsulate the complexity of the 19th-century public park phenomenon, the study proposes a framework, in which parks are viewed as 1) a physical site whose spatial, material and experiential traits can be explained through empirical data, 2) material culture that represents particular meanings and values accumulated over time within a collective group and 3) a social institution that controls behaviors and expectations of individuals through established social norms and roles. The main purpose of the framework is to recognize multidimensional dialogues on 19th-century park history, landscape meanings, conflicts in park use and perception among different social classes. The same framework was applied to the case study, serving as the basis for analyzing the first public parks built in major South Korean cities during the colonial period and comparing the physical, social, and cultural characteristics of the colonial parks to those of the 19th-century Western model.

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Considering The Aesthetics of Invasive Species in Carson Woods, New Jersey

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Keywords: Forest Aesthetics, Nonindigenous Plants, Beginner's Mind, Viridic, Ecological Design

Invasive species are a constant presence on the minds and in the work of ecologists, foresters, gardeners, and landscape architects, to the point that nonindigenous species can disrupt one's peace of mind during a walk in the woods and may cloud aesthetic judgement. "All the aesthetic choices we are making—are moral choices" (Worrall, 2009), artist Ai Weiwei reminds us, and ecological designers have drawn the highly moralized, and of course scientifically founded conclusion that invasive species are a scourge. While this is ecologically true, surely invasive species have some aesthetic value. Is it possible to bracket (conceptually), their negative effects and to contemplate their better nature? Is there an appreciable forest aesthetic to woodlands plagued by invasives? And might ecologists learn to love this hyper-nature for the spatial and sensorial experiences it offers?

This paper considers invasive forest aesthetics using the Zen Buddhist concept of "beginner's mind" (Suzuki, 2020), which means letting go of preconceptions in approaching a subject, such as knowledge of the adverse effects of invasive plants on ecosystem structure, function, and biodiversity (NPS, 2010). In this thought experiment, the author conducted a series of transects through Carson Woods, a 183-acre conversation area in Lawrence Township, New Jersey, making drawings of the multi-sensory experience. The transects record walks on and off the mowed grass paths over the subtly rolling land. The forest is a rich expression of Julian Raxworthy's (2018) concept of the "viridic", defined as the growth of plants shaping spaces over time. From the groomed paths, the forest experience is one of relative clarity and uniformity. As plants encroach on the cleared paths, they are clipped, gradually forming hedges, thick walls of vegetation made thicker by more trimming, creating distinct and inviting passages. Between the emergent hedges within the forest patches, the woods are often impenetrable, a sublime tangle of introduced species. The forest is disorienting and mysterious, dense with shrubs and vines, but opening into occasional clearings like secret gardens, rewarding the bushwhacker. The rampant growth creates enticing spaces both on and off the path when perceived with a "beginner's mind" leading one to question from an aesthetic point of view the contemporary war on invasives. In this "unbiased" state, it is possible to take off one's ecological hat to the emergent forest.

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From Persuasive Generosity to Expendable Commodity: The Future of the Modernist Corporate Estate

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Keywords: History, Corporate Design, Site Recycling

Beginning the 1950s American corporations, and the designers they employed, invented a new landscape form: the suburban corporate headquarters. Best understood as the latest permutation of an extravagant, aesthetically refined composition of buildings and landscapes serving an elite vision of status, patronage, and privileged retreat, these corporate estates for the captains of capitalism provided landscape and building architects with some of the most substantial commissions of their day in terms of scale, expense, and design ambition. The gleaming structures of metal, glass, and concrete sat upon and within idealized visions of an American pastoral, reconciling capitalism, and by extension its leaders and endeavors, within a bounteous, scenographic nature. Their visual generosity intended to persuade a range of receptive audiences of the righteousness of the American corporate endeavor. While, to be sure, not all the corporate estates proved distinguished pieces of design, dismantling landmark corporate estates is now occurring with increasing frequency. The reasons: corporate buyouts, mergers, and re-structuring which consolidate headquarter staffs in other locations, the expense of maintaining such sites, the difficulty of retrofitting bespoke buildings contemporary business operations, the vicissitudes of corporate valuations, the perception that the best corporate “talent” prize center city locations and urban, or at least urbane, living, and now, the dominance of remote work since the pandemic whose influence is yet to be fully felt. Four case studies demonstrate the dismantlement and fate of these landmark modernist designs: Upjohn in Kalamazoo, Michigan; Connecticut General Life Insurance Company in Bloomfield, Connecticut; TRW in Lyndhurst, Ohio; and, Weyerhauser in Federal Way, Washington. The importance of preserving modernist sites has been grudgingly embraced by historic preservation advocates. The modernist headquarters buildings encompassed by conventional pastoral landscapes—with aesthetic roots in the eighteenth-century English Landscape Garden—played an aesthetic slight-of-hand demonstrating that gigantic corporations could live within the traditional compass of American values. Nonetheless, however splendid, the pastoral was, and is, familiar and every day. That familiarity leads to these sites being considered as unremarkable, and hence not the subject of continuing interest. Certainly, in the terms of the corporate bottom-line, destruction to make way for new, more economically viable, uses is simply the way of capitalism. As a corporate financier slyly declared in 1963 at suburban headquarters inauguration: “The creation of wealth is not necessarily a lovely process.” It is simply the inevitable next phase in the capitalist cycle of innovation, functionality, decline, and obsolescence.

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Examine the Meaning of 21st Century Technology in Landscape Architecture (TLA)

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Keywords: Technology in 21st Century Landscape Architecture, Core Knowledge Domains

Technology in Landscape Architecture (TLA) has continually expanded from the 19th century arts-science binary narrative (Beardsley, 2000). However, the current scholarly literature does not appear to acknowledge TLA as core to the discipline of landscape architecture (LA) and indicates a knowledge gap. This research explores TLA and how it contributes to LA's body of knowledge with the major research goal to fill this knowledge gap. It draws from three realms of knowledge: 1) Digital Tools and Technology (DTT) in LA; 2) LA Core Domains; and 3) Trends, Themes and Priorities in LA Research. Another research goal is to reveal the significance of technology within the core of the 21st century LA body of knowledge. This study utilizes a mixed methods approach involving secondary data from peer-reviewed publications and primary data from archival research of ASLA award-winning projects and expert interviews. This study also incorporates a Grounded Theory approach where content analysis of the expert interviews (professional practitioners; scholars; and educators) combined with the analysis of the peer-reviewed literature and archival research of award-winning projects will assist in the inductive logic and analysis to determine patterns, categories and codes. In the final analysis and interpretation, the novel Conceptual Model for understanding Technology in 21st century LA is synthesized. This research demonstrates how technology has evolved as its own significant domain where the discipline of LA has shifted from the art-science binary to an emergent 21st century conceptual tri-partite narrative consisting of art, science and technology.

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Kapiʻolani Park: Towards a Plural Picturesque

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Keywords: Picturesque, Restoration, Ecology, Resilience, Parks

Sea level rise adaptation design strategies have been explored in the urbanized and post-industrial edges of places like the San Francisco Bay Area and metropolitan New York. However, much of this discourse has not investigated the adaptation potential of historical Picturesque public parks. Using Kapiʻolani Park in Waikiki as a case study, this research explores how the restoration of riparian systems in historical Picturesque Parks offers an opportunity for both climate adaptation to hydrological risks and a more ecologically resilient preservation approach.

Kapiʻolani Park was built in 1877 and is the second oldest example of a Western public park in Oʻahu. Located at the base of Diamond Head in what was once a marsh and coastal scrubland known as Kaneloa, the expanse of lawn, recreational fields, and clusters of choreographed canopy exhibit only fragments of the park's original Picturesque design by Archibald Cleghorn. Kapiʻolani Park began as a private suburban retreat for the wealthy complete with coastal mansions, sprawling carriageways, sculpted islands and waterways, and a race track.

A formal analysis of the park and literature review reveal that Kapiʻolani's original design reflected aesthetic Picturesque principles promoted by theorists like Andrew Jackson Downing and Frederick Law Olmsted. However, similar to other public urban parks in the greater territorial United States, Kapiʻolani experienced significant transformations as sociocultural values shifted in the early 20th century. The introduction of playgrounds, recreational fields, theaters, and roadways dismantled many of the Picturesque experiences. The fill generated from the dredging of the Ala Wai Canal in the 1920s was used to eradicate Waikiki's wetlands and the Park's waterways, creating developable land for a zoo. This historical analysis reveals the Picturesque role of the Kaneloa wetland prior to its erasure and restoration opportunities given future hydrological projections.

Ultimately, this paper argues that climate pressures such as frequent flooding events and sea level rise offer an opportunity to promote a more inclusive, non-binary understanding of nature and the Picturesque and to integrate the habitats, species, and narratives that were originally erased from the Park entirely. The broader goal of this research is to advocate for a more plural interpretation of restoration and preservation in historical Picturesque public parks that promotes an empathetic and inclusive stewardship of urban landscapes now and in the future.

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Design in the Present Economy: Mid-Century Regional Planning Studios at NC State College

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Keywords: Modernism, Landscape Architecture, Development

In the spring of 1961, seven landscape architecture students at NC State College spent the semester investigating the declining rural landscape of eastern North Carolina and reimagined it as an agricultural utopia. The approximately 80 square-mile project encompassed one of the State's largest river basins, comprising one of earliest-settled and most historically significant landscapes in the Cotton kingdom. Recognizing the environmentally and socially destructive effects of contemporary agricultural practices, students sought to adapt modernist planning ideas to redesign the region increasingly focused on monocultures of three main crops into an integrated system of "well-balanced ecological communit[ies]" supporting year-round, whole-food production. Their plans included systematized production fields, agricultural manufacturing facilities, agricultural villages modeled on the Neighborhood Unit model for community planning, a regional-rapid transit system connected with urban centers, and an "Agricultural Control Center" for educational, research, and administrative services.

This was one of several regional planning studios led by British immigrant and modernist designer Lewis Clarke at the recently established NC State College School of Design. Following the conference theme AlignïRealign, this paper will look at three of these landscape architecture studio projects from 1955-1964 to understand how regional planning concerns at the time were reflected in academic practice. Based on infrastructure plans by the U.S. Army Core of Engineers with the Soil Conservation Service to modernize the state's flood control and land management practices, the studios incorporated emergent city and regional planning models from the Tennessee Valley Authority that were being tested at smaller scales across the State. These studio projects focused on entire river basins and sought to expand the scope of landscape architecture in North Carolina from site design to include rural development, economic planning, and social infrastructure. Graduating students went on to teach and practice throughout the South, helping to establish modern landscape architecture in the region. Based on original archival research, the paper seeks to understand how academic studios served as laboratories to test modern planning practices adapted to the South, and how they helped popularize ideas that went on to inform developmental models for the region.

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Kooskia Interment Camp: A Design Opportunity or Design Responsibility?

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Keywords: Scenic Byway, Idaho, History, Japanese, Internment Camp

PURPOSE: This study evaluates how the World War II-era Kooskia Internment Camp impacted development of the Northwest Passage Scenic Byway, how this relationship is reflected in the byway's interpretive infrastructure, and opportunities for revealing this past through design.

BACKGROUND: Following its entry into World War II, the US authorized mass relocation and incarceration of individuals of Japanese heritage at internment camps across the United States. The Kooskia Internment Camp, a former federal prison situated along the Lochsa River in northern Idaho, was the first camp to use interned individuals as laborers in construction of US Highway 12, connecting Lewiston, Idaho with Montana's Bitterroot Valley. Like many internment camps, few physical signs of the Kooskia camp remain, which is described in literature (Wegars, 2010) and archeology (Camp, 2016), but is largely unknown by travelers and recreationists along the scenic byway.

METHODS: Because of the camp's contextual relationship to the scenic byway, a singular case study method was employed, using data from archival and historic sources, documentation and evaluation of its physical environment, and analysis of the interpretive infrastructure of both the camp and byway. Maps, archival data, literature, and historic documents were thoroughly reviewed to identify locations for in-depth on-site investigation. The camp's physical site and associated byway were subsequently evaluated using a ground truthing approach for physical indications, remnant artifacts, and interpretative elements that reflect the camp's presence and role of its incarcerated population in building the scenic byway.

FINDINGS & SIGNIFICANCE: All that visibly remains of the camp is a concrete foundation for a water tank and some topographic indications amidst overgrown vegetation. However, the most visible and physically durable artifact of the camp's existence is Hwy 12 itself, now designated as the Northwest Passage Scenic Byway. The route's interpretive infrastructure heavily reflects its importance to Tribes, exploration, extraction, and recreation. However, despite its significance in creating the scenic byway, the Kooskia Internment Camp is largely omitted from interpretive literature, signage, and maps. The physical conditions along the byway and camp site reveal nature's role of obscuring the past through erosion, succession, and growth. Its erasure from the landscape has been accomplished both through active dismantlement and passive management. Through its connectivity, the byway has real and metaphorical design potential: an opportunity and responsibility to reveal the camp's role through the interpretive infrastructure of the scenic highway it constructed.

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Enduring Stories and Changeable Ground: The Dune as Cultural Landscape

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Keywords: National Lakeshores, National Parks, U.S. Landscape History, Land Morphology, Genevieve Gillette

In 1950, for the journal *Ecology*, botanist and ecologist Frank Gates collected half a century of observations in an article entitled "The Disappearing Sleeping Bear Dune." He began with a childhood recollection of seeing the dune—located in Michigan's lower peninsula, on the northeastern shore of Lake Michigan—from the deck of a lake steamer in 1896, when the distinctive form loomed "conspicuous on the skyline." With a high degree of geometric precision, he catalogued human-induced degradation to the bear's neck, back, and rear and front haunches over subsequent decades (Gates, 1950). Gates' work built on a series of historical observations of the dunes' shifting physical form, published at regular intervals since the early twentieth century. What had changed by midcentury, however, was the desire to link these formal transformations, previously understood as natural variations in dune morphology, to human factors.

Erosion—human accelerated and otherwise—has changed the profile of the dune markedly in the past century. Contemporary visitors are left to imagine what contours in this shifted form might once have so convincingly conjured a sleeping bear. Sleeping Bear Dunes, so named from the Anishinabek story of a mother bear overlooking her drowned cubs (North and South Manitou Islands), would become one of a handful of designated national lakeshores in 1970. This designation, achieved in no small part due to the efforts of landscape architect Genevieve Gillette, followed more than a decade of controversy about how to preserve this fragile yet dynamic ecological and cultural landscape (Rutz, 2004).

Using archival maps and correspondence, recorded oral histories, and synthesizing the available secondary sources, this paper will trace the conservation challenges historically faced by this morphologically dynamic landscape type, the dune, with a focus on Sleeping Bear Dunes. In so doing, this work will contribute to existing literature on the emergence of national lakeshores in the American Midwest within the larger context of the growing national park and national seashore system during the mid-twentieth century. In particular, it will consider the challenges posed by dynamic coastal sites such as dunes, beaches, and marshes, which are characterized by ongoing and often rapid changes to the physical landscape.

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Democratizing Landscape and the Landscape of Democracy in the Postcolonial Paradigm: Louis Kahn's Capitol Complex in Dhaka, Bangladesh

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Keywords: Democratic landscape, postcolonial paradigm, Louis I. Kahn, Capitol Complex, South Asian Modernism

Louis I. Kahn (1901–74), the American modernist architect, has been one of the key figures in establishing the modern architectural landscape in South Asia. Focusing on Kahn's designed National Capitol Complex (1963–82) in Dhaka, Bangladesh, this paper examines how his landscape strategies operate in implanting democratic ideals in space; this research calls it "spatializing democracy." Till today, the Complex signifies the country's political stance and also remains to be an established, democratic imagery in the global arena. Among Kahn's oeuvre, landscape-dominant works such as Trenton Bath House (1954–59) in Trenton, New Jersey; the Salk Institute (1959–65) in La Jolla, California, and Erdman Dormitory (1960–64) in Bryn Mawr, Pennsylvania; Franklin Delano Roosevelt Four Freedoms Park (designed in 1973–74 and constructed in 2012) in New York, his Complex in Dhaka has remained to be the magnum opus of the last century. However, though scholars have analyzed Kahn's architectural designs (e.g., Scully 1962; Ronner 1977; Brownlee and Long 1997; Carter 2005), his landscape part, offering a larger public engagement and egalitarian usage, has not received significant attention. Constructed over 200 acres, more than 70 percent area is dedicated to landscape in comparison to its architectural counterpart at Dhaka's Capital Complex. Hence, centering on the designed landscape that surrounds the Capitol Building, this paper examines the role of landscape in establishing democratic values in the holistic built environment. The questions this paper asks are: How does the democratization process take place over the Complex? How do you place democratic principles and consequently, spatialize democracy? Is democracy participatory or just a landscape imagery? This research paper relies on multimodal qualitative methods: spatial and textual analyses of archival materials and on-site visits with interviews of key Kahn scholars and professionals who were involved in the making of the Complex landscape. Thus, this paper seeks to uncover the design ideas presently operational in the democratization process of this landscape of national importance.

LANDSCAPE ARCHITECTURE FOR HEALTH

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Mental Health and Flooding Experience Affect Perceptions of Green Stormwater Infrastructure Designs in Detroit

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Keywords: Stormwater Management, Vacant Land, Household Flooding, Urban Greenspace, Environmental Justice

We explored the relationship between mental health and household flooding experience on residents' perceptions of design characteristics of green stormwater infrastructure (GSI) in highly vacant neighborhoods in Detroit, Michigan, USA. Inequities in distribution and quality of greenspace may undermine the well-being of residents as greenspace exposure is associated with better mental and physical health (Sivak et al., 2021; Garvin et al., 2013). Additionally, climate change presents residents with increases in flooding-related stressors, disproportionately impacting communities of color (Larson et al., 2021). GSI with micro-scale design characteristics to increase perceptions of care and safety on vacant land may help to address these inequities (Nassauer et al., 2021).

While greenspace experience has been widely associated with mental health, this literature does not address the micro-scale landscape characteristics that are essential design decisions (Bratman et al., 2019). Related to GSI functions, residents' past experiences with localized flooding might also influence their perceptions of GSI. With this in mind, we examined how residents' perceptions of alternative micro-scale design treatments on vacant lots near their homes might be affected by their flood experience and mental health. In 2017-19, we surveyed Detroit households in census block groups selected in a stratified cluster sample to include different proportions of vacant property and likely exposure to localized flooding, allowing our study to generalizable to similar vacancy and flooding conditions.

Results suggest that household flood experience significantly increases perceived care and safety of all GSI interventions, regardless of micro-scale design characteristics. Further, our results suggest that perceptions of different micro-scale design interventions vary with respondents' reported depressive symptoms, as measured by the Center for Epidemiological Studies Depression Scale. Perceptions of care and safety increased with levels of cues to care in each design treatment. Also, respondents who did not experience depression perceived significantly higher levels of care and safety than did those who reported symptoms indicating moderate to severe depression. However, for perceived care this association varied across treatments.

Based on perceptions of care and safety, we conclude that while quality of greenspace significantly benefits all residents, benefits are greater for those who are not depressed. This finding raises an important question about the impact of greening interventions on mental health and suggests that further research explore the difference in impact among groups with varied mental health symptoms, including different levels of depression.

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A Study into the Application of an Occupational Therapy Theoretical Framework in a Public Space Design for Kirkwood Neighborhood Park

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Keywords: Meaningfulness and Physical Activity, Interdisciplinary, Environmental Justice, Community Cohesion

A shared goal of landscape architecture and occupational therapy is to improve quality of life for people and communities by removing environmental barriers in people's everyday lives, increasing their compatibility with the landscapes they occupy and enabling them to use spaces as they want and need to do. For this research-and-design project, landscape architects and designers collaborated with an occupational therapy practitioner to produce a hypothetical design for an existing public park in Hyattsville, Maryland. The collaboration between the two fields yielded a design that is tailored to the community's user group and promotes engagement in meaningful activities, which is a methodology that has applicability especially in urban areas where access to green space and public funding may be limited.

Research for this design involved an extensive literature review of therapeutic landscape design and application potential of occupational therapy models and frameworks, including the Person-Environment-Occupation Model and the Framework of Occupational Justice. The design also utilized elements of landscape architecture theory, environmental justice theory, and Roger Ulrich's stress reduction theory. Secondary source research, along with site inventory and analysis of the focus area, led to the development of a program for an urban park that addresses issues of equity, promotes social-emotional well-being, enriches cognitive and physical health, encourages sensory enrichment, and improves ecosystem health.

The purpose of this study is to address macro-level issues of occupational health and environmental justice through a design that imagines a built environment that enhances occupational participation at the meso-level. The park proposal provides ample space and appropriate landscape features for occupational therapists and other healthcare practitioners to work with clients and groups at the micro-level.

Elements of the design- which include accessible pathways, a meditative walk, game and exercise areas, and nature play- advanced the program goal to create an accessible public park in an urban environment, where there are myriad barriers to establishing green space. These barriers may include physical inaccessibility, unsafe circumstances, and an inadequate amount of space within walking distance. By aligning theories of occupational therapy and landscape architecture, this study goes beyond the resulting design proposal and introduces an innovative paradigm for further collaboration between the two fields of inquiry and practice. It also lays the groundwork for future exploration of how occupational well-being and environmental justice may have an impact on people's ability to participate in the world around them in a meaningful and equitable way.

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Is the Spatial Distribution of Urban Green Space Associated With Crime in the City of Chicago?

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Keywords: Landscape Ecology, Crime, Landscape Pattern, Urban Green Space, Chicago

There is much interest in exploring how urban green space (e.g., tree canopy, grass) is associated with the crime rate in American metropolitan cities. A large volume of tree canopy contributes significantly to the reduction of crime incidents and rates in urban areas (Troy et al., 2012; Wolfe and Mennis, 2012). Urban green space might contribute to the reduction of crime in two different ways: by promoting surveillance of criminal activity and by preventing violent behavior as a result of the reduction of mental fatigue (Kuo and Sullivan, 2001). However, despite previous studies, the linkage between urban green space distribution and crime remains understudied. The compositional and configurational differences in urban green space might be related to human behavior that mitigates crime.

The aim of this study is to investigate the association between landscape patterns and crime in Chicago. Incidents of crime, including assault, battery, and robbery were derived from Chicago Police Department in 2021. We only included records of crimes that occurred outside. A landscape analysis was performed to identify landscape patterns of tree canopy and grass and configuration of total green space. The landcover data was derived from High-Resolution Land Cover (HRLC). Landscape metrics, including a percentage of the landscape (PLAND), Mean Nearest-Neighborhood Distance (MNN), Clumpiness Index (CI), and Area-weighted mean patch size (AM) were measured in 77 community areas in Chicago. The multiple linear regression analysis using the ordinary least square (OLS) method was performed to explore the relationship between landscape patterns and crime incidents while controlling socioeconomic status.

Preliminary results indicate that there was no relationship between landscape patterns of tree canopy and grass and crime rates. Only employment and education level were associated with crime rates. In terms of urban green space configuration, however, greater distance of urban green space was positively associated with crime rates. In other words, community areas with less connected and isolated urban green space were more likely to have high crime rates.

This study illuminates that incidents of crime can be prevented not only by the amount of urban green space but also by the consideration of its distribution. The findings of this study suggest that city administrators and urban planners need to take into account a strategic plan to maximize the existing urban green space in high-density cities.

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Relationship Between Olfactory Stimuli and Mood in a VR Built Environment

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Keywords: Virtual Reality, Olfactory Stimuli, Mental Health, College Campus, Mood

Evidence that exposure to nature can benefit people has accumulated rapidly over the years but due to the dominance of the visual and auditory senses in humans, most research on nature experiences heavily focuses on the visual and auditory benefits (Franco et al., 2017). However, more attention is now being directed towards the sense of smell and the psychological effects of smell on human behavior. People's senses often work together, providing a multitude of benefits at once. A deeper understanding of how nature benefits people through the full range of senses reveals a more complete picture of how health and well-being are interdependent on nature (Franco et al., 2017).

This study uses virtual reality and pre and post-experience surveys to understand the relationship between smell, mood, and site perceptions in a campus environment for college-age students. During a time when mental health is declining due to the effects and aftermath of the Covid-19 pandemic, this study provides a critical step towards maximizing the benefits that students receive from campus environments.

Virtual Reality (VR) allows the simulation of real-life situations in a three-dimensional computer-generated environment in which the user can interact with their surroundings as though it were real. The scent *Gardenia jasminoides* was chosen for this study due to its proven mood enhancing benefits. The odor will be emitted using a diffuser and essential oils whose ingredients are extracted from natural sources. Essential oils are typically distilled from plant matter and possess the odor of the original tissue allowing them to accurately replicate the selected fragrance(s). Participants will immerse themselves in a campus environment using HTC VIVE Cosmos VR headsets. The environment will include greenery to match the scent chosen. There will be 2 study groups with 60 participants in total. 30 participants will receive the selected fragrance and the other 30 participants will not receive any fragrance. Before and immediately following the campus walk, the participants will be asked to complete a survey to identify their mood. The survey includes the Brief Mood Introspection Scale (BMIS) and additional questions where participants will be asked to rate olfactory satisfaction, overall comfort, and visual satisfaction.

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Intergenerational Community Design: A Visual Experiment With Two Form-Based Approaches

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Keywords: Landscape Design Form, Visual Preference, Older Adults, Aesthetic, Walkability

People have diverse preferences for landscape elements such as forms, materials, colors, and texture. Fragile older adults are particularly sensitive to these environmental characteristics due to their declining physical and cognitive conditions. Prior studies studied people's preferences for various landscape aspects and found they vary by individual (e.g., age, gender, health, region, or culture) (Heft, 1979). Many studies have focused on supporting older people and healthy aging in place in response to global aging. However, fewer research has studied elderly people's landscape choices and mental health and quality of life (Burton & Mitchell, 2007).

This study aims to explore which design elements and forms are preferred by older adults to recommend the most appropriate design forms for wayfinding by older adults. We focus on typical outdoor environments in a senior-friendly residential community, designed with two different forms—circular and rectilinear—as two of the most fundamental forms to shape landscapes in these settings (Booth, 2012). We employ two sets of digital landscape modeling designed with circular vs. rectilinear forms and ensure that all other design aspects are comparable to control variables. In addition, digital landscape modeling was used to create videos that simulate the landscape as people walk through diverse residential outdoor locations (e.g., park, plaza, garden, walkway, picnic area).
After a few rounds of pilot testing, we are currently collecting online survey data (target N = 50 participants) from older adults (aged 55 or older), primarily from Oklahoma and Texas. We expect the participants to be balanced in gender and birth location (born in vs. outside the US). The survey includes 13 short video clips with different design forms. After watching each video clip (containing a circular-rectilinear pair of the same location), participants complete a short 7-item survey asking (a) ease of walking, (b) wayfinding, (c) attractiveness, (d) safety, (e) comfort, (f) familiarity, and (g) overall preference.

By the end of 2022, when the data collection and analysis is completed, we expect to be able to identify specific design features and forms that are preferred by older adults (by gender and acculturation). We can further identify which features are more effective in promoting perceived walkability, wayfinding, attractiveness, safety, comfort, familiarity, and overall preference. Findings from this research can offer new insights on the different characteristics of landscape design elements that can help create supportive environments for older adults, which can lead to promoting their overall health and aging in place.

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Nature, Duration, Country, Gender, and Stress Reduction by Psychophysical Biomarker, a Cross-Cultural Experiment

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Keywords: Heart rate Variability, Virtual Reality Environment, Environmental Psychology, Landscape Architecture
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Stress affects human health and well-being (Juster et al., 2010). Evidence suggests that exposure to nature, including virtual natural environment, may help reduce stress. However, there are gaps regarding the extent to which doses, especially duration of nature, and other demographics, such as gender and culture, may play a role (Sullivan et al., 2014). The researchers have systematically filled the gaps, but more evidence is needed, especially in dose. Some studies said that less than 1 minute can restore stress, some said 5, and some more than twenty (Barton & Pretty, 2010). In this study, we aimed to find the factors that contributed to differences in stress levels after virtual nature in different durations across different demographics.

Participants from Taiwan and US were invited to laboratories in Champaign, IL and Taipei, Taiwan and asked to view virtual natural environments for 1, 5, or 15 minutes after stressors (n=127). Their heart rate variability (HRV) was measured before and after the exposure. Two measurements relating to HRV, pNN50 and LF/HF were normalized and combined to create psychophysical indicator of well-being. The researchers used Four-way ANOVA to understand how the virtual environment, duration, gender, and country in which the participants lived might contribute to the improvement of stress reduction.
The analysis did not find direct differences between nature and urban virtual environment regarding stress reduction. However, they found statistically significant interactions between naturalness and gender; naturalness and culture; and gender, naturalness, culture, and duration as predictors of stress reduction. This finding suggested that duration, gender, and culture of participants predicted parts of the relationship between nature and stress reduction. This study measures psychophysical responses of virtual nature between across countries. Future studies should measure real nature and a wider range of durations and deeper cultures, such as ethical groups, or urban vs rural residency.

The experiment has been approved by the Ethical Review Board of Chiang Mai University under Review Number 62/029 and by the Internal Review Board of the University of Illinois at Urbana-Champaign under Review Number IRB#20233.

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Revealing Impacts of Various Environmental Features of Urban Roads on Drivers' Mental Status: An Onsite Experiment

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Keywords: Real-World Driving, Road Landscapes, Greenness, Environmental Characteristics

Around 1.35 million people die due to traffic accidents every year (World Health Organization， 2021). The rising importance of road safety inspired researchers on examining impacts of environmental factors on safe driving. Several simulated driving studies have shown that road landscapes impact drivers' mental health and safety (Fitzpatrick et al., 2016; Jiang et al., 2020, 2021; Thiffault & Bergeron, 2003; Van Treese et al., 2018). However, very few studies have investigated these impacts in real-world urban roads (Wang et al., 2016). In the study, we selected seven one-hour driving routes in Liuzhou City and thirty-four participants completed seven real driving tasks in a randomly assigned sequence over a period of seven days. The study received a strict ethical approval of driving experiment from The University of Hong Kong, considering the risk assessment and all participants got insurance during the whole experiment. Participant's mental states including boredom, anger, frustration, tension, anxiety, and avoidance, were measured immediately before, during, and after the driving task through visual analog scale questionnaires. Results of multi-factor ANOVA showed that road with higher eye-level greenness significantly elicited more positive mental states than road with less greenness after one-hour driving ($F = 2.51$, $p < 0.05$). Lineal regression models revealed that perceived environmental characteristics that significantly positively affected drivers' mental status included better traffic conditions ($\beta = -0.259$, $p < 0.001$), lower variety of artificial colors ($\beta = 0.309$, $p < 0.001$), and higher perceived aesthetic quality ($\beta = -0.249$, $p = 0.004$). These findings suggest that greenness should be prioritized, and then traffic condition, color and aesthetic quality of roads should also pay more attention by urban planners and designers to promote drivers' mental health and safety.

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Plots, Parks, and Footpaths: Differences in Negative Moods, Pleasure, and Arousal Over 60 Minutes: Evidence from Chiang Mai, Thailand

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Keywords: Southeast Asia, Nature and Health, POMS-40, Walking in Nature

Walking, especially walking in nature, supports physical and mental well-being. Growing body of evidence suggests that walking in natural spaces can reduce stress, improve attention, and reduce risks of cardiovascular issues (Kuo, 2015; Suppakittpaisarn et al., 2017). However, gaps remain regarding types and durations of the contact with nature. In this study, the researchers investigated how people's mood can change within one hour before and after walking in different environments. They also measured how pleasure and arousal changed over time within those environments.

120 participants walked for an hour across three well-known public spaces in Chiang Mai, Thailand: a leisure farm, a traditional park, and the city center. Their total mood disturbance (TMD) was measured via short form Profile of Mood States (POMS-40) before and after the walk (Curran et al., 1995). Their pleasure and arousal were measured at 20 minutes, 40 minutes, and 60 minutes of the walks using Health Cloud App developed by the National Taiwan University. TMD before and after were compared across three sites. Pleasures and arousals at 60 minutes, along with their changes across time, were compared using paired sample t-test and ANOVA.

The results found that a walk in the park, but not agricultural plots nor the city center, predicted significantly improved TMD of the participants. At the end, agricultural plots and parks have similar pleasure and arousal level, which significantly differed from the city center. Pleasure and arousal levels significantly increased and decreased during the walks differently among all three sites.

These findings suggest that environments and durations may play a role in relationships between nature and human health. Designers and planners may explore the possibility of why pleasure level dropped in the middle of the agricultural plots and streets, and whether the drops related to the improvement in mood. In the future, studies should be conducted in more sites and within more cultural and geological contexts for further generalizability.

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Nature-Assisted Treatment for Drug Addiction: Examining the Impact of Exposure to The Natural Environment on Drug Addicts' Physiological Health States and Drug Addiction

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Keywords: Nature-Assisted Treatment, Drug Addiction, Stress System, Immune Functioning , Long-Term Onsite Experiment

Drug abuse and addiction cause a wide range of social and economic maladies and contribute significantly to the global burden of disease. The development of addiction seriously impairs humans' health states, especially the stress system and immune functioning, which in turn drive the addiction develop (Koob & Schulkin, 2019; Koob & Volkow, 2016; Liang et al., 2016)). Fortunately, many theories and empirical studies have demonstrated the benefits of nature exposure on human health by reducing stress (Ulrich et al. 1991; Yao et al., 2021; Lee et al., 2011; Jiang et al. 2014) and enhancing immune functioning (Andersen et al., 2021; Kuo, 2015). These findings carry hope for applied and clinical use of natural environments as drug use disorder treatments, but none of them provided solid evidence related to drug use or addiction outcomes.

To address this knowledge gap, this study conducted a long-term onsite experiment investigating the impacts of exposure to nature on drug addicts' physiological health states and drug addiction. This study has been approved by the Human Research Ethics Committee (HREC) at The University of Hong Kong on November 30, 2020 (reference number: EA200211). We recruited 70 drug users from the community drug rehabilitation program in Chengdu as our volunteer subjects. These participants have similar drug-free status, staying in after-care (rehabilitation) period. Then, they were randomly assigned to the forest and control group. The participants in the forest group participated in the nature exposure once a week, lasting eight consecutive weeks, while the participants in the control group lived as usual without any exposure experiment. The weekly nature exposure last one hour, including walk (1.5 km) and sit in the nature. We measured participants' cortisol and secretory Immunoglobulin A (sIgA) levels by collecting their salivary samples before exposure experiment, after four-week exposure, and after eight-week exposure. Also, we collected participants' frequency and duration of exposure to natural environments for each month in their daily life and social-economic and demographic information as the confounders and covariates.

The data analysis results show that exposure to urban nature for both four weeks and eight weeks significantly reduces cortisol levels, indicating reduced physiological stress and relieved drug addiction of drug addicts. Moreover, we found that exposure to urban nature for four weeks might increase sIgA level, indicating increased immune functioning. Accordingly, we propose that exposure to nature is a promising treatment for helping relieve or recover from drug addiction.

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The Significant Relationship Between Landscape Characteristics and Probability of Sexual Crimes: A Retrospective Study Based on 5656 Sexual Crime Records Across the USA

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Keywords: Sex Crime, Landscape Metrics, Spatial Configuration, Green Space, Machine Learning

Sexual crimes are widespread and cause long-term damage to victims' physical and mental health. More than 1 in 5 women in the US have suffered sexual assault in their life. While the number of sexual assaults is already staggering, estimates of data often underestimate the number of cases that occurred. Numerous studies have focused on sexual crimes, but little is known about the nature of sexual crime scenes. As the sexual assault analysis triangle model suggested, sex offenders need to find suitable crime locations and perspective victims. The environmental characteristics of crime scenes are necessary to examine for minimizing the risk of sexual crimes. Green space has gotten more attention for its benefit to safety as its benefits have been proven in multiple disciplines. Therefore, we quantified the landscape metrics of greenspace to measure the composition and configuration of landscape and investigated their impact on sex crimes based on 5656 sex crime records in the United State. Using the random forest model controlled with socio-economic factors and artificial built environment elements, our results showed that proportions of greenspace were associated with sexual crimes. The higher proportions of total greenspace, trees, and grass were associated with a lower risk of sexual crimes, but the relation of trees mixed with grass was the opposite. Landscape patterns significantly relate to the risk of sexual crimes. The more complex shape and the large distance of greenspace patched were associated with a lower risk of sexual crimes. The more aggregate greenspace landscape was associated with a higher risk of sexual crimes. Our study emphasizes that well-maintained green spaces could not only improve the environment but also be associated with a lower risk of sexual crimes. The composition and configuration of green space are important to urban planning and design strategies for reducing sexual crimes.

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Landscape Preference: A Comparison Between Coastal and Inland Communities

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Keywords: Mechanism, Therapeutic Landscape, Previous Experience, Site Design, Restorativeness

Growing research has shown that nature and open spaces benefit humans through improved physical and mental health and enhanced social engagement. A common mechanism for improving physical health includes reducing people's exposure to environmental pollutants and stimulating physical activities. Well-known concepts linking open spaces and mental health include Attention Restoration Theory (ART) and Stress Reduction Theory (SRT). Increasing attention to mental health has boosted research on landscapes' restorative effects, but little is known regarding the role of landscapes' qualities on these effects (Ekkel & Vries, 2017). Do some settings/ components have better restorative effects than others? Moreover, Hartig et al. (1997) claim that a place's restorative potential is related to preceding deficits in the current environment. Does that mean the restorative effect varies for people living in different environments?

This study aimed to test whether some landscape settings and features are more critical to landscape preference, a predictor of perceived restorative potential. Another major objective was investigating whether living close to the ocean influences residents' landscape preferences. Understanding the driving components of restorative effects would inform design practices that aim to promote health, and exploring the potential preference differences in coastal and inland communities can contribute to generating specific design guidelines for these two different environments. In 2021, we conducted surveys in two Florida cities: Port St. Joe (PSJ) and Gainesville. PSJ is located in the Florida Panhandle, with most residents living within one mile of the Gulf of Mexico, while Gainesville is an inland city in north-central Florida. The questionnaire consists of 14 questions inquiring about people's opinions on landscape features, outdoor activities, health-related benefits, etc. We received 73 responses from PSJ and 120 responses from Gainesville, which we believe are comparable, considering that Gainesville has a larger population.

Preliminary results indicate the two communities share some common landscape preferences, such as "walking trails," "flowers," "trees," and "shady areas," and activities that are likely indicators of restorative potential, including "walking," "biking," "meeting with friends," and "scenic viewing." However, people living in Gainesville rated "quiet nooks" and "wide views" as more relaxing than PSJ residents. Moreover, meditation and grassy lawns appear more attractive for Gainesville residents than for residents of PSJ. Detailed comparison and statistical analysis will follow.

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The Impact of Horticultural Therapy on the Mental Health of Post-traumatic Stress Disorder Patients With Different Cultural Backgrounds

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Keywords: PTSD, Horticultural Therapy, Mental Health, Sensory Experiments

Post-traumatic stress disorder (PTSD) symptoms can start at any time or during different situations after a traumatic event. PTSD is generally classified into four types, intrusive memories, avoidance, negative changes in thinking and mood, and changes in physical and emotional reactions. However, few studies discuss the difference between cultural treatments and how PTSD affects the emotions of the surrounding people in the patient's life. This study aims to demonstrate how horticultural therapy may positively impact PTSD patients and caregivers in a universal way among different races.
A two weeks sensory experiment will be conducted among people experiencing PTSD from different ethnic groups within the United States. Participants will answer questionnaires to track the healing improvements in their social interactions, career development, and family relationships. Self-reflections will be explored after the experiment. Results are expected to demonstrate horticultural therapy's effects on the five senses and its impact on mental health. This research will positively propose Horticultural Therapy as a universal treatment for the different ethnic groups struggling with mental health and will provide a future guideline for healthcare faculties.

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A Systematic Literature Review on Elders' Thermal Comfort and Thermal Regulation Studies

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Keywords: Elders' thermal comfort, Elders' thermal sensation, Physiological parameters, Systematic Review, Aging

INTRODUCTION: Given the global climate change and urban heat island effects, excessive heat significantly affects human health and causes heat-related illnesses and deaths. Elders have unique indoor and outdoor environmental requirements due to physiological changes that occur with age and make them susceptible to extreme heat and cold (Schellen, van Marken, Lichtenbelt, Loomans, Toftum, & De Wit, 2010). Understanding the physiological effects of aging on thermal regulation changes through experiments will directly help older people's adverse health outcomes under extreme heat or cold. There's an urgent need to conduct a systematic review on experimental studies that demonstrate the thermal regulation and optimal thermal conditions of the older population.

PURPOSE: This systematic literature review focuses on experiments on thermal comfort and thermal regulation for the elderly. The goals are: (1) to summarize experiment methods of investigating the thermal regulation characteristics of the elderly and their thermal comfort requirements; (2) to collect elderly people's physical and physiological data, including metabolic rate, sweating rate, surface temperature, etc., through previous studies; and (3) to examine outdoor and indoor microclimatic parameters that affect the elderly's thermal comfort.

METHODS: Four phases: paper collection, paper screening, data extraction, and data analysis using Endnote, Excel, and R were conducted for this systematic review. Four datasets: Web of Science, Pub Med, ProQuest, and JSTOR, were used for data collection. 2,249 pieces of paper were collected after duplicated deletion. Title review, abstract review, full paper review will be conducted. Experiment methods, experiment results, elder's thermal regulation data, and experiment applications will be extracted and summarized.

RESULTS: Through synthesizing results from previous experiments for the elderly's thermal regulation and thermal comfort, this study will reveal the thermal comfort (i.e., true neutral temperatures) and thermal regulation (i.e., physiological data differences between young and old adults) characteristics in cold and heat conditions for elderly. Microclimatic parameters that affect the elderly's thermal regulation and thermal comfort will be demonstrated. The environmental characteristics that affect indoor and outdoor microclimates will also be discussed.

DISCUSSION: This study will advise the indoor and outdoor design and management of a thermally comfortable environment for the elderly, as well as provide opportunities for guidance to prevent heat and cold-related disorders for the elderly.

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Association Between Women-Only Parks and Women's Mortality in Tehran-Iran Under Muslim Cultural Contexts

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Keywords: Greenspace, Mortality, Women-Only Park, Health, Gender

The relation between urban green spaces and mortality risk is well known but less known regarding the association of specific women-only parks on women's mortality risk in Muslim countries, where women are confronted with limitations. Six parks were mainly designed and offered and are the only open spaces that allow women for activities such as sports, recreation, and social relations in green open areas in Tehran, Iran. The primary purpose of creating these green spaces is to make this group of society more active so that women and men can achieve equal opportunities in public green areas. To our knowledge, there has been little research on the influence of women-only parks on women's mortality risk. However, there is little research on the impacts of these types of greenspaces on woman's quality of life and cultural outcomes of them. The results show that these green spaces play a significant role in women's lives in Muslim countries like Iran. We will conduct a cross-sectional study in Tehran-Iran examining whether women living in districts with women-only parks show a lower mortality risk than those living in areas with no such parks. We also like to determine whether the man-only park influences women's and men's mortality risks. We are collecting land cover data in 2018 (most recent) from the National Cartographic Center and mortality data related to cardiac and respiratory diseases from the National Organization for Civil Registration recorded in 2018 for the 22 geographical districts in Tehran, Iran. The number of parks, including women-only and not gender-specific parks, and the greenness level will be calculated via GIS software. A series of t-tests will be conducted to compare women's mortality risk in districts with and without women-only parks. The mortality risks of districts with a more significant number of parks versus a smaller number of parks, and the mortality risks of districts with higher versus lower greenness levels, while controlling socioeconomic, geographical, and demographic factors. We plan to conduct the statistical analysis using R studio. We hypothesized that women-only parks significantly affect women's daily activities and overall health. Once proven, such parks can be promoted to improve social and gender equity in Islamic countries.

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The Influence of Plant Richness of Urban Nature on Landscape Preference

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Keywords: Urban Nature, Biodiversity, Plant Species Richness, Landscape Preference, Nature Perceptions

Human preferences dominate the planning and design of urban nature (Nassauer, 1997; Gobster et al., 2007). To what extent can we leverage these preferences to help address the biodiversity crisis that is disrupting landscapes around the world? The costs of this disruption include a deteriorating quality of urban ecosystems and negative impacts on the health of urban residents (Schwarz et al., 2017; Aerts et al., 2018). Urban residents live within this environmental crisis. Therefore, it is essential to consider both ecological and human benefits when creating and designing urban green spaces. Increasing the diversity of plants in urban settings is one method to create more heterogeneous, healthy landscapes that might have positive implications for human health (Jiang et al., 2022).

We know that urban spaces with plants are preferred by people (Purcell et al., 2001; Suppakittpaisarn et al.,2019). But there is a conflict here. Many people may feel uncomfortable or even fear landscapes with high levels of plant richness and diversity (Cariñanos et al., 2017; Lyytimäki, 2014). Although we know that the greater the plant density, the more people prefer a setting, we do not know the extent to which plant density and plant species richness interact to impact landscape preference. By understanding the relationships among plant density, plant diversity, and landscape preference, we should be able to create evidence-based guidelines for urban green spaces that people prefer and that increase the plant diversity in urban settings.

In this study, we explore the impact of plant species richness on landscape preference while holding vegetation density constant. We also examine the extent to which a person's nature relatedness and their perceptions of species richness mediate this relationship. We manipulated species richness and vegetation density of ten urban landscapes into ten categories using a 3 by 3 design (three levels of plant diversity and three levels of plant species richness) and added one category with no vegetation. We then created 100, 2-dimensional simulations (ten simulations per category). We presented these images via Amazon Mechanical Turk.

In this presentation, we present the findings from over one-thousand responses to our questionnaire. The findings have implications for the design of urban landscapes that promote environmental health and human preference. Our next step, which we will complete in time for this presentation, is to develop a small set of design guidelines for creating healthy urban green spaces.

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Mitigating Community Health Risks Through Brownfield Revitalization in a Studio Setting

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Keywords: Service learning, Demonstration Project, Community Engagement, Contamination

The US EPA estimates that there are over 450,000 brownfield sites in America. These sites, defined as "a property, the expansion, redevelopment, or reuse of which may be complicated by the presence or potential presence of a hazardous substance, pollutant, or contaminant" (EPA 2022) present potential health risks to communities and inhibit public improvements and private redevelopment. Often brownfields are abandoned, unmaintained, unsightly, and pose risks to soil and groundwater. Landscape architects play essential roles in the brownfield revitalization process, including analysis, community engagement, planning and design visioning with remediation strategies, and site design. Through case study analysis of brownfield revitalization in a service-learning design studio, this paper demonstrates how landscape architects contribute [SR1] vital expertise to improve the health and wellbeing of communities.

The authors are a licensed landscape architect and associate professor, a planner and assistant professor, and an environmental scientist and assistant director of one of EPA's Technical Assistance to Brownfields programs. We have collaborated on numerous service-learning community engagement brownfield revitalization projects over the past 8 years. The study area is a 4-mile stretch of state highway in Des Moines, Iowa that connects the city's downtown to its suburban fringe. The highway is a prototypical post-WWII auto-centric road with high volumes of traffic, high design speed, virtually no pedestrian infrastructure, and is characterized by parking lots and functionally obsolete buildings, many of which are underperforming or abandoned. Third-year landscape architecture students analyzed two brownfield sites and developed design proposals to serve as demonstration prototypes for sites along the corridor. For this paper, we documented the project using Mark Francis's (2001) A Case Study Method for Landscape Architecture, with some alterations appropriate to an unbuilt design case.
The effort led to a series of tangible outcomes in the community. The Des Moines Planning Department shifted its focus to the study area and created an Urban Renewal Plan allowing them to use Tax Increment Financing as a tool to assist in redevelopment efforts. They will work with small developers and businesses to provide Phase I and Phase II assessments of sites on the corridor and will use program income from an EPA revolving loan fund to address environmental contaminants if found. They also continued with community engagement efforts with stakeholders and developers and have three sites[SR2] under contract. The research also finds that disseminating outcomes through ArcGIS StoryMaps provided a lasting and accessible deliverable.

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A Landscape Compensation Theory: The Complex Relationship Between Green Space Exposure and Cardiovascular Diseases in the United States

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Keywords: Cardiovascular Disease, Contact With Nature, Urbanization, Rurality, Landscape Compensation Theory

Cardiovascular diseases (CVDs), principally coronary heart disease (CHD) and stroke, caused a substantial disease burden globally (WHO, 2022). Accumulating evidence indicates a significant reduction in the risk of CVDs with greater exposure to green spaces (Astell-Burt & Feng, 2020; Liu et al., 2022). However, few nationwide studies investigated the link between exposure to various types of green space and the risk of CVDs, while also considering the spatial distribution of residents and green space, identifying the optimal buffer distances, investigating the modification effect of urbanization, and providing explicit theoretical interpretations.

This study uses a negative binomial mixed effect model to investigate the association between ratios of four types of green space, population-weighted exposure to four types of green space, and the incidence of coronary heart disease and stroke in 56,924 tracts across the contiguous United States, adjusted for sociodemographic, behavioral, and environmental factors. Additional stratified analyses were conducted to examine the potential modification effect of different urbanicity levels.

We found that a higher ratio of forest inside park, open space inside park, and open space outside park were significantly associated with lower CHD and stroke incidence, while a higher ratio of forest outside park was significantly associated with higher CHD and stroke in the nationwide models. Open space inside park had the largest effect size. Moreover, greater population-weighted exposure to forest and open space inside park was associated with lower CHD and stroke incidence within 800m buffer in the nationwide model, though the forest inside park-CHD association was nonsignificant; whereas greater population-weighted exposure to green space outside park within 800m buffer was significantly associated with higher CHD and stroke incidence. In addition, green spaces have a stronger health effect in highly urbanized tracts compared to rural tracts, and were not beneficial in rural tracts.

This study suggests that forest and open space inside park areas may lead to a reduced risk of CVDs at the tract level in the United States, particularly in highly urbanized areas. Green spaces had mixed associations with CVDs in the rural United States. Further studies are needed to validate the effect using individual-level data and data across a longer time span. We made an initial effort to propose a new theory to interpret our findings. Our findings advocate for evidence-based urban planning policies that are based on context and avoid one-size-fits-all solutions.

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Campus Environment of Higher Education and Student Health: A Systematic Literature Review

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Keywords: Built or Natural Environment, Physical Health, Mental Health, University or College Students

BACKGROUND: Numerous studies have investigated the relationship between the neighborhood environment and residents' health. However, other important settings, such as school campuses, have received little attention. This is the first systematic review synthesizing existing empirical work addressing the association between the built and natural environment of the university/college campus and students' health.

METHODS: This review was guided by the updated Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA). The inclusion criteria were: 1) the built or natural environment measured within a university/college campus boundary; 2) health-related outcome variables; 3) quantitative studies; 4) higher-education students as the study populations, and 5) peer-reviewed empirical studies written in English. We searched nine databases most relevant to this topic, including MEDLINE Complete, PubMed, APA PsycInfo, ERIC, Environment Complete, CINAHL Complete, GreenFILE, Psychology, and Behavioral Sciences Collection, and Urban Studies Abstracts. A total of 22,256 [DY1] articles were initially identified for the title and abstract screening and eligibility check, and 19 articles that met the inclusion criteria were finally extracted, which included 15 cross-sectional studies, three experimental studies, and one longitudinal study.

RESULTS: The reviewed literature suggests that built environmental features of campus such as walkability, pedestrian networks, and the presence and maintenance conditions of walking and biking facilities were related to increased physical activity, walking or biking behaviors, and overall health among students. Increased access to campus green spaces or perceived campus green space was also shown to support students' mental restoration and improve their quality of life. Additionally, the presence of trees (either clumped or scattered) was related to decreased symptoms of depression. Further, tree shades contributed to enhancing thermal comfort, especially during the summer seasons.

CONCLUSION: Literature shows that the built and natural environments of the university/college campus are and can be beneficial to students' health. The remaining knowledge gaps and proposed future research directions are: 1) campus environment and health research is dominated by cross-sectional studies, thus, demanding more experimental investigations using longitudinal and intervention studies to examine their causal relationships; 2) health problems that are particularly prevalent among college students, such as stress and sedentary behavior, require further examinations of their relationships with the campus environment; and 3) future research involving multiple campuses can offer additional and comparable evidence to guide the design and management of campus environments to better support student health.

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Is What You Think What You Feel? How Physiological Responses Demonstrate That the Measurement of Perception Is Not Enough

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Keywords: Immersive Virtual Reality Environment (IVRE), Eye Movement Pattern, Human Perception, Greenery, Residential Building

The fact that human interaction with nature triggers separate processes in the human body is well established in the field of psychology. These interactions have proven to have different perceptual and physiological impacts on individuals. However, many researchers have solely focused on human perception to measure such impacts. What has been examined far less is how the body reacts during those interactions and if the physiological and perceptual reactions are aligned. Therefore, exploratory experimental research has been conducted to examine whether or not the presence of natural greenery in indoor environments induces restorative physiological responses in individuals. Also, are individuals' perceptions of the restorative qualities of these environments aligned with their physiological responses? One hundred and eighty-two residents of a high-rise residential building were randomly assigned to walk through one of the two versions of their building's lobby. The two versions were modeled in an immersive virtual reality environment (IVRE). One version included natural greenery and the other version did not. The participants' eye-movement patterns were recorded via VR goggles as indicators of physiological responses. Aspects of the eye movement patterns recorded included fixation location, fixation duration, blink rate, and travel distance. At the end of the experiment, participants filled out a Perceived Restorative Scale (PRS) questionnaire to measure the two IVREs' perceptual impacts. The results revealed a significant difference in the eye movement pattern between the two groups. Those who walked through the lobby with greenery demonstrated eye movement patterns related to restorative environments in all four aspects of the recorded eye movement. The members of the group with no greenery did not demonstrate such patterns. However, the members of both groups did not perceive the lobby as restorative. The outcomes of this research suggest that measuring human perception as the indicator of the restorative impact of an environment might not be enough and may lead to premature conclusions.

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Designing Green Cities for Human Health and Biodiversity

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Keywords: Ecosystem Services, Urban Design, Public Health, Parks, Greenspace

Increasing biodiversity and improving human health are two frequently cited benefits that urban nature and green infrastructure provide. Success in realizing these goals depends on translating abstract principles into actionable strategies that can be efficiently integrated into site-informed educational studios and real-world projects. Our team has developed a set of design guidance strategies based on a combination of scientific findings and industry best practices that are intended to inform designers as they seek to foster healthy communities and resilient natural ecosystems.

Our research team, composed of landscape architects, urban planners, and ecologists, developed a set of typology-informed design strategies that can be used to support human health and biodiversity in cities. We developed these strategies to foster co-benefits in the design of urban spaces and resolve existing tradeoffs between designing for human use and supporting biodiversity. We built upon a systematic review of urban ecology and public health literature to inform the design of greenspaces. Using this scientific foundation, we developed a range of strategies for supporting both biodiversity and human health at multiple scales: planning, site design, and detailed design and management. We placed particular focus on developing guidance for common landscape typologies, including parks, greenways, waterfronts, and private properties.

Through our research, we have produced a set of actionable recommendations that leverage synergies and manage tradeoffs between supporting human health and biodiversity. Through sharing this work, we hope to foster further conversations within the design profession on how to create spaces that create multiple benefits. We also seek to gather further professional input on our design guidance, with the goal of continuing to improve our recommendations based on the experience of the wider design community.

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Southern Mobility Systems: Practices to Inform and Inspire Responsive Rural Path Types and Networks

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Keywords: Health, Transportation, Recreation, Typologies, Greenways

In response to increasing levels of depression amongst service members, the U.S. Department of Defense (DoD) is looking for ways to improve their mental health and wellbeing. In rural southern Georgia, DoD and regional planners are working together to develop and expand regional path systems in order to give service members and locals access to open spaces, active recreation, and new means of mobility. These efforts require consensus to help mitigate and diffuse conflicts of land use and access. The purposes of this study are 1) to develop studio practices that captivate student interest and capture the needs, preferences, and concerns of the people and communities who will likely use and host new path systems, in order to envision new rural path systems, modes, and mobilities that celebrate, conserve, and create new rural character.

This presentation describes 1) the process of facilitating community and DoD participation in informing character and linkages of new path systems, 2) path typologies and amenities, including art and infrastructure, developed to accommodate and encourage a diversity of users and uses, and 3) the emerging system itself with initial lessons gleaned from its early development.

Project methods include region-wide surveys, Photovoice, and collaborative mapping to generate character and responsive criteria; design and engineering of path routes and typologies to envision future paths and connectivity; and sequential programming, site-based design, and art interventions to celebrate rural landscapes and inspire visitation, use, and discovery of path systems. Reflection and evaluation using holistic and empathy-focused metrics are applied to design process and products. Findings and lessons include 1) the need to engage with stakeholders and residents early in the process to build rapport and trust for path systems that can be seen as intrusive or of little value; 2) the oft-overlooked complexity and potential of path systems to expand the reach and ways people experience, explore, and use rural landscapes; 3) the need for options and diversity in path systems to increase feasibility, equity, uses, and users; and 4) the need for creative studio practices to inspire students to find and illustrate path system design potentials.

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Examining How Green Space Measures Relate to Mortality Rates of Older Adults: A Case Study of U.S. Metropolitan Counties

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Keywords: Green Space Measures, Mortality, Older Adults, Socio-Economic Status

INTRODUCTION: Access to green space has been shown to influence psychological and physiological health. Furthermore, several studies yield empirical evidence demonstrating that exposure to green space can reduce mortality rates and benefit public health (Twohig-Bennett & Jones, 2018). However, simply investing in more green space resources into communities without considering demand may further exacerbate the green space disparity issue (Wolch, Byrne & Newell, 2014). Access to green space is measured through a variety of indicators, yet few studies compare different green space measures to cause-specific mortality rates. In addition, to advance the "just green enough" concept (Curran & Hamilton, 2012), it is necessary to collect population data from different socio-demographic groups. Older adults, a vulnerable group, rate green space higher than their younger cohorts (Sang et al., 2016), yet they are rarely studied in terms of health benefits and disparity issues.

PURPOSE: This study aims to investigate if access to green space is correlated with mortality rates of older adults (aged 65 years and older) within urban areas.

METHODS: 130 metropolitan counties in the northeastern region of the U.S. are sampled and analyzed. Measures of green space explored include Normalized Difference Vegetation Index (NDVI), tree canopy, green space coverage, distance to green space, and types of green space. Health is measured as the mortality rate of older adults. Multiple regression models are conducted to determine the relationships between exposure to green space and mortality rates across the counties. In addition, other confounding variables such as socioeconomic status (SES, measured as race, income, educational attainment), environmental factors (air pollution, temperature, humidity), and lifestyle and health indicators (physical activity, chronic health conditions, number of hospitals) are incorporated to control for potential association distortion by them.

EXPECTED RESULTS: This study estimates the strength of the coefficients between exposure to green space measures and mortality rates of older adults in urban areas. The green space measures with the strongest association with health outcomes merit more research attention and design interventions in future design initiatives. The influence of income and educational attainment on the green space-health relationship is also presented.

DISCUSSION: This study showcases the strengths and limitations of green space on health promotion for populations from different SES contexts and across metropolitan areas in northeastern US. Findings from this research suggest policy implications for green space planning and design approaches as well as lend support for how green space is linked to health equity.

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Urban Neighborhood Park, Tree Canopy, and Anxiety or Psychological Behaviors: Mental Health Disparities

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Keywords: Mental Health, Urban Green Space, Environmental Inequality, Vulnerability

There is growing evidence that living near more green space and tree canopy can help promote mental health and may also prevent depression, stress, anxiety, and other psychological behaviors. Additionally, these benefits may not be equally distributed throughout neighborhoods.
This study aims to investigate if 1) there are inverse associations of neighborhood park and tree canopy with anxiety/psychological behaviors and 2) neighborhood socioeconomic status (SES) can moderate such relationships.

An ecological cross-sectional analysis Using negative binomial regression was adopted to evaluate the effects of exposure to neighborhood park and tree canopy cover on anxiety and psychological behaviors reported by emergency medical services in the multiple cities in Marin County, California at the level of census block (n=2,219). Major independent variables were the exposure to neighborhood parks, a binary variable of block group locating ¼ mile buffer from each neighborhood park, and the tree canopy coverage, which was created at 1-m spatial resolution from 2018 National Agriculture Imagery Program aerial imagery. We added residential population as an exposure variable, which can make the outcome interpretable as a logged anxiety/psychological behavior rate. We also controlled for various sociodemographic/economics (i.e., White population rate, female population rate, household income) and built environments (i.e., population density, commercial area size rate, multifamily housing area size rate, Walk Score, and road density) associated with mental health.

We identified that low-income areas were more likely to have anxiety or psychological behavior rates but have less tree canopy coverage, compared to high-income areas. We then found significant associations of the presence of neighborhood park (β=-0.213, p-value=0.041) and tree canopy (β=-0.843, p-value=0.013) with the anxiety or psychological behavior rate after controlling for control variables. Finally, we found that neighborhood income significantly moderated this tree canopy-anxiety/psychological behaviors (β=0.109, p-value=0.02) but not park-anxiety/psychological behaviors. In low-income areas, the magnitude of the inverse relationship between tree canopy and mental problems was stronger than in areas with non-low-income areas.

These results have important implications for the benefits of neighborhood parks and tree canopy to mitigate mental problems. Since the benefits of tree canopy in reducing anxiety and psychological behaviors are stronger in areas with low socioeconomic status, more attention needs to be paid to those living in areas of low socioeconomic status to maximize the buffering role of tree canopy cover against mental problems. Future research is needed to confirm our findings with longitudinal designs at the level of individuals.

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The Association Between Neighborhood Park or Playground and Resilience Among Children With Adverse Childhood Experiences: The Mediating Effect of Physical Activity

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Keywords: Park/ Playground, Adverse Childhood Experiences (ACE), Resilience, Physical Activity

BACKGROUND: Children may experience adverse childhood circumstances throughout their lives, such as exposure to violence, caregiver mental illness, or parent loss. Due to its potential to reduce the risk of mental health issues, resilience may be especially crucial for children who have experienced traumatic events as young children. The availability of playgrounds and parks promotes self-control, self-esteem, and physical health. However, there is little research on the link between park/playgrounds and children's resilience, especially in those who have had traumatic childhood experiences. In this study, we explored the association between the presence of parks/playgrounds and resilience in children who had been exposed to adverse childhood experiences and investigated the potential mediating role of physical activity (PA) in this association.

METHODS: This cross-section study involved 9,241 children (6-17 years) who were exposed to one of the adverse childhood experiences (ACE) from the 2019 National Survey of Children's Health (NSCH) answered by their parents or guardians. To discern physical inactivity, we defined physical inactivity as being 0 days physically active and PA as at least one more day for 60 minutes of moderate to vigorous PA per week. Resilience was defined as staying calm and in control when faced with a challenge. Control variables included age, gender, education, parental status, screen time, curiosity, difficulties in making friends, family support, and living status in urban areas. Generalized structural equation modeling (GSEM) was used to understand the mediating effect of PA in the association between the presence of parks or playgrounds and children’s resilience among those who have been exposed to adverse childhood experiences.

RESULTS: 44% of children aged 6-17 experienced at least one or more ACE. Among them, children residing in neighborhoods with parks/playgrounds were significantly more likely to avoid physical inactivity (β= 0.223, p-value=0.003), which in turn increased children’s resilience (β= 0.387, p-value<.001) after controlling for demographics and other covariates. We discovered statistically significant indirect effects (β= 0.086) from the presence of parks/playgrounds to promote resilience through participating in PA.

DISCUSSIONS: Even though it is common for children to be exposed to ACE, the presence of parks or playgrounds may provide a chance for them to indirectly increase resilience by participating in PA. Further research is needed to understand the impact of park use and park-related PA as a preventative intervention for building resilience among children exposed to adverse childhood experiences.

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Intertwining Geriatric Physical Therapy With Outdoor Nature Experience

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Keywords: Therapeutic Garden, Elderly Population, Physical Rehabilitation, Disability, Horticulture Therapy

Existing studies indicate that therapeutic gardening activities enhance the experience and outcome of physical therapy for elderly patients. Still, physical rehabilitation in traditional therapeutic gardens is limited because gardening-related activities provide little high-intensity exercise crucial for the recovery of strength, balance, endurance, and daily function of elderly patients. (Criss et al., 2022) The absence of essential physical therapy elements like the obstacle course or the training space means patients still need to spend most high-intensity training time indoors. It is worthwhile to investigate the possibility of combining high-intensity training and outdoor nature experience in a therapeutic garden on the premise that nature can reduce stress from high-intensity training and provide a pleasant distraction from disability and pain. This study explores the potential of facilitating geriatric physical therapy exercises and equipment in therapeutic gardens to expand the capacity of therapeutic gardens and create more outdoor high-intensity training opportunities for elderly patients. This research is conducted around a real therapeutic garden project in Indianapolis, Indiana, with a substantial literature review on aging, senior health, horticulture therapy, and interviews with physical therapists. Eight physical rehabilitation goals are studied, and a concept design of the therapeutic garden that could accomplish these goals is generated using evidence-based design approaches. The design exemplifies the potential of intertwining essential geriatric physical therapy exercises and equipment, including but not limited to the balance beam, ramp, and therapy stairs, with soothing outdoor nature immersion. In addition, this research defines seventeen landscape features as requisites to accommodate age-related physical and cognitive limitations.

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The Effect of Waterscape Sound Type on Individuals' Psychological and Physiological Benefits

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Keywords: Emotion, Heart Rate, Physiopsychological Effect, Waterscape, Water Sound

Previous studies have shown that waterscapes can induce positive psychological benefits than other landscape types. Most research focus on the visual effects of waterscapes, however, the auditory influences of water sounds are rarely discussed. The aim of this study is to explore the impacts of sounds of different waterscapes on individuals' physiopsychological responses and to establish an auditory perception model of waterscape sounds. The sounds of different water types (stream, waterfall, fountain and rain) were recorded from on-site natural waterscapes and artificial water features. Subjects were assigned to listen to different water sounds in the laboratory to examine their responses including emotions, restorative experiences, preference and heart rate.

The results revealed that subjects showed significantly different psychological responses to different water sounds while there were no significant differences in the physiological response (heart rates). Sounds of stream induced more positive emotions such as calm, happy, relaxed, tranquil…etc, as well as less negative emotions, including afraid, gloomy and tense, than waterfalls, rain and fountains. Subjects showed better restorative experiences and higher preferences to the sounds of streams than other waterscape types. Additionally, there was no significant difference in subjects' physiopsychological responses to artificial water features and natural waterscapes. It indicated that sounds artificial water features can create the same auditory effects as natural waterscapes.

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Experiencing Well-Being in Wooded Landscapes Through a Deep Map Lens

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Keywords: Attention Restoration Therapy, Deep Mapping, Forest and Well-Being

The 2022 results of 'Stress in America' poll by the American Psychological Association are worrying more than ever. According to the poll, the stress and mental health statistics of the US are worsening, mostly due to a bundle reasons of COVID-19 pandemic, rising inflation, and the Russia-Ukraine crisis. (The American Institute of Stress, April 2022)

As a result, there seems to be an increased demand for therapeutic strategies and techniques to deal with this mental health crisis. New "therapeutic or stress reduction" apps, podcasts, and websites appear at an advancing pace.

This article is focused on the widely accepted therapeutic strategy that interaction with nature can be an effective antidote to stress and contribute to overall well-being. While this is generally acknowledged, there has also been extensive research underway in the area of environmental psychology and related disciplines. Some of the current terms and areas of study focused on the human-nature relationship that come to mind include eco-therapy, bio-spirituality, mindfulness in nature, eco-psychology, wilderness therapy, and biocentrism.

Most relevant to this article as a foundational theory is Attention Restoration Therapy (ART) developed by researchers, Stephen and Rachel Kaplan and their claim that an overload of directed or voluntary attention leads to burn out. Their evidence-based research found that time spent involved in involuntary or indirect attention has a restorative effect. They argue that time spent in nature may be particularly beneficial because it manifests the four criteria established in their theory: *being away from everyday stresses*, *spatial expanse or extent*, *compatibility*, and most significantly, ***soft fascination***. While a walk in the woods or forest has benefits, this project asks the question "is it possible to design a tool that helps the general public achieve a more nuanced depth of experience in a wooded landscape leading to an increased restorative effect" toward the discovery of soft fascination as described by the Kaplans.

The focus of this presentation is to present the framework of a deep map field guide tool that uses both visual and verbal imagery in a beech maple forest in northern Michigan and is concerned with the dynamic and poetic aspects of the vegetative component of the forest.

The imagery is curated to reveal the following seasonal phenomenon ***soft fascination*** details: 1) Spatial Drama, 2) Nuance of Color Palettes, 3) Bud Dynamics, 4) Vegetative Shape and Contour, 5) Canopy Dialogue, 6) Atmospheric Qualities, and 6) Surface Patterns.

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How Does the Campus Landscape Affect Student Well-Being?

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Keywords: Greenspace, Nature Benefits, Emerging Adults, Wearable Devices, Healthy Campus

Recent studies have shown an increase in the number and severity of psychological problems and help-seeking behaviors among college students around the world over the past decade. However, an important health resource that remains widely overlooked consists of campus green spaces. A well-designed campus environment with natural elements could have a positive impact on students' physical and psychological health. This research raises the question: Does the campus environment have a potential for restorativeness? Could the campus environment provide a sense of happiness and reduce negative emotions, thus achieving the benefits of physical and mental relaxation? In past landscape design research, the characteristics of a landscape designed for well-being and users' psychological responses to it have rarely been discussed. This research used National Taiwan University as a case study to illustrate how to combine real-time psychological data from a wearable feedback system (e.g., HealthCloud app) (Yeh et al., 2022) with physical and psychological responses. Meanwhile, we used the Google map overlay to display the psychological data (e.g., perceived restorativeness, landscape preference, and emotion) from the research on environment and well-being conducted by the Healthy Landscape and Healthy People Lab at National Taiwan University from 2009 to 2021. The result provides a holistic health evaluation index of campus green spaces to assess the importance of such spaces to human health. The practical and theoretical framework of bringing technology and mind together could be applied to infer and improve the campus environment in order to enhance overall happiness in the future.

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Water Sound Attributes for Mitigating Stress Responses to Traffic Noise

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Keywords: Stream Sound, Noise Annoyance, Skin Conductance, Signal-To-Noise Ratio, Low-Frequency Power

Previous studies that investigated the effects of water sounds on mitigating stress responses to traffic noise have largely focused on self-reported subjective measures of valence such as annoyance (Rådsten-Ekman, Axelsson, & Nilsson, 2013; Leung et al., 2017; Jensen, Rasmussen, & Ekholm, 2018). While positive valence has been found to reduce arousal (Medvedev, Shepherd, & Hautus, 2015), direct effects of water sound attributes on stress responses remain inconclusive. Running water generates self-similar fractal sounds with scale-invariant properties found in fractal noises (Geffen et al., 2011; Patón et al., 2020). Although computer-generated colored noises of varying fractal complexities (or relative power in the low-frequency ranges) have been used to simulate the sound of running water for stress reduction, the relationship between fractal complexity and stress reduction has not been systematically investigated (Tian, Kim, & Bae, 2020).

Objective measures of stress, including skin conductance level (SCL) and skin conductance response (SCR), were used with 33 participants listening to traffic noise recording as the baseline and six recordings as experimental conditions with eyes closed. Three of the six recordings were created from mixing the baseline traffic noise recording with the recording of a stream between a street and a sidewalk in Salt Lake City at a high (75%/25%), medium (50%/50%), and low (25%/75%) signal-to-noise ratio. Computer-generated brown, pink, and white noise were used to simulate water sounds with low, medium, and high fractal complexity (as low, medium, and high relative power in the low-frequency ranges). These colored noises were mixed with the baseline traffic noise recording at a medium (50%/50%) signal-to-noise ratio to generate the other three recordings.

Complexity had a remotely significant influence ($p<0.1$) on the change in the SCR low-frequency power: medium complexity found in pink noise significantly mitigated the stress response to traffic noise ($p<0.05$) while high complexity found in white noise significantly increased the stress response to traffic noise ($p<0.05$). The results of the change in the SCL low-frequency power showed that water sound volume was a significant attribute ($p<0.05$) and that medium (50%/50%) signal-to-noise ratio significantly increased stress response to traffic noise. All recordings except for the one mixed with white noise had a lower mean for the change in the SCR low-frequency power than that of the baseline traffic noise. Future studies should consider additional sound attributes to better investigate the potentially stress-mitigating effects of water sounds with low and medium complexity and low and high signal-to-noise ratios.

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Biophilic Designs to Promote Health: A Framework for Bringing Big Data and Environmental Perceptions Into Landscape Design

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Keywords: Biophilic Design, Health, Landscape Preference, Landscape Design, AI

Research from the past 40 years has shown that exposure to the natural environment supports positive health outcomes, such as attention restoration, stress reduction, and increased positive emotions (Bratman et al., 2019; Hartig et al., 2014; Kaplan & Kaplan, 1989; Ulrich, 1981). The use of biophilic design has been associated with similar improvements in human health (Berto et al., 2018; Berto et al., 2015; Gillis & Gatersleben, 2015). Moreover, the perceived biophilic design has been related to landscape preferences and emotional experiences (Hung & Chang, 2022). Landscape architecture and related research are fields that combine art, science, and technology. The A-E-I-O-U design process developed by Robinson et al. (1991) could be applied to site analysis and to experiencing the environment. Big data analysis and health issues have received attention from landscape-related disciplines in recent years. Researchers have aimed to answer the following questions: How can researchers and designers create healthy places in urban areas? How can they transfer information from environmental perceptions and images to the landscape design process and improve health and well-being? Therefore, this work proposes a framework for combining landscape image data, qualitative statements of emotional recounts/descriptions of the environment from social media, and on-site data collection to fill the landscape design and health gap.

This study used a database with more than 900 valid data points, including images of urban green spaces and self-reported data on perceived biophilic design and landscape preferences. The research found that labels with the term “natural landscape” detected by Google Vision AI were positively related to the aspects of perceived biophilic design, such as the state of natural change, environmental perceptions, and evolved human–nature relationships. In contrast, the label “city” showed a negative relationship with the state of natural change, visual aesthetic quality, and place-based relationships. Moreover, the use of the Google Reviews platform to collect information on what people perceive about urban green spaces and the rating scores could provide information on positive and negative perceptions of the environment. The combination of photos uploaded by participants and detected by Google Vision AI could support researchers and designers in understanding essential landscape elements and environmental perceptions in predicting health outcomes (e.g., emotional wellbeing, landscape preference). This research might strengthen the importance of on-site analysis by describing the problem-solving process, defining bubble diagrams, and providing primary concepts to frame landscape designs.

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Comparing the Attention Restorative Effect on Artificial Vertical Urban Greenery and Natural Landscape: A Case Study of Singapore

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Keywords: Skyrise Greenery, Restorative Benefits, Natural Elements, Urban Park, Visual Landscape

Nature is proven to be associated with multiple health benefits (Berman et al., 2008; Chang et al., 2007; Ohly et al., 2016; Van den Berg et al., 2014). Governments worldwide are actively promoting the greening of cities to help achieve a higher quality of living in the city. Singapore, known as Garden City, is famous for its greenery strategy regarding the high density of skyrise vertical greenery and other green infrastructures, such as parks, to obtain more green space within the community (Tan et al., 2013). With this nearby nature that Singaporeans experience daily, this study is curious about the forms of nature regarding the manipulation of man and how it affects restorative health. Does the vertical greenery of the buildings provide an attention-restorative effect?

While the Attention Restoration Theory (ART) describes that being away, fascination, extent, and compatibility are essential characteristics for an environment to be restorative (Hartig et al., 2003; Kaplan and Kaplan, 1989; Kaplan et al., 1998). However, to what extent does the nearby nature of artificial vertical greenery provide restorative effect is less known. In this study, researchers focus on how viewing the artificial vertical greenery landscape would reduce fatigue and restore attention. The research site is in Singapore with a downtown view that contains high-rise buildings with vertical greenery on facades, which includes many forms of foliage. As the control group, we decide to determine the urban parks that contain trees, bushes, and grassland as the restorative environment baseline. To investigate and compare the experience of the vertical greenery and park landscape, this study uses a 360-degree camera to film two types of environments with ten videos (five for each). Fifty participants are expected to view these videos in a Virtual Reality device and to rate the Perceived Restorativeness Scale (PRS) (Hartig et al., 1997; Pasini et al., 2014) response after they viewed both types of environments.

This study examines the restorative potential of Singapore's vertical greenery in the urban landscape and how people perceive it. By comparing it with the park landscape, we would further understand how the visual elements regarding different forms of nature are related to attention restoration. To deepen our knowledge of how the urban greenery on the facade and green walls take its place and health effect on healthy landscape design and planning strategy with the content of visual features, which is also critical to a healthier city on well-being.

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Social Interactions as a Potential Explanation for the Relationship Between Health and Academic Green Space

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Keywords: Wellbeing Campus, University Students, Social Health, Physical Characteristics, Photovoice

Several approaches to using green areas can improve human health and well-being. However, on-campus green areas can enhance the students' social, emotional, and physical well-being. The academic green space serves as a gathering area for students to engage and communicate, as well as a place to relax and recuperate from attention fatigue during daily university life. More outdoor places should be available to promote social contact on campus, improving students' feelings of well-being and belonging. However, there is still a lack of empirical research on the impact of the relationship between different aspects of green space (physical environment, perceived environment, user behavior patterns) on social interaction. Therefore, this research focuses on the scope of green space at the campus life circle and urban scale and aims to explore (1) the influence of different aspects of green space on social interaction and (2) the correlation between social interaction and environmental features and health. The research was carried out in two stages, and college students and graduate students were invited to be experimental participants. The first stage used the online questionnaire method. The subjects were asked to upload photos of the green space environment near their homes where individuals frequently take part in activities and to answer the questionnaire about types of activities, frequency, social interaction, environmental perception, and sense of well-being. The goal is to understand their frequent use of green space and the relationship between green space and social interaction. In the second stage, the subjects were invited to carry smartphones and smartwatches to record in real-time the GPS location, environment data (temperature, humidity), photographs of tasks, physiological psychology of the user’s activity trajectory, and other information to understand their immediate environmental feelings and possible influencing factors. The findings provide insight into the impact of different aspects of green space on social interaction to help inform urban green space planning and design principles. We also provide a holistic health evaluation index of academic green spaces to assess the importance of such spaces to human health.

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Shifting Minds Toward Green Spaces and Well-being

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Keywords: Social Media, Nature, Topic Modeling, COVID-19, Machine Learning

Covid-19 pandemic has changed many parts of our lives including health and social interaction. Since early 2020, many studies have found the increased pattern of park visitation and benefits of nature on human well-being, anecdotally or empirically; some research relied on data monitoring programs and social surveys, while other research mostly in public health focused on psychological tests or brain scans. Few research have found, however, how human perception has changed as they experience greenspaces during the pandemic. This study employs a novel approach to examine shifting human perception toward greenspaces in the eastern tri-state region (NY, NJ, CT) during the early months of the Covid-19 pandemic. We used Twitter data (tweets) that contain keywords predefined based on geography, space type, and recreational experience over a two-month window (March 13–May 12) in each year from 2016 to 2019, and then in 2020 for a comparison to the previous years. After several preprocessing steps, a total of 41,861 tweets were accounted for to conduct a topic modeling and semantic analysis that are deemed advanced machine learning techniques. Findings include that the nature-related tweets embodied 19 different thematic topics ranging from mask-wearing to fresh air to bird sound. The longitudinal cluster analysis classified the 19 topics into four clusters representing unique trajectories of the data over the five years in terms of frequency, polarity, and subjectivity. Unsurprisingly, the topics associated with COVID-19 safety measures (mask wearing, staying at home, social distancing) showed a significant increase in tweet data to the extent that they were clustered into a single discrete category. It is also understandable that traditional park activities (ball-playing, biking/running) were still prominent topics on social media, as represented in another cluster. Interestingly, the cluster of tweets characterized by the theme of love, gratitude, and spiritual wellbeing increased significantly compared to pre-COVID times, inferring that people's interests noticeably shifted to nature and health during this period. This change is likely tied to the positive sentimental attachment to green spaces as well. This study provides profound evidence of a renewed appreciation of nature as well as an emerging, yet prominent pattern of emotional experiences expressed through a social media platform. The study highlights the preeminent roles parks and greenspaces play during the pandemic and guides a new direction in future park development to support more natural elements and nature-oriented experiences from which emotional and spiritual well-being outcomes can be drawn.

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Learn But Don’t Touch! Designing a Toxicology Garden for a Veterinary Medical School

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Keywords: Plant Identification, Toxic Plants, Poisonous, Educational Landscape, Interdisciplinary Collaboration

Toxic plants are significant threats to livestock and pets. (Reagor 1981, James et al., 1992). Western ranchers can lose up to 15% of cattle to larkspur poisoning, and their communities lose millions of dollars to suboptimal management costs and rangeland use (Green et al. 2020). Plants were the #5 pet toxin in 2021, responsible for 9.8% of Animal Poison Control Center calls (ASPCA, 2021). Accordingly, toxic plant knowledge is a key component of veterinary medical (VetMed) education; however, only a handful of VetMed schools in the U.S. have gardens to supplement their toxicology curricula. This presentation discusses a collaboration between veterinary toxicology and landscape architecture professors to create a toxic plant garden for effective field education for VetMed and other students on their university campus.

In 2021, the landscape architecture (LA) professor guided the site selection and developed a phased schematic plan anticipating future expansion. Phase I converts 6,000 sf (0.14 ac) of utility turf flanking a primary walkway from the parking lot to the VetMed building into a garden, facilitating regular and year-long observation of toxic plants.

In 2022, a LA graduate student joined the LA professor in design development. Using VetMed toxicology lecture slides, they created a 60-species plant schedule categorized by toxic effect. This organization informed the layout and groupings in the garden. Seating for extended observation, socializing, or outdoor breaks was also incorporated. According to the VetMed toxicologists, the clinical organization, scope, and multi-purpose use of the garden would make it the top garden of its type in the country.

To support the success of the garden, the LA professor and graduate student will also develop plans to create signage with QR codes linked to a VetMed-managed website, rent university greenhouse space for tropical plant storage and plant production, prepare a maintenance manual, and connect with horticulture students for garden maintenance. The conceptual plan will serve to raise funds from VetMed alumni, and branded merchandise offers opportunities for further publicity and funding. Currently, the LA professor and graduate student are refining a cost estimate for evaluating installation bids from contractors. An initial installation is estimated for spring 2023, with later planting in summer as warm-season species become commercially available. When built, this garden will be a significant educational tool for VetMed students, alumni, and conference attendees, and also students and professors in biology, botany, horticulture, agronomy, range management, and landscape architecture.

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Engagement by Design: Intergenerational Communities to Promote Social Equity and Healthy Aging in Place

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Keywords: Community Environments, Intergenerational Interactions, Research Translation

BACKGROUND: Population aging is a global demographic trend that has led to many societal challenges across the economic, socio-cultural, and health sectors. Intergenerational communities can help address some of these challenges by bringing mutual benefits to older adults and younger generations. However, scientific evidence that can guide how to create such communities is limited.

PURPOSE: This research aims to identify key elements of intergenerational communities and their social and health benefits. Further, it aims to design an evidence-based design guide – Intergenerational Community Assessment Tool (iCAT) – that contains community and site design guidelines for creating intergenerational communities and intergenerational sites.

METHODS: This research, sponsored by the Landscape Architecture Foundation, will be conducted in three phases: (1) expert surveys and interviews about intergenerational communities/interactions, (2) interviews and surveys of older adults and children in age-mixed versus age-restricted communities to compare social and health benefits between the two, and (3) research translation to ensure broader impact and uptake of this work among professionals and policymakers.

EXPECTED RESULTS: We target 200-300 experts from built environments, public health and aging services, and/or health care in the US in Phase 1 and 1,000 older adults and 500 parents in Texas in Phase 2. Building onto the prior empirical work by the authors of this abstract (Zhong & Lee, 2022; Zhong, Lee, Foster, & Bian, 2020; Zhong, Lee, & Lee, 2020; Zhong, Lee, & Lee, 2022), this research will further identify and prioritize essential physical elements/features of intergenerational communities and their associations with three target outcomes among older adults and children: intergenerational interactions, age-related social equity, and mental health. iCAT will be the main research translation outcome providing end-user-oriented guides to help create intergenerational communities. The community-level iCAT tool will likely include items related to land use, safety, thermal comfort, aesthetics, wayfinding, familiarity, and connectivity relevant to the larger community environment. Site-level tools (e.g. iCAT-park, iCAT-street) will include more detailed items such as locations, sizes, colors, and materials of individual design elements for each site/setting. A user manual with visual aids will accompany each tool to facilitate its broad use/application in landscape architecture and allied fields.

CONCLUSIONS: This will be a pioneering effort that can lead to rethinking the future of our communities that can fight against ageism and social isolation and promote healthy and active aging in place. Findings from this study will facilitate the engagement of diverse stakeholders in efforts toward creating intergenerational communities.

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Case Studies on Assessing Outdoor Environment of Long-term Care Facilities: An Application of Alzheimer's Garden Audit Tool

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Keywords: Dementia, Healing environment, Alzheimer's Garden Audit Tool (AGAT), Post-occupancy evaluation, Design strategy

The number of elderly people with dementia (EPWD) is increasing rapidly in China, but China lacks sufficient professional long-term care (LTC) facilities. A good living environment can alleviate neurological symptoms, improve the quality of life, and reduce the risk of fall injuries (Bricket et al, 2010). Living environment design plays an important role in the care of various stages of dementia (Day, 2000). The purpose of this study is to assess the outdoor environment of current nursing homes and explore suitable outdoor landscape design strategies for EPWD.

Two typical care facilities with dementia caring units in Wuhan, China were selected based on their funding resources, public and private. Fifteen out of thirty-two EPWD from one nursing home were recruited regarding the willingness to participate and stages of dementia. The clinical Dementia Rating Scale (CDR) (Morris et al, 1997) was applied to evaluate participants' dementia stages according to their cognitive, behavioral, and functional performance. We employed self-reported garden utilization to obtain visiting frequency and preferred places, conducted 15 days of observation, and recorded the participant's activities and behaviors thus identifying their challenging behaviors. The Alzheimer's Garden Audit Tool (AGAT) was operated as a metric to assess whether a garden incorporates certain design elements and qualities that are necessary for a successful dementia care garden. It consists of six sections covering from location to maintenance and amenities, including seventy-four items scored based on a four-point scale ("0" for absent features, "3" for very successful) (Marcus, 2007).

According to our results, most participants had memory loss, time confusion, and problems with directions. More than half of them spent less than thirty minutes in the garden per visit but with noticeably favorite locations in common. Two selected facilities were scored below the standards of the AGAT. We suggest refining and localizing some instrumental items of AGAT to better meet the criteria for culture-friendly purposes, including the use of an entry patio; the guidance when using lawns; the establishment of a smoke-free community, etc. Certain AGAT criteria were discussed, such as "moveable seating", which may cause safety issues when misused by EPWD. Though the sample size is relatively small due to the difficulty in recruiting EPWD which can limit the generalizability of findings, the results of this study actively contributed to emphasizing the importance of a proper outdoor environment for dementia people to rehabilitate, engage, maintain and improve overall health.

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Climate and Meteorological Characteristics and Mental Health: A Systematic Review and Meta-Analysis

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Climate change is affecting the world and causing changes in ambient factors to which humans are routinely exposed in everyday life. To date, evidence has revealed an association between extreme weather conditions and physical diseases but the impacts of climate factors on mental health have received inadequate research attention. To fill this research gap, a systematic review and meta-analysis was conducted to examine two main questions 1) which climatic factors are related to mental health outcomes, 2) which mental and behavior disorders are affected by climatic conditions.

A systematic search of peer-reviewed empirical studies was conducted using seven electronic databases (Web of Science, Medline, ProQuest, EMBASE, PsycINFO, CINAHL, and Environment Complete). We included studies examining the association between objectively measured meteorological conditions and mental health-related outcomes in the general population and further performed a meta-analysis to estimate the pooled effect sizes of these associations.

The search process yielded 7065 initial results, from which we identified 76 studies to be included in the systematic review set. Finally, 42 were included in the meta-analysis. Results indicated that heatwave and extreme high temperatures were associated with higher risks of mental and behavioral disorders. Cold extremes, on the other hand, were not significantly associated with mental disorders. Beyond the temperature metric alone, findings identified a significant association between apparent temperature (a thermal index combining effects of temperature, humidity, wind speed, and radiation) and elevated risks of mental and behavioral disorders. For specific disorders, schizophrenia was significantly associated with climatic conditions. Despite the small number of studies, there was also evidence approaching statistical significance that suggested mood and depression disorders were also correlated with climatic conditions.

Our results highlight the relationship between high temperatures/heatwaves and adverse mental health outcomes and also clarify that temperature is not the only climatic contributor to mental conditions. Given the broad array of climatic factors, their synergistic effects, and the various types of mental health conditions, more research is required regarding each exposure-response pair and the joint effects of climatic exposures.

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The Synergistic Effects of Immersive Greenness and Microclimate Conditions on Psychological States in Green Space: An Ecological Momentary Assessment Approach

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Keywords: Mental Health, Greenness, Microclimate, Ecological Momentary Assessment

INTRODUCTION AND PURPOSE: Numerous studies have demonstrated the benefits of parks and green spaces in improving mood states and reducing stress (Li et al., 2019). Despite the benefits, in subtropical climates, outdoor activities during hot summer days may lead to heat stress and physiological strain, which may negatively affect visitors' psychological states. The present understanding of the synergistic effects of visual greenness and microclimate comfort on mental health is limited. As such, this study aims to investigate whether and the extent to which the microclimate condition modifies the mental health benefits of green space.

METHODS: This study is conducted in Houston Arboretum, a 155-acre public green space in the heart of the City of Houston and utilizes an ecological momentary assessment (EMA) approach. Participants were recruited as they entered the arboretum. They filled out a pre-visit baseline questionnaire and were each provided an Android phone with the EMA questions pre-programmed. Then they start their visit as planned, the phone app detects their locations and as they enter certain geofences set within various eco-zones, survey prompts were triggered. Main survey measures included the perceived biodiversity, affect and mood state, and thermal sensation of the specific areas within the arboretum. Microclimate conditions were measured objectively using Kestrel 5400 Heat Tracker in five different locations of the arboretum for continuous measurements. Eye-level green index was evaluated using Light Detection and Ranging (LIDAR) data and validated using pictures taken by participants. Multi-level models were used to estimate the relationships between green index and affect and mood state, taking into account microclimate as moderators.

RESULTS: A total of 177 individuals participated in this study, and 463 surveys were completed, averaging to 2.6 EMA surveys per participant. The results suggested that green index assessed using LiDAR data is significantly correlated with perceived naturalness and biodiversity. Similarly, thermal comfort index calculated through objectively measured micrometeorological conditions was significantly correlated with reported thermal sensation. The green index at any given location was significantly associated with psychological conditions, and the magnitude of the relationship can be modified by microclimate conditions and perceived thermal comfort.

CONCLUSION: This study goes beyond the common paradigm of the mental health benefits of green space (Wood at el., 2018) and examines the ambient conditions that may modify this relationship. These findings have implications for appropriate park and green space design in subtropical and tropical climates to maximize their mental health benefits.

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Landscape Architecture for Health: Student Health and Campus Environment in Higher Education

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BACKGROUND: This is the sixth year since the first panel on "Landscape Architecture (LA) for Health" was presented at the 2017 CELA conference. The LA for Health panel series engages panel and audience discussions around the three domains of protecting, promoting, and restoring health. This year's panel continues this dialogue with a focus on student health and the campus environment.

SIGNIFICANCE: As of Spring 2022, there are about 16 million students attending colleges or universities in the US [1]. Many of them are in an important stage of personal development as they grow from adolescents to young adults. This transitional period is one of the critical periods in life when many lifestyle habits are established, which will have life-long impacts on their health and quality of life. However, many college students report having health-related concerns; 60% report concerns about their mental health (e.g. stress, depression) [2]. Abundant evidence confirms that, in addition to personal factors, contextual factors such as the surrounding environment have a profound impact on human health. However, empirical studies that specifically focus on the campus environment and student health in higher education are limited.

PURPOSE: This panel brings attention to this critical knowledge gap, specifying the health-significant roles of the campus environment and the ways college campuses can be designed and managed to protect, promote, and restore student health. Campus environments are important settings for effective health-related interventions as large numbers of students are exposed to relatively contained environments for extended periods of time. This topic is especially timely, as many students continue to experience multiple and chronic stressors related to academic pressure, environmental/social changes, and financial burdens, which are further aggravated by COVID-19 [3].

PANEL STRUCTURE: After a brief overview of the existing literature on the relationship between campus environments and student health in higher education, panelists will make brief oral presentations covering (a) protecting health: COVID-19 impacts on students' behaviors and health; (b) promoting health: campus green infrastructure and users' health; and (c) restoring health: a Campus Nature Rx design studio project. These are part of an ongoing project called "Green Campus" led by researchers from Texas A&M University. The moderators will then engage the audience to discuss strategies to promote research and evidence-based intervention strategies to create healthy campuses and solicit audience interest in expanding the Green Campus initiative to other universities/colleges.

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Accessibility of Green Space and Childhood Obesity in the United States

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Keywords: Neighborhood Greenery, Parks, Playground, Body Mass Index, Children Health

Over the past four decades, the prevalence of obesity worldwide has almost tripled (WHO, 2016). The obesity epidemic in the U.S. is a major health issue and has shown a rapid rise over time (Ward et al, 2019). Among which children and adolescents obesity has already become a serious problem, one in five of them are affected, putting them at risk for poor health (CDC, 2022). Not only does obesity increase rates of childhood chronic disease, but obese children are more prone to obesity later in life (Lifshitz, 2008). According to the National Health and Nutrition Examination Survey (NHNES), the percentage of adolescents aged 12-19 years with obesity is 22.7%, children aged 6-11 years have an obesity rate of 20.7%, and 12.7% of children aged 2-5 years are in the condition of obesity (NHNES, 2020). A growing body of literature suggests that access to green space (GS) can help improve health by providing opportunities for physical activity and reducing obesity-related health problems (Brownson et al, 2003). However, there is a limited exploration of whether access to green space influences the obesity of children and adolescents in the United States.

The purpose of this study is to investigate the relationship between the accessibility of green space and childhood obesity to fill out the research gap. This study uses a secondary dataset from the National Survey of Children's Health (NSCH) generated in the year 2020. Hierarchical multiple regression analysis is used to investigate the relationship between the accessibility of green space (neighborhood parks and playgrounds, state and national parks, neighborhood walking paths) and the children's obesity rate in each state by SPSS Statistic 27.

Preliminary results indicate that accessibility serves as a strong predictor of reducing obesity among children. Accessibility of neighborhood parks and playground is significantly negatively correlated to child obesity (β=-1.002, $p<0.001$). That is, children who have better access to neighborhood parks and playgrounds are less likely to experience obesity than those with poorer access at the state level. However, access to neighborhood walking paths does not have an impact on children overweight/obese, nor does access to state and national parks. The findings suggest that the role of parks and playgrounds within the communities are the most important environmental characteristics in exploring child obesity outcomes.

LANDSCAPE PERFORMANCE

Landscape Performance (LA CES)

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From the Gutter to the Watershed: Using Hydrological Simulation to Understand the Catchment-Wide Impacts of Green Infrastructure

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Keywords: Green Infrastructure, Modeling, Hydrology, Process, Performance

The nascent discourse of catchment-scale Green Infrastructure (GI) research continues to be marked by many challenging questions regarding the most effective way to "upscale" GI interventions to maximize their multifunctional benefits (Golden & Hoghooghi, 2018; Tuomela et al., 2019). This includes questions of technical design parameters, as well as both the organizational and spatial upscaling of GI over medium and longer timescales. The research presented here adds robustness to this field of inquiry while identifying several possible trajectories for further research.

Historically, the use of digital tools in Landscape Architecture (LA) has been primarily leveraged to support the representation, morphology or construction of proposed projects. This often takes the form of maps, renderings and construction documents. In many design fields for example, 'parametric design' is primarily concerned with issues of data-responsive form-making. The presentation and paper suggests new possibilities for incorporating a wider array of parameters, data and digital toolsets to influence the likely social-ecological performance of a design at the early phases of the design process. Whereas (Felson & Pickett, 2005) have advocated the role of so-called "design experiments", a significant limitation to this approach is that evaluating the performance of a landscape intervention is typically carried out post-construction. By contrast, the incorporation of powerful hydrodynamic modeling tools such as Stormwater Management Model (SWMM) introduces a paradigm in which performative design testing can occur in the pre-construction or even conceptual phase of a project (Grose, 2014). This is important as it offers a way for various stakeholders and decision-makers to assess the tradeoffs that may exist between various scenarios before any shovels meet the ground. From a pedagogical and epistemological perspective, there are opportunities to further advance the discipline of landscape architecture by engendering a more meaningful interface with other disciplines including urban hydrology, environmental ecotoxicology, civil engineering, and urban planning. Introducing these methods and tools to LA students in accessible ways at an early stage in their education offers immense potential for bridging the gap between design and science. The presentation will examine recent examples of how computer simulations of hydrological and hydraulic processes have influenced my own design practice, teaching and research across projects spanning the Global South (Bangalore, India) to the High Plains region of Texas, USA (Phillips et al., 2020).

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Defining Canada's New National Urban Parks Program: the Winnipeg Proposal

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Keywords: National Parks, Performance assessment, GIS landscape analysis

In 2021 the Canadian government decided to expand the national parks system to urban metropolitan areas by establishing "at least one new national urban park in every province and territory, with a target of 15 new urban parks by 2030". The parameters for these new urban parks had yet to be defined even as Parks Canada, the agency managing the national park system, began establishing collaboration agreements with Canadian municipalities and Indigenous communities.

It is in this context that a group of civic leaders and community organizations began advocating for the creation of a National Park at the confluent of Winnipeg's Red and Seine Rivers, just east of the city's downtown. Parks Canada offered to support this community-based proposal by funding a comprehensive assessment of how this location might achieve multiple federal, provincial, municipal, and local community objectives. It was hoped that this study would benefit Parks Canada's site selection process in other Canadian cities by clarifying the performance objectives and methodological requirements for the early stages of the parks planning process.

A novel aspect of the Winnipeg proposal is a major institutional shift away from the conservation of established natural areas in favour of the long-term restoration of environmentally degraded ones – in Winnipeg's case legacy sites from the city's late 1800 industrialization. The proposal thus had to articulate the benefits accrued through environmental restoration efforts expected to last decades. This presentation will briefly describe the Canadian Urban National Park program. It will then review the performative framework developed for the park selection process and describe some of the methodological approaches adopted to validate the proposed location.

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Advancing Landscape Metrics and Methods: Excerpts From the *Landscape Performance Modelling Using Rhino and Grasshopper* Publication

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Keywords: Landscape Performance, Parametric Modeling, Data Visualizations, Ecosystem Services, Technology

There are a wide range of landscape representation books but as the field shifts towards regenerative and ecological design, decision-making tools will take precedent for analytical representations, performance modeling, and landscape metrics through the platform of advanced digital media. In the field of landscape architecture, technical books on representation and software are often limited to conventional and static two-dimensional drawings. Examples in this book through parametric modeling with Rhino and Grasshopper push the opportunity of utilizing temporal, fluctuating, and dynamic aspects of the living environment as they specifically relate to landscape performance.

Landscape performance is heavily reliant on measurements, metrics, and methods to evaluate the effectiveness of outdoor spaces as contributors to ecosystem services through environmental, social, and economic benefits. This analytical process utilizes quantified information, datasets, surveys, and sensory devices to calculate outputs for cross-referencing with project goals and objectives. This book demonstrates how this process is translated to a digital parametric model for measuring a variety of landscape performance topics. Although the bulk of the modeling methods focus on external datasets, simulations, and precedent analysis, the book also demonstrates how it can serve as an adaptive tool that can be refined from field surveys and ground truthing for an integrated approach to link the digital and physical environment.

As the book instructs and guides the reader, it will focus on the fundamental use of the computational software Rhinoceros 3D and the integrated Grasshopper plugin for parametric modeling. The demonstrations will begin with algorithmic scripts to model and inventory landscape characteristics as it progresses towards more advanced performative analysis as it relates to environmental, social, and economic outcomes.

This book can benefit educators, students and professionals that are interested in using computational modeling as a performance assessment and graphic visualization tool. It will be using industry standard calculators, metrics, and methods from the Landscape Architecture Foundation's Evaluating Landscape Performance: A Guidebook for Metrics and Methods Selection, the Site Engineering for Landscape Architects book, and other sources to implement outputs as both quantitative and qualitative outcomes. Historically, these methods have often resulted in tabular and abstract outputs without the spatial incorporation of a project site, however, this book will demonstrate opportunities to effectively communicate the significance of integrating of data with spatial immersion. It will also add a valuable skillset that is becoming more commonly practiced in the profession of landscape architecture during the analysis and post-construction phase.

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Performance Evaluation for Gulf State Park: A Case Study Investigation

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Keywords: Landscape Performance, Benefits, Case Study Investigation, Certification, Survey

This paper evaluates the performance of the Gulf State Park project in Gulf Shores, Alabama as a part of the Landscape Architecture Foundation's Case Study Investigation Program 2022. The project is a recipient of the American Planning Association, National Planning Achievement Award for Implementation - Silver, 2020 along with the Lodge at the Gulf State Park, which is awarded SITES Platinum, LEED Gold; FORTIFIED certificates. The paper reviews the investigation under LAF's three broad benefits categories (environmental, economic, and social) and identifies specific landscape architecture performance benefits for each category. Both quantitative and qualitative methods were used to substantiate the value of landscape architecture and its performance in the Gulf State Park. Chosen methods included: 1) Site observations using Gehl Public Life Tools (Gehl, 2017) accessed from LAF's Landscape Performance Toolkit, (2) Universal Floristic Quality Assessment Calculator accessed from LAF's Landscape Performance Toolkit to be used with a collection of primary on-site data (vegetation line transects), and 3) collection of secondary data (data collected/shared by partners and other sources). The key features of the project include a FORTIFIED lodge, the interpretive center seeking the Living Building Challenge certificate, and dune restoration. The results reflect the environmental, economic, and social benefits in terms of community engagement, preservation, and reuse of energy and water as well as the primary lessons learned through the CSI program.

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The Use of Post-Occupancy Evaluations to Measure Landscape Performance Related to Greenspace in Early Childhood Settings: A Systematic Literature Review

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Keywords: Landscape Performance, Post-Occupancy Evaluation, Early Childhood Setting, Greenspace, Outdoor Learning

Over the past five decades, research has linked the benefits of greenspace to improved health measures (social, psychological, and physiological) in children (Collins et al., 2020; Gill, 2014; Bell et al., 2008; Louve, 2008). As such, studying greenspace in early childhood settings specifically is important for understanding the design's quality and ensuring these spaces are conducive to children's health and wellbeing. For this research, an early childhood setting includes spaces where children under 12 spend most of their time away from home. These outdoor spaces include formal learning environments (schools and childcare centers) and non-formal learning environments (public parks, zoos, and museums) (Moore, 2014).

However, for early childhood settings to be considered part of a public health intervention, innovative assessment methods are necessary to evaluate how designed spaces can support health mandates (Moore and Cosco, 2010). One relevant methodological approach for generating empirical evidence related to health benefits at a site scale is post-occupancy evaluation (POE). Typically focused on a single type of setting, POEs aim to improve a designed environment, making the research method relevant to academics and professionals in landscape architecture (Cushing & Renata, 2015; Kapper & Chenoweth, 2000). Additionally, POE studies are important because they often take a mixed methods approach, thus integrating qualitative data that is not always possible to obtain in other types of quantitative greenspace studies.

This paper presents a systematic literature review of post-occupancy evaluations (POE) of greenspace design for early childhood settings. The literature review method covered three major databases (JSTOR, EBSCO, and Google Scholar), focusing on peer-reviewed journal articles with clear POE methods sections centered on specific settings, and published in English over the last ten years (2012-2022). Our research identified nine relevant articles across six journals applying qualitative and mixed methods approaches for measuring the benefits of greenspace in early childhood settings. The methods within the articles identified in this review can be applied by designers to expand empirical data related to health benefits, including social, psychological, and physiological benefits of greenspace for children more broadly and can advance qualitative approaches for measuring landscape performance.

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Plants for Living Wall System in a Subtropical Climate

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Keywords: Living Wall, Native Vegetation, Plant Performance, Micro-Climate, Facade

Living wall systems are becoming more common in dense urban environments (Blanc 2008). Their purpose is to activate and beautify building facades, moderate microclimates, reduce heat gain in buildings, and attract beneficial wildlife such as pollinators or birds to urban spaces (Francis and Lorimer 2011). Their use is particularly valuable in strategic locations where there is little to no opportunity to plant vegetation on the ground due to physical constraints. This includes unattractive building facades that are in public view. Vertical gardens offer biophilic benefits and enliven bleak facades with greening and floristic displays. There is a growing body of knowledge about which plants are well-adapted to living walls in mild climates (Jørgensen, Thorup-Kristensen et al. 2018). Less is known about which plants are suited for living walls in climates that experience long hot summers (Briscoe and Bright 2019). A custom-designed modular living wall system was designed to establish plants in an upright position and with space for canopy growth and root depth. The south-facing 294 custom-designed wall modules were initially planted in 2019 (Kio and Ali 2021). Winter temperatures killed nearly 90% of the vegetation in January of 2021. The modules were replanted in new media in mid-April 2022 with twenty mostly native species. Irrigation was customized to each plant species module. Clustering of similar species on the wall provided passers-by with a rotating aesthetic of blooms. Although all plants survived the first two months, extended above-average temperatures in central Texas in July and August caused some plant loss. A health rating scale of 1 to 5 was used to assess the degree of plant health in mid-September and November 2022. Species loss data is being collected for reporting. The results from this research will establish baseline data for planting living walls including the trialing of several untested plant taxa in the region.

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Teaching Landscape Performance: Expanding the Utility of the Landscape Performance Series Case Studies

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Keywords: Landscape Performance Benefits, Metrics, Methods, Database, Evaluation

Landscape Performance Case Studies are the centerpiece of the Landscape Architecture Foundation's (LAF) Landscape Performance Series (LPS). The Case Studies were developed through the LAF Case Study Investigation (CSI) program, a funded research collaboration between academic Research Fellows, student Research Assistants, and project Firm Liaisons. Each LPS case study features an exemplary built project and includes a project overview, a description of the project's sustainable features, and a list of quantified environmental, social, and economic performance benefits. An accompanying methods document explains how the landscape performance benefits were measured, including data sources and assessment methods. As of 2021, 161 Case Study Briefs were published on the LPS website.
The LPS Case Studies are beneficial in teaching landscape performance. From the LPS website, students can easily source precedents by filtering case studies by landscape performance benefit type, feature, project type, location, climate zone, size, and budget. This content is also downloadable. However, the website's data structure does not include information about the metrics and methods used in the performance benefit assessments, which limits further study of how particular metrics or methods have been used across the cases. Yet, this data has shown to be valuable for research purposes (Luo & Li, 2015; Wang et al., 2016; Modi, 2014). And though the metrics and methods data can be found by manual review of the case study text, the ability to efficiently access and analyze the data would be valuable for teaching and provide extra utility for research and professional practice application.
Recognizing a need to expand the utility of the LPS Case Studies, our goal is to compile a relational database that builds on the existing LPS data to: 1) show correlations between project attributes, like size or project type, with commonly applied landscape performance metrics and methods; 2) allow comparisons between measured and projective metrics to help substantiate reliability and validity (Luo 2015); 3) provide a basis for baseline data collection and performance goal setting; and, 4) enable the performance data to be aggregated across all LPS case studies. We are currently defining the database structure and indexing the data from a sample set of case studies, which students compiled in a Landscape Performance Lab course. In this paper, we elaborate on how we currently use the LPS Case Studies in our landscape performance teaching and report on our progress in developing the database as a teaching tool.

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Towards Sustainable Parametric Design in Landscape Architecture

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Keywords: Digital simulation, Evidence Based Design, Monitoring, Visual Programming Language

As climate impacts continue to amplify the imperative to design more energy efficient and responsive buildings and landscapes, the design industry must keep pace with tools that help us model and verify performance. In programs ranging from LEED, WELL, SITES, the incentive to design spaces that can achieve low-energy, low carbon, improve health and wellness, and other benchmarks has never been more urgent. There is limited toolset to measure landscape performance metrics in both design and post-occupancy stages.

The advent of open-source platforms such as Grasshopper (McNeel and Associates 2017) have radically changed the design workflow because they help drive the iterative process, giving designers a platform to evaluate various possibilities and get instantaneous feedback on design modifications [Sadeghipour Roudsari, Mostapha, 2013]. Traditionally, tools such as wind tunnels and sophisticated Computation Fluid Dynamics (CFD) are mainly used by engineers and are expensive and time taking [Maffassanti, 2019]. Ladybug Tools® and have developed fast and intuitive plugins and scripts that give designers the ability to predict site conditions, as well as optimize and visualize multiple parameters dynamically (such as comfort, solar radiation, wind). Users have the ability to integrate these visual programming languages (VPLs) into their workflow as it is customizable and open to creative arrangement of components/nodes present in Grasshopper [Mackey, Christopher; Sadeghipour Roudsari, Mostapha, 2017]. Predictive, parametric, evidence-based design is leading the architecture profession, however, there is a still a need for further investigation and integration of these tools in landscape practice.
Use of sensors on design sites have helped designers evaluate pre as well as post occupancy of their projects. Well Living Lab was the first lab designed to research indoor parameters for improving human health and wellbeing through collecting and analyzing data points using a network of sensors and cloud-based systems (Aristizabal et al. 2019). Prediction and monitoring of a landscape site can similarly help one understand site-specific conditions and help inform design.

This presentation provides instances of use of digital simulation and sensors for study of a site as well as integration of these tools into research as well as design practice. These two poles of integration of evidence-based design will be of interest to landscape professional practice and offer pathways forward for collaboration.

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Evaluating Climate-Positive Opportunities Through Learning Laboratories on University Campuses

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Keywords: Landscape Performance, Climate Positive Design, Design Build, Learning Laboratories, Applied Learning

Climate change advocacy has the power to ignite policy change at universities across the Southeast. To ensure climate neutrality by 2050, the UNC system has revised its five-year strategic plan to align with the seventeen UN Sustainable Development Goals. The Department of Landscape Architecture and Environmental Planning at North Carolina State University has embraced the UN Sustainability Goals in the Design/Build studio. Since 2010, the Design/Build studio has integrated low-impact development and green infrastructure on NC State's 2,000-acre campus. In a sixteen-week semester, an interdisciplinary team of students over the last ten years have worked with campus partners to conceptualize and fabricate landscape elements that represent best practices in sustainable site design for climate mitigation and adaptation on student housing sites across campus, including interpretative elements that communicate the intent of the designed spaces. Goals for the projects included improving stormwater quality, reducing stormwater quantity, mitigating the urban heat island, improving biodiversity and habitat, promoting sustainable site management and construction, improving the restorative quality of the spaces, and increasing the eco-literacy of students.

These goals served as the basis for post-occupancy evaluations and comparative evaluations of more traditional sites across campus for the Landscape Performance and Metrics course. Since 2015, the Landscape Performance class has been collecting data to evaluate whether the sites met their design goals and to compare their performance to other similar projects across campus with the hopes of influencing campus facilities' decision-making for future landscape projects. Methods used for data collection included stormwater sensors, infiltrometers, and temperature loggers. The data collected included soil, vegetation, water, climate, maintenance, mental restoration, and eco-literacy education. Findings from the data have provided valuable insight into which landscape best practices are most impactful for climate adaptation and mitigation and how such didactic experiences positively imprint on the students who engage in these courses or experience the designed spaces. These learning laboratories at a land grant university serve as real-world examples of climate-positive change aligning with the UNC system's five-year strategic plan.

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Using Big Data to Assess Park System Performance During COVID-19 Pandemic

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Keywords: Park Use, Park Management, Urban Resilience, Health, Underserved Community

Parks provide essential services to urban dwellers, but the ongoing global COVID-19 pandemic is causing significant disruptions in the use of parks (Jay et al., 2021; Li and Yang, 2021). However, little is known about how people adapt their park visit behaviors, and few studies have examined the visit pattern changes across different park types from a park system perspective (Bertram et al., 2017; Barth, 2020). This study uses SafeGraph cellular human movement data to compare park visits before and during the pandemic (2019 vs. 2020), using Tucson, Arizona, as the study site. We first review the chronological history of park management in 2020 and correlate the COVID-19 response measures with observed park visit data. Then, we use SafeGraph data to compare the changes in park visits across different park types and on different days/months. Principal results include: (1) Total park visits decreased by 21.8% in 2020, and park visit fluctuations strongly correlate with COVID-19 response measures. (2) Different types of parks experience different processes of visits decline and recovery during the pandemic. (3) River/linear parks remain attractive during the pandemic, possibly because the main activities (e.g., walking, bicycling) they afford are of less concern regarding virus transmission. (4) The pattern of visits over the weekends vs. weekdays can be an indicator of the level of pandemic impacts on park visits. The findings can provide timely guidance for park managers, planners, and designers for the ongoing use of parks amid the pandemic, prediction of attendance, and design adaptations for future pandemics. We conclude that big data such as SafeGraph data offer a feasible means to examine park performance at the park system level.

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Landscape Performance Along the Dequindre Cut: A Case Study Investigation of Health, Access, and Equity in the Design of Urban Greenways

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Keywords: Greenway, Health, Access, Equity, Performance

Greenways have become commonplace in the revitalization of urban areas to incorporate green infrastructural networks, improve accessibility to economic opportunities and public transit, and provide recreational amenities. This paper presents the landscape performance benefits of the Dequindre Cut in Detroit, MI. conducted as part of the Landscape Architecture Foundation's case study investigation series. Although the potential benefits of greenways are widely known, the paper focuses on those unique to its features of a greenway that has catalyzed growth along a once abandoned rail corridor to provide opportunities for health, access, and equity for its surrounding communities.

The Dequindre Cut is a 1.65-mile, non-motorized urban greenway that connects the people of Detroit to the city's natural resources, cultural destinations, jobs, and healthy food options while catalyzing a variety of adjacent development opportunities. Previously an abandoned below-grade rail corridor, the greenway began as an effort to provide pedestrian access through a city designed predominantly for vehicle access. The Cut connects nearby neighborhoods with the Eastern Market, the East Riverfront District, and community parks in the area. Serving as a springboard for development of the 31-mile Joe Louis Greenway, the Dequindre Cut aims to make the Motor City a dynamic and safe biking and walking community. The creation of the greenway provides a continuous 15-ft-wide path for multiple non-motorized modes of transportation and celebrates cultural heritage by preserving and encouraging contemporary urban art in the form of graffiti and murals, and supports a variety of community programming such as the D.Cipher live music series and the Soiree on the Greenway.

The research team identified landscape performance benefits based on the project goals, design intent, built features, and unexpected outcomes. Researchers gathered data from publicly accessible online sources, a publicly distributed survey, and on-site field work. The data show the greenway decreases CO2 emissions by 38,250 lbs. annually for commuter trips alone, provides access to more than 263,260 trips annually, improves quality of life and sense of wellbeing according to 94% of users through safe physical activity and social interaction, and improves health of visitors through an increase in physical activity by providing more than $8.4 million in health benefits annually, among other social, environmental, and economic benefits. The Dequindre Cut Greenway is an important precedent that advocates for the value of health, access, and equity in a city with historically low investment in public infrastructure.

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Integrating the Modified Rational Method Dashboard Into Performance-Based Modeling Workflows

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Keywords: Stormwater Management, LID, Performance-Based Tools, Bioretention, Rational Method

The purpose of this paper is to describes the approach to and performance behind the Modified Rational Method Dashboard (Dashboard) for Rhinoceros 3d software as an educational application for calculating storage volumes. At its core, the Dashboard is a multi-faceted Grasshopper script wrapped in a more user-friendly, data-oriented package. The Dashboard's primary purpose is to provide a performance-based tool for students and designers professionals to calculate required storage volumes from 3-dimensional models without the need for deep knowledge of Grasshopper scripting. As a result, consideration and testing of performance-based stormwater models can occur coincident with design modeling.

Users take a data file from NOAA and 3-dimensional Rhinoceros geometry and input it into the Dashboard. Once inputs for existing and proposed site conditions are complete, the Dashboard will automatically solve the Modified Rational Method formula (q=CaCiA) and required site storage based upon a selected design storm. The interface also displays the area (in acres) and the average slope for each land cover type.

The Dashboard and the Grasshopper script rests upon seeks to automate many of the steps required in a traditional textbook process (Strom, et al.). For instance, when users input the required Rhino surfaces, a mesh is created where the slope categories are sorted automatically into "Flat", "Rolling, and "Hilly" terrain. The area (A) is automatically calculated for each slope category. From there, the user can select the appropriate land cover type from a drop-down menu which triggers the formula to apply the appropriate coefficient of runoff (C). Using a curve or polyline drafted in Rhino, the procedure for determining the Time of Concentration (ToC) replaces the use of a nomograph for overland flow with the Kerby equation (TXDOT) and an embedded slope calculation. Combining the resulting integer (in minutes) and the user-inputted design storm, the formula retrieves the appropriate data for storm intensity (i) from the NOAA excel file. Finally, peak runoff (q) is calculated including the antecedent precipitation (Ca) value based upon the previously selected design storm.

Two sites are chosen as test cases each with unique climatic and site conditions. Design alternatives for each site are examined as a demonstration of the functionality the Dashboard and a test of its performative efficacy. The Dashboard allows students an approachable method for the integration of performance goals into their 3-dimensional design modeling process.

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Water-Based Thermal Comfort for Heat Adaptation

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Keywords: Urban Heat Island, Water Cooling Island, Body Temperature, Skin Conductance, Urban Waterscape

Water Cool(ing) Island (WCI) literature has largely focused on large natural water bodies (Santamouris, Ding, & Osmond, 2019; Bhargava, Lakmini, & Bhargava 2017) as opposed to smaller waterscapes for largely developed areas most vulnerable to the Urban Heat Island (UHI) effect. UHI can pose severe health threats because an increase of as little as 1.5°C can increase the body's core temperature and heart rate to cause heat stress when human body cannot release excess heat (Elsayed, 2012).
A within-subject repeated measures quasi-natural experiment investigated participants' changes in body temperature and stress level associated with the visual, auditory, and thermal properties of small waterscapes. Specifically, 17 participants were randomly assigned to visit seven waterscapes (S1-S7) in a treeless hardscaped courtyard using clockwise or counterclockwise sequence. Each participant was instructed to perform four 15s-trials in front of each waterscape: concrete view with natural gaze, water view with natural gaze, concrete view with controlled gaze, and water view with controlled gaze. During the experiment, participants wore a mobile sensor for body temperature (TEMP) and electrodermal activity (EDA), which was decomposed into skin conductance level (SCL) and Skin Conductance Response (SCR) as stress indicators.

The results show that the waterscapes located at the lower level (i.e., main waterfall (S1), the small waterfall (S2), and the lower reflecting pool (S3)) are associated with significantly lower mean TEMP, lower mean SCL, and greater degrees of stress reduction as change in SCL compared to those at the upper level (S4-S7). As cognitive and thermal stress have additive effects on TEMP, a significant reduction in TEMP without significant changes in either SCL or SCR (changes in cognitive stress) suggests the presence of evaporative cooling effects beyond cooling effects from stress reduction due to the visual and auditory aspects of waterscapes.

This study demonstrated the feasibility of using the mean TEMP and change in TEMP within 15s to investigate mesoscale and microscale WCI effects, respectively. The design parameters of the cascading waterfall and the lower reflecting pool provide a point of departure for developing form-based public health codes for heat adaptation. These evidence-based guidelines can help inform ways in which smaller waterscapes can provide effective cooling for predominantly hardscaped urban settings prone to the effects of UHI. This approach offers low-income residents without air-conditioning outdoor alternatives to indoor cooling centers in a post-pandemic era with more frequent and severe heat waves.

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Envisioning Xiong'an New Area 2035: Improving Spatial Planning Workflow With a Scenario Modeling Method

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Keywords: Spatial Planning, Scenario Planning, Geodesign, Land Change Modeling

In 2017, China's central government announced the plan of building Xiong'an as the 19th National New Area to relocate non-essential industries out of the crowded Beijing center city. This new town designation brought uncertainties to the 1770 km2 land and the vulnerable ecosystem around Baiyangdian, the largest inland lake in North China and the center of Xiong'an's political boundary. Considering the increasing ecological problems in China's current new town developments, scholars and practitioners have expressed concerns about preserving Xiong'an's valuable ecosystem services. Moreover, while the local planning institute released an ecologically ambitious comprehensive plan, doubts exist in questioning the effectiveness and rationality of the conventional spatial planning approach. How should spatial planners further incorporate ecological thinking in their daily practice? This methodological and exploratory research proposes to revise the spatial planning workflow and call Chinese (and other) spatial planners' attention to the ecosystem with a scenario modeling method. The method suggests creating multiple simulative scenarios, predictive and prescriptive, as base maps for drafting spatial plans. Spatial planners might add the scenarios as a supplementary tool into the conventional linear workflow. With Xiong'an as a test project, this study delineated four potential scenarios in 2035: business-as-usual (reduced-form model), last-gen (reduced-form model), 2018-plan (empirical model), and next-gen (rule-based model). The results show that Xiong'an's future varies significantly in each growth scenario, and practitioners need a pragmatic plan established on the scenarios to preserve the valuable ecosystem services. This study ends with a discussion on how to incorporate the proposed scenario modeling method as a loop in the existing linear workflow. It contributes to not only Xiong'an practitioners but also the spatial planning field by advocating for revisions on the current approach.

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Advancing a 21st Century Green Infrastructure Palette Through Regional Collaboration

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Keywords: Nature-Based Solutions, Multidisciplinary Collaboration, Community Action, Development Regulations, Local Government Policy

As the world faces climate change realities, landscape architects have an opportunity, and quite arguably a responsibility, to lead community development at every scale. Designing with Nature and employing nature-based solutions must become the universal approach to all community development and not continue on as a mere value-added component. In order to engage with the right decision makers at the right points in time, future landscape architects must be provided pollical science skillsets including the ability to turn data into useful information for decision makers, effective public communication, and understanding patterns and trends in policy capable of driving regional nature-based solutions. My presentation will feature proven methods of the Ohio Kentucky Indiana Regional Council of Governments, the Metropolitan Planning Organization I lead regional planning efforts for and demonstrate the wide variety of areas landscape architects have benefitted regional planning efforts to guide and influence community development. Examples will include improved environmental design by integrating nature-based solutions all scales of transportation system design (interstate system, transit system, local street networks); facilitating community led action to improve and restore urban tree canopy and providing local governments with the tools necessary to compel development compliance of nature based solutions to stormwater management systems; and illustrating the trends and results of policies and policy decisions.

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Stormwater Policy and Regulation in San Antonio: Trends, Opportunities, and Challenges in Utilizing Ecosystem Services for Stormwater Management

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Keywords: Green Infrastructure, Land Development, Runoff, Flooding, Law

Continued population growth in Texas will result in increased urban development as well as create stressors on Texas water resources. Conventional urban development patterns typically produce large quantities of impervious surfaces that prevent or disrupt natural hydrological processes when it rains. Impervious surfaces tend to increase the volume and rate of stormwater runoff, leading to flooding conditions and decreasing stormwater quality as stormwater flows across urban surfaces and accumulates chemicals, toxins, and contaminants. New design thinking in urban areas provides opportunities at the local level for addressing quantity and quality issues linked to urban stormwater flows during precipitation events. Stormwater ecosystem services (i.e., flood prevention, flood mitigation, and stormwater purification) have been recognized as valuable assets through implementation methods such as green infrastructure, nature-based solutions, low impact development, and similar terms. However, these invaluable services are not consistently recognized and incorporated into stormwater governance at the local level.

As the second-most populous city in Texas, the seventh-most populous city in the United States, and the city with the larges numeric increase in population from 2020 to 2021, San Antonio serves as an excellent case study for analysis of implementation of stormwater ecosystem services into local land development policies and regulations. This research seeks to address whether San Antonio has adopted land use regulations and policies that enable recognition and implementation of stormwater ecosystem services in current and future land development. Generally, the policies and regulations to be reviewed will cover four broad categories that support stormwater ecosystem services: (1) open space and floodplain protection; (2) minimization of impervious surfaces; (3) allowance of on-site capture and storage of stormwater; and (4) stormwater runoff quality protection.

Using San Antonio as a case study for understanding prevalence and methods of local land use development policies and regulations that recognize or incorporate stormwater ecosystem services will allow for: (1) the assessment of public implementation and recognition of stormwater ecosystem services as cities grow and develop; (2) the identification of gaps and opportunities for cities to integrate ecosystem services into development; (3) the evaluation of consistency of municipal regulations and policies pertaining to ecosystem services; (4) a greater understanding of local policies and regulations related to stormwater ecosystem services for designers and planners; and (5) recommendations for policy and regulatory changes and pathways that can be supported and advocated for by design and planning professionals.

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Urban Ecological Park Constructed By Mycelium—Mycelium As Restored Medium to Form Underground Network Of Connecting Roots In Urban Landscape Ecological Restoration In Shanghai

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Keywords: Mycelium, Urban Ecological Park, Ecological Restoration, Urban Landscape, urban wastelands

This project is an experimental research design. Currently, there have been numerous wastelands in city. The goal focuses on finding methods to transform urban wastelands into ecological parks. If methods work, these wastelands will eventually form and connect a green network system in city.

However, the research design is inspired by the mycelium playing a great role in the forest, for it facilitates informational exchange, substantial transference and energetic flow among various underground plant roots. Meanwhile, there are lots of construction wastes or weeds in urban wastelands like, bricks, concrete and sand. Whether could mycelium grow in these wastes or weeds when they are locally filled in soil of underground? So, I conducted an experiment to observe growth situation of mycelium in these organic or inorganic environments and then recorded changes in photograph. In this experiment, the control variables consist of temperature (18℃-32℃), humidity (50%-90%) and environment (sterile). And mycelium is respectively cultivated in soil (the control group), grain waste, concrete waste, brick waste and sand waste (the experimental groups). After a month of observation and record, I found mycelium could grow well in these circumstances. All in all, ideally and theoretically, the experimental result provides a potential solution to restore ecology for urban wastelands.

In the phase of design, Firstly, I propose a strategy that is to pulverize, sterilize, dump and fill wastes of construction or weeds into the site instead of transferring them to suburb, and to mix them with mycelium. Secondly, I started to design site roads by applying Grasshopper software to search the shortest and the most reasonable paths, which mimics swarm intelligence of ants finding food. Thirdly, based on having site roads, I design a beautiful terrain that satisfies earthwork balance and converges rainwater to a depression by runoff, for this rainwater could provide adequate water and keep abundant humidity for growth of mycelium and plant roots. Finally, using cultivated mycelium produce mycelium materials, like bricks, battens and poles, to assemble landscape facilities applied for in the site.
In conclusion, I believe mycelium is a type of medium that could possibly restore urban landscape ecology.

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Selecting Appropriate Acoustic Indices for Biodiversity Assessments in Different Acoustic Environments

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Keywords: Acoustic monitoring, Biodiversity monitoring, Soundscape ecology

Sound is the primary means of information exchange among individual organisms. Acoustic indices, defined as statistics that summarize some aspect of the distribution of acoustic energy and information in sound recordings(Sueur et al., 2014), have become a critical tool in soundscape monitoring for biodiversity assessment in protected areas. However, choosing appropriate acoustic indices could be challenging due to the highly variable acoustic environments and the potentially strong influence from other abiotic sound sources. Therefore, it is crucial to explore how different sound environments and sources influence the acoustic indices before the assessments. Focusing on Jiuzhaigou, a World Natural Heritage site in Sichuan Province, China, our study compared the biodiversity quantifications of 27 monitoring sites based on seven acoustic indices (i.e., Bioacoustic Index, Acoustic Entropy Index, Acoustic Diversity Index, Acoustic Evenness Index, Acoustic Complexity Index, Normalized Difference Soundscape Index, Acoustic Richness Index;(Boelman et al., 2007; Depraetere et al., 2012; Kasten et al., 2012; Pieretti et al., 2011; Sueur et al., 2008; Villanueva-Rivera et al., 2011)) commonly used to assess biodiversity. We calculated the correlation between each acoustic index and the acoustic signal diversity per 1 Hz based on the logic that the more diverse the sound sources, the higher the acoustic signal diversity in each frequency band. To ease the interpretation of the results, we also manually screened the spectrograms to identify the source types in each frequency band. Preliminary results show that (1) using different acoustic indices results in inconsistent biodiversity evaluations at the same site; (2) the frequency ranges under which various acoustic indices present significant correlations with the acoustic signal diversity are different, and the indices show different sensitivity profiles for sound sources of different frequencies. The study outcomes will help researchers select appropriate acoustic monitoring indicators under different environmental conditions, ultimately enhancing the effectiveness of long-term acoustic monitoring for biodiversity conservation.

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Redesigning the Urban Forest: Embracing Experimentation and Uncertainty in Planting, Development, and Management

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Keywords: Arboriculture, Forestry, Landscape Laboratory, Tree Architecture, Green Cities

We know the benefits of trees in urban contexts (Ferrini et al., 2017); the services they provide peppered major media coverage of climate change-intensified weather events throughout the summer of 2022. But in the face of growing public appeals for greener cities and increasingly ambitious tree planting targets from city governments around the world, we need to think carefully about how the urban forest is growing. The urban forest, in its broadest definition, embraces all trees in an urban area, from public street trees to trees in pocket parks, cemeteries, pastoral recreation areas, and managed woodlots (Konijnendijk et al., 2006). This umbrella term covers diverse scales and spatial types, but do these scales and types hold design lessons for one another, and what kinds of management thinking (beyond the basics of public safety and ecological diversity) can be brought to inform urban forest design as an ongoing, unfinished, and thereby flexible and resilient process (Corajoud, 2010; Fromonot, 2020)?

I seek to provide answers to these questions based on research carried out during the summer of 2022 including fieldwork at the Landscape Laboratory at SLU Alnarp, Sweden. The experimental forest project at Alnarp begun by Roland Gustavsson in the mid-1980s tests various species mixes and management approaches to examine how complexity and dynamism can be harnessed for diverse spatial experience (Gustavsson, 2004; 2012). Using the Alnarp lab as a philosophical and practical reference point, I examine several planted urban forest projects in France: Michel Corajoud's Parc du Sausset (Villepinte), Michel Desvigne's Parc aux Angéliques (Bordeaux) and Euralens Centralité (Lens), and areas of the Bois de Boulogne (Paris). A mixed methodological approach included interviews with management practitioners, assessment of current and recent internal planning documents, and examination of the Corajoud archives at ENSP Versailles.

Synthesizing these varied sources provides insight into present and historic challenges of urban forest establishment and stewardship such as poor genetic diversity, invasive species management, and climate adaptive planting. Drawing on these precedent projects, I aim to elucidate dominant paradigms and argue for developing new strategies and techniques, such as hyper-dense linear patterns, as well as for reconsidering traditional practices like coppicing. The objective is to expand the possibilities for trees as spatial agents and broaden our conception of how the urban forest looks and how it is experienced.

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Humans and Rivers: Challenges to Public Access and Equitable Flood Risk Management

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Keywords: River Access, Flooding, Pearl River, Equity, Public Access

Riverfronts are increasingly valued as public space, but along some large rivers, cities and towns are disconnected from their rivers by levees and other flood control infrastructure, as illustrated by the Mississippi River in the state of Mississippi. With the exception of recently developed access points, most of the riverfront in Mississippi is cut off from public access by levees, resulting in isolating people from what is arguably the most important landscape feature in their region. As river banks have historically provided important low cost open space and leisure opportunities for people of all walks of life (Kondolf and Pinto 2017), cutting off access to them represents a significant impact on recreational opportunities for many in society, notably historically marginalized residents. In a collaboration between Jackson State University (JSU) and UC Berkeley (UCB), we assessed flood management and public access along the Mississippi and Pearl Rivers, in comparison to conditions along leveed banks of the Sacramento River, California. We conducted field work and follow-up research in Berkeley and Jackson in 2022. Our results indicate that the interface between flood control infrastructure, humans, and their rivers has conventionally been designed by engineers without consideration for public access, but that solutions can be designed to improve access while preserving flood risk reduction benefits. However, flood control infrastructure is easily oversold to or misunderstood by the public, such that levees and dams provide a false sense of security (Ludy and Kondolf 2012) and encourage more development in flood-prone areas, especially low-income neighborhoods vulnerable to flooding (Serra-Llobet et al 2018). Analyzing the history of floodplain management in Jackson, we document critical points in time when decisions were made that have ultimately put more people at risk and made the river increasingly inaccessible, consistent with prior research (Platt 1982). Providing for public access while managing flood risk will inevitably involve tradeoffs, but our results suggest that solutions are possible to improve public access to riverbanks while taking steps to advance equity and resilience, while minimizing exposure to flood risk.

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Analyzing the Design Patterns of Virtual Landscape in Albion Online

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Keywords: Virtual Landscape in Digital Games, Design Pattern, Design Methodology, Reverse Engineering, Pattern Template

The game industry has significantly contributed to the global entertainment economy in the last twenty years. [2] The market size was valued at 220.79 billion USD in 2022 and is expected to expand [3]. Following Kim (2020), designing a virtual landscape consumes the greatest effort and time in game development, but only a limited number of landscape architects are joining the industry. We can expect that future landscape architects will join the industry as virtual landscape shares similar characteristics to a physical landscape, and preparations are needed for that moment. Therefore, we must understand the current status of virtual landscape design, which is the goal of this research. We selected the concept of 'pattern language' because today's game industry is not well unaware of the advantages of design patterns and a common vocabulary [1]. For this, Albion Online (Sandbox Interactive, 2017) was selected because the game carries various landscapes and relatively easy access. Levels were analyzed using the reverse-engineering methodology. The length of an average walking step is 0.762 meters. Based on this number, measurements were taken using the game's avatar and drawn with Autocad. Afterward, the game's assets were presented based on Kim's design methodology. As a result, five design patterns were found through a level. By considering the scale of the level, we can understand that only a limited number of patterns have been used. It indicates that today's game industry isn't actively using design patterns. However, we can easily assume that if well-trained landscape architects join the game industry, they could design richer and more sophisticated landscapes with various design patterns. The need to merge landscape architecture with the game industry cannot be ignored. We must start our education and training with young landscape architects about this new frontier to do so.

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The Maah Daah He Trail, ND, Analysis

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Keywords: Trail Spur Design, GIS Analysis

The Little Missouri Badlands of western North Dakota is a collection of rugged and spectacular landforms containing the Little Missouri River. The width varies from 15-25 miles. The exposed geology features Paleocene Epoch deposits (55-65 million years ago). The vegetation of the Little Missouri Badlands of North Dakota is naturally derived and have undergone selective maintenance and enhancement resulting in an altered landscape that today's visitors assume is a product of evolution.

The area is comprised of a patchwork of plant communities. The result is that there are over 700 plant species in this rugged landscape. Cottonwoods are the prominent species on the banks of the Little Missouri River. The Maah Daah Hey Trail (MDHT) is a 144-mile trail from Medora to Watford City, ND connecting the North Unit and South Unit of the 110 square miles of the Theodore Roosevelt National Park. The study shows that the majority of cotton wood trees (Populus Deltoides) along the trail were planted during the Works Progress Administration (WPA) 1935-1943 and the Civilian Conservation Corps (CCC) programs 85 years ago (1933-1942). The tree is native to the area but has been exponentially planted to cover the riparian zone of the Little Misouri. The life span of the Cottonwoods peaked ten years ago and have been on the decline. Many of North Dakota's important forest resources are in need of maintenance, but should this initiative be brought to the Badlands within the National Park?

The study shows that the majority of cotton wood trees (Populus Deltoides) along with trail were planted during the WPA and the CCC programs 85 years ago. The successional plant community is lacking this plant species proportionately and is drastically changing the trail user experience. A GIS analysis provides a historic look at the changes in plant communities over the last 100 years. Through archival research obtained from the Theodore Roosevelt Nature and History Association and the North Dakota State Historic Preservation Office and North Dakota State University Historic American Landscape Studies Initiative). Simulated historically captured data layers show the increase in certain species as the landscape became heavily managed and altered. Enhanced planting of cottonwoods was done with a naturalistic patch approach along with geometric patterns that are hardly discernable to the park visitors.

This study will guide Landscape Architects to the direction of enhanced plantings as they explore options for future trail development.

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Habitat for Hard Places: Wright-Patterson Airforce Base

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Keywords: Pollinators, Military Bases, Climate Change, Habitat

PURPOSE: This presentation outlines the pedagogical methodology and outcomes of Habitat for Hard Places, a landscape architecture studio currently in its first iteration, modified from a previous studio taught five times. The studio explores approaches to habitat creation for pollinators on military bases, specifically Wright-Patterson Airforce Base(WPAFB) in Dayton, Ohio.

BACKGROUND: The federal government owns approximately 640 million acres, about 28% of the land in the United States. These lands are managed by five federal agencies, four agencies are federal land management agencies. The fifth agency, the Department of Defense(DoD) manages 8.8 million acres which include military bases, training ranges, and other uses.

In 2014, President Obama released a memorandum 'Creating a Federal Strategy to Promote the Health of Honey Bees and Other Pollinators'. More specifically, it asks the DoD to "support habitat restoration projects for pollinators" on military bases. This memorandum responded to the decline of pollinator species, but also recognized the opportunity for pollinator habitat on federally owned land.

METHODS: Habitat for Hard Places asks students to innovate habitat solutions for pollinators such as bees, butterflies, birds, moths, beetles, and flies on WPAFB. This work begins with a detailed assessment of the lifecycles of local pollinator species and their specific habitat preferences. With this ecological research, students develop habitat modules that aggregate to create systems of varying complexity to protect and bolster pollinator populations during warm months and during overwintering. Students then deploy their modules through site design in four areas throughout the airforce base. As an active base project, students needed to respond to the ongoing training and use of the base in addition to the development of new pollinator habitat.

OUTCOMES: The studio work will be shared with the Natural Resource Program(NRP) at WPAFB currently working on expanding pollinator habitat on the base. The NRP worked with the studio to tour existing pollinator habitat and invited students to participate in DoD National Public Lands Day events. It is our hope to continue to foster this new relationship between WPAFB.

IMPORTANCE: Pollinator species have seen dramatic declines in population, with several species becoming threatened or endangered. With the potential for even more devastating losses increasing as climate change continues to disrupt phenological relationships pollinators have with their environment, this studio proposes interventions that help mitigate, protect, and produce pollinator habitats before their loss has even greater social and economic consequences.

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Mapping Child Poverty and a Framework to Support Urban Communities

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Keywords: Metacoupling, Urban Sustainability, Geospatial, Heuristic

In 2022, Syracuse, New York was reported to have the highest child poverty among larger cities within the United States (Tampone, 2022). External factors and internal variables such as environmental justice, economic pressure, climate impacts, poor quality infrastructure, and access issues regarding food, education, and clean water are drivers affecting vulnerable communities (Pulido, 2017; Deitz and Meehan, 2019). Child poverty is an exceedingly difficult issue to address for municipalities; however, understanding causation as well as areas impacted can help in alleviating issues and improving conditions. Interactive maps and web applications can provide planners and decision-making entities with a distinction of contributing variables which can potentially offer guidance for strategic planning of locations and issues to address. However, producing and populating these tools can be a costly and time-consuming endeavor for city government. Within this project, we propose a process to align this issue and need through a) a geospatial approach, b) a mapping workshop heuristic, and c) a web-based tool. The a) geospatial approach will utilize a method known as metacoupling (Liu, 2017) to understand geospatial interactions of both external and internal variables contributing child poverty within a given region. The framework integrates drivers affecting this issue from not only internal factors specific to the area (e.g. food deserts), but also policy and economic impacts from outside the city and region (e.g. economic disparity). The b) mapping heuristic imparts a framework for delivery and dissemination of mapping tools and data enrichment as a workflow of how researchers may disseminate these tools to communities facing similar issues. As a demonstration of the heuristic, c) the web-based, geospatial tool gives researchers with an example output for replicability. Similarly, the tool offers direction and support for policy makers, planners, and individuals in city government addressing child poverty within Syracuse and Onondaga County of New York State. Results of the approach were evaluated with a multivariate regression to test explanatory variables; however, the heuristic and the web-based tool demonstrate proof-of-concept through demonstration of these results. As a synthesis, this approach provides a methodological contribution to the body of knowledge in urban sustainability to address a wicked problem, specifically child poverty in urban design and planning. At a practical level, these outputs provide planning professionals and individuals within city government with a heuristic and a tool for addressing this issue within urban areas as well as the City of Syracuse, New York.

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Identifying Ecosystem Services Interactions in a Rural Mining Region of Central Appalachians

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Keywords: Ecosystem Services Bundles, Landscape Changes, Water Quality , Surface Mining Reclamation, Social-Ecological Systems

This research presents the analysis of the interactions among a set of ecosystem services (ES) and the resulting ES bundles in the Headwaters of West Virginia (WV) Coal River, an area in Central Appalachians historically characterized by surface mining and coal extraction. The main research question aimed to understand how to identify interactions among ES in the study area, highlighting a suitable scale and spatial distribution and informing future landscape management and planning actions. The InVEST suite was used to define spatially explicit ES models, while a custom model linked water quality to freshwater ES using two different spatial scales based on hydrologic units. High-resolution remote sensing data with a 1-2 meter resolution was utilized to integrate historical information from a land-change study, allowing for the differentiation of reclamation processes and the characterization of land-cover classes. In areas of the landscape characterized by surface mining processes, consistent tradeoffs in ES were observed, including significant losses in carbon sequestration, habitat quality, and freshwater ES. The interaction of complex human activities within this specific landscape resulted in the identification of different ES bundles, which were influenced not only by coal mining processes but also by the distribution of settlements and developed areas. By using relatively small hydrologic catchments (1-25 km^2) and comparing them with a larger set of spatial units, as well as incorporating high-resolution data with multiple land cover classes that included historical information, the authors gained insights into the interactions between changes in ES and their drivers in the study area. The identification of ES bundles can inform conservation and development-restoration strategies and support the implementation of more sustainable landscape management approaches in the region that prioritize alternatives to extractive economies.

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Design for Marsh Migration: Exploring Design Approaches Along Estuary Waterfronts

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Keywords: Marsh Migration, Sea Level Rise, Climate Adaptation, Waterfront Resilience

After years of habitat destruction, today's remaining marshes harbor unusually high-quality ecosystem value in estuaries amidst increasing development pressure. Hydrologic characteristics, specifically water depth and position along the tidal gradient, as well as salinity, tend to drive the types of marshes present in a given location. However, projected sea level rise due to climate change adds more water depth, and these marsh types must therefore shift or 'migrate' to higher ground where water levels are more suitable (Brinson, 1995, Redfield, 1972). This can lead to landscape conflicts where increasing development, rising sea levels and high ecological value collide on waterfronts. What might be the role of landscape architects in anticipating shifts in marsh location while meeting other waterfront needs? Drawing from studio-based design research, we propose speculative design approaches that may warrant further investigation when working in estuarine environments where landscape and aquatic shifts will continue to influence the future of marshes along waterfronts. Common amongst these strategies is that site grading fundamentally drives site elevations, which if combined with sea level rise projections would result in changing water depths and tidal conditions, in turn driving when, where, and how marshes may populate an area over time. Speculative approaches explored include methods for introducing marshes into urban waterfronts, specific design strategies for creating or maintaining species habitat in a given area and working with causeways and impoundments during marsh design as sea levels rise. We then review marsh migration studies in the literature and precedents in the gray literature, many of which are led by others outside the landscape architecture community, to compare and contrast with the speculative, studio-derived approaches.

The studio began with projected regional shifts in marsh composition generated by varying sea level rise and sediment accretion scenarios from a study using the Sea Level Affecting Marshes Model for the Hudson River Estuary (Tabak et al., 2016, Clough et al., 2016). We highlight the value of working with projected regional trends for marsh migration when working at the site level. As estuaries change, so too will the suitability of these landscapes for both people and ecosystems. The more landscape architects are aware of these projected shifts, the more we can incorporate them into urban and rural waterfronts to enhance design value for society and the greater ecology.

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University Campus Design in the Covid Era: Potential Approaches, Opportunities, and Challenges to Integrate Biophilic Design and Rewilding Into Campus Landscapes and Buildings

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Keywords: University Campus Design, Biophilic Design, Rewilding, Student Health and Well-Being, Restorative Environments

The arrival of the Covid Era in 2020 dramatically reshaped the university campus experience for students by pushing their classes online to Zoom for an extended period of time. The psychological and emotional impacts of the Covid Era on students, as young adults, has just been coming into to focus—with nearly 1 in 4 young adults in the United States seeking out mental health treatment (Phillips 2022). Now that many classes at universities in the United States have moved from Zoom back to in-person classes, there is a new opportunity to reconsider how university campuses can be redesigned to help support the mental health and well-being of students. The purpose of this study is to examine how biophilic design and rewilding might be used to conceptually rethink university campus landscapes and buildings to create more restorative environments for students, to enhance the quality of learning spaces on university campuses, and to establish more suitable habitats for biodiversity. This study fills an important gap in the academic literature because Peters and D'Penna (2020, 1) conclude that "salutogenic and biophilic design in urban post-secondary educational environments remains understudied and warrants closer investigation."

Biophilic design and rewilding are complementary ideas, but they are not conceptually well-integrated in the academic literature nor in the practice of university campus design. In fact, some people may feel strongly that they are mutually exclusive approaches in university campus design. To address this challenge, a typology is used to conceptualize how biophilic design and rewilding strategies might be integrated into different types of outdoor and indoor campus spaces. This typology is then conceptually applied to a campus transect at the East Bank Campus of University of Minnesota in Minneapolis that includes natural treasures such as the Mississippi River and historic treasures such as the Northrop Mall (i.e., a quad). Second, I will review some of the opportunities and challenges of integrating biophilic design and rewilding into university campuses in the Covid Era including long-held assumptions about (1) the conventional aesthetic of university campus design, (2) the power dynamic among different stakeholders, and (3) that greenness is always good. Finally, I will flesh out the importance of these lessons to the broader context of landscape sustainability, resilience, and performance.

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The Oasis Loop: Vernacular Agricultural Landscapes in Conditions of Extreme Aridity

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Keywords: Climate Change, Vernacular Landscapes, Arid Landscapes, Deserts, Feedback

Before the appearance of the human factor on the land, there is a geomorphological configuration resulting from the combined action of physical, chemical and biological processes operating on the Earth's surface. Some of the human processes involved in transforming this initial configuration are agricultural: they consist of the cultivation of specific life forms for human consumption. And while agriculture is often a driving force in land degradation, in some of the driest regions of the world, there are situations where traditional agricultural practices have enabled the emergence and maintenance of life at levels of abundance and complexity that would not otherwise be possible. These situations are the vernacular oases, i.e., agricultural landscapes in conditions of extreme aridity that have slowly evolved through the cultural practices of the people who inhabit them. This article analyzes the design of some vernacular oases as a result of the intersection of two main sets of material causes. On the one hand, processes that unfold indifferently—at least virtually—to humans and whose actions shape the geomorphological structure of these arid lands. These include climatic patterns such as prevailing winds and precipitation regimes, geological processes such as tectonic uplift and subsidence, and hydrological processes such as runoff, erosion, and sedimentary basin formation. On the other hand, the multitude of human-driven agronomic and infrastructural techniques—irrigation systems, land leveling and regrading, windbreaks, new plant associations, crop rotation—aiming to reduce erosion, capture water, and conserve topsoil. These techniques, many of which date back a thousand years through the Islamic tradition of agroecology, have for centuries maintained these desert lands as biologically productive, ecologically diverse, and aesthetically lush landscapes.

Vernacular oases constitute the most extraordinary realization of landscape architecture's potential to transform the existing material conditions of the environment into desired ones. Because of their extreme fragility, these landscapes are often—and mistakenly—associated with processes of degradation of vegetation, soils, ecosystems, economy, and, ultimately, culture. However, such degradation processes take place in any environment, and, in the current context of climate change, food security, and aggravated environmental crisis, the possibilities and limitations of these landscapes will become increasingly relevant to rural and urban landscapes not only in arid but also in humid regions of the world.

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Reading the Landscape Along Highway 89: Post Road Trip Reflections

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Keywords: Perception in Movement , Large-Scale Landscape, American West, Drawing, Video-Recording

This paper explores the methods used to study landscapes along US Highway 89 (H89) in context. We offer broader implications for our field, investigating collaborative experiential methods, interpretation of maps and landscapes, and mix of drawing, film, and photography. Drawing on elements of methodology from geographer J.B. Jackson (1997), geologist and geographer Wayne Ranney (2018), and photographer James Cowlin (2018), we examine the intersection of geography and human settlements along H89 (Vale & Vale, 1989) to understand the structure of the landscape and its communities from the road (Appleyard & al., 1965, Lavoie, 2016).

The primary author, along with travel companions, drove the length of H89—both directions, 2019-2022, over 2,800 kilometers one way, from the Canadian to the Mexican borders—visiting sites and recording visual and other sensory experiences of the North American West. Video recording (GoPro), fast and slow-pace drawings, and photographs captured the scales of the landscape and landscape experience (Appleyard, D., Lynch, K., & Myer 1965; Lavoie, 2021). The first trip focused on segments of the road. The second looked at surrounding communities in more depth.

Pre-trip planning methods included first GIS mapping and analysis of political boundaries and land use, followed by selection of watersheds, mining towns, railroads, First Nations lands, National Parks, deserts, etc. After the trips, interpretation methods included parti and juxtaposing sketchbook stories with drawings with maps. The interpretation phase was then translated into a concept for an upcoming 4-month solo exhibition at the Livingston Depot Museum, Montana. This presentation triangulates the use of maps, experiences while drawing and filming, and stories to better communicate the landscapes. Long hours on the road provided time and space to scale in and out—as we moved from map, to text, to sketches, to stories, and back again. For example, in Livingston, MT we studied the synergy between H89, the railroad, the river, communities past and present, and Yellowstone National Park.

This was an iterative process. In moments along the way, patterns, themes, and contrasts emerged. Collaboration and travel companionship were critical for reflection and reflexion (Deming & Swaffield, 2011), resulting in a shift from systematic daily planning to embracing complexity and spontaneity. The fluid approach allowed us to adjust and look through different lenses or integrate multiple ways of knowing and experiencing. The broader message is that we can all remain fluid in our process, to give a better understanding of landscapes and communities.

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Sweetgrass: Using Floating Wetlands, Eco-Art, and Community Engagement to Improve People-Environment Relationships

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Keywords: Ecological Literacy, Landscape Literacy, Place Attachment

The Sweetgrass Shoreline Restoration Project analyzed people-environment relationships related to floating wetland prototypes that were installed along the Lake Washington Ship Canal in Seattle, Washington to benefit out-migrating juvenile salmon. First, through examining the Lake Washington Ship Canal using a landscape biography methodology, changes in historical land and system relationships were identified. Subsequently, floating wetlands were designed, built, and installed to restore juvenile salmon habitat and repair salmon-environmental relationships in the watershed. Sweetgrass Arts, a grant from the City of Seattle Neighborhood Matching Fund, created an opportunity to hire local artists to share their land stories, experiences, and perspectives through art along the trail. Posters, banners, painted stencils, and poetry were installed near the floating wetlands to reveal the ecosystems and make more-than-human elements -- salmon, plants, water, and wildlife -- more visible to people using the adjacent trail.

Surveys and observations of site users assessed the landscape and ecological literacy people gained from storytelling through design (i.e., site and system history demonstrated through the design) and eco-revelatory aspects (i.e., more-than-human elements are revealed and made visible to site users through the design). Place attachment (i.e., human connection with the land) was assessed through interviews with the artists, community scientists, and project team members.

This study indicates that community engagement is important in forming meaningful connections with the landscape and needed to help restore human/more-than-human system relationships. Additionally, storytelling and eco-revelatory practices need to be more widely implemented for people to understand and care for the systems around them. A holistic lens to design is vital to improving people-environment relationships and promoting landscape stewardship practices.

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A Quantitative Approach of Understanding How Augmented Reality Wayfinding Influence People's Environmental Perception

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Keywords: Walkability, Environmental Perception, Augmented Reality, Wayfinding, Mental Mapping

Walkability is a significant component in landscape architecture and urban design, in terms of creating a built environment with higher livability, sustainability, and benefit economics (Forsyth, 2015). Walking can not only benefit individual's physical and mental health, but also help build attachment between people, communities, and the built environment.

In the past few decades, implementing effective pedestrian wayfinding signage (Lu & DiPasquale, 2020) and digital map applications on smartphone have become widely used strategies to encourage walking behavior and improve walkability, by providing information such as walking distance and time, nearby points of interest that are accessible by walking, neighborhood information or local events and programs that welcomes foot traffic. Wayfinding is a dynamic decision-making process, during when people interact with the environment (Aurther & Passini, 1992). The intention of the pedestrian-oriented wayfinding is to encourage walking behavior by revealing the accessibility walkability of the environment in pedestrian scale.

In recent years, with the rising of technology, augmented reality (AR) has been applied in smartphone applications for pedestrian-oriented wayfinding, such as Live View on Google Map. AR wayfinding allows people to see the physical environment and the virtual reality simultaneously – while showing the real-time image on the screen display, it adds virtual elements on top of the objects, including directions and distance to the destination. However, it remains unclear whether AR wayfinding may impact people's environmental perception, how they understand the place, or decide their travel behavior. Some people think AR wayfinding is a good addition, in terms of helping people to perceive that the environment is walkable and accessible by walking (Sekhavat & Parsons, 2018). And others argue that AR wayfinding might be distracting, and people may care less of the "real" environment (Chang et al., 2015).

This research looks at how the AR pedestrian wayfinding influences people's perception of the environment by applying mental mapping. Participants are asked to walk on a designated route with an assigned wayfinding tool (AR wayfinding/2D digital map/no wayfinding) for navigation. And they are asked to sketch the route they have in mind before and after taking the walk, using the symbols that follow Kevin Lynch's five elements of a city (Lynch, 1960). A before and after comparison within groups, and a cross-section comparison will be conducted to help understand how participants read and understand the environment, the changes of their spatial awareness and walkability of the environment.

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Environmental and Mobility Strategies During COVID-19: Insights From an Empirical Study Focusing on Park Visitations

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Keywords: COVID-19, Park Visitation, Age, Neighborhood Environment, Environmental Strategy

BACKGROUND: The global COVID-19 pandemic changed how and where people were able to engage in physical activity and social interactions (Park, Zhong, Yang, Jeong, & Lee, 2022) for millions, including in the USA. During this time, parks allowed for safely engaging in physical activity and social interactions to combat social isolation (Slater, Christiana, & Gustat, 2020). However, park visitations significantly decreased in many US cities, especially during the early phase of the COVID-19 pandemic (Curtis, Rigolon, Schmalz, & Brown, 2021; Ziesler & Spalding, 2021). To the best of our knowledge, no empirical studies have investigated how age and environmental factors may moderate the impact of COVID-19 on park visitations among Hispanic populations residing in low-resource areas.

OBJECTIVES: This study first explores the importance of environmental and mobility strategies (e.g. access to nature/parks, less crowding in public spaces, wide sidewalks) during COVID-19 and how they vary by age and ethnicity. It then investigates park visitation as an important coping strategy and how it is impacted by COVID-19.

METHODS: This study analyzed online survey data from 683 residents of El Paso, Texas, and objective measures of park characteristics in their neighborhood. Chi-square tests were used to explore the varying importance of the environmental and mobility strategies for dealing with COVID-19 by age and ethnicity. Mixed-effects logistic regression was performed to identify personal and environmental predictors of park visitations considering the COVID-19 impacts.

RESULTS: Respondents reported that physical and visual access to nature (e.g. parks, greenery, forest) was important to help them cope with COVID-19. We found a significant decrease in the visitation of parks or trails/paths during COVID-19. Before COVID-19, middle-aged and older adults were less likely to visit parks than younger adults, while this difference became insignificant during COVID-19. Hispanics were more likely to visit parks than non-Hispanics both before and during COVID-19. Other personal factors, such as sex, marital status, health conditions, living with children, employment, education, and income, were not significant. Positive environmental predictors of park visitations included park availability in the neighborhood, proximity to the closest park entrance, neighborhood walkability, and neighborhood aesthetics.

CONCLUSIONS: Proximately located parks, high walkability, and aesthetic quality are the potential features of pandemic-resilient communities. Adequate access to parks should be considered an important national priority to maintain and promote the health and well-being of the population, especially during pandemics like COVID-19.

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The Role of Urban Space in Social Justice Movements Case Study: General Command Street as the 2019 City of Khartoum Sit-in in Sudan

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Keywords: Demonstration, Miniature-city, Protest, Revolution, Spatial

A sit-in is a form of direct-action social movement that involves one or more people occupying an area for a protest, often to promote political, social, or economic change. In a sit-in, protesters typically gather and remain seated until their requests have been met or until they are evicted, usually by force. The often clearly visible demonstrations are intended to spread awareness among the public or disrupt the goings-on of the protested organization. This study investigates the urban and landscape spatial changes brought about by the 2019 social movement accommodated in the city of Khartoum, and how it reshaped the General Command street. Ever since 1956, social movements have been the main source of reflecting the voices of the people of Sudan in the city of Khartoum. However, April of 2019 marked the greatest number of protestors to ever join a sit-in in Sudan. In response to the economic mismanagement, persistent protesting took place on the streets of the city of Khartoum and its neighboring towns for several months. The Sudanese protestors created a miniature city within the sit-in square, catering to all their needs while spending days and nights there. Data for the study was collected from local newspaper articles, photographs, maps, and social media as the primary source of extraction. Activities and changes done to the urban context of the sit-in square were divided into categories of accommodation set ups, art and cultural facilities, educational resources, health centers, and food and entertainment areas. This study demonstrates the significant role of urban spaces in reflecting causes adopted by citizens. This suggests the successful probability of urban areas hosting peaceful events to fulfill the demands of those expressing their needs. Eventually, the greatest consequences of the sit-in were the dethroning of the Sudanese President Omar al-Bashir, and the permanent change of the urban space of the area. Today, the square used for the sit-in portrays the story of the uprising through the artistic works of the revolutionaries and serves as a public stage to serve any social or political demonstration.

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Approaching the Cultural Landscapes of Suburbia

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Keywords: Cultural Landscape, Environmental Planning, Suburbia , Home Rule, Photo Survey

J.B. Jackson famously illustrated how everyday interaction among people is forming our cultural landscape. Writing about his experiences when exploring America on the motorcycle gave us narratives of cultural landscapes that go well beyond the designed spaces of the cultural elite. This everyday cultural landscape has become the topic of research and has influenced the academic discourse even overseas.

Half a century later, our research was asking how this approach may inform planning and design of the dense but still expanding suburban areas of the Northeast. Municipalities are struggling with aging strip malls; office parks and highways are not considered cultural landscapes, just utilitarian spaces that people drive through. Are these just “drosscapes” (Berger 2006), or can they gain value for the suburban fabric?

The leadership of Middlesex County in central New Jersey has charged our team with developing an Integrated Landscape and Ecosystem Services Plan (L-Plan). A comprehensive County-wide ecological assessment is combined with an analysis of the County’s cultural landscape, embracing the interrelationships between human-wellbeing and landscape design. The questions we ask include: What do we expect from our towns? Is it just low taxes, a hopefully short commute to work, and ample parking? How can integrative and proactive environmental planning on a larger scale address sustainability, resiliency, and quality of life?

Our L-Plan raises the bar. Suburbia can be more than a conglomerate of profitable land uses lined up along roadways; it can become a place to be. Our survey showed that residents’ relationship with their environment is formed by stories and experiences of individuals or groups that add to the meaning of place. The interaction between people and place forms a cultural landscape that is not limited to critical historic sites or spectacular natural scenes. We developed landscape typologies that include the strip mall and the parking lot, the retention basin of the warehouse, the industrial waterfront, the charming main street, and the picturesque park. Residents can expect these diverse locations to become a sequence of places, a suburban story worth telling.

The presentation will outline how our methodology builds on the tradition of interdisciplinary environmental planning developed by Ian McHarg at the University of Pennsylvania in the 1970s that has similarities with European comprehensive landscape planning. The innovation lies in the application of landscape urbanist approaches toward a regional environmental decision-making framework, while engaging with municipal decision makers and the public.

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Informing Buffer Zone Planning for Urban Protected Areas Through Public Perceptions: A Case Study of the Shugang-Slender West Lake Scenic and Historic Area, Yangzhou, China

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Keywords: Stakeholder Satisfaction

Urban protected areas (UPAs) are "protected areas situated in or at the edge of larger population centers" (Trzyna et al., 2014). Managing UPAs can be highly challenging because they are under high urban development pressure and are affected by many urban actors (Sanette, 2011). It has been increasingly recognized that the buffer zone between the city and protected area plays a significant role in managing and protecting UPAs (Defries et al., 2007; Schlee, 2017). At the same time, it is also the frontier of conflicts due to the buffer zone's complex functionality and essential role in connecting the city and UPA. While it is important to secure the buffer zone's function of protecting the UPA core area, it is also vital to understand how it can fulfill the diverse needs of multiple interest groups residing in or utilizing this area. Worldwide, there has been minimal social science research on buffer zones, especially in the Chinese context, where UPAs typically exhibit high cultural, social, and aesthetic rather than ecological values. This study focuses on the buffer zone of Shugang-Slender West Lake Scenic and Historic Area (SSWL), a UPA in Yangzhou City, China. Through intercept and online surveys (n = 499), we investigate the perceptions of three user groups, i.e., residents, businesses, and tourists, about five types of buffer zone qualities, including environmental quality, connectivity, infrastructure quality, cultural quality, and visual quality. Moreover, we explore how satisfaction levels of these qualities contribute to participants' overall satisfaction with the buffer zone. This will inform if different groups place a higher value on specific types of quality over others and the particular areas of successes and underachievement for the SSWL.

Our preliminary results indicate high levels of overall satisfaction with SSWL's buffer zone for all three groups, with residents significantly more satisfied than businesses and tourists. Environmental quality, connectivity, and infrastructure quality significantly influenced overall satisfaction, while cultural and visual quality did not, and this result did not differ among the three groups. This appears to suggest that the public expects the buffer zone to serve as high-quality recreational greenspaces that connects both the UPA and city. Whether or not this model applies to other UPAs in China and beyond requires further investigation. But our results highlight the importance of social perceptions research in informing the functional planning of UPA buffer zones for the benefit of multiple user groups.

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Charismatic Wildlife & Story-based Strategies: Communicating to the Public About Habitat Conservation

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Keywords: Animal-Aided Design, Narrative, Urban Wildlife, Museology

Interest in design and planning for urban wildlife habitat has increased in recent years, fueled in part by climate change and rapid urban growth. Research has shown that cities are biodiversity hotspots (Schwartz 2002) and that planning/designing for urban wildlife contributes to biodiversity conservation and species recovery (Ives 2016), increases public support for conservation (Nilon 2017), enhances human well-being (Vandruff 1995), protects the ecosystem services provided by wildlife (MillenniumEcosystemAssessment) and contribute to social development beyond ego-centered consciousness (Spirn 2014). Research on the negative consequences of ignoring wildlife in cities underscores that the environmental determinants of human health are shared by wildlife (Santini 2019). Lack of exposure to wildlife contributes to what has been coined the 'extinction of experience', where a reduced daily exposure to wildlife and its benefits increases disconnection and incognizance of wildlife (Cox and Gaston, 2018). Extinction of experience disproportionately impacts communities of color and lower income communities (Schell 2020).

Practitioners who have heeded the call will face challenges and a key obstacle lies in advocating for urban wildlife to the public. Public perception of urban wildlife and species conservation is largely shaped by non-scientific factors often more linked to socio-cultural factors including histories, values, and identities (Heise 2016). With the daunting task of convincing the public to support urban wildlife without sole reliance on scientific knowledge and research we can look to adjacent fields that face similar challenges to mine their theory and experiences for new approaches. One tool that has been used by species researchers and curators in natural history and science museums is in the application of story based or narrative strategies in stakeholder communication coupled with the use of charismatic wildlife as protagonist. A review of contemporary museology theory and practices can inform the fields of landscape architecture and planning to unpack and analyze the structure of interpretive frameworks in planning/design communication. This serves as the basis for interrogating the body of work of scientific researchers and museum curators at the Florida Museum of Natural History and the North Carolina Museum of Natural Sciences. Their roles that balance species research with public engagement provides an analog for planning/design professionals promoting urban wildlife habitat. The findings demonstrate a clear structure and pattern of how charismatic species are used in interpretive studies to capture the imagination and build empathic connection to increase the odds of action and advocacy from the public.

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Pocket Neighborhoods, Reconsidered

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Keywords: Neighborhoods, Residential Landscapes, Green-Hearted Neighborhoods, Radburn Model, New Urbanism

PURPOSE: This study analyzes design principles for contemporary internally focused neighborhoods, toward a greater understanding for how such neighborhoods can balance community and privacy needs while supporting a diversity of residents.

BACKGROUND: In his 2011 book Pocket Neighborhoods: Creating Small-scale Community in a Large-scale World, architect/author Ross Chapin (AIA) makes the case for building neighborhoods that provide an internal, interconnective common landscape apart from street networks. He provides a considerable range of built-place examples, from familiar historic experiments such as Stein and Wright's Sunnyside Gardens and Radburn to more contemporary small-scale infill projects and co-housing enclaves. In making this case, Chapin challenges the 1990s "new urbanist" precepts and prescriptions for street-based (and not internally situated) common space, while otherwise reinforcing new urbanist notions of increased densities and walkable, pedestrian-scale and pedestrian-friendly environments.

Earlier critics of new urbanist street-focused design principles similarly advocated for internally interconnected neighborhood forms, but also noticed four particular unintended-consequence/evolved-over-time phenomena within experimental "green-hearted" neighborhoods. One, such neighborhoods tended to change dramatically in spatial character and organization through the years as homeowners constructed edges that demarcated private and common outdoor zones—or, when bylaws precluded such changes (as at Radburn, NJ), the bylaws were sometimes a source of conflict among resident with differing sensibilities. Two, "green-hearted" neighborhoods typically become intensely private enclaves when their streets have little civic-connective function. Three, the internal gardenesque commons typically cannot support children's play activities that require extensive areas of pavement. And four, any higher-density neighborhood that has both an internal common behind houses and a public street on the front sides lacks significant autonomous yard space that is not surveilled by neighbors or passers-by—a feature that the very popular traditional American suburban backyard provides.

METHODS AND RESULTS: This paper assesses Chapin's prescriptions and primary case-study exemplars in light of these phenomena, mapping neighborhood landscape zones of common and private areas. Such mapping typically reveals limitations on autonomous outdoor space, or the absence of transitional zones between common and private areas; these conditions reflect limitations on the pocket neighborhood's ability to support a diversity of neighbors or of family types.

CONCLUSION: The author proposes a secondary set of "pocket neighborhood" design principles or design considerations that serve to mitigate some of the land use conflicts inherent within high-density, green-hearted neighborhoods, allowing pocket neighborhoods to support a greater range of residents.

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MLK Way: Investigating Community's Priorities for Historic, Social, and Economic Cohesion

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Keywords: MLK, Community, Social Historic, Economic Cohesion, South Carolina

Naming a street after Dr Martin Luther King Jr. is initiated to honor his legacy as well as the heritage of African Americans in communities across the nation. Streets named after the civil rights leader not only educate the public about the significance of the civil rights movement and black historical contribution but also serve as a vehicle for achieving economic development and improving built environment (Alderman 2012). However, research suggests that naming MLK streets correlates with areas of economic depression and marginalization, leading to stigmatization of designation (Tiwari & Ambinakudige 2022). Additionally, such designation is seen as a precursor to gentrification, and areas in economic decline may see no benefit (Coulson & Leichenko 2004).

A Community in Oconee County, South Carolina is in a unique position to contain segments of Dr. MLK Jr. Way and be located within a newly designated Opportunity Zone (OZ). A federal program created to encourage economic development through tax incentives, opportunity zone designation accompanies public infrastructure investment targeted to promote economic growth in low-income areas (Sage etal, 2019). Community leaders and residents, while invested in the process, are interested in cultivating a sense-of-place that unifies shared history, social connectivity, and cohesive economic development. This research examines priorities and concerns for future development along Dr. MLK Jr. Way that capitalizes on opportunity zone incentives while addressing community development needs. Neighborhood observation and GIS mapping were conducted August through November 2021 to identify demographic and behavioral trends. A community engagement mapping exercise, community survey and stakeholders' interviews were conducted September to December 2021. The survey, using quantitative and qualitative questions, was distributed in person and through local churches and online platforms. According to 89 respondents, residents expressed enthusiasm for change while voicing concerns of gentrification.

Residents emphasized historic observance, improved public space, and opportunities for investment in MLK Jr. Way redesign. Residents prioritized MLK memorial, public art, and historic markers illuminating human and civil rights history. Opportunities for residential and commercial infill were identified with intent to leverage the Opportunity Zone. Additionally, research findings identified community building, improving quality of life for all citizens, and establishing vital economy that supports growth and prosperities as priorities. A complete street along Dr. MLK Way with a network of trails to promote health and social connectivity was also expressed as a priority. The research contributes to the body of knowledge by identifying effective approaches to community redevelopment and empowerment.

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A Theory-Driven Site Evaluation Criteria to Create Restorative Nearby Green Spaces for Knowledge Workers: An Integrative Review Study

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Keywords: Knowledge Workers, Restorative Nearby Green Spaces, Mental Health, Physical Health, Performance Evaluation

Background: Knowledge workers drive social and economic development in contemporary cities but often exhibit poor psychological and physical health because of sedentary work, long-term and intense mental labor, and high-level occupational competition. Four health problems are induced by these conditions, including mental stress, mental fatigue, lack of physical exercise, and social isolation. Thus, providing high-quality restorative green spaces in knowledge workers' proximity to promote their health and well-being has become an important and pressing need. Although the multiple health benefits of proximity to green spaces have been highlighted, the existing planning and design practices are not well supported by scientific theories and evidence.

Methods: We conducted an integrative literature review to identify theoretical mechanisms and key environmental characteristics to provide theoretical and empirical evidence for developing the evaluation criteria for creating restorative nearby green spaces. First, we specified four major theoretical mechanisms that can potentially clarify the effects of appropriately designed green spaces on the health and well-being of knowledge workers: stress reduction, attention restoration, physical activity promotion and sensory enrichment.

Second, we performed a two-phase literature search to select the theoretical and empirical articles:1) Theoretical articles on the interpretation of the effects of the work environment on health and well-being, authored by researchers who proposed the relevant theories, were selected: 2) Keywords were created according to the key original theoretical studies to filter empirical studies: stress reduction theory, supportive design theory, attention restoration theory, preference matrix model, biophilia hypothesis, green exercise, and nature exercise. In total 14 theoretical articles and 743 empirical articles were selected. To develop guidelines for planning and designing practice, we retained only those studies that 1) examined the relationships between the work environment and the health of knowledge workers, and 2) identified specific environmental characteristics that can enhance health, and 3) presented suggestions or recommendations for planning and design.

Findings: We identified the studies relevant to the four theoretical mechanisms through which health interventions can address the four prevalent health issues of knowledge workers. Evaluation criteria and design guidelines were established based on the identified key theories and environmental characteristics. Therefore, adaptable strategies can be selected to promote knowledge workers' health based on different circumstances. We also observed that most of the research outputs regarding the environment and human health are difficult to apply in environmental planning and design practice, and thus proposed a simple paradigm to connect interdisciplinary research and practice.

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Zero Waste Lessons for Cities on the Move: A Comparative Study of Waste Management Strategies in Kamikatsu (Japan), Boston, New York City, Seattle, and San Francisco

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Keywords: Waste Policies, Recycling Rates, Recycling Behaviors, Waste Streams, Resource Management

Kamikatsu is a rural town in Japan known for its zero-waste challenge. Its programs reduced the town's waste and environmental impact (Kyōko et al., 2018). However, the town did not achieve zero waste by its original goal (Waste Sorting Guide, 2020). Why was this goal missed, with a maximum recycling rate of 80%? How do Kamikatsu's zero-waste programs compare with those in the U.S.? Archival and historical research from the Kamikatsu government and Zero Waste Academy revealed that still usable but unrecyclable things were inherited from the past, and there are still non-recyclable items in stores and factories. Critiquing Kamikatsu's drastic change from the past demonstrates how the town's waste-reducing programs have evolved into a successful model for working towards zero waste. To understand Kamikatsu's progress, its waste data are compared with four U.S. cities that have also taken the zero waste challenge around the same time (Seattle, San Francisco) and more recently (New York, Boston). The comparison of diversion rate and quantities between them revealed that the landfill/incinerated quantity per capita in Kamikatsu is far less than in the four U.S. cities. Five cities' waste categories were compared to understand the relationship between sorting categories and diversion rate, revealing little association between the two. Results from this study include 1. The four U.S. cities have higher populations and more diverse sociodemographics, making it more challenging to educate new policies individually; 2. Zero-waste is considered a solution to the landfill crisis and not a primary industry for the four U.S. cities; and 3. The four U.S. cities rely on imports, which include many unrecyclable. Though cities have successful reuse programs, those programs do not replace unrecyclable items with environmentally friendly products. Based on those findings, global metropolitans with high per capita waste generation can: 1. establish a committee to research waste patterns and new methods to reduce waste by collaborating with different organizations; 2. upgrade and expand existing waste facilities to include other public services and educational spaces to raise public awareness; 3. improve the item exchange, repair, and reuse rate so that things would stay in material streams, allowing cities to rely less on natural resources; and 4. use the internet and advanced technologies to raise awareness further, helping residents to reduce waste.

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A Dose-Response Curve Describing the Impact of Tree Canopy Density on Stress Reduction of Drug Addicts

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Keywords: Nature-assisted Treatment, Drug Addiction, Dose-Response Curve, Tree Canopy Density, Stress Reduction

Drug use killed almost half a million people in 2019, while drug use disorders resulted in 18 million years of healthy life lost. Mental stress is an important role in development and aggravation of drug addiction (Cohen et al., 2016; Cohen et al., 2007; Porter, 2006; Satel & Lilienfeld, 2014). The reduction of exposure to nature on people's mental stress has been well documented (Bratman et al., 2019; Ulrich et al., 1991; Yao et al., 2021). However, drug users share a large difference with non-drug use people in mental states (Blum et al., 2013; Koob & Schulkin, 2019). Thus, we know little about the impact of tree canopy on drug addicts' mental stress and the dose-response relationship between tree density and stress reduction effects.

To address the gaps, we conducted a photo-based experiment[LL1] with recruited 1027 (660 valid) drug users in four compulsory drug treatment centers in China. Photographs have been successfully used as surrogates for real settings in many empirical studies (Tang et al., 2017; Ulrich, 1993). Firstly, we create one control group (almost barren street scene with low tree canopy density: 1.7%) and nine treatment groups (street scene with varied tree canopy density: 4.2-62.0%) of materials. Then, each participant was randomly assigned to one treatment group to view the photos from the control group and the assigned treatment group. They were required to self-report stress levels after viewing each photo, and background information (covariates) via questionnaire.

For data analysis, we applied paired t-test and hierarchical multiple linear regression model with stepwise. We found that all treatment street scenes, compared to the barren street (1.7%), significantly reduced the drug addicts' self-report stress level. Then, we found that the effects of stress reduction increased as the tree canopy density increases when the tree canopy is lower than 36.8%, while stress recovery effects did not change along the tree canopy density increases when the tree canopy is higher than 36.8%. The dose-response curve shows a slope-plateau shape, consisting of two segment lines, a rising line and a flat line.

This study first identified the stress reduction benefits of nature exposure on drug addicts and the dose-response relationship between tree canopy densities and stress reduction effects.

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Physical Inactivity and Green Space: A Dose-Response Landscape Pattern Study in the USA

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Keywords: Unhealthy Behaviors, Green Space, Nature-Based Strategies, Landscape Pattern, GAM Model

Physical activity has been proven that has significant benefits for health. However, insufficient physical activity has been identified as the fourth leading risk factor for global mortality, causing an estimated 3.2 million deaths globally. Numerous studies have shown that mental and physical illnesses may be impacted by the built environment. But it is little to know what characteristics of the environment especially green space impact the prevalence of physical inactivity. We examined the composition and configuration of green space at the census tract level in the United States to investigate the relationship between those and the prevalence of physical inactivity. Using the generalized additive mixed models (GAMM) controlled for covariables, our results showed that the amount of green space (i.e., total green space, trees, and grass) has U-shaped patterns with the prevalence of physical inactivity in all census tracts. Total green spaces and grass were significantly negatively associated with the prevalence of physical inactivity in metropolitans, especially the green spaces outside the park, which have more intense effects to reduce the risk of physical inactivity. Notably, although all trees did not contribute to minimizing the risk of physical inactivity, the area of over 37.5% of trees outside the parks can significantly reduce the prevalence of physical inactivity. Shannon's Diversity Index (SHDI) was used to indicate the landscape diversity, showing the convex downward curve with physical inactivity, which means increased SHDI can quickly reduce the prevalence of physical inactivity, but this effect decreases gradually. The Aggregation Index (AI) was negatively associated with the prevalence of physical inactivity, which indicate the segregation of landscape leads to a higher prevalence of physical inactivity. Those two findings were proved in metropolitans as well. Our findings highlight that the composition and configuration of green space had significant effects on the prevalence of physical inactivity, especially in metropolitans. It can provide evidence for nature-based solutions to human health and well-being.

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Statistically Linking “Redlining” (1933 Home Owners Loan Act) With Tree Canopy Coverage in 131 U.S. Cities

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Keywords: HOLC, Greenspace, Tree canopy, Environmental Justice

A robust tree canopy connected throughout communities can provide multiple benefits to its residents such as reduction in heat island effects, increased ecosystem services, increased physical and mental health, and generally increased housing values (Donovan et al., 2013; Nowak et al., 2014; Hoffman et al., 2020; Cappiella et al., 2005; Donovan et al., 2019). Unfortunately, in 1933 the Home Owners Loan Act created possibly one of the most discriminatory systems of segregating neighborhoods and subsequent investments, ever. This act created the Home Owners Loan Corporation that mapped and rated neighborhoods and communities to help inform future investments by banks to reduce foreclosures. Neighborhoods were rated from “A” highest rating to “D” as the lowest rating for investing money into the community and neighborhoods. The presence of any Black residents was often sufficient to categorize an areas “D” under this new system (Jackson, 1980). We hypothesized the maps created in the 1930s continues to negatively impact tree canopy levels in these affected communities today; this constitutes a serious environmental injustice with direct consequences for the health and well-being of those currently living in formerly redlined areas. We assessed 131 mapped communities with NLCD 2016 data tree canopy coverage to compare “A”, “B”, “C”, and “D” rated neighborhoods with percent tree canopy coverage through ArcGIS ModelBuilder. Neighborhoods rated as “A” were significantly higher in tree canopy (95% CI) than any other rated neighborhood. There tended to be less difference between neighborhoods rated “B”, “C” or “D” overall. In light of the impact of these significant issues on historically marginalized communities, our understanding of the necessary steps to combat climate change, systemic inequities, and health disparities along racial and socioeconomic lines must be reconsidered. Redlining, and its continued impact on tree canopy, remains a clear example of racial oppression and recognizing its harmful legacy is necessary to ensure equitable solutions to the problems listed above are adequately pursued.

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Blue and Red Tides in the Chesapeake Bay Watershed: Evidence of a Political-Environmental-Health Framing From the 2016 and 2020 Elections

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Keywords: Chesapeake Bay Watershed, Political-Environmental-Health Interactions, Multi-Disciplinary, Spatial Division

The Chesapeake Bay Watershed (CBW) is a heterogeneous landscape spanning 44 million acres across 157 counties in 6 Mid-Atlantic states and DC home to 23 million people (Manson 2022). Despite 35 years of organization and effort, the ecological health of the CBW has not improved (UMCES 2022). The current conditions of the CBW make this watershed a distinctive case study for describing the dynamics between political, environmental, and health frames as they intersect within a vital natural ecosystem with consequences for its many residents.

Three core ideas underpin our investigation. First, since 1994, rapidly accelerating political polarization in the U.S. linked to people's social identities (Mason 2018) is eroding our capacity for shared environmental sentiment (Pew Research Center 2016, Koerth 2017). Second, people's behaviors are a result of interactions between their individually held values, beliefs, and the social, physical, and natural environments in which they spend time (Guagnano et al. 1995, Mainzer & Luloff 2017). Third, while values and identities are traditionally rooted in place (Tuan 1974, Lewis 1979, Jackson 1994, Greider & Garkovich 2991, Williams & Vaske 2002), the recent nationalization of politics in the U.S. has de-coupled people's political sentiments from their local bonds (Hopkin 2018). While people are expected to act in ways that support their connections to place, the ways in which they express these actions may vary based on perceptions and ideologies.

We suggest that the recent 2016 and 2020 General Presidential Elections were periods of exemplary changes in people's political, environmental, and health framings. Our study applies mapping, descriptive means comparisons, and regression analysis of county- and individual-level data from the American National Election Survey (ANES) including self-reported health, the National Historic Geographic Information Systems (NHGIS), Rural-urban Continuum Codes (RUCC), and modeled water and air quality at critical moments in American political cycles—the presidential elections. Our findings indicate that demographic, environmental, and political characteristics varied in accordance with distance to the bay and that polarization between 2016 and 2020 is acerbating spatial differences. However, our findings suggests that people do not link their health and environment with their political behavior.

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Curb Appeal and The Social Space

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Keywords: Taxonomy, Case Study, Residential Design, Front Yard, Realtor Statistical Data

Opportunity for prosperity, success, and upward mobility to any individual willing to achieved it by virtue of hard work is known as the American Dream. This is the national ethos of the United States were as owning a home is consider the benchmarks of attaining the dream. Home ownership is regarded as one of the most important financial investments and a symbol of individual success and prosperity. Home ownership is one of the economical indexes used to gauge the national economy and a volatile factor affecting Wall Street. Housing value is assessed by several complex factors, but the front yard is seldom perceived and often overlooked.

The 2018 NAR Remodeling Impact Report suggested sellers complete a landscape improvement project before attempting to sell their home. This will increase the curb appeal and therefore the appraising value of the property. The report also suggests that functioning front yards are an important design feature to incorporated in new housing development. Today's home sell market conditions have created a renewed interest among realtors to reevaluate the property's front yard. It is instructive to re-examine the origins and symbolism of the dream house's front yard in order to provide a better understanding and instruction to the next generation of planners, landscape architects, architects and urban designers. Through a more thorough examination of scholastic research, peer review - real estate statistical data, and case study theoretical framework, this paper will strive to create a taxonomical set of guidelines for front yard development.

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Co-designing a Performance Tool for Sustainable Businesses in the Built Environment

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Keywords: Co-design, Design Thinking, Local Businesses, Sustainability, Indicators

Landscape performance and evaluation systems such as LAF CSI, SITEs, and LEED, have been established in the industry aiming to achieve sustainability through professional practices. Although these efforts have contributed to the understanding, analysis and design of the built environment, the rating systems are designed for general sustainability outcomes with limited indicators for site development (Trischler et al., 2019) and without local perspectives (Turcu, 2013). This study aims to apply co-design methods that allows users and experts to design more integral solutions for sustainable future scenarios (Sanders & Stappers, 2008). This study collaborates with the business owners in Phoenix and Tucson who participated in a sustainable training program developed by Local First Arizona, a not-for-profit organization in a co-design process to develop a tool for local businesses aiming to adopt sustainable practices in the built environment. The research team conducted a literature review and identified 30 indicators, and hosted a hybrid (i.e., in-person and online) workshop to engage business owners. The workshop included three activities designed to understand the participants' perspective towards achieving sustainability in their businesses, identify key indicators relevant to sustainable development and prioritize the indicators based on their relevance to sustainability and feasibility for implementation. A four quadrant and scoring system was developed to summarize the workshop results that revealed three common indicators for social sustainability: 1) Health and Wellbeing, 2) Inform and education, and 3) Equity and Social Value; four common indicators for ecological sustainability: 1) Water monitoring, 2) Energy monitoring, 3) Energy efficiency transport systems, and 4) Usage of regional materials; four common indicators for economic sustainability: 1) Balance cost benefit, 2) Operation and maintenance, 3) Life Cycle Assessment, and 4) Sustainable construction practices. The workshop served to engage with the stakeholders and better understand their sustainable perceptions and practices. The performance tool includes indicators of sustainable development in both indoor and outdoor environments and across site and neighborhood scales when considering design process, outcomes, and impacts to business operation, workers, and community health and well-being. This project contributes to the development of participatory and co-design methods for researching the indicators and guidelines needed to improve sustainable development with local businesses. Moreover, the study contributes to merging social and expert opinions by designing "glocal" and personalized tools useful to achieve social, environmental, and economic sustainability within the natural and built environments.

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Safe, Active, Attractive: Aligning Walkability and Placemaking in Historic Park Communities

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Keywords: Streetscape, Olmsted, Pedestrian, Site Inventory

Cities with Olmsted's urban park systems are representative of areas planned before the onset of vehicular prioritization. These park systems demonstrate an historic respect for the physical and mental health of their communities. Today, these parks offer an insight into ways to holistically improve our human, environmental, and economic health by focusing on walkability. These parks also differ in that they are funded through conservancies rather than municipal park budgets. Many walkability analyses provide a regional science to map physical connections but lack the human experience provided by a design team. For this study, the team utilized the PEDS Survey (Clifton, 2006) to rate the status of physical conditions within 15 minutes of Olmsted parks in three mid-size cities: Boston, Buffalo, and Louisville. The team used Google Street View as well as on site analysis in their rating. The PEDS Survey asks the user to inventory many components of the street, including topography, vehicular intensity, and sidewalk width. A component analysis and linear regression identified graffiti, vandalism, and site furnishings as targeted street elements to prioritize for a walkable street that is safe, active, and attractive. Planners and designers, constrained by time and finances, may utilize the full measures of these analyses to study and realign walkability between historic parks and today's communities.

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The Brain Does Not Lie: A Case Study of Psychophysiology and Landscape in South Clifton Park

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Keywords: Virtual Reality, Attention Restoration Theory, Stress Reduction Theory, Vacancy, Urban Design

Researchers have long explored how humans respond psychologically and physiologically to distinct landscapes and natural features. Walking in nature and viewing photographs of natural landscapes have been shown to reduce stress measured through physiological responses of blood pressure, salivary cortisol concentration, and pulse rate (Park et al., 2009; Tsunetsugu et al., 2013). Exposure to natural landscapes has also been shown to improve feelings of relaxation and positive emotion (Hassan et al., 2018; Lee et al., 2009). The increased popularity of virtual reality (VR) in landscape architecture provides an additional visualization tool to immerse a participant in a landscape on a human scale. Little research has focused on the potential impact of visualization through VR, studied the impact of urban nature, or compared the impact of landscape design using the same site. However, Yu, Lee, & Luo. (2018) found that exposure to virtual forest decreased negative emotions when compared to exposure to virtual urban space. This pilot study adds to that body of research by exploring how employment of psychophysiological measures provides objective assessment of humans' landscape perception in response to the restorativeness of a virtual place. Twenty students were recruited to view a site in South Clifton Park, Baltimore City through convenience sampling with flyering, emails, and in-person recruitment. Utilizing VR, participants observed the site as it exists currently and reimagined using the tenets of attention restoration theory (ART) and stress reduction theory (Kaplan, 1995; Ulrich, 1983). Psychological response will be analyzed using the Perceived Restorativeness Scale (PRS-16), a survey designed to evaluate a place's restorativeness through principles of ART, and physiological response will be analyzed using electroencephalogram (EEG), the non-invasive measurements of the electrical brain activity. The anticipated findings from the PRS-16 are that the score for the redesigned site is significantly higher than its current state. The anticipated findings from the EEG are that alpha (8-13 Hz) power, associated with a restful mind, are suppressed when viewing the site in its current state and increase when viewing the redesigned site. Alternatively, beta (13-30 Hz) power, associated with a busy mind, will increase when viewing the site in its current state and decrease when viewing the redesigned site. The present research does not address impacts of other senses on experience of a landscape. It seeks to fill a gap in understanding objective indicators of restorativeness of a place and explore the power of VR as a tool for visualizing place.

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Effects of Various Outdoor Space Types on Human Thermal Comfort at Nighttime

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Keywords: Thermal Comfort, Outdoor Comfort, Nighttime Comfort, Small-scale Necessary

The aim of this study is to explore the effects of various types of small-scale outdoor spaces on human thermal comfort at nighttime. The outdoor thermal comfort of urban spaces significantly impacts human participation in outdoor activities (Chen et al., 2012). Studies of human thermal comfort have focused on large-scale spaces (Andrade et al., 2008; Taleghani et al., 2015) and/or simple elements such as vegetation (Karimi et al., 2020) and materials (Irmak et al., 2017; Yan et al., 2015), and mainly concerned about summer or daytime conditions (Xu et al., 2010). The effects of various small-scale spaces on human thermal comfort in winter and at night have rarely been evaluated. This study will examine how to improve the thermal conditions of outdoor spaces at nighttime.

The research will select four types of small spaces: open field area, corridor area, buildings around area, water area. The sites are on a college campus. Three principles were followed in selecting the site for this study. First, there should be a high density of users and excellent availability for better observation results. Second, because the amount of terrestrial radiation and wind speed are important factors for the outdoor thermal environment, as surface pavement and barrier conditions are crucial factors in determining the terrestrial radiation and wind speed, there should be several different types of surface and barrier at the site, e.g., vegetation and buildings, to create a diverse thermal environment. Finally, diversified functions and activities in each space are required to investigate the thermal adaptations resulting from differences during different spatial activities, e.g., exercising, standing, sitting and trolling. We hypothesize that the buildings around area have the best thermal comfort and the corridor area has the worst thermal comfort at nighttime. This study uses a survey to investigate subjects' feelings about thermal comfort in different spaces, thereby verifying the hypothesis. We randomly recruit student subjects who are active users of these spaces on campus at nighttime. During the experimental period, the sensors will obtain continuous environmental data such as temperature, humidity, and wind speed in each space at night. The correlation between comfort levels and environmental data will be examined. The conclusions are drawn through a combination of surveys and experiments. The study results may provide suggestions for landscape design and planning in winter and at nighttime environment to improve the human comfort in outdoor spaces.

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Public Perceptions of Perceived and Actual Value of Ecosystem Benefits of Bioswales

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Keywords: Bioswales, Ecosystem Benefits, Survey, Perceived/Actual Value

Climate change, aging infrastructure, and increased urbanization have contributed to increased high volume precipitation and urban flooding events (United Nations 2020, Arnone et al. 2018). Green stormwater infrastructure (GSI), in the form of bioswales, are popular, affordable stormwater management strategies employed throughout the US and worldwide. A universal challenge of urban stormwater programs is leveraging GSI to achieve multiple co-benefits beyond the single stormwater reduction goal (Miller & Montalto, 2019). Co-benefits of bioswales include climate change mitigation, increased public awareness, biodiversity, habitat creation, public education, aesthetic value, property value increase, and recreation (Prudencio and Null, 2018). There is a general lack of research exploring public preferences for different ecosystem benefits. But such knowledge is essential to inform the synergies and trade-offs among co-benefits and help managers optimize GSI planning and design and identify public education and outreach opportunities (Barclay & Klotz, 2019).

This study surveys residents of five urban areas in Northeast US (i.e., Prince Georges and Montgomery County MD, New York City, Philadelphia PA, and Lancaster PA) and measures the public's 1) concerns about stormwater issues; 2) perceptions of GSI in terms of knowledge, experience, and support; 3) perceptions of ecosystem benefits of GSI; 4) demographic and socio-economic status. The study evaluates the ecosystem benefits provision of GSI and how it relates to the public's willingness to adopt GSI, providing critical information to municipalities and other organizations for broadening GSI implementation. The survey has currently received 854 valid responses. Responses will be analyzed for perceived and actual ecosystem benefits and public support. Responses will inform municipal manager and designer choices in bioswale design for maximizing bioswale co-benefits desired by the public.

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Citizen-Based Bird Monitoring Using Artificial Nest Boxes and Ecological Knowledge: a Mobile App, and an Internet Blog

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Keywords: Urban ecology, Citizen Science, Biodiversity, Paridae family, Ecosystem health

Although rapid urbanization dramatically leads to habitat fragmentation and biodiversity loss, birds in urban areas are relatively easily observed. Earlier studies found that birdwatching is an increasing nature-related activity, which led to various health benefits for both human and birds. For example, watching birds outside is known to lower stress and relieve depression or anxiety. Monitoring birds is also an essential way to protect them by tracking the health of bird species. However, little attention is paid to the role of monitoring the ecosystem and habitat of birds on human's ecological knowledge and attitude.

This study aims to investigate how bird monitoring can impact the change in ecological knowledge and attitude by using a pre-post survey.

This study was conducted to monitor the urban ecosystem of birds in South Korea by using an artificial nest box. We recruited a total of 755 participants from January to February 2022. After receiving training session, the participants were asked to regularly record the monitoring results through the mobile app and the blog. We also conducted a pre- and post- surveys in March and August separately, before and after installing artificial bird house. The pre-post survey design was administrated to evaluate participants' perceived ecological knowledge and attitude (e.g., knowledge of local species, value of biodiversity, curiosity of ecosystem, understanding of benefits of wildlife habitat) with a 1-5 Likert scale (1=Strongly disagree and 5=Strongly agree). We analyzed changes in the perceptions of citizens before and after participating in the program by using chi-square and independent groups' t-test.

Among 755 participants, a total of 544 (72%) participants finally installed an artificial nest box and monitored ecosystems of birds by using a mobile app. From March to August, participants recorded a total of 5,813 monitoring results in the app. This number means that 10.7 photos were taken per artificial net box. Birds were observed in about 30% of the installed artificial nest boxes. By the end of August, a total of 389 participants (follow-up rate: 71.5%) remained in the study and monitored the birds. We also found that the level of perceived ecological knowledge and attitude had been increased before and after participating in this program.

The findings of this study are anticipated to be applied widely in the development of citizen-involved ecosystem monitoring techniques as well as the study of bird breeding capacity in relation to diverse urban ecosystem parameters.

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Public Opinion and Perceptions of Urban Planting Strategies in Semi-Arid to Arid Environments: How to Improve Urban Planting Design in West Texas Cities

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Keywords: Virtual Reality, Educational Intervention, Sustainability, Green Spaces, Ecosystem Services

In semi-arid to arid environments, landscape architects face the challenge of finding a balance in public usage, opinion, and ecosystem services when designing urban green spaces. In particular, conventional wisdom and opinions of the general public on landscape aesthetics and design practices often contradict with sustainable ecosystem services offered by landscape architects. This problem affects both public satisfaction with urban green spaces and the ecological health/ecosystem services that these spaces provide. In order to address this challenge, a two-phase study is conducted with the goal of understanding how education on ecosystem services can affect opinion on alternative designs to public green spaces in semi-arid to arid environments. In the first phase of research, a literature review was conducted of studies on urban populations and their opinions concerning topics related to urban settings and green spaces. Next, literature was reviewed regarding the challenges of designing effective urban spaces in semi-arid to arid climates and how these challenges can be addressed. Finally, the literature review examines plant species and design precedents that are appropriate for designing within the climate zones studied in this paper. In the next phase of research, green spaces will be designed building on the knowledge gathered in phase one. These designs will range from conventional aesthetics that lack sustainability to a more natural aesthetic that offers sustainable ecosystem services. In order to better understand how educational interventions can affect acceptance of alternative landscape designs that are less traditional and have more environmental benefits, research participants will be divided into two groups. One will be the control group without prior educational intervention, and one will be a treatment group with prior educational intervention. Surveys and biometric sensors will be used to ascertain opinion, reactions, and concerns with these designs. All research participants will use virtual reality (VR) headsets for an immersive experience with the designed environments. Additionally, all participants will have biometric data collected during this VR experience to evaluate their internal and unspoken reactions to the designs. Afterwards, all participants will participate in an opinion survey based on the VR experience. Using the data collected from the opinion surveys and biometric data, combined with the information gathered from the reviewed literature, a more informed approach to educating about and designing for semi-arid to arid environments can be achieved.

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Virtual VS. Real: A Test of Immersive Virtual Reality as a Reliable Tool for Measuring Impacts on Cognitive Performance

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Keywords: Immersive Virtual Reality Environment (Ivre), Physical Environment , Virtual Reality, Cognitive Performance, Residential Building

The use of immersive virtual reality environments (IVRE) to measure the impacts that a physical environment can have on individuals is on the rise. Studies utilizing VR can detect the impact of natural and built environments on individuals. However, the extent to which such outcomes reflect real-life experiences and impacts has been disputed. This paper reports on an experiment, with 60 participants, that compares the impact on cognitive performance of short-term exposure to design elements in a residential building lobby. Participants were college students between the age of 18 and 24 who accepted to participate in the experiment voluntarily. An existing lobby was significantly augmented with the addition of natural greenery. Participants were given up to one minute and randomly assigned to experience one of the two augmented lobbies, the lobby in IVRE or the actual lobby with the same greenery augmentation. Participants' cognitive performance was measured using the Sustained Attention to Response Task (SART) test. A pre-test was conducted to establish a baseline of the cognitive performance of the individuals in the two groups. After completion of the IVRE or real-life experience, a post-test was administered to record possible changes in individuals' cognitive performance. A between-subject comparison including the mean commission and omission errors and also the response time means was conducted. The initial outcomes showed no significant difference in the number of omission and commission errors between the participants in the two groups. These findings suggest that IVRE can be a reliable tool for measuring an environment's impact on cognitive performance.

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Spatial Disparity in Neighborhood Context and Children's Health-related Quality of Life During COVID-19

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Keywords: Child-Friendly Community, Natural Environment, COVID-19, Health, Health-Related Quality of Life

BACKGROUND: The COVID-19 has changed people's daily lives around the world, including children. Its countermeasures led to less time spent outdoors [1] and in nature [2]. Exposure to and engagement with nature have been shown to bring many health benefits, especially for children [3-5]. Despite the large volume of studies addressing COVID-19 impacts, few studies have explored the potential role of nature in mitigating the negative impacts of COVID-19.

PURPOSE: This study examines if and to what extent urban nature can mitigate the negative health consequences of the COVID-19 pandemic on children. Urban nature in this study is assessed as the accessibility, quality, and use of various types of green spaces (e.g., views to nature) in the neighborhood.

METHODS: A survey was developed based on existing validated survey instruments [6-7] to understand how the neighborhood environment can help children and their parents cope with the COVID-19 effects. It was administered to the parents of public elementary school students in Texas, who agreed to release their contact information via open record requests according to the Texas Public Information Act. The survey data were collected from June to September 2021. 1,280 participants completed the survey and were included in the analyses. Two-level mixed effects models with the time as level 1 and the individual as level 2 were used to examine how children's mobility-related outcomes and health-related quality of life scores changed during the four time periods: immediately before COVID-19, Spring-Summer 2020, Fall-Winter 2020, Spring-Summer 2021.

PRELIMINARY RESULTS: Daily moderate-to-vigorous physical activity (MVPA) were significantly lower in Spring-Summer 2020 (77.33 minutes) and Fall-Winter 2020 (83.93 minutes) compared to immediately before COVID-19 (102.16 minutes). No significant difference was found between the Spring-Summer 2021 and pre-COVID-19 MVPA levels. Mixed effects models suggest that several environmental factors contributed to increasing MVPA among children since COVID-19 compared to the immediately after the pandemic, which included access to walking or bicycle paths, quality of walking or bicycle paths, access to parks, having views of nature from home, and having crime-free neighborhood open spaces. Additional health outcomes and spatial disparities among different groups are being analyzed and completed for presentation at the conference.

ANTICIPATED OUTCOMES: The results will identify environmental and interpersonal factors that can be modified through policy and design interventions. Implications for future research/practice will be discussed including actionable strategies to create child- and family-friendly communities that are resilient from pandemics like COVID-19.

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The Landscape of Mobile Sensory: How the Landscape Effects on Cyclist's Psychological Benefits

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Keywords: Cycling, Landscape perception, Mobile experience, Flow experience, Psychological benefits

With the concept of global sustainability, energy saving and health benefits gaining importance, the establishment of humanity-oriented and green transportation development has become the goal of major cities, and bicycle is undoubtedly one of the most sustainable and green means of transportation. Cyclists are in a distinctive position vis-a-vis the urban environment. Cycling is faster than walking, demands less space than car-oriented transport, and technologically assisted yet open to the environment to a much greater degree than public transport users. They can experience distinctive feelings and needs relating to both their sensory experiences and their sensory technologies. Cyclists are found to be the most satisfied commuters. Therefore, build on the idea that cycling offers a unique embodied experience of urban landscapes, the study has three main aims: first, to consider how we perceive the landscape when we are cycling. Second, how does the cycling landscape promotes a sustainable city. Third, to explore whether mobile sensory landscapes can promote psychological benefits. In order to examine cycling as a situated experience of urban life, we used semi-structured interviews as the main means of data generation and completed psychological questionnaires (preference, emotion and attention) immediately after completing the cycling experiences. As Ingold (2000) insists, our understanding of space is "constantly shaped" as we move through it, and we can find that the cycling awakens more sensory engagement and enhances the sensory experience. As with Kaplan's proposed the theory of environmental perception, actively gathering information from environment can promote preferences and emotions. Participants discussed how cycling and cycling landscapes can produce an engaging and relaxing experience. This type of mental state is described elsewhere as an experience of "flow". In addition to the psychological benefits for cyclists, they felt that the cycling landscape further promotes the city's move toward an ecological and sustainable environment.

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Addressing Objections to Implementation of Native Plants in Landscapes

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Keywords: Polycultures, Extinction, Native Plants, Intermingled Planting Design, Ecology

Many members of the public assume that landscape architects are forward leaning stewards of the environment. There is also an increasingly important imperative to reverse the ecological decline that has multiplied the extinction rate of species 1,000-fold since the advent of the industrial revolution. This presentation addresses both these issues with an evidence-based presentation on why landscape architects must address ecology in metropolitan areas. and not just environmental concerns such as global warming, carbon sequestration, clean air and clean water. If landscape architects do not become advocates for native plants, animals and regional ecologies, there is almost no chance that any of the other players in the development process will.

After an initial discussion on the ecological imperative, common reasons for not using native plants that are put forth on a regular basis and that have been widely published in books, magazines and online will be addressed. The reasons for not using native plants will be rebutted and shown to be more of means to rationalize the “inconvenient truth” of their necessity in the fight against the current anthropogenic driven mass extinction event.

The final part of the presentation will briefly explain a new approach to using plants indigenous to a specific ecological area in dense intermingled combinations called aesthetically qualified native polycultures. The presenter has been researching, designing, and implementing these polycultures using native plants since 2014. Examples of installed polycultures, both successful and unsuccessful (with lessons learned), will be presented as time allows.

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More Than Decolonizing: Cultivating Student Activism Through Recognizing Indigenous Narratives Using Land Back as a Model

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Keywords: Settler Colonial Theory, Indigenous, Land Relationship, Climate Futures, Design History

On a personal level and as a society, our relationship with the land begins with history. For the United States, this is characterized by the fragmentation of indigenous land to be distributed among settlers as private property, a process which has led to today's environmental degradation and the climate crisis (Dunbar-Ortiz, 2014; Popovich and Plumer, 2021). However, potentially subversive historical narratives are typically overlooked in favor of the traditional chronological perspective of European immigrants in design history education, particularly in the description of indigenous peoples (Raxworthy, 2019). 2020 marked a cultural tipping point with the revelation of just how deep inequality runs in this country; the COVID-19 pandemic and the murder of George Floyd spurred many design programs to take a harder look at who and what they were teaching (Mortice, 2020). While seminar and studio courses are often structured to allow design students flexibility to pursue topics of personal interest, introduction to design history courses remain stagnant in their survey-style approach, operating as if students have no prior knowledge of design history and limiting time to analyze historical precedents because of the overly broad curriculum. The accreditation standards published by the Landscape Architectural Accreditation Board (LAAB) in January of 2021 state only that, "The professional program curriculum shall be guided by, but not limited to, coverage of: history, theory, philosophy, principles, and values," with design history as the first on a list of themes to address but no additional insight into what "design history" should mean. In order for landscape architecture students to become the land stewards that our uncertain future calls for, they need to be introduced to the design of landscapes via a thorough understanding of what informs our relationship with the land, using indigenous narratives to reframe design history and contemporize land-based activism. Using the surging, decentralized movement known as Land Back as a parallel to traditional landscape architecture trajectories, this paper advocates for more direct activism than scholarship alone by highlighting the role the profession could play in connecting design students and practitioners to indigenous communities and ways of knowing (Barnett, 2016; Dang, 2021). An understanding of the importance of decision-making power by indigenous peoples over their ancestral lands and both the mechanisms and outcomes of these land "returns" offers students a positive model for grappling with complicated histories and lays a foundation for alternative people- environment relationships.

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Trail Guide for a Hybrid Landscape: Using Interpretive Design to Curate Experience for the Nebraska Hand Planted Forest

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Keywords: Interpretation, Forestry, Narratives

This paper explores the role of interpretation in landscape architecture through the investigation of a hybrid landscape — the Bessey Ranger District of the Nebraska National Forest and Grasslands, which is the largest hand planted forest in the United States (20,000 acres) situated within the largest contiguous temperate grassland in the world. Botanist professor, Dr. Charles E. Bessey, initially conceived of the forestry experiment in the 1880's, an era of widespread industrial deforestation, to adapt the harsh climate of the sandhills for inhabitation. Today, the Bessey Ranger District of the Nebraska National Forests and Grasslands, along with the first federal nursery in the United States, works toward land and water conservation, grassland restoration, and reforestation in native forest areas devastated by climate change driven wildfires and beetle infestations. The book, "A Field Guide to a Hybrid Landscape," which features photography, essays from an interdisciplinary group of scholars with backgrounds in forest ecology, art history, and geography, along with illustrative maps, provide a detailed account of the parallel narratives that comprise the history of the hand planted forest. Five interpretive themes emerged from this research including sand/wind/water, planting, thinning, fire, decomposition, and sowing. These themes were explored further within a third year design studio at the University of Nebraska - Lincoln in collaboration with the United States Forest Service to critically examine the ecological and cultural implications of the forest and how visitors can engage with its legacy through the design of an interpretive trail system. The Trail Guide for a Hybrid Landscape unravels the entangled history of the Nebraska National Forest and Grasslands — a forestry experiment, dendrological anomaly, and ecological nexus at the center of the largest contiguous temperate grassland in the world by situating a network of trail alignments, narratives, and experiences throughout this extraordinary landscape.

500

The Role of Amenity Configuration on Social Satisfaction Among People Living With Disabilities

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Keywords: Social Satisfaction, Individuals With Disabilities, Urban Amenities, Sensitivity Analysis, Built Environment and Community Integration

Individuals living with disabilities are more likely to be isolated and have fewer social connections than those without a disability. One of the factors that can increase isolation is a prohibitive physical environment, one that can disproportionately marginalize people with disabilities (PwD). To improve the quality of life for people with disabilities, we need appropriate measures to determine how well our social, economic, and environmental ecosystems interact with one another. Researchers have examined various factors that impact social satisfaction, but there is limited empirical evidence showing the relationship between the role of the built environment and social satisfaction. Specifically, the spatial pattern of urban amenities and the access to these amenities could play a role in social satisfaction. Previous work has hinted that living close to urban amenities, including shops, cafes and restaurants, public transport, and public spaces, increases participation in community life. However, we do not have a firm grasp on the relative influence that urban amenities have on community integration and the level of satisfaction especially among individuals living with disabilities.

To address this knowledge gap, we have developed a research agenda based on two key research questions: 1) What is the most socially meaningful way to measure access to and pattern of urban amenities within an individuals' environment, and 2) is there any relationship between the pattern and accessibility of urban amenities with the level of social satisfaction among individuals with disabilities? To answer these questions, we generated several variations of a spatially explicit accessibility model and conducted a sensitivity analysis to make systematic comparisons of the pattern of urban amenities. For example, we explored several different spatial metrics including: the density of urban amenities within a service area buffer and the average proximity of urban amenities to origins (several others were also created). Then, we conducted a regression analysis drawing from data generated by the model results and a social satisfaction survey. The results of the regression analysis between the level of social satisfaction (from a survey) and the model results, indicated that proximity to different amenities (e.g., places of education, outdoor recreation, restaurants) impact the level of satisfaction among individuals living with disabilities. Results contribute to ongoing evaluation of social satisfaction, particularly for comparing the role the built environment has on social satisfaction for people with and without disabilities.

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Building Blocks of Inclusion: Minecraft as a Tool for Youth Engagement

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Keywords: Participatory Design, Video Gaming, 3D Modeling

Land-use planning tends to be adult-oriented, leaving young people's ideas and concerns frequently dismissed. In addition, attempts to involve youth in planning are often resisted due to societal views of young people as lacking the capacity to participate meaningfully in the design process (Frank 2006). Despite this tendency to dismiss youth in the planning process, encouraging youth to participate in decisions that will impact them empowers them to take active roles in their personal and community development (United Nations n.d.). One goal of participatory design is to give people a sense of agency in the design process, and the inclusion of youth in participatory design is gaining traction as a priority issue (Sanders & Stappers 2008). Video games are an emerging way to include young people in the design process. With more than 480 million copies sold as of 2019, Minecraft is the most successful video game of all time. Due to its cultural ubiquity and relative ease of learning, Minecraft has become an increasingly popular form of youth engagement (Delaney 2022). Minecraft has been applied by nonprofits and professional organizations, including Block by Block (a collaboration with UN Habitat) and ASLA as a way to gather youth input in the design process. However, few studies have evaluated its effectiveness in building youth understanding and contribution to the design process. This study aims to address this issue by comparing youth responses to traditional and video-gaming engagement practices. In this study, 45 students aged 14-19 from an urban high school in Kansas City, Missouri will be randomly selected and assigned to one of two community engagement workshops: a traditional paper-based design charette and a video-game workshop using Minecraft. In both workshops, students will create designs for a streetscape, a vacant lot, and a stretch of greenspace near their school. Surveys issued before and after the workshops will evaluate the effectiveness of each approach by assessing students' understanding of the design process and the degree to which they felt included. The outcomes of this study are expected to encourage youth participation through effective methods and provide insights to better ways of involvement of young people in design decision-making.

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Drifting Through Landscapes: A Study on Walking, Drawing, and Sensory Experiences

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Keywords: Psychogeography, Dérive, Pedestrian, Perception, Embodied Knowledge

Psychogeography is an artistic practice and theory that investigates how people walk, perceive, and interact with their surroundings. Emerging from avant-garde movements such as Dadaism and Surrealism in the mid-nineteenth century, psychogeography was developed by the Situationist International – a group of radical artists, poets, and intellectuals. The Situationists developed a method called the "dérive" or "drift" as an experimental way of exploring urban environments on foot (Careri, 2002; O'Rourke, 2013; Solnit 2000).

As professionals that strive to design not only walkable, but also evocative places, landscape architects can benefit from understanding how people physically and emotionally experience a place. However, the advancement of remote sensing technologies in the twenty-first century allows easy access to site imagery and data, and designers therefore spend less time engaging with the places they study and design for (Jenkins 2018). This study aims to ground site research in human experience through a multi-sensory lens. In addition to walking and visual perception, the study also investigates how other human senses – sound, smell, and touch – shape pedestrians' sense of place.

Based on the dérive method, thirty-five student participants walked through a university campus to map their sensory experiences in various types of open spaces. Participants also provided hand-drawn sketches, route maps, and written descriptions of their observations, emotions, and the memories that these places evoked. Using an arts-based methodology in line with psychogeography, this study synthesizes and analyzes participant data through the production of a series of composite maps and graphics. The findings illuminate patterns between landscape conditions and pedestrian preferences. Furthermore, they provide valuable insight into how people use all the human senses to relate to their natural and built environment. Through walking, drawing, and direct observation, landscape architects can deepen their understanding of the connection between the physical environment in which they design and the human experiences of places.

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Retail Grounded - Promoting Landscape Architecture in Liminal Retail Landscapes (Old) Lots of Liminality - Redressing the Vacant Lot (New)

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Keywords: Vacancies, Ritual, Engagement, Stewardship, Liminality

It is no secret that land vacancy plagues many cities across the United States. In the Midwest, cities like Detroit run a program that sells vacant side lots to adjacent homeowners or neighborhood lots within a distance of 500 feet. More recently, Youngstown, Ohio, announced a similar program, “Mow it to Own it,” for homeowners to legally acquire an adjacent vacant lot by maintaining it for one year. If approved, the program would reduce pressure on the city to maintain all 6,000 city-owned vacant lots, which are currently mown three times a year.

These programs provide immediate solutions to land vacancies, a cheap transfer of ownership, and duties of upkeep. Still, organizations, such as 596 Acres of New York City, work to redefine how vacant lots are perceived and organize opportunities to build functional spaces for community engagement. Unfortunately, there are many differences between an urban vacant lot in New York City and a suburban vacant lot in Youngtown, Ohio, or Detroit, Michigan. So the question is, can the liminality of suburban vacant lots be leveraged as tools to build its future? What happens if its site structures are grown, such as those created out of living willow branches? While in limbo, vacant lots can become more than just a community garden but serve as the genus loci, the spirit, for those who maintain it. This proposal investigates how vacant sites are transformed, through small interventions of sequence and rhythm, to create iconic landscapes. Places of memory works of art grown in slow transition through ritualistic practice. In turn, these sites may also serve to promote the stewardship and practice of landscape architecture, an open channel for generational mentorship, and a way to pique the interest of individuals from diverse backgrounds to pursue future work in the field.

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Bridging the Indoors and Outdoors: Towards an Integrated Approach to Creating Supportive Environments in Long-Term Care

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Keywords: Well-Being, Restorative Environments, Interiorscaping, Nature, Skilled Nursing Facilities

As a place that functions both as a residence and a workplace, long-term care facilities are tasked with creating environments that support the needs of distinctly different user groups. Given that the design of both interior and exterior spaces impacts the quality of life of both residents and staff, it is crucial to integrate design solutions that improve the human experience in long-term care. While nature has been demonstrated to impact well-being (Berman et al., 2008; Hartig et al., 2011), existing design recommendations in long-term care facilities typically limit opportunities for exposure to nature to exterior spaces. These exterior spaces are often underutilized by users, particularly for the residents and staff who are unable to explore these outdoor environments (van den Berg et al., 2020). While views of nature have been documented as a means of achieving restorative benefits indoors (Tennessen & Cimprich, 1995; Ulrich, 1984), residents may not have a room with a view of nature or may prefer to block a natural view with blinds or curtains. With underutilized opportunities to connect with nature, current design recommendations for long-term care facilities are less likely to provide residents and staff with the restorative benefits of nature. This mixed-method study uses the Supportive Environments for Effectiveness (SEE) framework (reDirect, 2022) as an approach to address this disparity between design intentions and reality in a long-term care facility, Meadowlark Hills Retirement Community, in Manhattan, Kansas. Drawing on the findings of a photo-survey study on preferences and satisfaction of existing outdoor spaces and self-reported wellbeing, as well as the literature on supportive environments, this study examines how to creatively integrate nature to better address the SEE needs for model building, meaningful action, and being capable. A set of interior and exterior design recommendations is developed accordingly to meet the needs of both residents and staff. Through semi-structured focus group interviews of 24 residents and 24 direct care nursing staff, these recommendations are conveyed through photomontages and analyzed for user needs and preferences through descriptive coding based on themes. The findings are expected to reveal the potential differences between residents' and staff's needs and preferences, which would lead to practical design recommendations that create supportive interior and exterior environments in long-term care. This study also offers insight into the existing body of literature by presenting Supportive Environments for Effectiveness as an applicable framework for designers.

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Creating Restorative Outdoor Environments by Meeting Informational Needs: Applying the Supportive Environments for Effectiveness Framework to Long-Term Care Design

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Keywords: Well-Being, Mental Restoration, Skilled Nursing Facilities, Contact With Nature

Supporting health and well-being in long-term care facilities has long been a pressing issue that has only increased in significance due to rising mental health concerns for residents and staff in response to the COVID-19 pandemic. While outdoor environments have been demonstrated to support well-being (e.g., Berman et al., 2008; Braubach et al., 2017; Hartig et al., 2011), long-term care facilities typically offer limited opportunities for restorative exposure to nature. Furthermore, the exterior spaces of these facilities are often designed to only meet the functional needs of residents. These spaces are less likely to be designed to meet social or emotional needs and, furthermore, rarely designed to meet the needs of staff. Current design recommendations for outdoor spaces in long-term care facilities are, therefore, less likely to be inclusive of the wide ranges of needs of all users. This quantitative study introduces the principles of the Supportive Environments for Effectiveness (SEE) framework (reDirect, 2022) as an approach to address this issue by creating restorative outdoor environments that meet the informational needs of residents and staff in a long-term care facility, Meadowlark Hills Retirement Community, in Manhattan, Kansas. Photo-surveys were used to collect data from 200 residents and direct care staff about use patterns, preferences, and satisfaction with existing outdoor environments based on the three components of the SEE framework: model building, meaningful action, and being capable. The survey data also included self-reported well-being, access to outdoor spaces, and the impact of the COVID-19 pandemic on outdoor use patterns and well-being. Using linear regression, central tendencies, and correlation coefficients to analyze the Likert survey questions (Boone & Boone, 2012), the data analysis results are expected to show potential similarities and differences between the needs and preferences of residents and staff, as well as the potential relationships between satisfaction, use, and well-being across the two user groups. The findings will be used to evaluate the degree to which existing spaces provide opportunities to meet the informational need domains of SEE, which will inform practical design recommendations to create supportive outdoor spaces that meet the needs and preferences of both residents and staff. The findings offer insight into the existing body of literature by presenting Supportive Environments for Effectiveness as an applicable framework for helping designers create more inclusive supportive environments that improve well-being in long-term care facilities.

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Quantifying the Pedestrians' Eye-Level Visual Experience: Using Real-Time Experiment Data

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Keywords: Semantic Segmentation, Vanishing Point, Pedestrian's Eye-Level Visual Experience, General Frame of View

INTRODUCTION: Visual characteristics of the environment that pedestrians encounter affect their safety directly by securing visibility, and indirectly by affecting perceptions of safety and stress responses. Previous studies used street audits (Adkins et al., 2012), video images (Ewing & Handy, 2009), and image semantic segmentation using existing street image datasets (Koo et al., 2022) to measure the visual properties of the street environment. Real-time eye-level images from pedestrians can more clearly reveal the link between the specific visual elements and pedestrian responses (e.g. behaviors, psychological states). However, methodological challenges remain in collecting and analyzing such data. Purpose: As part of a large project called Urban Green (Infra)structure for Pedestrian Health funded by the Center for Health and Nature, this research aims to develop an effective and efficient method to quantify pedestrians' eye-level imagery data, using semantic segmentation and vanishing point detection methods. These methods allow measuring the direction, angle, and duration of diverse visual exposures that can be linked with walking and stress data (e.g. skin conductance, heart rate variability). Methods/Procedures: We recruited 36 participants who were asked to walk along the two (built-up and natural settings) pre-defined routes twice during the spring and summer months, carrying a mini-camera, a GPS device, and an E4 physiological sensor. We measured 12 categories of environmental features (e.g. green, sky, sidewalk, building) by reclassifying the Ade20K datasets (Zhao et al., 2018). Also, we inferred the line of sight and measured the frequency of head movements based on the vanishing point (Zhou et al., 2019).

PRELIMINARY RESULTS: Participants were more likely to look down while walking in the built-up setting, compared to the natural setting. On the other hand, people walking in the natural setting with more open view tended to look forward in the direction of walking. The accuracy of image extraction was higher in the natural setting due to its more distinctive and heterogeneous features, compared to the built-up setting.

NEXT STEPS: Data are being further analyzed to evaluate how the 12 categories of environmental features in the images can be used to capture pedestrians' eye-level visual experiences linked with walking behaviors and stress responses, and the effect of visual experiences on walking/stress. This study can offer insights on how to objectively measure and improve visual experiences of pedestrians which are shown to impact their behavioral and health outcomes.

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Neighborhood-Level Planning and Design Strategies to Promote Dementia-Friendly Communities and Challenges to Implementation: A Qualitative Study Using Expert Surveys

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Keywords: Age in Place, Older Adults, Health, Dementia

Population aging has underscored many public health concerns about persons living with dementia (PLwD). The concept of 'Dementia-Friendly Communities (DFC)' has been increasingly embraced worldwide by policy-makers, researchers, and designers in response to the increasing number of PLwD and the care burden/cost it has generated to the whole society. However, empirical studies that can guide the development of design guidelines/recommendations for DFC are very limited. Addressing this gap, this study aims to explore the current knowledge and perceptions about DFC among experts in the built environment (BE) disciplines in both academia and professional fields (e.g. urban planning, urban design, architecture, landscape architecture, land/property development). Online expert survey will be conducted with BE experts who are familiar with the US context and have research or professional expertise in environment-aging issues. Participants will be asked to rate the importance of a series of BE items across ten domains (land use and accessibility, navigation, legibility and familiarity, comfort, safety, housing, transportation, access to nature, engagement in outdoor activities, aesthetics and stimulation) using a 4-point Likert scale ranging from not at all important to very important. Open-ended questions will also be created to let participants share insights on strategies to create DFC and the possible implementation challenges. Experts will be recruited from a variety of sources including published authors, academic/professional organizations, city planning departments, design/construction companies, etc. Informed by existing literature and instruments (Gan et al., 2022; Hung et al., 2021; Maki et al., 2020; Shannon et al., 2019), a preliminary survey has been developed and pilot tested among several internal experts. The finalized survey will be administered to about 50 experts from different disciplinary fields from Jan - Feb, 2023 and preliminary data analysis will be conducted by the time of the conference. Descriptive statistics will be conducted to describe experts' sociodemographic characteristics and the responses to the closed-ended questions, and content analysis will be used to extract meaningful clusters of responses from the open-ended answers. This study is expected to identify the most important neighborhood-level BE factors that can help support "aging in place", especially for PLwD, the planning/design strategies to make a community more dementia friendly, and the potential implementation challenges in the US. The findings of this study will serve as the foundation for a planning/design tool and provide a direction for future research to continue the efforts of better understanding and promoting DFC.

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Assessing the Effects of Pedestrian Path Layouts on Stress Responses to Traffic Noise

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Keywords: Walking pattern, Traffic noise mitigation, Adaptive behavior, Skin Conductace, Heart Rate Variability

Hospitals are often vulnerable to traffic noise mixed with ambulance sirens while traffic noise has been found to increase stress-related illness (Luca et al., 2020). Pedestrians tend to walk faster in the presence of traffic noise (Franěk et al., 2008). Yet, noisy urban streets are often composed of many 90-degree turns that slow down pedestrians. Unlike the spiraling labyrinths that facilitate continuous walking, those with a large number of sharp turns between switchbacks and U-shape segments are often used by hospitals to facilitate stress reduction (Yang, 2004) through slowing down walking speed (Zucker et al).

This study hypothesized that stress responses to traffic noise can be mitigated by 1) straight versus curved segments, 2) the number of turns, 3) the degrees of turns 4) switchbacks, 5) U shapes, and/or 6) spirals. These path features were used as independent variables with each stress indicator from heart rate variability (HRV) and electrodermal activity (EDA) signals as the dependent variable to identify the best-fitting mixed-effects models. Each of the 33 participants was randomly assigned to one of the six path layouts (composed of common patterns found in labyrinths) to walk for two minutes while listening to traffic noise with intermittent ambulance sirens. Each participant randomly selected each subsequent path layout to repeat the two-minute protocol until all six layouts had been walked on. Throughout the experiment, each participant wore an HRV-EDA mobile sensor with an accelerometer for measuring the intensity of physical activities as a proxy for walking speed.

The best-fitting mixed-effects models suggest that: (1) different path layouts had varying stress-mitigating effects for traffic noise; (2) the most stress-mitigating layout was composed of curved segments without sharp turns, switchbacks, or U shapes; (3) the curved segment had positive stress-mitigating effects followed by switchback, while the U shape, 90-degree turn, and the number of turns had negative effects.

The findings show that a continuous curved path layout can effectively reduce people's stress response to traffic noise through enabling faster walking away from traffic noise. When mainstreamed through public health codes, this evidence path layout can help minimize stress response to traffic noise in areas with limited space for sound barriers and noise-absorbing vegetation. In addition, the results provide evidence-based guidelines to caution the use of complex labyrinths in noisy areas.

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The Maya and Garifuna Coast of Mexico and Central America

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Keywords: Diaspora, Central America, Garifuna, Culture, Migration

This short documentary film investigates the ancestral roots of the people that represent the Central American Diaspora, specifically the people along the Caribbean coast focusing on the main minorities and indigenous people (and descendants) of the Maya and the Garifuna. The film chronicles a recent research trip through the Yucatan Peninsula and Central America and documents archeological sites and important towns/villages along the coast and the Honduran Bay Islands, it seeks to understand the cultural legacy and ancestral roots of groups that now make an intrinsic part of communities in the United States. More specifically, it documents important sites and cities of the Mayan civilization as well as towns and villages where their descendants continue to live and the less well-known and poorly documented settlements of the Garifuna people in Honduras, Guatemala.

The film investigates the colonial past and the legacy of the region. While, generally, more is known about the Mayans, the focus is usually on the archeological sites and the significance of their civilization in the past. This film focuses on understanding the social, environmental, and physical conditions of the surrounding areas where their descendants live and the impact that climate migration and a tourist economy have on the region.

Much less is known about the Garifuna and other indigenous and ethnic minorities of Central America. Currently, Honduras has the largest Garifuna population at around 200,000. Surprisingly, the United States has about the same number with New York City having the largest population. The Garifuna are a mixed African and indigenous people from the Caribbean Island of Saint Vincent. Eventually, they were exiled from Saint Vincent to the island of Roatan off the coast of Honduras. From there they settled along the coast of Honduras and Belize where they have remained for over two centuries. Economic development, climate change, and government corruption are threatening to displace their communities from their ancestral-occupied lands.

Additionally, some of these communities are in danger of disappearing because of the Central American diaspora and the increased pressure to develop their land into tourist attractions, and the sea level rise resulting from global warming. The film concludes with interviews of members of the Garifuna community from New York City who have moved to Roatan to establish a Garifuna Community Center to prevent the culture's disappearance.

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Tackling Food Insecurity in Historically Disinvested Areas: A Case From Kansas City, Missouri

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Keywords: Health Markets, Urban Vacancy, Community Gardening, Healthy Food Options, Redlined Areas

The consequences of climatic change are anticipated to continue to disrupt future agricultural production and food security in the United States (Wheeler & Braun 2013). The pressures on the global food system and extreme climatic events are challenging city dwellers in most densely populated areas. With over 80% of the population living in cities and metropolitan areas, these populations have become early responders to climate change, placing them in the path of vulnerability (FAO 2020) and food insecurity. The anthropogenic relationship between current food systems will intensify within the next few decades as populations continue to increase, creating a need for integrative food-sharing programs in urban areas (Kortetmäk 2019). This study examines food-sharing programs, including community gardening and shareholder health markets, as a potential approach to address urban food insecurity in high-vacancy areas in the era of climate change. Providing land ownership allows local communities to repurpose vacant lands and sustain economic food endeavors through urban farming. This study was conducted in nine neighborhoods of the Eastside Kansas City, Missouri, a historically redlined area with middle to low-income residents. This area suffers from racial segregation and high vacancy. Spatial analysis was conducted using GIS to identify areas of opportunity for potential design intervention. Then a survey was distributed both online and in-person in two most vulnerable neighborhoods to examine residents' concerns about food security, food access, and involvement in food production, as well as the expected outcomes they wished to seek in their community concerning food-sharing programs. 68 residents participated from Ivanhoe and Oak Park neighborhoods. The results showed that 50% of the participants utilized food stamps and ate fast food every day and about 66% reported that they could not afford to buy healthy food. The resulting information was used to develop an integrative food-sharing program model that shifted toward sustainable food production and decreased health implications associated with global climate change and food insecurity. This study offers insights to the role landscape architects can play in tackling urban food insecurity.

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Scientific Sites of Climate Practice

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Keywords: Science, Data, Sensors, Arctic, Climate Change

The Arctic is a twenty-first century "truth-spot" for climate change, a place that lends credibility for science. The combination of highly visible signals of climate change in the Arctic and far-reaching impacts of its warming environment on the rest of the planet has raised the urgency and pace of scientific activities in the region, creating a dense concentration of globalized scientific landscapes including in Utqiaġvik, Alaska – the scientific and logistical hub for climate change research in the U.S. Arctic. Historically, science has played a central role in the formation of social, economic and political worlds in the Arctic. In an age of climate change, this relationship has only heightened, transforming the relatively remote and sparsely populated territory into a climatological center of Earth. In this context of intense and increasing scientific investigations into climate futures, landscapes of science in the Arctic offer glimpses into emerging environmental knowledge and social relationships around this new knowledge. In this way, scientific sites are both social and technical scaffolds for long-term environmental observation. The authors will discuss how this intersection in Utqiaġvik has provided strategies for site analysis and interdisciplinary collaboration germane to landscape architectural research, with a particular focus on how the way science is done affects the knowledge that is produced, which consequently influences the practice of landscape.

Drawing from the author's ongoing, five-year research titled "Understanding the Changing Natural-Built Landscape in an Arctic Community: An Integrated Sensor Network in Utqiaġvik, Alaska" funded by the National Science Foundation, the presentation outlines material and spatial practices of scientific fieldwork the project team carried out in summer 2022. Authors show that socio-technical processes of deploying micrometeorological sensor arrays and geophysical surveys (e.g., electoral resistivity tomography and repeat LiDAR scans) establish an important interdisciplinary and inter-epistemological convergence necessary for collaborative research on climate change. Moreover, a series of physical planning and interventions made on study sites to install instruments and generate high-resolution environmental data to be used for future design studies—such as marking underground utilities, identifying satellite sensor locations, getting permits, and digging into frozen ground—brings together a landscape "thought collective" of researchers, designers, technicians, and stakeholders through situated labor. With a growing importance of collaborative and scientific research in the praxis of landscape architecture, it is imperative to examine relationships between the production of scientific environmental knowledge and cultural landscapes to inform landscape designers' approach to sites and climate practice.

RESEARCH METHODS

Research Methods
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On Laboratories and Machines: Interfacing With Landscape Processes

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Keywords: Urban Ecology, Technology, Maintenance, Climate Adaptation, Computation

This paper presents a case study of establishing a landscape laboratory – the Ecological Laboratory for Urban Agriculture (ELUA) within the City College of New York's landscape architecture program.
In the past two decades, many university landscape architecture programs have incorporated laboratories with machines and a "laboratory culture" as both research and education infrastructure. Examples include the work of Alexander Robinson at the Landscape Morphologies Lab of the University of Southern California [1]; the work of Bradley Cantrell and Xun Liu with hydromorphology tables at the University of Virginia and Harvard University [2]; Matthew Seibert's work at Milton Land Lab [3]; and robotic landscape research by Ilmar Hurkxken and Christophe Girot at ETH Zurich [4]. Each develops landscape laboratories that integrate physical spaces with customized tools and machines.
This phenomenon mirrors the 21st-century development of landscape theory that prioritizes dynamic landscape processes and ecological evolution over static forms. Landscapes are imagined to evolve with recursive and process-based strategies (e.g., maintenance) over a long period, instead of as a one-time construction. Projects such as Fresh Kills and Downsview Park competitions in the early 2000s were examples of this design paradigm [5] [6]. Meanwhile, new tools, machines, and devices have been imagined as part of landscape systems to perform process-based strategies, such as maintenance or responsive actions, and co-evolve with other landscape actors [7].

Situated within this body of work in theory and practice, ELUA explores what kind of knowledge a landscape laboratory can produce that is different from a science or engineering laboratory. Similar to the many laboratories above, the use of machines in ELUA is pervasive. Two FarmBots – a commercial gantry farming robot – were installed, with sensor arrays, AI cameras, and databases. However, ELUA has different aims. Rather than accepting and applying intelligent machines in landscape design, ELUA reverses the dynamic and applies landscape thinking to push technological development by inventing new machines and algorithms with landscape sensitivity. In addition, ELUA targets border socio-ecological issues; it designs, tests, and evaluates innovative methods of robot-assisted urban polyculture gardens to alleviate food insecurity in cities like New York.

The talk will present the process and the resources – technology, knowledge, expertise, and materials – involved in establishing a landscape laboratory in a minority-serving public school. The goal is to provide first-hand documentation and present the successes and obstacles during this process.

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A Multi-Stage Stratified Random Sampling Tool for Spatially Explicit Landscape Survey Research

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Keywords: Stratified Random Sampling, Spatial, Survey, Greenspace, Public Perception

With the rise of research focusing on pattern analysis for public greenspace use in cities, there is an increasing need for collecting firsthand data from surveys on public perception and greenspace use. However, existing survey tools in landscape research seem not adequately address random sampling technique or spatial properties of the unit of analysis (geographical addresses, census units, etc.). Such gaps create a biased representation of the total population and put us into question the reliability of the surveys. This study introduced a multi-stage stratified sampling approach that takes both random sampling and spatial autocorrelation into consideration, in order to examine the relationship between greenspace use and community resilience. The sampling frame included the population aged 18 and over living in the Hartford and New Haven metropolitan areas in Connecticut. The sampling process was performed at two different spatial unit levels: census block group level and the United State Postal Office (USPS) Every Door Direct Mail (EDDM) route level. This approach allowed for the integration of census data, reduction of sampling errors, and efficiency in survey delivery. The methodological procedures we followed ensured the adequate representation of socio-demographic populations in the NECTA area: we first stratified the census block groups (CBG) within the study area into eight strata based on three binary variables: 1) poverty level (low or high), 2) racial diversity (low or high), and 3) level of urbanity (urban or exurban). With two random samples from the CBGs in each stratum, it resulted in 16 CBGs sampled. Second, we randomly sampled one EDDM route in each sampled CBG from the previous step, leveraging ArcGIS tools created by the USPS. This approach allowed the adequate representation of minor groups (such as low-income and racially segregated neighborhoods in affluent and white dominant counties). Besides, the adoption of urbanization level variable in the sampling tool enabled the consideration of urban-rural spectrum across the study area. This sampling framework provides research in the fields of landscape and human perception with a valid starting point for survey research and facilitates post-survey spatial analysis that ties in with the spatial characteristics considered in the sampling process.

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The Quadratic Law May Best Describe the Dose of Green Landscape-Mental Health Response Curves: Theoretical Mechanism and Empirical Evidence

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Keywords: Dose of Nature, Curvilinear, Landscape Exposure, Bell Pattern, Green Treatment

BACKGROUND/INTRODUCTION: The world is facing severe mental health problems. While sufficient studies have confirmed the positive effects of exposure to green landscapes, the common question of "dose" still exists. In the study, the "dose" refers to the duration, frequency, and intensity of green landscape exposure, any ways in which a person made contact with green landscapes or sensory representation of green landscapes. Few scholars have sought to identify a dose-response curve describing the relationship between green landscape and mental health. Without this knowledge, we cannot effectively support future research on potential statistical models and laws to depict the dose-response relationship accurately, nor provide more robust support for policymaking, planning, and design practice.

RESEARCH OBJECTIVE: The research aims to establish a practical and reliable dose-response curve. With the theoretical mechanism and empirical evidence, we try to identify the significant laws of dose of green landscapes- mental health response, as well as the optimal dose of green landscapes associated with the best mental health benefits.

METHODS/PROCEDURES: The research contains three major steps: theoretical hypothesis, systematic literature review, and statistical analysis. Firstly, we proposed a set of rationale hypotheses of possible major laws based on established theories and laws in the relevant fields, including the power law (linear and power patterns), the quadratic law (bell pattern), and the catastrophic law (catastrophic pattern). Secondly, we reviewed published empirical studies (1985-2022) with the PRISMA principle to summarize the existing discovered dose-response patterns and optimal doses of green landscapes. Finally, we utilized R studio 10.2 to plot and compare the AIC (Akaike information criterion), BIC (Bayesian information criterion) and adjusted of the hypotheses proposed in previous steps, and generate the best fitting dose-response law.

RESULTS/FINDINGS: Results reveal that, for both eye-level or top-down measures of green landscape exposure, the dose-response relationships fit the quadratic law best with a bell pattern curve. From the plotted curve and function, we could clearly identify an optimal dose of green landscape that provides the best mental health response. For the eye-level measurement, the optimal dose is 56.6% of the green landscape; and for the top-down greenness, the optimal dose is slightly smaller with 50.3% of the green landscape.

DISCUSSION/CONCLUSION: The study might be the first to identify the major law to describe the dose-response relationship between green landscapes and mental health. We are positive it will be a significant theoretical and practical contribution.

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Multidimensional Evaluation of Public Engagement for Long-Term Large Park Development

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Keywords: Yongsan Park, Nationwide Public Participation Group, Q-Methodology

This study focuses on the Yongsan Park Development Project, in progress for three decades. This project aims to create a 300-hectare park on a former US army base in Seoul, South Korea. Due to the delay of the US army relocation and inherent sociopolitical complexity, the project was paused and postponed several times. The project still remains far from complete after the international design competition for Yongsan Park in 2012.

The importance of public engagement has been emphasized by experts since the project's initiation in 1988. However, until 2016 official public hearing was almost the only way for the public to be informed of the park development processes. For example, an online survey of 2,000 respondents conducted in 2020 showed that only 16% of respondents had accurate information about the project. Only recently, there have been significant communication and public outreach. The Nationwide Public Participation Group (NPPG) of three hundred public volunteers was to join the first direct public engagement in 2021. As a result of the NPPG, seven primary objectives for park planning and design were derived and reflected on legal documents in December 2021.

However, the authors believed that it is equally important to conduct both in-depth interviews and quantitative analysis to gather the public opinions of these volunteering participants. To test this, the authors adapted Q-methodology, a rank-based quantitative survey followed by qualitative in-depth interviews. Twenty people from NPPG volunteered for the study. The result showed that the groups were divided into four categories – 'Economic Sustainability,' 'Green Park,' 'Activity,' and 'Public Participation.' A key difference offered by this methodology was the interest in the economic sustainability of the project. Because the previous debates about the projects focused on the site's historical significance and the new park's ecological value, this result demonstrated that in-depth interviews could provide important data for urban open space development sites that will be otherwise lost in the polls.

Several have discussed the efficacy of public engagement methodologies, particularly since the pandemic caused a change in public gatherings. A series of quantitative and qualitative public engagements the authors performed empirically demonstrate public opinion regarding the project as a spectrum of ideas. This means that in practice, public engagement is best practiced through a multidimensional public engagement plan. Adaptation of multidimensional engagement methodologies can help enhance park planning and design, therefore making the park development phase more resilient.

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YouTube: An Opportunity for Urban Streetscape Research?

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Keywords: Streetscape, YouTube, Cost-Effectiveness, Data Collection, Urban Design

The physical characteristics and built environment of streetscapes are essential elements in assessing the urban street design affecting livability (Forsyth et al., 2010) and walkability (Ewing et al., 2016). One of the established strategies for data collecting is field observation via a video recording to conduct design assessments on the microscale of the site (Harvey & Aultman-Hall, 2016). Video clips as a storage medium can deliver the experiential quality of specific locations with a sense of place. However, video recording presents formidable challenges, including travel expenses, recording device operation skills, and the safety issue of nightlife observation.

As a social media platform, YouTube shows myriad streetscape videos called "Walking Tour" that record famous streets without the recorder's intervention. Since those videos have been popular with gradually increasing viewers, content creators worldwide spontaneously upload videos with high-quality resolution.

The purpose of the study is to examine the role YouTube walking tour videos can play in conducting site analysis using streetscape design indices. We hypothesize that walking tour videos could replace or augment field observations because 1) they increase the temporal frequency and diversity of observations (e.g., different times of day, years, months) and 2) they increase the diversity of experiences stemming from multiple content creators.

For this pilot study, fifty walking tour videos recorded in the U.S. were used to collect environmental data, such as outdoor dining, street furniture, landmarks, and nighttime ad signs. Although metadata for videos can differ substantially, at least recording location and season could be estimated. Using the walking tour video showed to be a cost-effective method of gathering the physical characteristics of streetscapes about people's activities, such as dynamic behavior at night.

The videos provided an opportunity to assess how environments influence behaviors at different times of the day, during major events, or as a result of a renovation. Using the video is an effective method for data collecting when comparing streetscapes in various places. Additionally, some famous streets have several videos from many content creators, so we were able to track the changes in the street. However, the novel method's limitations were (1) constrained observation sites and (2) recorded areas with the content creator's interest. We expect increased total data showing the whole streetscape would complement those limitations since walking tour videos are continuously uploaded.

Using YouTube videos as big data can contribute to quantifying street features and discovering user behavior along with streetscape design.

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Seed Bank of the Landscape Architect

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Keywords: Field Work, Botany, Interdisciplinary Study, Species Conservation, Seed Banks

This presentation outlines the methods for the development of a seed bank for landscape architects, as well as initial outcomes of this undertaking. The seed bank, held by Ohio State University's Midwest Landscape Lab (MidLL), is in its first year.

Seed banks - human-curated repositories of plant genetic material preserved for future use - have existed for centuries but have proliferated since the environmental movement of the 1960s. These banks vary in scale (from local seed savers' exchanges to global networks of crop supplies) and purpose (to continue growth of heirloom vegetables, to ensure access to food, to selectively breed advantageous traits into plants, to preserve biodiversity), with methods that respond to each organization's means and goals. Yet these organizations are often inaccessible to landscape architects, despite the discipline's attunement to and support for such aims. Even the most pragmatic use of seeds - production of usable plant material, particularly of native or ecologically beneficial species - is highly valued and integral to the profession, yet the methods of producing these essential materials of landscape architecture are most often outsourced and not directly enabled by landscape architects. How might a seed bank operate or take shape around the particular needs and skills of our discipline, and how might we benefit from a closer relationship to the materials that are so integral to our work?

The work of an advanced media seminar, Seed Bank of the Midwest Landscape Lab, and supporting research explores how a seed bank tailored to the needs and use cases of landscape architects takes shape and operates. Working in the field (collection, in situ seed conservation) and laboratory (processing/storage, germination, microscopy and visual research), students and faculty at Ohio State are producing a supply of viable plant seeds for near- and mid-term use alongside a rich knowledge bank of these particular flora. Work includes interaction with these plants across their life cycles and at numerous scales, from the territorial and site to specimen and microscopic. Initial work to establish the seed bank has underscored the gaps and overlaps in knowledge and methods between landscape architecture and plant sciences. Further, this work highlights the benefits of continuing to fold botanical knowledge and field experience more securely into the discipline.

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Quick Landscapes, Quick Methods: Multispectral Imagery as a Method for Messy Places

Knox, Emily Auburn University

Keywords: Research by Design, Meadows, Messy Landscapes, Photogrammetry, Multi-Spectral Imagery

In the last decade, the meadow has emerged as a trend in landscape architecture - permeating into the work, teaching and research of academics and practitioners alike (Martin, 2022; Jenkins, 2022). Championed now for being wonderfully biodiverse, drought tolerant, low maintenance and rich in texture and color, meadows and grasslands have historically been misunderstood, undervalued and eradicated to make room for higher value uses like urban development and agriculture (Noss, 2014). The recent proliferation of meadow-based landscape projects speaks to a slew of contemporary trends within the discipline and beyond.

First, meadows are messy. They pack an incredible number of species and individuals into each square foot. Second, meadows are quick. While a forest takes decades to establish, you may see meadow species grow to maturity in a single season. Third, meadows are reactive. Unlike landscapes dominated by trees, meadow species react to the tiniest of site discrepancies (hydrological, topographical, or solar) or human intervention. And finally, meadows have a unique orientation towards process. Again, unlike tree-dominated landscapes, ecological processes – burning, mowing, seeding - are much more frequent and perceptible in meadow landscapes.

These distinct qualities have made meadows a rich landscape for experimentation, testing and design innovation. Concurrently, they have also challenged our methods, rebuking traditional design and monitoring tools like the planting plan or construction document which become futile in the face of the aforementioned points. A meadow's relative quickness and messiness make change incredibly difficult to monitor or percieve. To address these difficulties, this paper will propose a new set of analytical methods for landscape architects engaging these typologies. Multi-spectral imagery, used frequently by the agricultural industry (Honrado et al, 2017; Warren et al, 2005), is underexplored in the context of landscape architecture. Unlike typical cameras, multispectral cameras capture non-visible wavelengths like infrared - creating new opportunities for reading the state of vegetation on the ground. Relative to traditional plant monitoring methods, multi-spectral drone flights are quick and capture more information at a bigger scale with less labor. For these reasons, the imagery lends itself to capturing and offering otherwise obscured insights into meadow landscape dynamics. To demonstrate this, the paper will present findings from the Alabama Meadows project, which, over the last growing season, has used multi-spectral imagery and GIS to help researchers see the quick, messy, small-scale landscape patterns unfolding across the 3-acre project.

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The Economic Effects of Parks Best Management Practices (BMPs) and Land Cover on Housing Sale Prices in Washington, D.C.

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Keywords: Green Amenities, Housing Sale Prices, Hierarchical Regression Model, Hedonic Pricing Methods, Washington, D.C

The purpose of this study is to investigate the economic effects of parks, best management practices (BMPs) and land cover on the housing sale prices in Washington, D.C. Such green amenities contribute to neighborhood aesthetics and appeal, further benefits include the mitigation of stormwater runoff and pollution, all of which influence human quality of life and health (Zupancic et al., 2015). While there is extensive empirical work on the valuation of green amenities (Franco & Macdonald, 2017), studies of the economic value of green amenities are limited or neglected in planning and policy making in the US (Sander et al., 2012).

Previous research showed that various measurements such as types, proximity/distances, and count of parks, BMPs, and landcover were used to estimate the economic impact on housing sale prices (Netusil et al., 2014; Saphores & Li, 2011; Donovan & Butry, 2010; Sander et al., 2010; Lee & Li, 2009; Hoover et al., 2008). Primary findings show that 100-m distance far from the detention basin within a park decreases housing sale prices by $164.82 (Lee & Li, 2009). Hoover et al. (2008) found that there is no statistically significant relationship between bioretention and housing sale prices. Every 10% increase in tree canopy coverage within a 100-m donut parcel increases the housing sale prices by $ 1,371 (0.48%) (Sander et al., 2010).

We use hedonic pricing methods to study the economic effects of green amenities on housing sale prices. The method not only includes green amenities (e.g., parks, bioretention, and land cover etc.), but also includes structural (lot size, number of bedrooms, etc.), locational and neighborhood indicators (population density, crime rate, etc.), and D.C wards.

Our primary findings with a 100-m land cover buffer indicate the robustness of the result after controlling for structural, locational, neighborhood, and D.C. wards indicators. Proximity to parks increases housing sale prices regardless of parks with or without BMPs. On the other hand, proximity to BMPs outside of public parks decreases housing sale prices and a bigger size of BMPs decreases housing sale prices. Tree canopy coverage significantly increases housing sale prices with a 100-m buffer from housing parcels.

Our findings contribute to including certain types and measurement of parks, BMPs, and landcover that have not been studied than previous research. These implications could be used by planners, policymakers, and public awareness of the economic effects of parks, BMPs, and land cover to improve their considerations in planning and policy decisions.

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Video as Design Research: Method, Pedagogy and Practice

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Keywords: Stewardship, Fieldwork, Environmental Planning, Landscape Design

How might a video-based approach to design research provide new opportunities for the study of landscape stewardship? While drawing and diagramming ecological dynamics is one way to open alternative ways of knowing, other audio-visual formats have great potential in their ability to render additional insight into these grounded realities.

This research contributes to knowledge in landscape studies regarding the practice of conducting visual research. In doing so it explores the socio-ecological relations of forested landscapes in incentivized stewardship programs in Ontario through a video-based approach. Integrated into fieldwork, analysis and outcomes, this presentation examines the use of time-based media, as a medium through which to convey the history and composition of these landscapes, while also offering insight into different definitions of 'management.' This approach draws from scholarship in urban and landscape studies that positions film as a moving map that offers a potential way forward in constructing and defining landscapes (Waldheim, 2012), allowing for a different approach to its manipulation and measurement (Larsen, 2012), and in the inclusion of diverse observational views and everyday narratives (Bruno, 2007).

Outcomes draw from 15 site visits conducted during 2016–2020 with individuals involved in forest management in southern Ontario, where video was integrated into fieldwork and a final installation. Ultimately, this form of research served to highlight the diverse interpretations of management taking place in the region. In some cases, these landscapes have been dramatically changed through human intervention. In others, management practices have been stalled or subverted by other environmental agents. At the same time the practice of integrating video into a research methodology—the collecting, processing, and assembling of visual data—is explored in terms of its contribution to knowledge on the use of arts-based research methods. Here, video as fieldwork, analysis and outcome has led to new ways of organizing data that allows for the often invisible, and geographically disperse aspects of stewardship to be seen. This has contributed to new venues for conveying experience and sharing knowledge with direct relevance to the future planning and design of these landscapes.

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On Behalf of Plants: Drawing Stories of Plant Companionship in the Hawaiian Islands

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Keywords: Plants, Companions, Ethnobotany, Drawing , Representation

Plants epitomize the idea of palimpsest – something altered but still bearing visible traces of its earlier form. Embedded within each plant is a web of genetic knowledge, ecological function, and socio-cultural significance; characteristics that have often been forgotten, romanticized, or exploited over the course of time. Within this web inextricably exist humans, who generate behaviors, routines, and spatial registrations of significant and small scales all in relation to plants.

The Hawaiian Islands have been cultivated, exploited, appropriated, and romanticized because of their floral identity and capabilities. The construction of this multi-faceted floral identity has had a multitude of spatial implications on the islands – implications that are not always understood as intentional, introduced, or having multiple meanings of ecological, cultural or agricultural importance. This research asks the viewer, the dreamer who fantasizes about Hawaii, to stop and think about the floral identity of the Islands, how this identity was constructed, how the behaviors of humans have largely created this construction, and how we must foster a more reciprocal relationship with flora if we are to thrive moving onward.

This research will present student work produced over the course of three years in a graduate Landscape Architecture elective at the University of Hawaii at Manoa.

This work uses drawing and ethnobotanical research as a means of unearthing the pasts and speculating on the design possibilities of Hawaii's plants. The goals for this method of investigation and drawing is to offer an alternative way of engaging with plants not just as a tool, but as design collaborators that are necessary for our adaptation to and recovery from extreme climatic disruption in Hawaii, other islands around the world, and beyond.

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Terrain Cures: New Approaches to Interpretive Trailmaking in the Historic Health Landscape of the Sadgeri Plateau

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Keywords: Interpretive Design, Cultural Landscapes, Historic Landscapes, Trails

Trailmaking is a ubiquitous interpretive strategy in historic cultural landscapes. The design of most interpretive trails aims to educate visitors about the past through a series of text-based trail "armatures" installed beside a connecting path (Birnbaum and Peters, 1996). However, some scholarship suggests that interpretive design in such landscapes has become unnecessarily narrow, focusing only on learning outcomes, and disregarding the autonomous and highly individual processes of meaning-making in which visitors engage (Staiff 2014, p. 29). While visitors travel to heritage landscapes to learn about the past, they do not seek facts (which are easily accessible online, for example) so much as they seek embodied, place-based *experiences* (Otero-Pailos 2009, p. 242).

Marc Treib suggests that designers might choreograph landscape experiences by invoking the universal, physical senses of a visitor rather than attempting to engage "semantic channels (2009, p. 198)." Trailways are compelling but underexplored landscape infrastructures that can support such goals. Their linear form can structure coherent but non-totalizing narratives, allowing a visitor to trace - physically and conceptually - "through lines" across the landscape, drawing scattered, disparate elements into relation with one another through the act of walking.

While landscape architects are trained to choreograph phenomenological experiences through the design of space, trailmaking has received little critical or scholarly attention from the discipline. Though landscape architects employ interpretive approaches, engaging extant natural or historic features of a given site, typical design processes within the profession tend to focus on holistic site design within clear boundaries. The problem of tracing a meaningful transect through a more diffuse and extensive context – one which will remain largely unmodified, outside of the designer's purview – is less familiar. Therefore, our discipline requires a methodology for designing such an infrastructure in historic cultural environments. This paper will present one attempt to formulate an approach in the historic health landscapes of Borjomi-Bakuriani region in the Republic of Georgia. It will demonstrate how the goal of re-orienting trail users in historic person-environment systems, attitudes, and sensations might drive an interpretive design process, rather than focusing solely on the built vestiges that evidence them (discrete "sites of significance"). It will explore the ways in which historic human-environment interfaces and practices might be reanimated to instigate bodily engagement with heritage landscapes through the form of a trail, providing coherent, meaningful, and memorable experiences to visitors.

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Open-Ended Methods: Grounded Theory at the Alabama Meadows Project

Knox, Emily Auburn University

Keywords: Design Research, Messy Landscapes, Methods, Grounded Theory

Over the last several decades, landscape architecture has shifted away from the arts and nudged closer to the sciences (Corner, 1997). This can be seen in much contemporary work, where ecology is deemed equally important, and often more so, than other cultural or aesthetic values. It is also evident in the academic programs lobbying for STEM designation. As our work has moved away from the confines of the garden or park and into the more complex realms of climate adaptation and resilience, we have armed ourselves with all-important data and advanced technologies like drones and computer modeling, borrowing from the scientific methods of fields like ecology and civil engineering (Mattern, 2013). While these borrowed methods have at times proven useful, as a method for probing landscapes, they tend to be inappropriately reductive; shifting the openness of inquiry toward a pursuit of a finite truth or solutions (Holmes, 2020; Lutsky et al, 2017).

This paper discusses the value of a more open-ended approach to design research in complex, messy landscapes. The Alabama Meadows project is a field-based research initiative that seeks to re-build knowledge of the largely eradicated southeastern meadow. The work borrows from the rich legacy of *grounded theory*. First described by Glaser and Strauss in 1967, grounded theory seeks to immerse the researcher within the data, "grounding" them within context and specificity and allowing research discoveries to be unearthed from within (Glaser et al, 1967; Walker et al, 2006). Over the last fifty years, this theoretical framework has taken many forms and has crossed many disciplinary lines, but the Alabama Meadows initiative has uniquely spatialized this approach to research. These meadow test plots were designed not to prove or disprove anything specific prior to installation, but rather to fully immerse the researchers (and visitors) within the ongoing, first-hand 'data' of the meadow. Analysis strategies in the meadows are diverse and many, including: embodied manual labor, recurrent analog section drawing, re-photography, and multispectral photogrammetry. None of these strategies are designed to prove a hypothesis, but rather provide a range of ways of seeing, documenting, and learning. This density and diversity of strategies shapes a mode of inquiry that values the tendencies and trajectories of the landscape over quantifiable data. The paper will describe the range of strategies used to-date and discuss how they have produced the less empirical, yet rigorous knowledge that has enriched the project over several years.

RESEARCH BY DESIGN & IMPLEMENTATION

Research by Design and Implementation (LA CES)

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Examining Microclimate Impacts of Stormwater Management Landscape Design Using a Case of Rain Garden

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Keywords: Microclimate Analysis, Stormwater Management-Related Landscape (Smrl), Rain Garden, Design Guideline, Envi-Met

This research explores the microclimate impacts of stormwater management-related landscape (SMRL) taking rain garden as the case study. It aims to examine the relationship between different rain garden design factors and their impacts on microclimate patterns. Landscape design plays an important role in stormwater management. It achieves stormwater control and improves quality of environment simultaneously. SMRL has become an important aspect of contemporary landscape industry. However, focusing only on drainage functions is a missed opportunity of some existing SMRL design, especially rain garden design. The recent landscape performance metrics (LAF) have addressed the importance and potentials of SMRL in urban green infrastructure systems and regional environmental restoration (Landscape Architecture Foundation, 2018), of which microclimate control and adjustment are crucial functions. Therefore, besides the drainage functions, the microclimate impacts of SMRL, and its related design guidelines need more in-depth study (Tóth et al., 2015). This research takes the rain garden, a typical form of SMRL, as a case study to investigate its microclimate impacts on surrounding environment. This research focus on three factors of rain garden design (scale, planting design, and topography), and develops multiple rain garden design scenarios for a study site. Three scales of rain garden design (50 m^2/ 150 m^2/ and 250 m^2), three types of planting design (only land cover/ land cover and shrub/ land cover, shrub, and tree), and three types of topography (relatively flat/ with some topographic fluctuations/ with obvious topographic fluctuations) are included in the study. By combining these factors, 27 types of design rain garden design scenarios can be generated. The microclimate impacts (surface temperature, air temperature, and air flow) of each rain garden design are simulated and analyzed through ENVI-met, which is an environmental climate simulation software used in urban planning and environmental analysis. The microclimate data of different rain garden design scenarios are statistically analyzed using correlation analysis and ANOVA. Based on the results, the relationship between the factors of rain garden design and microclimate impacts can be examined, and a rain garden design guideline considering the microclimate impacts can be suggested. Overall, this research enhances SMRL studies from the perspective of rain garden design and microclimate control. It is potential to benefit the future SMRL design, Green Stormwater Infrastructure (GSI) design, and urban environment improvement.

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Using Topology Optimization in Landscape Architecture for the Design and Fabrication of Urban Elements Using Concrete

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Keywords: Topology Optimization, Precast Concrete, Digital Fabrication, Material Efficiency, Carbon Reduction

The purpose of this paper is to introduce topology optimization (TO) as a design and fabrication methodology and strategy for precast concrete urban elements. TO gives both architects and landscape architects the ability to optimize and minimize the amount of concrete required to create precast-formed pieces whilst focusing on structural performance while at the same time opening up new aesthetic possibilities with these forms. Other positive by-products of this process include reducing carbon footprints and potentially reducing material and construction costs. Its use can allow designers to ask the simple question: how much concrete does one actually need to use?

The application of topological optimization as a constitutive design tool has been widely adopted by the aeronautic, automotive, and naval industries (Bendsøe). While initial research on the application of TO architectural structures indicates the possibility for both significant performance gains in terms of reduction of material consumption and the infusion of particular design qualities specific to the process (Dombernowsky, Stromberg), TO in relation to landscape and architectural construction remains widely unexplored. This could be attributed to the complex formwork required by the forms derived from the TO process. Through the early integration of digital fabrication constraints and tools, the analytic capabilities of topology optimization can be turned into generative design tools that produce novel, materially efficient, and fabrication-informed architectural forms.

This paper will review current literature and present the case study of a recently installed collaborative pilot project between the University of Calgary and the City of Calgary that utilized TO and digital fabrication techniques for the design, fabrication, and deployment of precast modular site furnishings. For the pilot, an interdisciplinary team approach incorporating architecture and landscape architecture was utilized to examine manifold variables at play. The team explored potential strategies to strengthen design, materiality, and sustainability to create more inhabitable streetscapes. A fundamental part of the design was the creation of a kit of parts that can be repeatable and deployed in different configurations as part of a comprehensive downtown “main street” re-branding and revitalization effort by The City. The documentation will also include the iterative fabrication process between the university design team and a local precast concrete manufacturing company to illustrate the accessibility the profession has to integrate this fabrication method successfully. The hope is that this study will illustrate the potential of this powerful design tool yet to be harnessed by the discipline.

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Innovative Design-Build Opportunities in Nature Play

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Keywords: Competition, Design-Build, Design Education, Habitat, Native

In early 2022, Colorado State University landscape architecture faculty, Kelly Curl, and several undergraduate students were awarded two of the five selected Backyard Garden Casitas Design Competition plots for the Santa Barbara Botanic Gardens in California. In June of 2022, The Gardens opened the Backcountry Garden, a woodland garden with numerous opportunities to explore and experience nature for children ages 5-13. The competition asked for creative and engaging use of natural materials, family-friendly durable structures, inspirational, and environmentally native habitat that is supportive of the Garden's mission to conserve California's native plants. Nature play is growing in popularity but does not have empirical evidence supporting claims that play in nature is beneficial for child health and development with the underlying risk management (1). With consideration of motor development, cognitive development, and social and emotional learning, students worked through ideation plans, sections, perspectives, models, and prototypes in preparation for understanding the site scale and context, design parameters, goals of the project, and materiality. Faculty and students formed small cohorts of project teams and had the opportunity to design, problem solve and determine construction details together. This design experiment allowed students to have a professional client, yet they were asked to design nature play structures for children. Students engaged in the literature review, precedent research, and case study analysis to find inspiration from built work. This paper frames the students' research and experience in the design process, which led to constructing both casita designs on-site in Santa Barbara over a time frame of 8 days in May 2022. Students were thoroughly engaged in the material selection that was required to be native to the Santa Barbara area. Throughout the week, four students and two faculty skillfully built the Trolling Trees structure for children to climb and sit on and play under. The Be a Bee structure is a human-scaled pollinator habitat home that invited children to climb through hollowed spaces, providing sights of the habitat for bees, butterflies, moths, flies, beetles, and hummingbirds. A student survey was completed upon the completion of the project to record students' experiences and learning outcomes of the design-build competition. With this work, I plan to investigate through user surveys to measure the engagement, activity level, and outcomes of their exposure to nature play experience.

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Stamped Standard

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Keywords: Concrete, Fabrication, Construction, Hardscape

Purpose: This presentation outlines the pedagogical methodology and outcomes of Stamped Standards, a seminar that explores new approaches to conventional concrete stamping.

BACKGROUND/INTRODUCTION: Though concrete stamping is widely used; landscape architects do not contribute to the design of the stamps. How can landscape architects reimagine concrete stamps to develop new designs? This prompt was used to guide students through a lab-based seminar, mirroring the approach in lab-based landscape architecture research.
This course was supported by an OSEP grant. The grant funds a pilot project for Curbing Sediment, redesigning concrete curbs and aprons with patterning, to collect sediment from roadways. The pilot project will be constructed using new concrete stamps. The seminar was the first step in adapting concrete stamping techniques.

METHODS: Class met at the MAT-Fab Lab at Knowlton Hall at Ohio State University (OSU). Lisa Buress, Assistant Professor of Civil Engineering at OSU, who specializes in the study of concrete, supported the course with lectures, concrete mixing demonstrations, and worked with students to develop a specialized concrete mix ideal for stamping.

Students worked in teams, developed a design, and were asked to make an array of stamps using different fabrication methods. This included 3-D Printing and CNC-Milling, and vacuum-forming. Students constructed rubber molds from negatives that were 3-D Printed or milled. Students worked with 12x12” forms to hold the concrete for stamping once the concrete had reached the necessary plasticity. Once cured, students could observe different patterns and textures applied to concrete, compare stamp fabrication techniques, and compare curing and stamping times. Students then worked independently to develop their own patterns. Their final casts were coupled with plan drawings showing the potential for landscape application.

RESULTS/CONCLUSION: Students gained extensive knowledge on how concrete is mixed, stamped, and how stamps are fabricated. They developed an understanding of the impacts of pattern density, depth, and texture on concrete surfaces. Students benefited from a new lab-based seminar structure, where they were asked to work through a series of explorations. At times the explorations worked as intended and at times they did not, success was measured on innovation and inquiry.

Concrete stamping is a viable construction method and an area currently overlooked by landscape architects. Stamp application for Curbing Sediment will take place in Spring 2023. Students from the course will be able to see a new application of stamped concrete at the pilot project site.

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3D Concrete Printing for Terrain-Responsive Wall Construction

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Keywords: Robotic Fabrication, Additive Manufacturing, Computational Design , Concrete Construction

In architecture and engineering applications, 3D concrete printing (3DCP) technologies have demonstrated the marrying of individualized design and aesthetic goals with sustainability considerations and construction efficiencies. Conventional concrete construction places a higher value on saving labor over reducing material use and subsequent environmental impacts. In contrast to the rapid fabrication of individualized designs with 3DCP, typical labor and formwork constraints limit design capabilities and geometries. Previous research in architecture and engineering disciplines have applied 3DCP to the reduction of environmental impact through thin, lightweight structural designs that draw strength from complex geometry tailored to the specific use case. Prior research and applications of 3DCP primarily focus on architectural and structural elements such as columns, vaults, bridges, and buildings. [2] These architectural applications of 3DCP are typically constructed on level ground rather than integrated into terrain. Printed concrete designs in landscape architecture have likewise been limited to non-site-specific objects such as benches and planters. The potential and advantages of 3DCP methods to produce terrain responsive designs have not been thoroughly investigated. Emergent 3DCP technologies range in complexity, from stationary printers to mobile robots that roam terrain and print concrete in-situ. Existing research on 3DCP indicates diverse benefits to landscape architecture practice such as the rapid fabrication of customized geometries [4], increased construction automation [3], and deployment in remote environments [5]. In contrast, conventional in-situ concrete construction methods deployed in landscape architecture practice are restricted to simpler geometries due to labor and formwork limitations. This research aims to clarify constraints, advantages, and processes of creating site-specific 3DCP structures from the perspective of the landscape designer. Existing literature is analyzed to provide an overview of the diversity of concrete printing methods with their impact and constraints on the design of landscape structures. Different 3DCP techniques are applied to the design of a site retaining wall with an analysis of the implications of each printing method. The comparative analysis results in a framework to guide landscape designers in adapting print methods. Likewise, the framework guides the choice of method to fit the design intent and construction circumstances. The intention for this research is to communicate the potential and challenges of applying 3DCP technologies to site-specific landscape elements.

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The Living Room: A Flat-Pack Learning Garden Addressing Food Equity in Mississippi

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Keywords: Food Insecurity, Learning Garden, Design/Build, Modular Design

Mississippi has the highest prevalence of food insecurity in the nation; over one-third of the state's population lives in a classified food desert.[1] Concurrently, learning gardens are outside the reach of most schools due to a lack of resources.[2] The Living Room is a learning garden typology designed and built by students of landscape architecture, architecture, and graphic design to address Mississippi's health, food, and nutrition education demands. The design meets the physical, pedagogical, and administrative needs of learning gardens identified through research. The design consists of flexible planting, seating, and storage components, including off-the-shelf materials, which permit easy transportation and adaptation to varying site conditions and individual school needs. The modular system allows for endless arrangements, each supporting a different amount of food production and student participation. Thus far, students have designed and installed three learning gardens in Mississippi: Galloway Elementary School in Jackson, MS (2021), Leland Middle School in Leland, MS (2021), and Leflore County Elementary School in Itta Bena, MS (2022). For each garden, students fabricated individual elements over the course of a semester, packed elements on a flatbed trailer, transported them to each site, and installed them over three days with assistance from community members. The Living Room prototype is documented through construction drawings, diagrams, material lists, and a brochure and serves as an open-source document for other interested communities to implement their own learning garden.

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Bioretention Planting for Multiple Ecosystem Benefits

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Keywords: Bioretention, Planting Design, Ecosystem Benefits, Barriers, Best Practices

Urban water bodies are widely impaired by excess nutrients and sediments from stormwater (Shrestha et al., 2018). In the last two decades, green stormwater infrastructure (GSI) has gained massive interest and investment for mitigating stormwater runoff impacts (McPhillips & Matsler, 2018). One type of GSI – bioretention, has received increasing attention as an essential stormwater management tool for its demonstrated hydrological and pollutant removal capabilities in both laboratory and field settings (LeFevre et al., 2015).

While the hydrologic and water quality benefits have generally been well-studied in GSI, a critical knowledge gap exists in the role of vegetation contributing to bioretention performance (Muerdter et al., 2018). The concept of bioretention relies on vegetation as a key biological component; however, research remains inadequate to inform design and management decisions, even at the basic level of plant survivability, aesthetics over time, and maintenance regime, let alone pollutant treatment and habitat function.

To advance our knowledge in bioretention planting design for multiple ecosystem benefits, we interviewed design experts with extensive GSI planting research, design, or nursery experiences. The objectives include: 1) to understand the critical factors driving bioretention planting design decision-making, 2) to understand how decision-makers prioritize different ecosystem benefits to be provided by bioretention; 3) to identify barriers to implementing designs that could achieve multiple benefits, and 4) to synthesize design and management best practices for multiple benefits. More specifically, we used the snowball sampling technique to recruit 15 experts of diverse backgrounds. They included stormwater manual creators, designers or practitioners, researchers, educators, and plant nursery experts. All interviews occurred on ZOOM, lasted an hour, and were either audio or video recorded. The recordings were transcribed, and qualitative data analysis software Nvivo was used for analyzing the transcripts.

The preliminary findings suggest that aesthetics, plant survival, maintenance, and soil characteristics are currently the most critical considerations in bioretention planting design. Barriers such as knowledge gap, lack of resources, lack of systems thinking and collaboration, and regulatory and law constraints all contribute to the underperformance of current design in achieving multiple ecosystem benefits. Design and management best practices, such as understanding the site, designing for swift establishment and reduced maintenance, encouraging collaboration between researchers and practitioners, landscape architects and engineers, and practitioners and maintenance crews, investing in advancing research of effective technologies, and creating user-friendly and reliable resources for students, designers, clients, and the public can help address the inadequacies of current bioretention planting design.

RESILIENCE & CLIMATE ACTION

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Survey on Flood Evacuation and Sheltering Choices During the COVID-19 Pandemic

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Keywords: Compound Hazard, Risk Perception, Address-Based Sampling, Emergency Management, Logistic Regression

In May 2020, unexpected dam failures and associated flooding caused the displacement of over 11,000 people to public and private shelters in Midland County, Michigan [1]. The flooding coincided with the COVID-19 pandemic, introducing a novel form of conflicting stressors that prevented the traditional logistics for single-hazard emergencies from functioning [2, 3]. For example, mask wearing and social distancing in a crowded shelter or on confined evacuation transportation posed challenges for communities protecting their health and life from virus transmission while timely evacuating to secure places [4-6]. Yet, how communities perceive these conflicting risks has been substantially understudied. This study utilized a web-based survey to explore the relationship between residents' perception of COVID risks and flood evacuation and sheltering choices in the wake of the 2020 Midland flooding event. In collaboration with the Office for Survey Research at Michigan State University, postal mails were sent to a random sample of 5,000 households living in the flooded Midland area in April of 2022, and 556 responses were collected, producing an 11.1% response rate. Two choice models predicting resident's evacuation choices and sheltering length were developed using binary logistic regression and partial proportional odds models. A series of covariates including situational, flood risk, and sociodemographic factors were controlled for model specification. The Mann-Whitney U and Kruskal-Wallis tests were additionally conducted to examine how socio-demographic factors impact perception of COVID risks. The result revealed political polarization of risk perception; democrats were consistently found to have greater concern on COVID-related issues, such as violating stay-at-home order and exposure to COVID while evacuating and sheltering. In the binary logistic regression analysis, we found the interaction effect of concern about exposure to COVID while sheltering and number of seniors on evacuation choices: as the number of seniors in the household increased, the probability of evacuation decreased more dramatically, with an increase in concern about exposure to COVID. In addition, the partial proportional odds model revealed that residents' concern about the lack of mask enforcement at sheltering locations tended to shorten their evacuation length. The findings in this study suggest a better understanding of emergency responses to novel compound hazards and contribute to adjusting current hazard mitigation and operations plans which assume the independence of individual hazards [7, 8]. The results also suggest future directions to enhance community's adaptivity to high-risk low probability compound hazards.

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Boundary Spanning by Design; Individual Attributes of Spatial Designers Engaged in Design-Led Planning Programs

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Keywords: Climate Adaptation Planning, Water as Leverage, Rebuild by Design, Design-Led Entrepreneur

Traditionally, spatial designers such as landscape architects and urban designers develop high-quality, tailor-made spatial designs for a place, city or area. Nowadays, in response to complex societal and environmental challenges spatial designers also take up boundary spanning roles (Van den Brink et al. 2019) by bridging interests, disciplines, and organizations (Webb 1991) in initiating, planning and creating new spatial developments. This study investigated the individual attributes of landscape architects and urban designers who took up boundary spanning activities in two design led-planning programs: Water as Leverage for Resilient Cities Asia (WaL) and Rebuild by Design in New York/New Jersey (RbD). The study consisted of a literature and document analysis, 22 interviews with professionals involved in WaL or RbD (both designers and other backgrounds), and two focus groups with each 5 participating designers and other planning professionals to verify, deepen and enrich the case study findings. The study revealed that designing in the context of design-led planning always includes boundary spanning, in which designers employ their expertise and competences to bridge spatial differences and span boundaries between organizations and stakeholders. Next to known boundary spanning individual attributes (see Meerkerk and Edelenbos 2020, Jesiek et al. 2018, Curnin and Owen 2014), abductive reasoning, synthesizing and integrating information and ideas, knowledge on spatial systems, visualization skills, storytelling, optimism, and an ambition to contribute to a better world came to the forefront as individual attributes employed by landscape architects and urban designers to span boundaries in WaL and RbD. However, we also encountered that whether, or to what extend designers could take up boundary spanning, depended on their role and position, as well as other organizational, institutional, and environmental conditions.

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Travel-Related Emissions From Past and Future CELA Annual Conferences

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Keywords: Carbon Footprint, Climate Action, Multiple-Site Conference, Virtual Conference, Aviation

Aircraft fuel burn accounted for 2 to 3 percent of total global anthropogenic carbon dioxide emissions in 2010 (Owen, Lee, & Lim, 2010) and 2.4 percent in 2018 (Lee et al., 2021). Accounting for aircraft CO2 and non-CO2 emissions (Lee et al., 2021) increases the global warming potential of aircraft operations by a factor of three. Halting the contribution of aviation to global warming requires net-zero CO2 and declining non-CO2 aircraft emissions (Lee et al., 2021). Alternative fuels, power (e.g., solar), aircraft modifications, and efficiency gains will not achieve needed reductions (Owen et al., 2010; Peeters et al., 2016). Numerous studies since at least 2002 show that air travel accounts for most conference related GHG emissions. No travel-related emissions estimations from CELA in-person conferences, or meeting modes that yield "deep emissions reductions" (IPCC, 2018), exist. We present both. We used presenting authors' names and institutions to calculate two estimations of travel-related emissions from 2012, 2015, 2018, 2019, and 2022 CELA annual conferences. First, we multiplied great circle distances (GSD) between authors' origins and conference locations by emissions values per travel mode in Jungbluth and Mieli (2019). We assumed authors travelled by air when GSDs exceeded 400 km, as per Klöwer (2019). Second, we entered aircraft routes that include connecting flights from a web-based travel metasearch engine into the ICAO Carbon Emissions Calculator. To explore multi-hub-based meetings, we selected US hub locations from mean numbers of presenting authors by institution and computed travel-related emissions with GSDs to the nearest hub. In-person CELA conferences yielded travel-related emissions between 212 to 571 t CO2e (M = 358.40 t CO2e), 99.55 percent of which came from air travel. Using methods from Jäckle (2021), the 2021 CELA virtual conference yielded between 0.06 and 0.90 t CO2, between 0.02 and 0.28 percent of in-person conferences. Results from two- to six-hub hybrid conferences yielded emissions reductions of between 33 and 78 percent. Convening at centralized in-person meetings at five select US hubs would meet a 45-percent emissions reduction target, relative to the mean, if at least 25 percent of the most-distant authors attended online. To slow the growing cumulative contribution to the climate crisis, CELA should transition toward biannual or hybridized conferences that connect three or more hubs or incentivize virtual attendance by at least 25 percent of the most-distant registrants. Beyond 2030, CELA should transition to virtual conferences only to meet the IPCC's 2050 net-zero recommendation.

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Remediation Through Extraction: Integrating Landscape Architectural Design Into Quarrying Operations

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Keywords: Post-mining Landscapes, Reciprocal Landscapes, Material Agency, Design Technique, Landscape-Led Urbanism

This paper presents an argument for an alternative approach to the remediation of open-pit quarries and mines by integrating landscape architectural design into the processes and economics of extraction. Current approaches to remediation rely on designers and ecologists engaging with the site and its associated problems after extraction has ceased. Typically, this involves restoring the site to an abstract idea of 'natural character' or adding programmed activities or architectural objects within the quarry itself (Pearman, 2009). This limits the possible outcomes to what is possible with the deceased quarry's final form, effectively leaving landscape architects as the ambulance at the bottom of the extracted cliff. As such, the creative methods and tools of landscape architecture that straddle the spheres of art, science, and humanities are left less utilized than if earlier involvement was possible. As such, this proposed alternative approach would see landscape architectural designers, in coordination with quarry operators, guiding the eventual form, layout, activities and landcover of an evolving quarry landscape throughout the entire extraction process. This allows for a reframing of the aesthetics of remediation of post-mining landscapes as the emphasis on returning to a 'natural' state is undergoing critique (Hine & Kirsch, 2014, p. 123; Langhorst & Bolton, 2017, p. 166; Storm, 2014, p. 155). Doing so requires working, and challenging, the envelope of possible formal outcomes that mining procedures can produce alongside embracing the scientific information necessary for remediation (Arbogast, 2007, p. 55). Opening these sites of extraction allows a window into the material world from which the urban environment is crafted. This allows for the entangled and reciprocal formation between extracted landscapes and designed urbanisms to be encountered, drawing out the affectual dimensions of stone (Hutton, 2019; Edensor, 2020). This approach empowers designers to make novel propositions in the process of remediating these landscapes into public spaces through phased stages, allowing an evolving and open socio-cultural relationship to quarrying processes and material.

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Climate Justice in Community Design: Investigating Alternative Metrics of Economic Vulnerability to Extreme Heat in Metro Phoenix, Arizona

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Keywords: Economic Vulnerability, Extreme Heat, Poverty, Living Costs, Community Resilience

The metro Phoenix in Arizona has been experiencing exponential urban growth in recent decades while observing the trend of increasing daytime and nighttime temperatures (Yang et al, 2016), indicating the potential of urban-induced heat in cities al. 2020). The extreme heat events have impacts on urban population's health and well-being, especially people who are economically vulnerable et. al. 2020). Vulnerability can be considered as a function of exposure plus sensitivity to hazards minus adaptive capacity. Heat vulnerability Index in the literature often identifies income or poverty levels as major socioeconomic indicators (Reid et al, 2009) and overlooks affordability measures in relates to adaptive capacity. Heat adaptation strategies are effective responses to mitigate impacts from extreme heat by providing the vulnerable groups with appropriate legal resources (Saraswat & Kumar, 2016). The metro Phoenix in Maricopa County presents significantly higher living cost among neighborhoods than the state and national average. Consequently, poverty estimates from the US Census alone not only limit poverty assessment criteria but also neglect regional variations in the cost of living. The question arises, how can residents afford their living costs during the period of extreme heat and who are the most impacted by? What is the relation between household income and cost of living in metro Phoenix areas by considering their vulnerability to extreme heat? This paper introduces an alternative economic vulnerability metric, HEIGHT Poverty Tool, developed as a joint effort between Arizona State University Knowledge Exchange for Resilience and the Valley of the Sun United Way to measure and visualize the true costs of living at the neighborhood scale. This tool highlights the emerging gap between household income and living costs by counting for food, housing, health care, childcare, and utilities expenses (Height Poverty Dashboard, 2022). This study examines the poverty and household income data from US Census in comparison with HEIGHT Poverty Tool. The results demonstrate using HEIGHT tool reveals more vulnerable families to extreme heat when counting living costs and affordability. This study demonstrates that using alternative methods, other than poverty alone to measure economic vulnerability has the potential to address the gaps between household income and living costs to capture the real nature of poverty. Understanding socioeconomic factors in assessing climate change associated hazards vulnerability is critical for landscape architects and urban designers to account for economic vulnerability and affordability to cope with climate change by co- designing nature-based solutions with communities.

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Coralpolis: More Than Human Entanglements in the Coral Triangle Region

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Keywords: Counter-Mapping, Indigenous Knowledge, Ecological Cognition, Multispecies Entanglements, Climate Justice

This study reconceptualizes the dynamics between land and sea, colonial and indigenous, nature and culture in the Coral Triangle region by mapping the interconnectivity, ambiguity, and fluidity of coral reefs eco-sociocultural habitats, to reflect and respond to the challenges of climate change in transnational and aquapelagic territories.

In maritime Southeast Asia, Sama-Bajau cultures are threatened by current ecological and political pressures. Known as the "sea nomads," Sama-Bajau people traditionally live nomadically offshore in the Coral Triangle (Kusuma et al., 2017), moving between countries including Indonesia, Malaysia, and the Phillippines. As they mingle their identities with the Coral Triangle region's diverse ecologies and cultures, their collective Sama-Bajauness through "'maritime creolization' becomes porous, amphibious, ambiguous, yet marginalized.

While manifested locally, the pressure and problems of climate change are globally imposed (Richardson et al., 2011). They reveal the interconnectedness and ambiguity across space and among species (Fleming et al., 2016), urging us to think in terms of dynamics, relations, and multiplicities of agents, contexts, and scales.

As a species that embodies multiple "natures" – plant, animal, and stone (Bowen, 2015) – coral provides a perspective to perceive and experience the world with connections and fluidity. Coral's ambiguity and amphibiousness further forge reef habitats that shelter, sustain, and diversify other species. Through combining traditional ecological knowledge (Watson, 2021) and geospatial data (Allen Coral Atlas, 2022) by counter-mapping, this thesis investigates and integrates the Coral Triangle's multispecies entanglement to provide a critical lens for deriving sea-based design solutions to address climate challenges in the Coral Triangle.

The study explores Sama-Bajau's sea knowledge and traditions, providing a critical lens for deriving sea-based design solutions to address climate challenges. While indigenous and scientific knowledge is synthesized, this study further reveals degrees of subordination and resistance of nomadic indigenous communities' livelihoods and their modes of negotiation with layers of governance, calling attention to and recognition of their knowledge as possible ways to increase the synergy between ecological and sociocultural resilience in the Coral Triangle.

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Developing a Planning Tool for Resilience Quotient: Improving Interplay Between Planning Policy and Practice for Climate Change Adaptation

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Keywords: Climate Change Adaptation, Coastal Resilience, Zoning Ordinance, Resilience Quotient, Planning Tool

The city of Norfolk in Virginia experienced many coastal flooding events in recent decades. Because of climate change, both the quantity and severity of flood-related damage are rising and will continue to do so in the future (Kuntla, 2021). To address climate change-related issues, the local government in Norfolk proposed an innovative zoning ordinance three years ago: the Resilience Quotient (RQ) system. It is a points-based rating system in which developers can select interventions from three components to meet community resilience requirements, including risk reduction, stormwater management, and energy resilience (Wang et al., 2022). However, the present RQ system is still in the initial stage, requiring evidence-based modifications and a decision support tool for implementation in the field. The results of this research will not only bridge planning policy and practice but also facilitate stakeholders to make sound decisions that can help improve coastal resilience. Moreover, RQ can be easily adapted to various communities across the country based on a common framework of resilience principles.
In this research, we collected the primary data from the Spatial Hazard Events and Losses Database as well as RSMeans. There are two sections of the study. The first section is modifications to components in the current RQ system based on the adjustment of the Resilience Assessment Framework (Resilience Alliance, 2010). We found that RQ should include components of social vulnerability assessment and land subsidence reduction as a complement to the above three components. The second section is to develop a planning tool for RQ based on the theories of the Life Cycle Costing Analysis and Cost-Benefit Analysis (Lichfield, 1960; Woodward, 1997). This tool can help planners, developers, and property owners understand and quantify the full costs and benefits of interventions in RQ in order to select more cost-effective resilient measures. There are three modules in this tool that are developed in Microsoft Excel: an interface, processes for cost and benefit calculation, and a database. Specifically, this comprehensive set of capabilities will enable users to select interventions, monetize costs and benefits, and calculate points to meet their financial and resilience goals.

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Enhancing the Science-Practice Interface: Co-Production of Knowledge for Community-Based Climate Adaptation Planning

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Keywords: Climate Change Adaptation, Co-production of Knowledge, Science-Practice Interface, Collaboration

The prospect of knowledge co-production to address complicated environmental issues is enticing (Chambers et al., 2021). Co-production of knowledge refers to the process of developing useable or actionable science through collaboration between scientists and others who utilize science (Meadow et al., 2015). Knowledge co-production is widely employed in various fields (e.g., environment, sustainability science, public administration, education, and health) that involve a wide range of goals, terminology, and activities. However, there are limited examples of knowledge co-production in U.S. communities and, furthermore, there is little understanding of co-production processes and outcomes of climate change adaptation planning. The purpose of this study is to investigate how knowledge co-production can result in the effective translation of knowledge into action and to advance inclusive engagement in climate change adaptation planning in order to achieve more equitable, inclusive, and effective outcomes. This research also provides conceptual and practical recommendations for overcoming the science-practice gap to increase the scale of adaptation in local government and capitalize on its transformational potential.

Based on case studies related to knowledge co-production projects, this study outlines the co-production of knowledge in U.S. communities. The primary data were collected from newspapers, online government publications, and scientific reports. We employed document analysis, case studies, and data analysis research methods. According to research findings, transparency, trust, embracing, and valuing diversity in the co-production process improve inclusion, flexibility, and effective communication in planning. Moreover, lessons from the cases underscore the significance of developing collaborative capacity, with attention to the process of interdisciplinary communication in order to reach more tangible policy and science goals in science-action collaborations. Additionally, landscape visualizations play a significant role in the knowledge co-production process by promoting power sharing. Meeting materials which include a variety of visualizations help marginalized community members, particularly non-English speakers, understand and participate in knowledge co-production processes. In conclusion, co-production is still in the developmental stage and more systematic research is needed on the prevalence, success factors, and side effects of climate change adaptation.

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Power||Energy: The Thickened Ground of Labour

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Keywords: Labor, Production, Energy, Territory, Material Flows

The definition of energy is dominated by a western logic that describes it as a resource. This understanding is focused on the primary objective of putting energy to effective use that consequently saw it translated into power objectives and governance schemes for putting the planet to work in service of fossil-fuel empires. Subsequently this defined concept of labour, society, and the environment through power struggles for vast territories of natural resources, land claims, the growth of economies, and development of urbanised areas.

The now outmoded and failing US electrical network of energy production, distribution, and consumption have shaped the patterns and territorial infrastructure of the country's urbanized landscapes. This vast infrastructure network describes a complex, dynamic exchange between human beings and the landscape over an extensive period of time. Emerging from these tensions is a 'thickened-ground' of multiple heterogeneous parts and networks intertwined with less tangible metabolic and material processes that describe the 'natures' of the urbanised landscape through its indeterminable characteristics.

The ubiquitous and relentless exploitation of the earth as a resource for energy production to be plundered and commodified continues to disrupt the deep complex processes of nature leading to major environmental and health ramifications. Consequently, racial, social, and economic disparities that are imminently present and inherently linked to the environment are further exacerbated. The climate crisis is symptomatic of this prejudice where the power of a select few humans rises above others and their non-human counterparts, corralled into disciplinary regimes of work valued through distinct economic imperatives.

This paper reckons with the immediate need to upgrade and expand the US electrical power grid system to meet the demands of growing urban communities and recognizes the obligation to engage with the climate crisis. It envisions energy systems that inherently hold a capacity for adaptation and simultaneously serve as the formative catalyst of the urban landscape and new value systems for the environment and alternative definitions of power, work, and energy to tackle this complex systemic suite of crises.

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Assessing the Impact of Green Infrastructure on Community Recovery From Tropical Storm Imelda in Houston, Texas

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Keywords: Green Infrastructure, Flood Resilience, Disaster Recovery, Landscape Performance, Resilient City

In the last few decades, cities globally have experienced increasingly frequent environmental hazards, such as flooding, sea-level rise, and droughts caused by global environmental changes and climate change. As a result, populations have witnessed how natural disasters can destroy cities and communities. Expensive costs related to post-disaster urban recovery and the pain caused to families involved in resultant environmental hazards remind us of the importance of building resilient cities based on systems capable of absorbing, withstanding, and recovering from hazard events (Li and Buckle 1999, Klein, Nicholls et al. 2003). Green infrastructure (GI) has been repeatedly shown to reduce flood risks if multiple mechanisms are utilized (e.g. structural and nonstructural) to provide stormwater management benefits. Increases in pervious surfaces can reduce stormwater runoff speed and infiltration rates, thereby increasing water storage. Surface runoff reduction and absorption performance have been focal point of the current GI-related literature, while the social aspects of GI performance during disaster recovery have received little attention. Current literature lacks quantitative performance assessments of the impact of GI on visitation rates of surrounding businesses, and recreational land uses, even though multiple social and economic benefits of GI have been proven through qualitative research, primarily through interviews and surveys (Mekala, Jones et al. 2015, Cinderby and Bagwell 2018). This study assesses the community recovery patterns of local business visits during and after the tropical storm Imelda in Houston, Texas. It utilizes mobility data to track daily and weekly foot traffic of points of interest (POI), such as grocery shops, restaurants, etc., in inundated areas during Imelda to evaluate recovery times and the post-disaster status of businesses in affected communities. POIs with differing levels of accessibility to GI are compared to those without to analyze the impact of GI on recovery patterns of businesses from flood disasters caused by Tropical Storm Imelda. The research results suggest that the POIs close to GI have better performance in businesses being visited in recovering from Tropical Storm Imelda. The results of the analysis provide quantitative evidence to the economic benefits of GI on local businesses and flood recovery speed and patterns.

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Forb Heavy Perennial Meadow Establishment Protocols for the Southeast

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Keywords: Meadow, Landscape Management, Public Perception, Meadow Design, Roadside Management

Reliance and preference for human and turf dominated landscapes maintained by artificial means has damaged ecosystems and caused decreasing biodiversity worldwide (Tallamy, 2012). A growing body of work lies at the invigorating intersection of ecology, landscape architecture, horticulture, and planning and points to the need for economically viable, low maintenance planting solutions that meet human aesthetic needs, support agriculture, and provide greater ecosystem services.

This paper outlines the methods and results of a three-year study of designed seed mixes for the southeastern Piedmont of North America. Following protocols for in situ seeding methods developed by Hitchmough, Dunnet, and others (Hitchmough, 2020) this study details three unique seed mixes featuring native forbs and grasses. The approach is novel in that the conventional grass dominance of 80% has been reversed with forbs composing 80% of the seed mix to meet public aesthetic goals. Three growing seasons of data are reported for meadow trials in phase one, installed January of 2020, in which three distinct seed mixes are trialed on two soil types: Mix A on clay, Mix A on clay plus mineral fines blanket; Mix B on clay, Mix B on clay plus mineral fines blanket, and Mix C on clay, and Mix C on clay plus mineral fines blanket. Phases 2 and 3 test alternate methods of installation via Terraseeding, with incorporation of cool season cover crop species. Terraseeding is discussed while data collection for phases 2 and 3 is ongoing and will be presented in future research. Phase 1 results favor seed mixes applied on mineral fines for weed suppression and successful establishment of desirable species. Challenges remain to achieve the public's desire for roadside color as provided primarily by on-native annual species.

The results of this study are significant in building a set of successful protocols for establishment of low growing, native meadow plantings for use in public green infrastructure projects to reduce costly maintenance, increase habitat and ecosystem support, and provide aesthetic beauty for people. Establishment methods and species selection must be tested and developed for each specific ecoregion across the globe leading to unique place honoring approaches that meet human and ecological needs.

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Representing Indigenous People in Justice-based Frameworks for Climate Change Adaptations

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Keywords: Tribal communities, Sea Level Rise, Qualitative Frameworks, Public Engagement, Census Tracts

Indigenous people are the highest at-risk group for climate change impacts, like big storms, and rising waters (Hutton & Allen, 2020; Leonard, 2021). The National Oceanic and Atmospheric Administration (NOAA) predicts that over the next 30 years, the sea level on the U.S. coast will rise an average of 10 - 12 inches, equaling the total sea level rise (SLR) over the past 100 years. Coastal Native American tribes are acutely vulnerable to climate change impacts due to a history of ongoing colonial disenfranchisement, which led to displacement to high-risk locations and a loss of traditional subsistence practices (Bronen, 2010; Hutton & Allen, 2020; Maldonado et al., 2013).

Our study explores methods of representing Indigenous people in SLR adaption plans. We explored a nationwide spatial and statistical analysis of publicly available demographic and environmental data sets, including the ACS (American Community Survey) Census and NOAA SLR data. To generate a comprehensive visual of SLR over time, we spatially overlaid scenarios of 1 foot (20-30 years), 2 feet (40-50 years), and 10 feet (100 years) onto demographic data (race, ethnicity, sex, age, geographic mobility, and Gini Poverty Index) in ArcGIS Pro at the census-tract level. We summarized the data through a series of descriptive mean comparisons and pairwise correlation tests.

The dataset revealed the potential impacts of the SLR; 36.9 million people, including 5.2 million non-White people, live in census tracts at-risk of being impacted by SLR. However, we discovered that these nationwide, publicly available datasets fail to represent certain at-risk groups, especially those with small populations like American Indian and Alaskan Native. There were no statistically significant relationships between Native Americans or any minority groups living in census tracts impacted by sea level rise, even though existing research supports disproportionate climate impacts on Indigenous people. These findings lend support for smaller scale, qualitative-focused methods often favored by Indigenous scholars, like justice-based frameworks.

Justice-based frameworks, like WAMPUM and the Alaska Federation of Natives Guidelines for Research, help guide researchers, practitioners, and policy makers in the collaboration process with tribal members (Alaska Federation of Natives Board of Directors, 1993; Leonard, 2021; Maldonado et al., 2013; Whyte, 2013). The frameworks commonly include comprehensive public participation, Indigenous worldviews, recognition of tribal sovereignty, and protection of tribal members. This nationwide dataset is a first step in elevating justice-based frameworks as standards in the academic and planning community to ensure a more equitable and representative collaboration process.

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A Systematic Assessment Framework of Assessing Climate Vulnerability and Resilience for Shrinking Cities

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Keywords: Climate Change, Exposure, Sensitivity, Adaptivity, Natural Hazard

Increasing population decline and economic recession make shrinking cities more susceptible to natural hazards. Social segregation driven by population loss and limited municipal resources hamper the implementation of cooperative actions and prompt recovery after disasters, respectively. Therefore, understanding the multifaceted capacity of the community to handle climate risks is vital to establish effective hazard mitigation planning in shrinking cities. Although diverse models have been conceptualized and used for climate vulnerability and resilience analyses, only few studies take comprehensive approaches to assessing communities' resilience capacity in shrinking cities. The purposes of this research are to 1) develop an index framework assessing climate vulnerability and disaster resilience for urban communities at flooding and heat risk and 2) validate the developed framework for two shrinking Midwestern cities, Detroit in MI and Cincinnati in OH.

For developing a climate vulnerability and disaster resilience assessment framework, this research conducted a systematic review of peer-reviewed journal articles and local climate action plans. ScienceDirect, Taylor & Francis, Wiley Online Library, SpringerLink, MDPI, and Sage databases were used to extract the most relevant literature. Search keywords included climate change vulnerability, resilience capacity index, and natural disasters with exposure, sensitivity, and adaptivity. Through the tiered screening process of the title, abstract and full-text review, the finally extracted articles were individually rated based on their relevance to flood and extreme heat events. Additionally, we performed a backward search, tracking papers importantly cited in the full texts but excluded in the initial screening process. This research also comparatively evaluated climate action plans of 10 selected cities to those of Detroit and Cincinnati and extracted policy-relevant indicators. To ensure the depth and breadth of indicators, we selected 1) the Midwestern cities that had a similar size, population, or socio-economic status and suffered from types of natural disasters comparable to those experienced by Detroit and Cincinnati, and 2) large benchmarking cities within or outside the Midwest, equipped with well-established climate action and strategy plans.

After reviewing 74 finally selected articles and 10 plans, 334 vulnerability and resilience indicators were identified in six capital assets (i.e., social, economic, environmental, infrastructure, health, and planning). We will apply these indicators to assess the climate vulnerability and resilience capacity of Detroit and Cincinnati in the second phase.

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Development of a Heat Vulnerability Index for Oklahoma City, OK

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Keywords: Heat Vulnerability, Energy Budget, Heat Exposure

Climate change is causing extreme heat in American cities. In the United States alone, there was an average of over 700 heat-related deaths reported in 2016 – 2018 [1]. The state of Oklahoma with a climate ranging from humid subtropical in the east to semiarid in the west is also a place known to be vulnerable to heat-related risks. The City of Oklahoma City (OKC), OK has recently focused on urban heat mitigation through a series of sustainable plans and actions. The heat vulnerability index (HVI), usually composed of exposure, sensitivity, and adaptive capacity assessments help to identify heat-vulnerable areas and populations. However, previous heat exposure assessments and predictions failed to reveal the energy exchange between the human body and the environment due to the focus only on meteorological-based metrics, leading to an incomplete understanding of the impacts of heat exposure on the human body. There is an urgent need in OKC to gain a comprehensive picture of the urban areas and populations vulnerable to heat.

The construction of HVI in OKC includes 23 factors for sensitivity, exposure, and adaptive capacity covering climatic, environmental, social-economic and socio-demographic areas: age, poverty/income, education level, living alone, ethnic minority, employment, language barrier, home ownership, gender, vehicle ownership, health insurance coverage, disability, physical illness, air temperature, humidity, wind speed, solar radiation, land surface temperature, surface albedo, land use/land cover, accessibility, NDVI, urban density, electricity supply, and communication technology. In our model, heat exposure will be calculated using the COMFA model, which has been identified as one of the most comprehensive energy budget models [2]. The COMFA model, with the input data including climatic data, human physical and physiological data, and ground albedo, reflects the energy exchange between the human body and the environment. After exposure calculation, all indicators will be prepared at the census-tract level. The HVI will be created using principal component analysis (PCA) and equal weight. Individual factor scores will be calculated for each census tract.

Through our study, an HVI including socioeconomic, climatic, and environmental factors using a comprehensive model reflecting the interactive and combined functions of all meteorological parameters on the human body will be provided to the city of OKC. The HVI will help local planners and designers determine where actions are most urgently needed within the city or neighborhoods, as well as what kind of interventions are required for heat events.

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ASLA Climate Action Plan: A Call for Partnership

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Keywords: Adaptation, Biodiversity, Carbon-positive, Collaboration, Equity

A major focus of the American Society of Landscape Architects has been on the creation of resilient and adaptable communities through design and planning. In recent years, the Society has increased the focus on directly addressing the impacts of the climate crisis, including support for creating carbon-positive designs. To advance on the pathway to zero emissions, ASLA took a significant step forward with initiating a Climate Action Plan.

The Intergovernmental Panel on Climate Change has found that humanity must reduce greenhouse gas emissions into the atmosphere to have a good chance of only increasing temperatures by 1.5° C instead of 2° C. It is critical that the landscape architecture profession directly take on the challenge of reducing carbon emissions.

The ambitious Climate Action Plan seeks to transform the practice of landscape architecture through actions taken by ASLA and its members. The plan is organized by six overarching goals focused on climate mitigation and adaptation, ecological restoration, biodiversity, equity, and economic development.
The ASLA Climate Action Plan development was led by a diverse, intergenerational, five-member Task Force of landscape architects. In order to frame the plan, a Climate Action Plan Survey was sent out to members in 2021. The response by landscape architects, designers, and educators was analyzed by the Task Force to ensure the plan served members' needs. The plan was also shaped by an Advisory Group of 17 diverse climate leaders.

Global warming is proceeding at an increasingly rapid pace, so it is important for those involved in education and research to work closely with practitioners to advance actionable changes in practice more quickly than in the past. As a component of the Climate Action Plan, ASLA seeks to partner with academic programs to develop studies analyzing global peer-reviewed scientific research on the benefits of strategies that reduce emissions and help communities adapt to climate impacts. ASLA would also like to work with programs to include research needs for practice and to communicate ongoing research priorities and results to practitioners.

Collaboration and collective action are required for climate action solutions and communications in support of these goals. The collaborations must include work within the landscape architecture community, with other disciplines, with justice leaders, and with affected communities.

This session is a call to action to build these partnerships and to develop a network of academics and university programs focused on climate solutions and research.

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Enhancing the Science-Practice Interface: Co-Production of Knowledge for Community-Based Climate Adaptation Planning

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Keywords: Climate Change Adaptation, Co-production of Knowledge, Science-Practice Interface, Collaboration

The prospect of knowledge co-production to address complicated environmental issues is enticing (Chambers et al., 2021). Co-production of knowledge refers to the process of developing useable or actionable science through collaboration between scientists and others who utilize science (Meadow et al., 2016). Knowledge co-production is widely employed in various fields (e.g., environment, sustainability science, public administration, education, and health) that involve a wide range of goals, terminology, and activities. However, there are limited examples of knowledge co-production in U.S. communities and, furthermore, there is little understanding of co-production processes and outcomes of climate change adaptation planning. The purpose of this study is to investigate how knowledge co-production can result in the effective translation of knowledge into action and to advance inclusive engagement in climate change adaptation planning in order to achieve more equitable, inclusive, and effective outcomes. This research also provides conceptual and practical recommendations for overcoming the science-practice gap to increase the scale of adaptation in local government and capitalize on its transformational potential.

Based on case studies related to knowledge co-production projects, this study outlines the co-production of knowledge in U.S. communities. The primary data were collected from newspapers, online government publications, and scientific reports. We employed document analysis, case studies, and data analysis research methods. According to research findings, transparency, trust, embracing, and valuing diversity in the co-production process improve inclusion, flexibility, and effective communication in planning. Moreover, lessons from the cases underscore the significance of developing collaborative capacity, with attention to the process of interdisciplinary communication in order to reach more tangible policy and science goals in science-action collaborations. Additionally, landscape visualizations play a significant role in the knowledge co-production process by promoting power sharing. Meeting materials which include a variety of visualizations help marginalized community members, particularly non-English speakers, understand and participate in knowledge co-production processes. In conclusion, co-production is still in the developmental stage and more systematic research is needed on the prevalence, success factors, and side effects of climate change adaptation.

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Developing a Planning Tool for Resilience Quotient: Improving Interplay Between Planning Policy and Practice for Climate Change Adaptation

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Keywords: Climate Change Adaptation, Coastal Resilience, Zoning Ordinance, Resilience Quotient, Planning Tool

The city of Norfolk in Virginia experienced many coastal flooding events in recent decades. Because of climate change, both the quantity and severity of flood-related damage are rising and will continue to do so in the future (Kuntla, 2021). To address climate change-related issues, the local government in Norfolk proposed an innovative zoning ordinance three years ago: the Resilience Quotient (RQ) system. It is a points-based rating system in which developers can select interventions from three components to meet community resilience requirements, including risk reduction, stormwater management, and energy resilience (Wang et al., 2022). However, the present RQ system is still in the initial stage, requiring evidence-based modifications and a decision support tool for implementation in the field. The results of this research will not only bridge planning policy and practice but also facilitate stakeholders to make sound decisions that can help improve coastal resilience. Moreover, RQ can be easily adapted to various communities across the country based on a common framework of resilience principles.

In this research, we collected the primary data from the Spatial Hazard Events and Losses Database as well as RSMeans. There are two sections of the study. The first section is modifications to components in the current RQ system based on the adjustment of the Resilience Assessment Framework (Resilience Alliance, 2010). We found that RQ should include components of social vulnerability assessment and land subsidence reduction as a complement to the above three components. The second section is to develop a planning tool for RQ based on the theories of the Life Cycle Costing Analysis and Cost-Benefit Analysis (Lichfield, 1960; Woodward, 1997). This tool can help planners, developers, and property owners understand and quantify the full costs and benefits of interventions in RQ in order to select more cost-effective resilient measures. There are three modules in this tool that are developed in Microsoft Excel: an interface, processes for cost and benefit calculation, and a database. Specifically, this comprehensive set of capabilities will enable users to select interventions, monetize costs and benefits, and calculate points to meet their financial and resilience goals.

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Islands Futures: Land, Sea, More-Than-Human Islanders and Transient Others in the Maldives

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Keywords: Islandscapes, Climate Change, Design-Thinking, Aquapelagic, Futures

Islands cannot be addressed without understanding the continua formed by land, sea, and islanders—that is, their islandscapes (Broadbank, 2000), a concept that treats the diverse components of islands in a comprehensive and integrative manner (Vogiatzakis et al., 2017). This study explores modes of inquiry (e.g., “human-in-nature worldview", Berkes, 2017; socio-ecological systems, Nel et al., 2021; island research, Nimführ & Otto, 2020) for better understanding the islandscapes of the Maldives as continua engaging translocal phenomena and both permanent and temporary “islanders,” human and non-human alike, and with the aim of developing proposals for alternative Maldivian futures.

The Republic of the Maldives is an archipelagic coral nation in the Indian Ocean comprising 1,200 islands in 26 atolls over a 35,000 sq. mi area. With its highest point only 2ft above sea level, the country is highly vulnerable to sea-level rise; a modest increase could submerge 80% of its territory by 2080. Along with the effects of climate change, such as an increase in weather-related events, many issues threaten the long-term survival of the Maldives, including impacts on freshwater resources threatened by contamination and on the coral reefs protecting the islands, which are core to the country’s tourism and fishery industries. High population density, land-based pollution, and heavy dependence on climate-sensitive industries (i.e., fishing, agriculture, tourism) add to the country’s vulnerability (UNEP, 2017; USAID, 2021; World Bank, 2022).

Climate change is a global translocal phenomenon, whose consequences manifest locally (Richardson et al., 2011). For the future of island nations such as the Maldives, it is urgent to understand the potential for adaptation, modification, and transformation at multiple scales and, based on that, to identify robust and diversified, context-specific spatial concepts and strategies for achieving long-term transformational change (Nunn & McNamara, 2019).

Examining closely the case of the Maldives, this research by design combines methods such as layered analysis, geospatial data mapping, countermapping, and futures studies through foresight, backcasting, (en)visioning or scenarios projections, as an approach to understanding adaptation. The works developed in a design studio environment propose forms of aquapelagic assemblages and highlight that the future of the Maldives—like that of other small islands—requires new and divergent adaptation pathways in order to respond to variable degrees of environmental conflict and disturbance while grappling with, and adapting to, climate change.

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Implementable Visions: The Role of Community Capacity Building and Governance in the Creation of Urban Climate Adaptation Projects

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Plans for urban resilience and climate adaptive strategies offer an urban design and landscape solutions and long-term visions for urban transformation, bringing together watershed system strategies and focused neighborhood-scale interventions. These comprehensive visions require a collaborative effort of advocacy and funding for implementation—moreover, a review of existing practices, policy, and governance mechanisms. While practice starts to engage these gaps towards implementation through community capacity building and implementation roadmaps, education and research focus on performance evaluation and design development.

This paper will examine case studies that align design actions with governance and community organization. The central hypothesis is that the focus on public spaces as components of urban resilience and part of an integrated climate infrastructure will require their management as urban commons to allow equitable access and community co-benefit. Several community organizations and neighborhood focused resiliency plans across the US are creating new and adjusting existing governance frameworks to achieve these objectives.

The study conducted a review of climate adaptation projects in the Greater Boston area and the City of Houston to extract strategies for community governance and how they support the implementation of resilience projects. Collaboration between the Greater Boston area watershed communities became common following the Municipal vulnerability preparedness program. Watershed associations previously focused on the river ecosystems utilized their social capital to advance climate adaptation actions in support of municipalities. In Houston, the city is developing a neighborhood resilience strategy to bridge climate adaptation and environmental justice issues, emphasizing the capacity building of local community organizations.

The review of the projects and organizations will focus on the overlap between the proposed actions and the needed frameworks for funding, implementation, operation and maintenance, and policy. The evaluation will be based on three key aspects:

1. The existing and proposed governance and planning tools
2. The proposed actions and the process of co-design
3. The climate justice and community resilience in urban commons resource management

This paper concludes by proposing a framework for the role of community groups at the various scales and stages of the climate adaptation project. It will summarize the opportunities to leverage social capital for co-benefit and community well-being in addition to increasing the successful implementation of such a project.

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Prioritizing Receiving Communities: Reducing Environmental, Social, and Economic Risk as People Migrate from the Coast

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Keywords: Sea Level Rise , Resilience, Climate Migration

By 2050, approximately 1.2 million people in Louisiana will be at risk of coastal flooding due to sea level rise (statesatrisk.org). While Louisiana's communities are losing land faster than most, coastal communities around the world are increasingly affected by sea level rise. Federal funding currently focuses on coastal community disaster recovery and adaptation. Some residents will adapt in place, but many will move over time. Where will they go? How can this movement of people result in positive outcomes for both those who move and the communities they enter? Public agencies, designers, and planners can prepare communities to embrace and support coastal migrants by proactively planning for resettlement in a way that reduces environmental, economic, and social vulnerability. The message is clear: we must start strategically investing in receiving communities now to be prepared for the displacement of hundreds of thousands of residents over the next 50 years.

People migrating from the coast are looking for new communities that will embrace them and improve their overall wellbeing. Directing them to communities that are better prepared to reduce their environmental, economic, and social vulnerability is critical to protect our people, our culture, and our economy. Furthermore, identifying specific vulnerabilities in receiving communities can help direct federal funding that increases long-term resilience.

This presentation features research conducted by the Robert Reich School of Landscape Architecture that developed a methodology for identifying potential receiving communities and identifying projects needed to increase resilience using GIS data, census data, interviews, literature review, and national grant scoring guidelines. This study and data examined revealed several key themes related to receiving communities: 1) some communities are already better positioned to receive people; 2) data shows ways to improve resilience in potential receiving communities; 3) existing federal funding can be used to address specific needs; and 4) planning for migration is critical to our long-term resilience, along with protection, restoration, and adaptation of coastal areas.

This poster will also feature how students have applied this methodology to large-scale planning and site design in coastal communities. To take care of those that need to migrate from the coast due to climate change while improving the quality of life for all our residents, we must teach our students to proactively and systematically plan for resettlement that supports long-term resilience.

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Making the Invisible Beautiful: Public Art as a Tool for Landscape Design Activism

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Keywords: Public Art, Design Activism, Climate Emergency, Environmental Justice

The urgency of the climate, social, and environmental justice problems, call for landscape architects to expand their practice in order to instill systematic change in social and political systems that are often fraught with injustice (Fleming, 2019). Current interest in design activism and participatory design practices reflect the profession's growing desire to reconnect with its moral ambition of creating a better world for everyone, as well as the reckoning of the need to re-politicize the profession through direct contact with the public (Hou, 2020; De la Peña et al, 2017). While there has been renewed interest in novel forms of participatory design (de la Peña et al, 2017) and attention paid to the role of design activism in pedagogy (Hou, 2020), it is important to consider alternative forms and methods in which landscape architects can engage in design activism.

This paper will situate the role of temporary public art practices within the discourse of landscape architecture design activism (Hou, 2020); and broader urban design activism described by Fuad-Luke (2009) and Markussen (2013). An overview of 10 projects designed and executed by the author over a 12-year span, will be used to create a framework for understanding how temporary art projects may be used as a tool for design activism, with potential for both instigating change as they are designed for politics—improving existing procedures and mechanisms of governance—and/or for political purposes creating spaces of contest by creating disruptions in public space (DiSalvo, 2010). Special attention will be paid to the role of data visualization through the arts and aesthetic experiences as unique opportunities offered by this medium (Aragón et al, 2016; Markussen, 2013). An initial framework demonstrating the series of best practices will provide opportunities for replicability, while a discussion of current challenges related the practice, including challenges in measuring their impact, will lead the way in future innovation and improvement of these projects.

In conclusion, this presentation argues for the importance of legitimizing temporary landscape art practices as a distinct design activist tool through their capacity to communicate to, with, and within local communities, increase awareness, change perceptions, and offer opportunities for creating coalitions with non-designers. While the framework presented is far from complete, it offers possibility for strategic improvement of this practice to increase the effectiveness of landscape architects in promoting democratic design by bringing attention to pressing environmental and social issues.

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Resource Sensitive Design for Resilient Water Infrastructure: Using Spatial Planning Theory and Land Use Software to Inform Riparian Stewardship

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Keywords: Water-Resource Resilience, Landscape Conservation Planning, Ecosystem Resilience, Riparian Corridors, Inland Wetland Conservation

Keeping ecosystems resilient and preserving species' evolutionary capacity in human-built environments is a critical challenge for modern civilization as humankind becomes the principal force shaping the global landscape in the 21st Century (Schmitz, Oswald J. 2016). In 1992 Daniel Simberloff called for a prudent approach to conservation planning and expressed skepticism about applying island biogeography in conservation practices (Simberloff et al. 1992). Five years later, Forman and Colling made a compelling case for structural considerations to streamline spatial planning theory by highlighting large landscape patches and riparian corridors as critical linchpins for conservation (Forman and Collinge 1997). Building on this model, our presentation focuses on riparian corridors and the relationships between landscape architecture and anthropogenic development near freshwater ecosystems in urban and exurban environments. By clarifying the pros and cons of current practices, we aim to inform decision-making practices that promote resilient riparian corridors. Using Connecticut and two adjacent, coastal New England States (Massachusetts, and New York) as the study area, we examine the Clean Water Act and municipal enforcement practices to illustrate the strengths and weaknesses of existing regulatory structures for protecting riparian landscapes.

Since its inception in 1972, The Clean Water Act has improved water resource protections caused by point source pollution. Yet today, non-point source pollution poses the leading threat to wetlands and watercourses. According to the EPA, poor riparian vegetative cover and high degrees of riparian disturbance are the most widespread stressors to water quality in the United States (U.S. Environmental Protection Agency 2009). Tree removal exacerbates the issue. In 1970 Likens and Bormann demonstrated that the wholesale clearing of a watershed's vegetation results in severe changes to its nutrient outputs (Likens et al. 1970). Left alone, some landscapes recover (Turner et al. 1993). Yet, anthropogenic development interrupts revegetation indefinitely (Schmitz, Oswald J. 2016).
Landscape architects and wetland managers routinely make decisions regarding varying degrees of tree clearing within riparian corridors. To assist these efforts, we sought to understand the impact of tree canopy density on the function and condition of riparian ecosystems. Using GIS software and Connecticut as the initial case study, our project mapped changes in tree canopy density within a 300' buffer of wetlands and watercourses from 2006-2016. We found a striking difference between impaired watercourses vs. all watercourses, whereby tree canopy density was 26.3% lower for areas adjacent to impaired watercourses than for the average for all watercourses throughout the state.

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Spatial Politics of the Clean Energy Transition

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Keywords: Energy Landscape, Renewable Energy, Transmission, Land Use, Infrastructure Planning

With the recent passage of federal infrastructure policies (e.g., the 2021 Infrastructure Investment and Jobs Act, the 2022 Inflation Reduction Act) that seek to dramatically accelerate clean energy deployment in the U.S., the business case for widespread deployment of renewable energy has become stronger than ever. However, the challenges of planning, siting, and permitting this massive renewable energy buildout—along with the transmission lines that will be needed to carry it—have not gone away, and now represent the greatest barrier to deployment at the speed and scale required for meeting national decarbonization targets. In terms of climate action, any help that the design professions can offer in facilitating the spatial politics of coordinating, siting, and winning community support for new renewable energy facilities and transmission lines in their backyards will be critical to a successful buildout.

The transmission buildout alone is a physical construction project on a scale that has not been attempted since the era of national highway construction in the mid-20th century. Where can the landscape architecture profession partner with the federal and state agencies that will be charged with the coordination, comprehensive planning, and the drawing up of this infrastructure? What social dynamics can we anticipate, and how can physical design propositions by landscape architects add critical tools to these agencies' toolkits? What can be done to ensure that this infrastructure buildout is done more fairly and more justly than previous, historic, infrastructure programs? What are the strategies and policies that other countries have successfully utilized to improve the spatial quality of their renewable energy infrastructure, and to increase local support?

This presentation will explore the challenges and contestation around new transmission line siting and design, and position this contestation within the broader land use politics of renewable energy infrastructure's landscape impact. It will discuss the main social-political drivers of such contestation, and offer U.S. and international case studies of transmission deployment that diffuse local tension through the creation of tangible community benefits through both design and policy, such as multifunctional corridors that co-locate transmission lines with other linear rights-of-way, or policies that incentivize the integration of public facilities and public uses in communities along the line. By advocating for improved spatial quality of this infrastructure and empowerment of communities that will be most impacted, it will offer strategies for the design professions to advance the spatial politics for the energy transition.

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Katrina Cottages: The Value of Place and Permanence in a Post-disaster Landscape

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Keywords: Disaster, Planning, Housing, Gulf Coast, Katrina

Hurricane Katrina overwhelmed coastal governments' capacity to provide adequate long-term housing to disaster victims. In response, Congress created a pilot program to test the efficacy of permanent disaster housing prototypes known as “Katrina Cottages.” However, implementation was hindered by a lack of planning and local opposition. In Mississippi, residents feared adverse impacts to property values, citing poor design quality resembling manufactured mobile homes as a primary concern.
Using appraisal values based on current market valuations provided by local tax assessors, this study explores the long-term value of Katrina Cottages within Federal Emergency Management Agency (FEMA) group sites in five Gulf Coast communities. Valuation patterns were compared among group sites and against other residential land uses to determine differences within communities. Next, means tests were conducted to analyze the significance of valuation differences between land use groups. Finally, linear relationships were observed to understand the correlation between appraisal values and smart growth metrics endorsed by FEMA.

This study finds that over ten years after initial installation, Katrina Cottages are valued significantly higher than manufactured homes. It further reveals no significant difference between Katrina Cottages and single-family homes. It also suggests a strong relationship between value and smart growth design metrics, including density, walkability, and urban context. However, it shows that Mississippi Katrina Cottages are valued lower than those in Alabama and Louisiana, suggesting a difference in approach and general valuation differences by local agencies. Analysis of community demographics suggests Katrina Cottages may be less valuable in wealthy communities. Overall, the study suggests that communities could use Katrina Cottage style housing to address short- and long-term housing needs in a post-disaster landscape without negatively impacting community development.

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Oil and Gas Related Caliche Land Cover in the Llano Estacado Region: Opportunities for a Resilient Future

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Keywords: Resilience , Oil, Gas, Caliche, GIS

The Southern High Plains of Texas has shown resilient characteristics throughout history from its people, profitable land use, and ecosystems. The adaptive cycles connected to the region's resilient characteristics have changed over time with settlement, agricultural production, irrigation from groundwater sources, transportation, and the extraction of oil and gas. Over the last 100 years, oil and gas exploration and production operations have drilled 210,181 wells producing over 21.7 billion barrels of oil making the Llano Estacado one of the top oil producing regions in the world.

This case study uses GIS image classification methods to quantify oil and gas land use using caliche land cover. Six Llano Estacado oil production counties (three increasing and three decreasing over the last 20 years) where selected for detailed study using ArcGIS Pro imagery classification techniques. The study found that 8-12% of the region's land cover in study areas had been impacted by oil and gas operations and infrastructure defined by caliche used for access roads, storage tank pads, and well pads.

The study found that within the six separate study areas totaling 42 square miles (26,880 acres), there are 2,590 acres of caliche land cover at an average depth of 5.5 inches equaling a volume of 55.7 million cubic feet of mined and placed caliche. While the oil and gas industry has provided county jobs and economy over the past 100 years, alternate land-use and cover options must be considered if a resilient future is to be realized in the region. Over the last 20 years, oil production has declined in 25 of the 43 counties in the region and transitions to renewable energy sources like wind and solar are increasing. Simulations and calculations indicate that much of the caliche could be recycled or re-used in future landscape planning projects as base material. The volume of caliche estimated for the 210,081 wells in the Llano could be used to create 8,005 miles of trails, 52,834 housing foundations, or 247,969 wind turbine sites. The re-use of caliche can help the adaptive cycle of the region remain above a critical threshold and aid in the transition to alternative land uses and covers key to a resilient future. Ecosystem restoration and phytoremediation approaches are considered as important aspects of future research, along with the potential land use of produced water from oil and gas wells.

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Mapping the Ecological Significance of the Sierra de Picachos

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Keywords: Watershed, Rio Grande, Analysis, Resilience

Located in the Northeast region of Mexico in the state of Nuevo Leon, the Sierra de Picachos is a mountain range that is ecologically unique in terms of wildlife, vegetation, and climate, classifying it as a sky island. To preserve the ecological uniqueness of the Sierra de Picachos, the area was designated as a Natural Protected Area (ANP) by the Mexican government. This paper evaluates ecological significance and environmental benefits the Sierra de Picachos provide to the surrounding area, identifies key areas for protection, and recommends ways to support development without harming the unique environmental quality of the Sierra de Picachos.

The Sierra de Picachos is located in the southern portion of the larger Rio Bravo/Grande Watershed, which spans across the United States and Mexico. With its northern-most border in Colorado and southern-most border near Nuevo Leon, the Rio Bravo is one of the largest watersheds in the world and has binational importance, providing irrigation and drinking water for more than six million people (Návar). This area also exists within the Central Flyway, a critical migratory corridor that supports necessary habitat for species of threatened flora and fauna. An increase in demand for water, for uses such as drinking and agriculture, has created stress on the watershed. Protecting the health of this watershed will be a binational and state-led effort.

The Sierra de Picachos is at risk of a water crisis (Sisto). Pressures from population growth, urban development, and agriculture are negatively impacting environmental quality (Navar). Currently, the Sierra de Picachos is estimated to provide 50 million hectares of water, making it a vital resource to the health of the Rio Bravo Watershed (Martinez). Impacts from the Sierra's surrounding communities, such as the industrial city of Monterrey and the rural community of Higueras, will have direct effects on the health of the Rio Bravo Watershed.

Located 55 kilometers northeast of Monterrey, the Sierra de Picachos is isolated from the nearby mountain range Sierra Madre Oriental by highways, ecological differences, and its mountainous terrain. Contrasting the surrounding semi-desert shrubland, the healthy oak forests of the Sierra de Picachos are considered a priority terrestrial region due to their ability to host myriad species that may otherwise not exist in this region. This mountain range offers a host of regional environmental benefits such as habitat, carbon sequestration, and water collection and filtration.

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Guidelines for Designing Landscape-Compatible Renewable Energy Facilities in Appalachia

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Keywords: West Virginia, Former Coal Mines, Best Practices, Energy Transition, Landscape Quality

The urge to address climate change, for instance, by decarbonizing the energy production using renewable energy (RE) sources, has increased the search for sites where RE facilities can be located. However, although there is a general consensus on the need for RE facilities, their implementation often faces a high rate of public opposition because of their potential negative impact, especially visual and environmental, on the surroundings. Literature shows though that when RE facilities are located in old energy landscapes, such as former mine lands, controversy can be avoided or limited (e.g. Cowell 2017). Former West Virginia coal mines have been considered suitable for wind and solar farms development. The availability of natural resources, the amount of nearly flat land, the proximity to high voltage powerlines, and the already highly disturbed environment make former coal mines good candidates for this industrial activity. However, very little consideration, though, has been given to the communities living in the area, and who often prefer reclamation leading to forest restoration over RE development. In the paper, the authors will present ongoing research whose main goal is to define design strategies and guidelines to be adopted in the development of RE facilities on former Appalachian coal mines. The guidelines – mostly focused on visual impacts mitigation – are meant to support planning and design of RE production systems that are compatible with the characters of the Appalachian landscape. They aim at increasing the level of public acceptance by avoiding, reducing or mitigating the possible impacts on landscapes – for example visual dominance – and communities already heavily affected by coal mining. The guidelines are built based on an extensive literature review of best practices developed primarily in the European context and are crafted to suit the West Virginia coalfield landscape. They take into account former mines current landscape conditions – accessibility, landform, land cover, etc. – and provide directions for spatial placement and distribution, form, size, color, and other relevant features of wind and solar farms. The design strategies also recognize the potential for these landscapes to support multiple uses and take this into account in their recommendations.

The research generates new knowledge on design principles that can be utilized by government officials, policymakers, stakeholders, design and planning professionals, and public agencies involved in the design and assessment of RE projects. This knowledge can also be used to address the energy transition in Appalachia from both an environmental and social perspective.

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Climate Justice & Coastal Adaptations: Lessons From a Collaboration With the Shoalwater Bay Tribe

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Keywords: Climate Change, Traditional Ecological Knowledge, Culturally-Based Placemaking, Decolonization, Coastal Hazards

There is a pressing need regionally and worldwide to adapt to coastal hazards by "growing away" from dynamic and flood-threatened coastlines (Dannenberg et al, 2019) and by mitigating climate change through ecological design and low-carbon building (King & Magwood, 2022). Currently, the Shoalwater Bay Tribe resides on tidelands on the most rapidly eroding portion of the US Pacific Coastline. In response to climate change-driven sea level rise and tsunami risk that threaten their coastal ecosystems and habitation, the Tribe has purchased former timber harvesting lands on higher elevations adjacent to their reservation in order to expand their community onto safer ground and to maintain self-reliance. The purpose of this presentation is to share the work and outcomes of an ongoing university-tribal collaboration with the Shoalwater Bay Tribe that involves research and design to support the upland expansion and climate change resilience. The question this project explores is one facing all coastal tribal communities: How can a community plan and build a new collective home that they can embrace when a changing climate and the injustices of colonization put the present home in a precarious place?
This project uses the theoretical framework of decolonization and reinhabitation (Greenwood, 2012) to work toward equitable resilience (Kousky et al, 2021). It addresses decolonization in that it furthers the Tribe's reclamation of unceded traditional lands and seeks to address oppressive historical practices that have had devastating effects on people and ecosystems. It support reinhabitation by reimagining and recovering ecologically- and culturally conscious relationships between people and place (Tuck & Yang, 2012).

The research and design work draws on methods of interviewing, storytelling, geo-narratives, mapping, community workshops and design charrettes with Tribal members to capture community assets, values and priorities to inform schematic designs and recommendations for the new Master Plan. Researchers also work with Tribal members to understand and draw upon traditional ecological knowledge, and histories of environment change, and community survival and adaptation. Outcomes include web-based geo-narratives that document culturally-based place meanings and spatialized community values, technical recommendations and best practices for innovative and sustainable design, and a set of culturally informed schematic designs, materials lists (Kriegh et al, 2021) and standards. This project will also develop replicable methods for co-producing actionable place-based research with other Indigenous coastal communities.

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Oil and Water: Planning for A Texas Sized Challenge

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Keywords: Water, Oil & Gas, Produced Water, Resiliency, Planning

Produced water, a byproduct of oil and gas production, is being considered as a potential water source in western states to meet growing water demands and decreasing water availability. Authors will present their development of a visual dashboard used to illustrate produced water challenges and opportunities for beneficial use as part of their work for the Texas Produced Water Consortium (TxPWC) included in the report to the Texas Legislature on September 1, 2022, titled, "Beneficial Use of Produced Water in Texas: Challenges, Opportunities and the Path Forward."

The Permian region of west Texas and southeastern New Mexico includes the Delaware and Midland Basins which form the largest unconventional tight oil shale play in the United States (USGS, 2016). The Delaware Basin is estimated to account for over 50% of US Oil Production during its estimated productive lifetime over the next 80 years (Scanlon, 2020). In 2021, the 24-county area in Texas atop the Delaware and Midland Basins produced a record 1,033,609,096 barrels (BBL) of oil (RRC, 2022). The amount of produced water estimated based on 2021 oil production and oil to water ratios, totaled 3.40B BBL, or 142,970,000,000 gallons (1.43 B gal) of produced water (TxPWC, 2022).

While the Permian Basins' produced water volume is striking, the average quality of >123,000 total mg/l Total Dissolved Solids (TDS) is 3.5 times ocean water (35,000 TDS) posing significant challenge to desalinization and use outside oil and gas. Currently there few technologies capable of treating Permian quality produced water to an acceptable level for beneficial use outside the oil and gas industry. Estimated treatment plant capital costs, energy requirements to treat produced water, and necessity of additional pipeline infrastructure present significant barriers to produced water use in the region. Therefore, over 90 percent of produced water is disposed in salt-water injection wells today.

By 2070, as reported in the 2022 Texas Water Plan, this region projects an unmet need for water of 56,998 Acre Feet (ACFT), with more than half the unmet need in irrigated agriculture. Additionally, the region's semi-arid short grass prairie ecosystems have been significantly impacted by oil and gas operations requiring restoration. The developed dashboard offers insights to alternative future land use and water planning decisions vital to a resilient future for the region, Texas and the world given the importance of potential beneficial uses including agriculture and ecosystem restoration.

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Building Coastal Community Resilience With Nature-based Shoreline Solutions

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Keywords: Coastal, Wetlands, Change Models, Land Transformation, Nature Based Solutions

This project is developing an integrated framework focused on the Delaware estuary for infrastructure monitoring and modeling to assess physical and social vulnerabilities. Advanced sensing technologies and remote infrastructure monitoring of salinity and water levels, land transformation models (LTM), and agent-based modeling (ABM) are being employed to understand interactions between hazards, coastal communities, and their environment pre- and post-implementation of nature-based solutions.
The Delaware estuary and adjacent coastal wetlands are vital natural resources that provide valuable ecosystem services from natural defenses from hydrodynamic forcing, community provisioning to community recreational space. The effects of erosion, wetland degradation and loss, habitat fragmentation and compounding factors of SLR and land subsidence all pose threats to the physical, social and economic infrastructures that make up vibrant coastal estuary communities.

The project explores a multi-habitat approach to take advantage of synergistic co-benefits of various habitat types and resources that are naturally interconnected along coastal shorelines. By promoting multiple habitats along a continuum, each habitat type has greater potential to promote more optimal physical, chemical, or biological conditions needed by other habitats. As well, energy can be dissipated at a wider range of tide stages to protect shorelines from erosion and surge impacts. Finally, nearby communities are reliant on the coastal fisheries, wetlands, cultural and recreational sites in the Delaware estuary. By analyzing transects both parallel and perpendicular to shorelines connecting these communities, change models and scenario planning will identify long-range decision information that plays a central role in community and ecosystem resilience.

A trans-disciplinary team of landscape architects, coastal engineers, plant and marine biologists and data modelers is working to determine the feasibility of regenerative nature-based solutions (NBS) in mitigating effects of SLR and extreme events on landward regions and infrastructure while considering upland urban pressures, infiltration, and water quality on wetland functions and health. Knowledge of NBS performance against SLR and urbanization will 1) enhance understanding of sediment movement at the land/water interface; 2) yield critical data on infrastructure resilience and adaptation in close coastal proximity; 3) develop change models; 4) enhance understanding of nature-based solutions to adapt and recover from impacts, and 5) determine associated benefits for communities.

This presentation describes early phases of the multi-year research project Developing Engineering practices using Ecosystem Design Solutions for Future Army (DEEDS) funded by the US Army Corps of Engineers Engineer Research and Development Center (ERDC) and with ties to the Engineering with Nature program.

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Learning From the Contemporary Transportation Fuel System Wicked Mess for Critical Infrastructure Climate Risk Governance

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Keywords: Climate Adaptation, Cascading Disasters, Sociotechnical Systems, Energy Services, Strategic Decommission

The contemporary transportation fuel system (TFS), predominantly relying on the fossil-fuel sector, is not only the major cause of the climate change crisis, but as a critical infrastructure (CI), it is also behind the potential for climate-induced hazards to cascade into major disasters. While the TFS is at the crux of the climate mitigation and adaptation problem, few efforts are seen in integrating energy transition policy goals, strategic decommission of the vital energy services provided by the current TFS, and adaptation needed for the transient and future TFS. We argue that failure to frame the TFS as both source and effect of climate-induced disasters will result in siloed climate resilience policies that focus on the energy transition process without considering the TFS vulnerabilities beyond carbon-emission and non-renewable technological fallacies. Based on CI resilience, disaster risk reduction, supply chain sustainability, and energy policy literature review (Cumming, 2011; Cumming et al, 2006; Markolf et al., 2018; Lovins & Lovins, 1982; Lindbergh & Radke, 2021; Roe and Shumann, 2016; Schäfer, N., 2022; Sovacool, 2013; Goldthau & Sovacool, 2012; Sovacool & Linner, 2016) , this study seeks to shed light on what can be learned from the contemporary TFS wicked mess so that we can avoid perpetuating known vulnerabilities in the future TFS. Five unique traits help contextualize the wicked mess of the TFS climate risk governance: unprecedented transition; complex and widespread interdependencies; hazardous materials; complex organizational networks; and path-dependency. Emblematic TFS-related disasters in the U.S., and the projected impact of climate-induced hazards to the fuel sector in California (Radke et al., 2018) help illustrate these unique characteristics, underscoring the recurrent challenge of organizational network complexity and derived fragmented governance. We propose therefore framing the TFS as a social, technical, and environmental system to better understand the shared states between organizational networks, physical infrastructure networks, and climate hazard footprints. Policy directions for improved resilience of transient and future TFS need to better address these core vulnerabilities of the contemporary TFS and explore collective organizational scales of CI. We end by providing guidelines on mapping sociotechnical network exposure to climate-related hazards, which can promote complex system governance necessary to advance socioeconomic goals of decarbonization policy and environmental justice.

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Designing for Resilience and Adaptation to Climate Change on the Indian Sub-Continent Recovering and Re-Adapting India's Stepwells

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Keywords: Climate-Change, Resilience, Water-Harvesting Structures, Hydrological Infrastructures, Indian-Asian Landscapes

Sophisticated for their times, India's stepwells traditionally served as harvesting and holding structures for water within their communities. These architectural infrastructures were symbiotically linked to both natural ecological systems and social infrastructures across a series of nested scales. They were part of the larger continental caravan route networks, as well as positioned centrally within their villages. They often dualled both as sacred and profane space, operating both as temples as well as spaces for water harvesting and collection. These structures accessed the ground water several levels below the ground, through a series of descending stairs, with landings at multiple levels. Their designs lent themselves to absorbing and holding water and to be accessed and programmatically used during fluctuating seasonal water levels during the Indian monsoon season.

With the colonization of India of the British beginning in the 1800's, many these structures, were closed, predominantly in the name of "hygiene" and modernization through the rationalization of the water supply. These self-sustaining infrastructures creating water self-reliance for their communities were effectively rationalized by the British, through the introduction of the piping and civil engineering of water supply. Stepwells which are not heritage monuments under the government's care (predominantly the Archaeological Survey of India (ASI) have largely fallen into disrepair and have large amounts of trash in them, due to a lack of municipal services for garbage collection.

The premise of this paper is that the recovering of these structures that embed the logics of symbiotic design with ecological systems and social infrastructures which both harvest and collect water, have the potential to address the current context of climate change.

A literature review will be synopsized on all that has been written on stepwells, including their documentation. In-field research conducted documenting a number of stepwell temples which are both situated and engage in differing conditions, including both urban as well as rural will be described. The importance that they occupy within their urban contexts or communities will also be documented, through ethnographic research and interviews Further, documentation of examples of these structures now being informally recovered and used again for water harvesting will be examined, as well as their renewed importance to their communities. The design research will propose a useful model for their revitalization as social infrastructures which are designed for resilience, water harvesting, and which are adaptative to climate change.

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Heat Resilient Design: Using Urban Climatology to Develop Cooling Landscapes

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Keywords Heat Resilient Design, Bioclimatic Design, Cooling Landscapes

For the past 30 years, heat has been the deadliest weather-related event in the United States (NOAA 2021). More than ever, heat has been at the forefront of federal and state policy as we look to secure the health and well-being of our communities. Studies in human bioclimatology have long indicated that planning and design can address environmental factors linked to heat vulnerability (Reid et al. 2009; Johnson et al. 2012). Furthermore, Stewart and Oke (2012) developed a commonly used framework for characterizing urban microclimates in different regions, known as the local climate zone (LCZ) classification. This method categorizes landscapes into 17 typologies and focuses on measurable physical properties (e.g. density, roughness, vegetation cover, building height). However, though this method suggests its application in design and planning fields, it has not extended its application to landscape architecture. Concurrently, in design the identification of climate vulnerabilities, such as heat, have been addressed through the concept of resilience. In other words, design approaches that seek to embrace the landscape's ability to bounce back from a disturbance or natural disaster (Zeng et al. 2022).

This study uses Fairfield and New Haven counties in the state of Connecticut, United States, to examine the application of the LCZ classification as an approach to understand how landscape design solutions can better address heat vulnerability. The project relied on the pixel-based protocol from World Urban Database and Access Portal Tools (WUDAPT) to apply the LCZ classification (Bechtel et al 2019). The study also uses thermal remote sensing techniques to analyze Landsat satelite images over a 20-year period and aid in the association between LCZ categories and hot spots. The results obtained aim to answer the question: how can landscape design better promote heat resilience?

The results draw on studies in bioclimatic design (e.g., Olgyay 2015, Chiesa 2021) and landscape ecology (e.g., Wu 2019) to further analyze potential strategies for developing heat resilient design, considering existing hot spots. This study explores how its findings could promote the creation and maintenance of cooling landscapes. Therefore, the results presented are seen from the lens of resiliency to understand how the microclimatic characteristics of landscapes can support: (1) the ability of an urban environment to absorb or buffer disturbances and still maintain its core attributes, (2) the ability of the city to self-organize, and (3) the capacity for learning and adaptation in the context of change (Eraydin and Tasan-Kok 2013).

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Four Plant-Based Methods for Fabric Formed Poured Earthen Construction: A Study in Place

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Keywords: Local, Site-Based, Soil, Geotechnical

This paper tests a range of natural fibers as reinforcing components for fabric formed poured earth samples made from site soils.

Earthen construction is an opportunity to use material directly from the building site as well as providing an alternative to Portland Cement which greatly contributes to greenhouse gas emissions. Fabric formed poured earth has been developed and published by the authors and employs all natural earthen materials in a forming system that has the capacity to move with the shrinking clay. The authors have previously tested un-stabilized poured earth construction and have found its compressive strength to be under the threshold as outlined in the New Mexico Earthen Building Code. The research outlined in this paper is an attempt to strengthen the mix to satisfy this threshold.

Two parallel tests will be conducted in the Southwest and Midwest United States. The intention of the two locations is to test regional site soils, aridity, and to examine local plants as reinforcing agents. Using site soils and regional reinforcing fibers is also a way make immediate connections to place that aren't possible for conventionally mass-produced building components. The paper will outline the process of (1) identifying site soils and having them tested at a certified geotechnical laboratory (2) identifying and harvesting site soils and local reinforcing fibrous plantings (3) standardizing the mix components and percentages of reinforcing fibers (4) casting a pair of control blocks and eight test blocks [four pairs] one each with fungal mycelium, flax, yucca, and hemp fibers [the optimal site soil based, poured earth mix discovered by the authors will be used throughout the samples] (5) allowing the blocks to dry for a month (6) testing and documenting the blocks for compressive strength as outlined within the NM Earthen Building Code (7) testing and documenting the surface erosion of the blocks.

The findings will be documented and re-presented graphically in relation to other earthen building systems and mixes. The research will outline different regionally based opportunities for using immediate materials directly from the site.

The findings of this experiment will offer a site-based method for strengthening poured earth with plant-based additives. This creates a building process anchored in the materials of place, soil and flora, providing a dialog between living landscapes and human interventions. The comparison of different fibers from fungi to native plants allows a palette that can be adapted to the specificity of locale.

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Designing Impossible Landscapes

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Keywords: Codesign, Delta, Conservation, Research By Design, Adaptive Capacity

A central question in landscape architecture concerns how design and design research might successfully operate within increasingly complex or ”wicked” landscapes that are characterized by socio-technical and ecological crisis, conflicting values and priorities, and environmental injustices. Franks Tract, a 3,500-acre shallow lake in the center of California’s Sacramento-San Joaquin Delta is a case study of a place where design reconciliation seems impossible. This lake was created in 1938 when a levee breach flooded the reclaimed, subsided polder of ‘Franks Tract’. Since that time, Franks has co-evolved as a novel ecosystem; a world class bass fishery and a unique state park used for fishing, boating and hunting. However, the tidally-influenced lake also pushes salty water into the Delta, jeopardizing the state’s fresh water export infrastructure that supports the southern half of the state; a problem that is worsening with sea level rise and climate change. Additionally, given the decimation of the Delta’s endemic fishes due to habitat loss and altered flow regimes, there are contested state mandates for large-scale ecological restoration in the region.

Thus, California’s public agencies have explored concepts to dredge and regrade portions of Franks Tract at massive scales to create tidal wetlands for combined ecological and water quality benefits. Initial plans were met with strong resistance from local communities and recreationists, due to the cultural and economic impacts it could have, and the lack of public input in the design process.

This presentation will share the co-design process and findings of the Franks Tract Futures project. This project used a transdisciplinary, integrative approach that included online geospatial user surveys, extensive fieldwork, interviews, long term public engagement, stakeholder-led hydro-dynamic modeling, design visualization and structured decision making to drive the design research process. The research question was if the impossible is actually possible: if living, adaptable infrastructure of tidal marshes could be designed and configured in a way that could meet multi-benefit ecological, water quality, recreation and sustainable local economy goals. The presentation will critically assess the merits and shortfalls of this design approach. Results will demonstrate how intentional diversification of landscape form and structure - the creation of differences and distinctions in the landscape medium itself (rather than trends towards homogenization) - can support respectful coexistence in socio-cultural domains. We conclude that rather than always trying to achieve consensus or “commons” in landscape design, nurturing uncommons can be a pathway to fostering equitable spatial diversity.

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Landscape History and Nature-Based Infrastructure

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Keywords: Cultural Landscapes, Coastal Resilience, WRDA, Landscape History, Design Research

PURPOSE: This presentation will review the results of the first year (of three years) of design-focused collaboration between a landscape historian and a team working on natural and nature-based design approaches for a series of coastal national parks. It will explore the challenges and potential of the integration of cultural and human history work into a set of landscape interventions intended primarily to appear and perform like existing natural features or systems.

BACKGROUND: Contemporary coastal resilience work leveraging natural and nature-based features is considered by many to represent the cutting edge of climate-adaptive coastal infrastructure. Furthermore, this approach to coastal resilience offers new collaborative territory for the design fields, in particular for landscape architecture via partnerships such as EWN + LA (Engineering with Nature + Landscape Architecture). Crucial legislation such as the 2016 WRDA Bill (Water Resources Development Act), has mandated that “natural and nature-based features in water resources development projects, including flood risk reduction, coastal resiliency, and ecosystem restoration projects” be considered alongside, or in lieu of, more standard infrastructural approaches (WRDA, 2016). Given the degree to which their appearance and performance is intended to blend into pre-existing natural systems, historical work in the context of these features is essential—both in how it their sites are assessed as future cultural landscapes, and in how the history of the existing places are addressed in the design process. In this context, the implicit mandate to functionally and aesthetically extend existing natural features and systems poses unique challenges for the integration of human and cultural history research into the design process, even while these historical dimensions of the project remain essential.

METHODS/PROCEDURES: Using archival maps, navigation charts, and construction drawings, alongside literary and art-historical sources, the historians on the Preserving Coastal Parklands project at the University of Virginia worked with landscape architects, ecologists, and engineers on a set of natural infrastructure recommendations for Colonial National Park. The historical work was focused on how natural features of the site had been valued, represented, protected, used, transformed, and understood to naturally change by a range of historical occupants of the land. This work became integral to the design process in ways that extended beyond a more typical cultural landscape report or inventory process.

RESULTS/CONCLUSION: Current emphases on nature-based solutions are shifting the way that cultural and human history are integrated into the design process, but these historical dimensions remain as important as ever.

SERVICE LEARNING & COMMUNITY ENGAGEMENT

Service Learning and Community Engagement

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Community Green Network Development by Restoring Natural Habitats: Applying Pollinator Garden Design

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Keywords: Habitat Restoration, Green Infrastructure, Ecological Corridor, Survey, River Corridor

Urbanizing communities often value economic growth and population expansion over environmental quality and protection (Bellamy, 2017). Smaller communities destroy vast native landscape to make way for subdivisions, malls, and commercial or industrial districts. This rapid expansion leads to urban sprawl, wasted landscapes, and monocultures (Mooney, 2015). Habitat fragmentation has been occurring more often with urban sprawl cutting off naturally linked areas (Pyke, 1980). The aim of this study is to look at a small urbanizing community to find what current residents like in their community green spaces and places they visit often to find key environments to save before they are repurposed. Marysville, Michigan was chosen as the study location due to the growing size of the population and large amount of existing green space. Located 45 minutes north of Detroit, along the St. Clair River, Marysville's dominant land uses include single family residential and light industrial. In collaboration with the Department of Recreation, an online survey was developed and distributed to 964 residents of the city through September 1 to October 31, 2021. Structured questions were developed to collect five types of data: 1) general community vision of future green network development , 2) existing conditions of urban greenspaces, 3) residents' awareness about and willingness to adopt pollinator gardens, 4) level of community engagement in routine physical activity, and 5) socio-demographics information. 106 responses (11%) were sampled, providing a 9% margin of error at the 95% confidence interval.
The survey result shows that a vast portion of the residents were open to seeing more green spaces in their cities which focused on increased ecosystem services (71%) and were even willing to invest in habitat restoration efforts on their own property (63%). Comprehensively reflecting the survey result, the guideline of green network development proposed in this study suggests utilizing busier streets as opportunities to showcase green infrastructure, converting a portion of the failing municipal golf course to a more sustainable native meadow, creating opportunities for business that use green infrastructure techniques on their properties, creating plaza spaces near publicly owned buildings that feature learning opportunities, and upgrading existing play features with new more inclusive play zones that feature native plantings. The findings provide a prototype for planning and designing a pollinator habitat network in small urbanizing communities across the country.

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Promoting Student Success and Awareness of Environmental Issues in Environmental and Transportation Planning Through GIS (Geographic Information System) Lab Course for High School Students

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Keywords: Environmental justice, Environmental planning, GIS training, environmental/STEM Education

The educational attainment gap for underrepresented minorities graduating high school and earning a college degree, especially in the STEM field, continues to remain wide. This gap furthers into a workforce where science and engineering jobs are disproportionately held by the white and male population. Though there has been an increase in diversity programs by many large organizations to increase minority populations in STEM fields, high-profile top-level appointments of people of color are still limited. Addressing the education gap at the student level is important to develop a robust pipeline of bringing students as new workers into the related fields and pursue their professional success in the long term. In addition, literature shows that teaching theories of environmental justice and transportation planning in school curricula helps empower the youth of communities that are most impacted by environmental injustice.

To bridge the educational gap and promote environmental awareness the research team developed a curriculum focusing on GIS (GIS training + guest lecture + field trip) as part of STEAM education (expanding the scope from STEM and reflecting the effort of LA discipline to be included in STEM) by partnering with high schools that serve students from lower- to mid-income families and underrepresented population. Advanced from the first funded project, this grant project exposed students to the theories and analyses of transportation planning and environmental justice using real-world local data on the Trinity River and adjacent communities.

Development of GIS skills taught at the school level has been observed to be useful for career development by helping students find “meaningful employment” and success in continued higher education by encouraging critical and spatial thinking. When used as a Problem-Based Learning teaching method, students get to engage with the theoretical foundations of the subject within a real-world problem that needs a solution.

With the GIS lab course, students could understand the interrelationships of ecology, land use, socioeconomic status, and site history regarding environmental impacts in the region and how equity can be integrated into transportation-environmental planning. The interview with the research participants including teachers and professionals revealed that the course was effective and was able to help students to gain an immersive experience with GIS. So students become aware of the importance of environmental issues. Interviewees also appreciated that students were exposed to a practical tool that expanded their future careers, had opportunities to engage with professionals in the region, and learned about real-world projects.

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Service Learning in the Landscape Architecture Design Studio: A Guide for Success

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Keywords: Service Learning, Community Engagement , Design Pedagogy , University-Community Partnerships, Case Study Review

Service learning has gained widespread interest in higher education as it provides students opportunities for community-engaged learning, public outreach, and participatory education in real-world contexts. Pedagogies of service learning may be particularly well-suited for supporting such opportunities in upper-division studio courses where design processes are often explored or practiced through projects intended to serve community stakeholders.

Importantly, service learning also exposes students to aspects of the professional practice of landscape architecture, such as processes of public engagement, that extend beyond the classroom. As methods of public engagement become increasingly interwoven with the contemporary practice of landscape architecture, students must be properly trained to effectively communicate with, understand the needs of, and develop appropriate design solutions for the communities in which they will work. This study examines literature on service learning in landscape architecture education, and reviews case studies highlighting the application of service learning in design studios, and courses from allied professions such as urban planning, to identify best practice guidelines for developing studio courses that supports these goals.

Over two dozen peer-reviewed articles and three scholarly volumes were identified as candidates for analysis using systematic search protocols. Drawing on this sample, the theoretical underpinnings of service learning as design pedagogy have been summarized to identify core principles critical for successful development of service learning-based studio instruction (Roakes & Norris-Tirrell, 2000). Case studies documenting processes employed in service learning-focused landscape architecture studio courses have been reviewed to understand the relationship between theory and praxis (Dearborn & Harwood, 2011). Curricula from allied professions have been included in this review to understand how service learning in these fields might inform approaches in the landscape architecture studio (Neuman, 2016). Finally, select literature describing course development and processes for structuring partnerships are explored to identify what does, or does not, work and guide the synthesis of best practice guidelines for future courses (Juarez & Brown, 2008).

Though analysis remains ongoing, initial findings suggest there are clear benefits when applying a pedagogy of service learning in landscape architecture studios, including an enhanced understanding and retention of course materials for students, increased involvement and capacity building for communities, and the establishment of ongoing community partnerships and relationships for instructors. However, potential negative outcomes, especially for community partners, such as inadequate planning or design, reinforcement of university-community power imbalances, and limited sustainability or accountability, may result if service learning-based approaches to studio instruction are not properly managed or planned.

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Acknowledging Diversity: Photography for Community Engagement

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Keywords: Photography, Aesthetics, Community Engagement, Diversity

Almost anyone can take a photograph. This isn't a new condition – it's easier than ever for anyone to make, share and look at photography. Photography continues to be a primary form of representation used during community and stake holder engagement. But as designers, do we use photography in a fully inclusive way? Do unexamined aesthetic expectations for photography act as unconscious gatekeepers to accepting multiple photographic experiences and viewpoints?

This discussion presents two methods that can open up designers' acknowledgement of multiple forms of photographic representation as a means to cultivate more inclusive dialogue. These methods are interested in bringing stakeholders and community members into the process of making and choosing the photographs used for the design process of public spaces. Utilizing these methods also confronts unexamined aesthetic biases, because the results of these photographic methods often do not yield conventionally beautiful or picturesque photographs.

Each of the methods presented is designed to take place during a community and stake holder engagement event. They are to be engaged by individuals and small groups – two to five people. And are intentionally crafted to encourage discussion and sharing, as well as photograph making. Examples will be shared from projects by TENXTEN and the author's own work with students.

The first method, Predetermined Path, asks each member of the group to walk or otherwise navigate a site of interest in a pre-determined way lead by a set of arbitrary rules. The participants are prompted to make photographs at pre-determined step intervals. This disrupts the tendency to navigate a site lead only by desires and make photographic scenes based only on aesthetic interest or pleasure.
The second method, Photograph Like Someone Else, asks one designer and one community member to pair together. Each person, instead of making their photograph, describes to the other person how they would photograph a particular place or subject, then the other person makes their photograph. This process lets both people "see through the other persons eyes" and instigates dialogue about values and ideas about a place.

Finally, sharing and listening are key components to both of these methods. The author will discuss some engagement issues to pay attention too, such as "improvement" and "correcting." Further this explores how the accessibility of photography can help designers transcend these tendencies, confront aesthetic norms and accept broader types of photography.

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Landscape Architecture as Democratic Practice: Challenges at the Nexus of Academic Pursuits, Professional Demand and Community Commitment

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Keywords: Democratic Professionalism, Community Engaged Design

The landscape architecture profession has long been anchored in and driven by social responsibility, predicated upon landscape architects' mission of pursuing a sustainable and equitable built environment premised on safeguarding and promoting public interests (Horrigan & Bose, 2018). Democratic professionalism shifts professionals from being task monopolists to task sharers emphasizing lay participation that "enhance and enable collective action and deliberation about major social issues inside and outside professional domains" (Dzur, 2019, p. 14). To understand how the landscape architecture discipline could be situated in and act in the spirit of a democratic profession, we conducted semi-structured interviews with 17 landscape architects/scholars/ practitioners whose academic and professional practices are rooted in participatory and democratic actions. We first identified the methods and strategies used and the motivations driving their practice (abstract in EDRA 53), and the pedagogical and practice-related outcomes realized through their work (abstract in 2022 CELA proceedings). To further understand and advance the democratic transformation of landscape architecture as a discipline and profession, this study focuses on the challenges and difficulties faced by landscape architecture scholars/ practitioners amidst the democratic turn in the design field. Our study probes the following question: What are the difficulties and challenges faced by landscape architecture scholars/practitioners whose praxis is rooted in participatory and democratic actions? The interview transcriptions were qualitatively analyzed through open coding using Nvivo (March 2020 release) - a qualitative data analysis computer software. The analysis reveals patterns regarding the difficulties and challenges incurred by the multiple identities and missions democratic professionals enact while teaching, conducting research, and engaging in community practice. Our study found that landscape architecture scholars/practitioners with multiple roles for teaching, research, and community practice need to mediate between challenges at the nexus of commitment to the communities they serve, the escalated pressures of career development in academia, and responsibilities to multiple external sectors. The lessons from their experience delineate the trade-offs democratically oriented landscape architects face and provide pointers for democratically oriented landscape architecture education and the profession.

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Low-Cost Joint Contribution: The Practice of Participatory Modular Design in the Transformation of Primary School Landscapes in High-Density Urban Communities

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Keywords: Low-Cost Design , Environment Science Course, Edible Garden, Community Participation, China

In China, students spend 8 to 10 hours per day, 5.5 to 6.5 days per week in school, and no more than 1 hour per day for outdoor recess. Therefore, campus green space is the most accessible natural environment for children. It has become the most vital resource for reducing the daily pressure that Chinese students suffered.

During the past 5 years, a roof space(1300m2) of an elementary school in Nanjing China has gradually been transformed into an outdoor classroom dedicated to cultivating edible crops by the design team. This project has produced, on average, 2000 kilograms of fruit and vegetables annually. The rooftop farm is accessible once a week for 45 to 120 minutes to each of the school's 15 classes, grades 3-6. Considering China's high-density cities, this project provides a low-cost(less than $20k to launch a new project), sustainable approach to redeveloping existing Chinese schools of the compulsory educational stage. In the design strategy, including at least six basic design units, vegetable gardens, teaching galleries, ecological pond, greenhouse, composting, and petting zoo, use these elements as a medium to provide a seasonal space theme to support more than 30 different environment science courses and even gradually bring the traditional indoor subjects such as art, mathematics, and biology to have few lessons outdoor, significantly increasing the length of children's physical contact with nature and promoting children's health and sense of collaboration.

Being limited by the construction and maintenance fund management of Chinese public schools, the project was slowly completed by the design team, school, and professional construction company over 4 years, with a total cost of less than $50K. The design team, social organization, community, and school are all involved in daily outdoor lessons, and most of the minor maintenance or co-design work such as plant management, facilities updating, and art design are capable of carrying out in the daily sessions. Agriculture has a special meaning in traditional Chinese culture, and the use of edible crops as a “design aid” is able to gain broader social acceptance and significantly reduce the technical requirements for public participation. The project design also offers a new type of strategy for reshaping degraded neighborhoods of urban communities. The project won the 2022 Landscape Institute Awards (Final winner of The Dame Sylvia Crowe category), and the 2022 International Landscape Architecture Design Award-School and Playground special award.

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Unused Outdoor Space Update: Improving Neighborhood in High-Density Urban Communities With Food-Cored Environment Science Course

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Keywords: Environment Science Course, Edible Garden, Twenty-four Solar Terms, China

With the urbanization process accelerating year by year in China, urban outdoor spaces are shrinking rapidly. The lack of outdoor space has severely loosened neighborhood connections in the urban area of Nanjing. Our purpose is to develop and utilize idle community public spaces, build outdoor gardens to attract children, and introduce a series of environment science courses so that they can enhance social collaboration capabilities and have more chances to get in touch with nature.

Jianye Children's Education Club originally functions as a community activity center, providing after-school education services for 23,224 people. The existing public service functions of the Children's Education Club have the potential to attract the surrounding neighbors, and the unused adjacent space of the Club’s building provides the physical basis for improving these functions. As a reference for farming schedules, the 24 solar terms have long-term use in Nanjing’s traditional agriculture history. Taking advantage of the unique educational resource, the design team pinpointed the site as an edible garden that meets the needs of children in the adjacent community for environment science courses, extending the original indoor curriculum structure of the Children's Education Club. The courses and the selection of vegetables and fruit are carefully arranged to match the vegetation in the garden under the guidance of the 24 solar terms.

The design, construction, and long-term maintenance of the garden are the result of collaborative efforts. The year-round environment science subjects were developed by the Club teachers and the designers, considering the integration of the traditional culture of the 24 solar terms and the accessibility for children of all ages, also making full use of the landscape features and structures in the garden, such as the ‘grand stairs’ in the greenhouse which became benches for children during lessons. The garden's crops and landscape plants are also planned throughout the year by the design team in conjunction with constructing consultants, and correspond to the 24 solar terms curriculum, including sowing, watering, fertilizing, harvesting, etc.

More than 60 kinds of vegetables are planted every year covering 9 months of planting and year-round harvesting, filling all the outdoor lessons, and attracting regular visitors including teachers and students through landscape features. The garden, which serves primarily as an outdoor classroom, has been built and improved to provide a new social venue for the surrounding neighborhoods.

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Placemaking as Social Learning: Taipei's Open Green Program as Pedagogical Civic Engagement

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Keywords: Placemaking, Social learning, Civic Engagement, Open Green Program, Taipei

Placemaking has risen prominently in recent years as a focus of practices in planning, design, and community development. Its ubiquity is also found in studies that situate placemaking in a variety of contexts from municipal city naming in Los Angeles (Kim and Kang 2022) to Informal practices by street vendors in the Philippines (Amper, Jr. 2022). The broad and often uncritical application of the concept has invited growing criticisms with focuses ranging from the impacts of gentrification (Loh, et al. 2022) to the suppression of minority culture (Montgomery 2016). Within the literature, however, there has not been enough discussion on the efficacy of placemaking as a form of civic engagement. Beyond the association with quick fixes and temporary interventions, what opportunities do placemaking practices offer in advancing the agenda of civic engagement?

This study examines the Open Green Program in Taipei that provides funding support for community placemaking projects to spurt community-based urban regeneration. By involving multiple stakeholders including community organizers, volunteers, professionals, and government staff, the program offers an opportunity to examine processes and mechanisms that facilitate social learning in planning and placemaking. Through interviews with different stakeholders, including community participants, professionals, and government staff, this study explores the processes through which social learning and capacity-building have occurred. It further examines the ongoing issues and challenges facing the program and reflects on the implications for the ongoing development of civic engagement in East Asia. The findings of this study provide specific insights into the mechanisms of social learning. These include "trials and errors" through which knowledge and experiences were developed, "expanded involvement" via the engagement of additional actors beyond the typical cast of actors, and the "roles of intermediaries" in facilitating the process of social learning. Three particular challenges were identified: first, the disconnect between the municipal staff and the community process as other actors became more actively engaged, and second, the uneven degree of capacity-building and community ownership across different sites and projects, and third, the difficulty of measuring success under normative program metrics, given the complex social processes.

With both its success and continued challenges, the Open Green Program in Taipei suggests a pedagogical model of civic engagement in which social learning becomes an integral part of community planning and design for municipal staff, professionals, and community members alike. The study offers insights into a potential dimension of placemaking that needs to be further explored.

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Black Dirt Futures: Alternative Methods for Rural Engagement

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Keywords: Rural Adaptation, Community Engagement, Exhibition , Water Quality, Climate Change

While creative outreach strategies have long been central to practice and research in cities, rural engagement methods remain less explored within the discipline and offer challenges quite different from urban contexts. Stakeholders are often dispersed across a wide region, trust can prove difficult to build in the short time spans, and, in agricultural communities, working hours can be long and seasonal, making participation in typical outreach events often impossible. The Black Dirt Region in southeast New York state is one such rural community facing rising risks to local lands and livelihoods due to changing climates. Named for its expanse of black muck soils, the Black Dirt Region offers the largest concentration of such soils in the United States outside of the Florida Everglades and the largest under cultivation. Altered hydrology and urbanization along its floodplain have made the waters of the Wallkill some of the most polluted in New York state, while the low-lying lands and unique soils remain increasingly vulnerable to flooding, erosion, oxidation, subsurface fires, and subsistence amid changing climates.

This research asks how alternative methods of engagement can better reach rural participants where they are and better illustrate both future risks and possible alternatives. *Black Dirt Futures*, a traveling exhibit developed with community partners, offers an alternative engagement method to tell the unique story of the cultural and ecological conditions that have shaped the Black Dirt Region, as well as current and emerging risks to local ecologies and economies. Initial research was developed through an engaged graduate landscape architecture studio at Cornell University in collaboration with a range of community partners, including the local Soil + Water Conservation District, Orange County Planning Department, and the Wallkill River Watershed Alliance. Through interviews, fieldwork and workshops, the studio identified catalytic locations for designing rural landscapes as both living infrastructures and novel public spaces. The traveling exhibit builds on the momentum of the studio to educate the public about invisible and urgent issues within the Black Dirt, and illustrate a set of site-specific green and living infrastructures ‘toolkits’ that can improve ecologic and economic resiliency within the region. The presentation will review the development, design and fabrication of the mobile exhibition, and share lessons learned alongside feedback from community partners, exploring how site specificity in outreach methods can build momentum for stewardship and change within a rural community.

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Evaluating Public Education Modules for Green Stormwater Infrastructure Development

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Keywords: Green Stormwater Infrastructure, Environmental Education, Behavior Change, Public knowledge, Attitude

Education for green stormwater infrastructure (GSI) is critical for enhancing the public's knowledge regarding the structure and benefits of GSI facilities, which increases public support, management, and stewardship of present and future GSI initiatives. However, practitioners are often not trained in environmental education and, therefore, likely lack skills in constructing educational modules that effectively convey GSI knowledge while addressing residents' specific concerns. Additionally, there is a significant gap in the literature regarding studies that assess existing educational modules' ability to increase the public's understanding and encourage behavioral change for GSI adoption. Concerning this gap, this study utilizes a mixed research method to explore what constitutes a successful educational module for GSI in Pittsburgh, PA. First, we selected ten projects and applied the North American Association for Environmental Education (NAAEE) Guidelines for Excellence (Simmons et al., 2021) framework to unpack and evaluate the education and outreach modules structure. Second, we interviewed project managers and public education administrators who created the modules to understand the strength, weaknesses, and best practices of the applied modules. Additionally, we surveyed the participants of the engagement activities to understand the effectiveness of applied techniques in changing the public's knowledge and behavior towards GSI. The study will help understand the successes and underachievements of the assessed educational materials and inform how educational modalities, learning materials, and knowledge transfer techniques can be enhanced in the future to encourage behavioral change for GSI adoption.

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That's OUR Garden!: Design Engagement in Community Gardens as a Way to Quickly Build Ownership and Operational Know-hows

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Keywords: Community Garden, Design Approach, Design Practice, Engagement, Rapid Urbanization

The importance of community engagement has been extensively discussed, and there have been various approaches on the evolving roles of landscape architects in these engagement-heavy projects.

The paper explores a particular approach employed by the authors in practice, aimed at addressing the community garden projects against a context of rapid and dense urbanization context. The approach is developed in hopes of creating both near-term spatial and community positivity and long-term operational successes, with the latter focused on building ownership, organization, and know-hows. The evidence base of the research comes from a series of seven community gardens commissioned to the authors, and the extended community garden initiative in the city of Shenzhen, China, which sees a growth of over 100 such projects per annum.

The paper argues for seeing such engagement-heavy projects not as a shift of design agency, but an extension of design, and importantly, operational agency. Through a series of carefully curated and timed engagement events, community engagement can be a powerful tool to create ownership without leaving design as a process undirected or too open-ended. At the same time, they incubate organizations of people and provide technical know-hows in the hardscape and horticulture construction of the project, and by extension the maintenance and evolution of it.

In this sense, engagement is not simply a retreat or reassignment of the role of the landscape architects and their expertise, leaving the risk-embracing exercise of design to the untrained hands. It is not less of what landscape architects do, but what more. This paper will present the overall project processes and schedule and setup of engagement workshops from beginning of project to completion and beyond. The paper concludes with the suggestion that against such urbanization context, it is important to quickly advance ownership, through a retreat of authorship without yielding design authority, and to quickly build community capacity, through the engagement process itself, that will reach far beyond the delivery of the project.

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A Deeper Reach: Academic Design and Outreach Assistance With the National Park Service Through the Cooperative Ecosystem Studies Unit Program

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Keywords: Community Outreach, Design Partnership, Nature Center, Wetland Restoration

Ecosystem services are of vital importance to the well-being of community and individual health. Landscape degradations and changes are becoming increasingly challenging under the pressures of climate change and development (Armenteras et al., 2017; Lewis et al., 2015), even among protected lands (Golden Kroner et al., 2019). Addressing the complexity of these challenges requires more integration of knowledge and skills from broader partnerships toward systems thinking, connectivity, nature-based solutions and regenerative economics (Keesstra et al., 2018). The Cooperative Ecosystem Studies Units (CESU) network facilitates partnerships between federal agencies, academic institutions, and a variety of other governmental and nongovernmental partners to support research, technical assistance, education and capacity building in response to these grand challenges across the nation. This study is a case to illustrate the relevance and relationships of CESU to landscape architecture, and to evaluate the efficiencies in the process of obtaining deeper insight of the site and community among a public, private, and educational team partnership.

The case focuses on a community generated project in Tubac, Arizona in coordination with the National Park Service – Rivers, Trails, and Conservation Assistance (RTCA) program and the University of Arizona through the CESU network. The project involves a 160-acre nature preserve on the Santa Cruz River near the U.S.-Mexico border. An Indefinite Deliverables Indefinite Quantities (IDIQ) landscape architecture firm will be selected to carry forward the work effort through the NPS, but we seek to understand how the academic role in the CESU partnership can best serve to dovetail and reach deeper into the knowledge and skills available among the community members. A collaboration Diagnostic Tool will be used to understand the collaboration strengths and areas that would benefit from attention, and we will deploy focus groups and surveys beyond that of a traditionally contracted project.

Anticipated outcomes from the case study efforts and evaluation, include 1) an enhanced understanding of the roles and relationships between NPS-RTCA, Landscape Architecture faculty and graduate assistants, and the IDIQ landscape architecture firm, and 2) an assessment of the efficiencies for the CESU network to facilitate the ability for a comprehensive network to address the opportunities and challenges of this case. In facilitating this deeper reach in connecting with community partners and expertise, we anticipate a more robust and long-term solution toward restoration and protection of this vital landscape to bring greater health and well-being to the Tubac community and landscape.

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Bridging the (Eco-Literacy) Gap: Using Public Engagement to Explore, Learn and Act

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Keywords: Community Engagement, Landscape Architecture, Detroit, Natural Systems, Legacy Soils

The ability to react and respond to climate change at a community, or individual, level is an important issue in today's world. In Detroit, adaptation and mitigation of climate change is implemented primarily through green infrastructure to combat increases in extreme flood events. However, continued work with Detroit community and neighborhood groups has revealed an observed disparity in ecological literacy including lack of resident knowledge of soils, drainage, and plant materials that often accompany these green infrastructure projects. This presentation directly responds to this issue, building on knowledge and expanding ecological literacy using a threefold engagement process of learning, exploration and action.

Using a framework of engagement techniques related to 'learning, exploration and action,' the process places focus on climate issues at the global scale, translating them down to a hyperlocal scale focused on understanding and action. The process aims to expand ecological knowledge to achieve community collaboration and buy-in (Benson and Dresdow 2015) and ultimately empower residents to implement sustainable ecological practices into their everyday lives, in their own backyards, and in the greater expanse of their communities.

This presentation builds on the theory behind the authenticity of community engagement (Johnson and Lane 2019) and shares action research and outreach processes to support and empower collaborative public engagement in an effort to adequately address the resiliency needs that respond to growing climate change concerns and changing communities. The study describes the preparation, process, and evaluation for each engagement strategy and limitations of this research process. The final component of the study will share how co-designed outcomes will be applied to a series of pilot projects to address soil health and connect people back to place.

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Designing a Community Interpretive Park: The Case of Huntertown

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Keywords: Community Design, Public Open Space, Placemaking, Partnership, DE&I

Community design is an effective process to interpret and represent a community's landscape, although telling the stories of everyday lives and creating a commemorative place for communities of color is not often practiced. Such landscape design efforts are more commonly redeveloped and reinterpreted by entities beyond the community and their narratives get lost with time. However, for the Huntertown community in Central Kentucky, its heritage is being visioned as a community interpretive park through a strong partnership and engaged community. Huntertown was an African American freetown settled in 1871 by formerly enslaved people and existed for nearly 140 years. The once thriving community experienced varied historical changes and environmental challenges over time. Due to environmental concerns such as local flooding and lack of water and sewer connections, the local government sought multiple funding attempts to improve the conditions. Fortunately, the local government finally received a federal grant and purchased the properties in the community. After the residents relocated, all structures were demolished and cleared.

Strong partnerships between the Huntertown Community Interpretive Park (HCIP) Committee and numerous community partners, including a university landscape architecture department, the Huntertown Community Interpretive Park Master Plan was designed and adopted by the local government. Between the summer of 2020 and 2021, the university department engaged with the HCIP Committee and broader interested parties through service-learning and further community engagement efforts. Through the partnership, the stories to be represented in the park design were deciphered and strategized through access to various documented histories and interviews and engagement with concerned community members among other methods. Topics of community heritage, diversity and inclusion, environmental conservation, educational and recreational amenities, and overall sustainability were explored.

The adopted final passive open space design reflects the ideas and conversations from the visioning process and efforts brought together by the partnership. The design consolidated ideas from the university students' proposals through further feedback. The master plan has also helped leverage more funds and interest from the broader public and is continuing the momentum to build the park through a grassroots effort. The community-engaged designing process and design outcome present a case for how organizing and building collective voices can effectively inform and help shape a cohesive spatial vision for generations of Huntertown decedents and the broader public to share and continue the stories of the landscape.

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The Profanity of Experiential Learning: Since When is Make a Four Letter Word?

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Keywords: Placemaking, Special Needs, Experiential Learning, Community Service, Practice Partnerships

This presentation reflects on the perceptions of design-build curriculum approaches (national survey), the motivations for developing hands-on learning opportunities within a landscape architecture curriculum, insights from student participants, insights from community partners and insights from practitioners hiring graduates of these programs.

Over a five-year period, the “placemaking studio” has evolved out of existing implementation and advanced construction courses in the undergraduate and graduate curricula of a state university’s landscape architecture program. Starting with small scaled, on-campus interventions and supported through the financial gifts of friends-in-practice, the logistics of the COVID pandemic lockdown compelled the program to shift off-campus and into the heart of the local community.

Students pivoted from hands-on to pandemic-driven, virtual-only classroom presence and back to a face-to-face engagement to plan, design and build meaningful and impactful interventions on a community commons site. This site, managed by a local not-for-profit commercial nursery, serves an important role as home to a transitional program that provides training and employment opportunities for adults with disabilities.

Student learning in the placemaking studio extends beyond the tangible outcomes of hands-on-tools experiences as students engage directly with members of a special needs population. In addition to gaining skills in observing use patterns and responding with theoretically-derived human behavioral aspect-sensitive design solutions, students also developed close personal relationships with their clients. These relationships have helped students develop a deeper understanding and appreciation for the needs and challenges faced by this population of users and have helped the students become more intimate observers of mobility challenges, more sensitive authors of equitable outcomes and stronger placemakers in the service of users with sensory sensitivities.

Within the context of a placemaking studio that focuses on making, students become sensitive to the reality and implications of building costs and budgets. They learn how variable and rapidly-shifting commodity markets are in the building sector and they learn to articulate the value and impact of their work as landscape architects as they assist community partners in preparing grant funding applications and capital campaign plans.

This presentation concludes with a summary of lessons learned from an analysis of feedback from students participating in the placemaking studio, their clients and their sponsors. It presents these findings against a backdrop of the historic, contemporary and emerging attitudes and perceptions relating to the value, appropriateness and relevance of experiential learning, design-build and hands-on learning opportunities integrated into a professional degree program in landscape architecture.

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Narrowing the Gap Between Academic Aspirations and Community Needs: The Winchester Design Studio

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Keywords: Community Design, Community Engagement, Design Studio, Placemaking, Community Development

Community design is an important approach to rural downtown revitalization efforts, yet, rural communities are often underserved with such assistance. Barriers to accessing these important services vary by community but can include the proportionally high cost of hiring professional design consultants, not knowing how to start the process, or even awareness of the role that design plays in supporting downtown revitalization efforts. When outside assistance is employed, the process and outcomes look different in rural areas rather than urban communities, where the research and literature are primarily focused. Compared with urban areas, rural regions show differences in demographic and economic changes that influence political behaviors (Cramer 2016). An additional difference between rural and urban communities is their level of readiness, defined as the degree to which a community is prepared to take action on an issue (Donnermeyer et al. 1997).

This study presents an engaged community study of the Winchester Design Studio in Winchester, KY. The studio was conceived as a three-year pilot project between two colleges at the University of Kentucky: the College of Design, and the Community and Economic Development Initiative of Kentucky (CEDIK) in the College of Agriculture Food, and the Environment. Located on the dividing line between the Bluegrass and Appalachian regions of Kentucky, Winchester was well suited to host this proof-of-concept for embedding the University's academic courses, service learning, and professional practice resources in a rural community. The studio's location in a historic downtown storefront provided a central space to host academic courses and studios, but also to act as a neutral third space for larger conversations around downtown, place, and community.

Assessing the role of design in Winchester was first undertaken by two graduate architecture students in an independent study course during the fall of 2018. Additional academic endeavors included a landscape architecture summer intern creating a master plan for Depot Street, a graphic design intern creating the Studio graphic identity, and Interiors studio working with housing service providers on how to design their facilities for dignity.

An obstacle we experienced was weak leadership within various levels of the local government, hindering downtown revitalization, and a lack of vision for how the community can best serve the next generation. Lessons learned from the Winchester Design Studio are directly influencing the upcoming Sharpsburg Design Studio, creating a new mechanism for the University's design programs to embed the land-grant mission into rural Kentucky communities.

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The Evolving Internship Experience: Reflections on a New Partnership for Experiential Learning, Discovery, and Engagement

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Keywords: Action-Research, Multidisciplinary, Campus as a Lab, Pollinators, Nature Rx

To enrich its undergraduate curriculum, the Department of Landscape Architecture at the University of Kentucky incorporated an internship as a required experiential learning course as part of its 2010 strategic plan. The internship experience has evolved to accommodate different partnerships and realities ranging from for-credit internships during the semester or summer as well as paid and unpaid internships. The purpose of this study is to examine the ten-year evolution of internships in the department and to evaluate a recent threefold internship model that combines teaching, service, and research.

According to Nisbett, Tannenboum & Smither, “experiential learning such as service-learning and internships provide real world learning as well as service to the community” (Kelshaw, Lazarus & Minier, 2009, 104). While internships typically are a skill-based experience in connection to professional education; service-learning engages students with the course content and develops a sense of civic responsibility in addition to advancing their skills (Wagner & Pigza, 2016). Moreover, a growing number of scholarly articles present action-research as an experiential learning model that integrates teaching, service, and research. Action-research balances the need to gather data with the need of students to gain knowledge about applied research.

Successful action-research models are possible through partnerships where resources are integrated, cooperation is forged, and institutions are remodeled in innovative ways (Kelshaw, Lazarus & Minier, 2009). Partnering with the University of Kentucky’s Sustainability Office has made possible the integration of learning, discovery, and engagement through grants and internships. Since its inception in 2015, its UK Sustainability Challenge Grant program has awarded a total of $1.35 million to 49 projects pursuing sustainability-driven projects. Over the years, projects have evolved to become more realistic in scope thus allowing for more targeted allocation of funds leading to successful outcomes, focused research efforts, and meaningful undergraduate internship opportunities through the UK Sustainability Internship program.

This presentation utilizes feedback (essays, forms, and surveys) from three groups to evaluate and validate the internship experience: students who benefit from knowledge and skill development; faculty and employers as supervisors; and the community that benefits from the student resources. This research will expand on a UK Sustainability Internship model that has utilized the UK campus as an action-research lab for two projects: 1) the implementation of a vision for a medical campus courtyard as a place to heal people and the environment and 2) an internship independent project focused on the design and installation of pollinator gardens.

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"Please Do Touch!" Increasing Community Participation in the Design Process Through Themes of Play and Interaction

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Keywords: Engagement, Tactile, Communication Tools, COVID-19, Curiosity

“Please do touch” invites the public to be hands-on in the design process. In community design it is vital to build trust with the public, give them agency in the design process, and gather their local knowledge and input to create spaces that are supported by the community and reflect its vision and values. To accomplish this, designers must provide a means for the public to not only provide their thoughts, but to be directly connected to the creation and testing of design concepts. This paper examines how interactive, manipulatable engagement tools and methods, combined with a theme of play, invite more authentic participation and exploration from the public and stakeholders in community-based design. Not all engagement has to be “serious,” and can have big impacts when the public is open to the end result - as opposed to traditional design review or voting approaches. Over the past decade, the opportunities presented through our community design projects have inspired experimentation and new approaches to garner greater participation, test design strategies, and create awareness of the design process. This paper also highlights how restrictions created by the COVID-19 pandemic expedited the advancement of the methods and materials we use and provide as support to our partner professional design teams to give them the capacity to innovate in their engagement.

As part of the evolution of our practices, we have critically examined traditional engagement tools and methods, their successes, and the factors that limit participation and authentic collaboration in the process. The idea of designing, drawing, or even committing an idea to paper, especially in front of others, can be intimidating for non-designers. Through our work and collaboration with professionals, we have explored how utilizing tangible elements that participants can manipulate encourages them to “touch” the design process, providing them with a deeper connection to the project and allowing them to see how their decisions will affect the spaces being designed. Additionally, we have experimented with strategies involving concepts of play to further entice interaction and create a more casual atmosphere for connecting with the public or stakeholders. Play has been incorporated into our engagement tools as well as into outdoor experiences and site installations to make the process approachable and reduce the barrier between designer and participant. These methods rely on curiosity and nostalgia over authority, and expertise to draw people into the process and facilitate design decision-making, conversation, and learning.

URBAN DESIGN

Urban Design

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System Order in Smart Cities

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Keywords: Urban Theory, Urban Systems, Smart Cities

Advances in Information and Communication Technologies (ICTs) are changing the ways communities provide for health, safety, and welfare. This paper considers how ICTs may influence the planning, design, and management of the built environment, particularly with regard to urbanizing areas and "smart cities."

This examination considers the built environment as a system-of-systems. The enveloping system is understood to be: (1) purposeful, because it is created to satisfy societal goals; (2) emergent, because the behavior of the whole cannot be reduced to the behavior of individual elements or sub-systems; (3) complex, because individual elements have many relationships with other elements; (4) open, because they exchange energy, materials, and information with their context; and, (5) self-organizing, because, internal structures or functions can be changed in response to external change. In this context, the introduction of ICTs reimagines longstanding conceptualization of the built environment as a coupled biophysical-social (or natural-human) system as a trebled biophysical-social-cyber system.

A central question is how system order evolves to address changing internal needs and external pressures. Working within a framework developed for characterizing functional relationships and identifying critical uncertainties within urban dynamics, three classes of ordering mechanisms based on triplets of civil- and civic practices are hypothesized. Examples of the first two mechanisms can be found throughout the nineteenth and twentieth centuries. "Order from above" predominantly comes about through factors grounded in political, security/safety, and conventional or "gray" infrastructure practices. "Order from below" predominantly comes about through factors grounded in social, economic, and conventional information exchange practices. The third mechanism is "order from within" and may occur through two triplets. Combinations of factors grounded in political, infrastructure, and ITC-based information practices enable high-models of order from within. Examples range from dynamic synchronized traffic signaling to the Peoples Republic of China's social credit system. Combinations of social, economic, and ICT-based information practices enable low-models of order. Examples are Reddit and Facebook. It is recognized that the three mechanisms of order operate simultaneously, even if not equally across a given area and at a given time.

Based on this theorization, opportunities to influence system structure and function within each triplet are considered. Topics related to urban dynamics, such as metabolic flows of resources, that are of central concern to landscape architecture and urban design, are highlighted. Approaches to quantitatively assess changes in the triplets are offered.

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Landscape Performance Research for Assessing Design Impact

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Keywords: Urban Revitalization, Urban Design, Urgan Regeneration, Vacant Land, Landscape Metrics

Michigan's crisis demands the redevelopment and reuse of neglected industrial sites. Gaps in past research on this topic include a dearth of studies specific to Michigan that involve the quantitative analysis of social, environmental, and economic aspects of industrial redevelopment of abandoned areas. The purpose of this research is first to examine the issues and challenges of urban vacancy, with a specific focus on abandoned industrial areas. Another purpose of this research is to develop a comprehensive master plan for a particular abandoned industrial site. Lastly, this research quantifies the design impact, based on the principle of landscape performance research. The study area for this research is the Michigan Central Station in Detroit, Michigan, USA. The abandoned Michigan Central Station is an empty 15-story station building area. Combining the station with the attached Roosevelt Park, the design site is over 6.9 hectares in size. The main design goals of this project were: 1) improving safety and social aspects, 2) fostering economic growth, and 3) enhancing environmental resilience. The design featured an extensive amount of open greenspace, providing areas for field sports, picnics, and other outdoor activities for diverse population groups. Changes would offer shade and climate mitigation for the southern end of the site. The old Detroit and Canada railroads were used as a concept for the sidewalk paths weaving through the site. A raingarden was added to the middle of the entrance drive lanes to help infiltrate water. The redesign of the abandoned elevated railbeds would provide the site with up to 30 new business locations designed to be beneath the railbed structure. The findings show that implementing the case study redesign would result in positive environmental impacts. These impacts include expanded areas of ecologically valuable land, a reduction in sulfur dioxide, and increases in carbon sequestration, retained stormwater, and the use of recycled contents. The design proposal would impact the surrounding economic context through savings on water treatment costs obtained from the use of retained stormwater, increased property values, and job creation. Furthermore, the redesign would also impact social aspects by increasing the available gathering spaces and public open areas and enhancing safety by adding sidewalks and bike lanes. The findings of this study will help designers and planners recognize the value of reusing existing industrial sites instead of undertaking harmful demolition processes, eventually leading to more sustainable community designs.

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Re-Design With Nature in Suburbia: Evaluating the Impacts of Sprawl Retrofitting Projects in the U.S.

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Keywords: Design with Nature, Smart Growth, New Urbanism, Natural Experiment, Green Space

Literature shows that urban sprawl causes negative outcomes for public health, society, the economy, and the environment. Recent efforts to fix those problems, often labelled as sprawl retrofitting, focus on increasing density, adding different land uses and diverse housing options, and improving walkability and environmental amenity. Preserving the natural environment and providing more green spaces are integral for sprawl retrofitting projects to achieve their goals. Nature in suburbia can provide environmental (e.g., biodiversity, air purification, water and climate regulation), socioeconomic (e.g., community events, place of cultural heritage, property value premiums) and physical and mental health benefits. But lacking in the literature is empirical evidence about if the recent projects have achieved their “regreening” goals. Some studies even show a significant loss of green space during suburban densification.

This quasi-experimental study evaluates green space changes in sprawl retrofitting projects in the U.S. completed between 2000 and 2018. The difference-in-differences analysis compares multiple green space measures in sprawl retrofitting sites to those in nearby neighbourhoods. First, socio-demographic analysis shows that despite the increased density and (seemingly) improved walkability, sprawl retrofitting projects may not have achieved their social and behavioral goals, while there is an indication of gentrification. Second, our analysis of 19 projects shows a significant decrease in all types of vegetation in sprawl retrofitting sites. Such decreases were bigger in project sites compared with a control group. And projects on previously public housing sites are most likely to lose vegetation. Through quantitative analyses and case studies of successful projects, we share planning and design principles of re-designing suburbia with nature. Key principles include: 1) Ensure the quality and quality of urban nature after development, 2) Integrate multi-modal access, safety, and walkability, 3) Provide inclusive and authentic public spaces and programming, 4) Increase local and regional connectivity of green space, 5) Promote environmental performance, and 6) Secure initial leadership and investment from the public sector. Our findings call for more dedicated and coordinated efforts to provide socially and ecologically functioning green spaces when retrofitting suburbia.

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Urban Design in Action: Searching for Best Use of the Downtown I-345 Corridor in Dallas, Texas

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Keywords: Highway Removal, Urban Renewal, Multimodal Connectivity, Walkability, Community Justice

What happens if a city repeatedly outgrows itself and endangers the physical memory of its cultural history? Dallas, Texas is a city confronting these issues and is being seen as one without significant place memory, culture and history. The downtown-adjacent neighborhood of Deep Ellum regularly finds itself at the heart of this conflict, much of it having been bulldozed in 1969 to make room for I-345, a raised highway (Maxwell 1994). Like most modern cities, Dallas has largely been designed to accommodate the automobile at the expense of the pedestrian, with I-345 being one of the largest offenders. Deep Ellum and Downtown see some of the city's heaviest foot traffic, but without streetscapes, pedestrian pathways, and amenities and open spaces that support this.

This research assesses this conflict by studying experts' spatial preferences and needs, and designs an appropriate replacement for I-345 in Dallas, TX. The research aims to improve the connection between east Dallas and Downtown, preserve the culture and history of the Deep Ellum neighborhood, and enhance the identity and economy of the city as a whole.

A four-step process following qualitative methods (Creswell 2008) is adopted to assess needs, and propose a redesign of the I-345 corridor in Downtown Dallas, Texas for its best use. First, the histories of urban highway removal, as well as Deep Ellum and Downtown, are documented. Next, five case studies of similarly affected cities are likewise reviewed (Francis 2001). In-depth interviews are then conducted with experts who live or work in the community. Finally, the spatial qualities of the area are documented using passive observation, photography, and GIS mapping techniques. The findings are then used to produce a design vision for the segment of I-345 corridor between Deep Ellum and Downtown Dallas.

In conclusion, this research demonstrates the best use for the area based on data triangulation (Deming & Swaffield 2011) and findings includes uses such as a walkable mixed-use neighborhood, communal green space, promotion of history and culture through public art, and affordable housing. The space occupied by I-345 has the potential to become a new transitional neighborhood that connects Deep Ellum to Downtown, while simultaneously improving the city's walkability and spotlighting the rich arts culture of Deep Ellum. Such design also has the potential to preserve the culture and history of Deep Ellum, improve the connection between east Dallas and Downtown, and enhance the city's identity and economy.

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Analyzing Spatial Distribution of Bicycle Sharing System Station's POI: An Open-Data Case Study of Bicycle Use as a Short-Distance Transportation Mode in Seoul, Korea

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Keywords: Bicycle Sharing System, Point-Of-Interest, Round-Trip Travel, Short-Distance Transportation Mode, Spatial Distribution

To date, many studies have explored the spatial pattern of bicycle sharing system (Lee et al., 2021; Noland et al., 2019; Zhang et al., 2018; Zhao et al., 2015; Xie et al., 2018). However, few studies have examined what is going on near the bicycle sharing system station in a micro-scale range. Docked system, a traditional system, mainly deals with the flow between stations, rather a certain station range. Recently, by emerging dockless system, researches of point-of-interest in specific areas became available (Shen et al., 2018; Xing et al., 2020). Nevertheless, this tends to be restricted to singular trip patterns with different origin and destination, causing a limited understanding of comprehensive analysis of the spatial unit.

With this background, this study supplements the existing studies by investigating round-trip travel of short distances, in which rental and return occur at the same station. The goal is to measure spatial distribution of overall point-of-interest around the station, which helps us better understand the shared bicycle system as a short distance transportation mode.

As for the methods for this study, round-trip travel data in October 2021 collected by Seoul public bicycle sharing system are examined. Each travel data has rental and return station, starting and end time, the sequence of GPS point with latitude and longitude recorded on a one-minute interval. This study has three steps of analysis. First, by measuring the velocity of each point and using Gaussian Mixture Model, we can distinguish the stopping points during round-trip travel (Lo, 2013; Schrader et al., 2016). Next, by using Kernel Method, it is possible to measure the distribution of point-of-interest by each station. Finally, the relationship between point-of-interest and environment factor such as distance, slope, facility density, and land-use, is analyzed.

As for the research findings, two types of POI distributions appear prominent: a type close to donut shape and its expansion type in a specific direction. Also, with each type, specific relationships are explained further through analyses with environmental factors, which previous studies mentioned. This study contributes to developing a new methodology that can easily compare and analyze the use of bicycle transportation by station. Also, when establishing traffic plan to promote bicycle use in the neighborhood, this study can give spatial guidance in terms of short distance transportation along with substantial POI characteristics.

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The Driverless City Project

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Keywords: Ubiquitous Robots, Urban Landscape Design, Geo-spatial and Digital Analytics, Human Infrastructure, Future Cities

Ubiquitous co-robots offer society a unique opportunity to reshape our transportation infrastructure. To do so, we must balance the needs of safety, usability, and aesthetics. These innovations will have consequences, either beneficial or detrimental, to the urban structure. The Driverless City Project, a current initiative at the Illinois Institute of Technology, interrogates these technologies' urban design implications, focusing on social equity, risk and safety, and environmental quality: How can the street right-of-way change from 20th Century transportation infrastructure into 21st Century human infrastructure? To mitigate safety risk, one could shape the environment to maximize a robot's localization safety, similar to the careful placement of radio-navigation equipment at airports for approaching aircraft. This could be done by creating ordinances that dictate the appearance of the streetscape so that self-driving cars, drones, and other mobile co-robots can guarantee their pose covariance envelope in the presence of faults as they navigate. However, modifying the environment to maximize co-robot safety could have negative and wide-ranging societal impacts if the process does not consider the needs of other stakeholders, such as pedestrians, cyclists, drivers, vehicle passengers, homeowners, business owners, robot manufacturers, and the government. In response, a highly interdisciplinary team studies the relationship between landscape architecture, city planning, and mobile co-robot navigation safety and the impact that ubiquitous robots will have on shaping urban design. This research presents a framework that informs city planners, architects, and landscape architects how to plan and design cities in which ubiquitous robots safely interact with humans and also educates roboticists on how the technology they are developing impacts other aspects of society.

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Urban Agriculture as Green Infrastructure for Urban Planning and Design: A Review of the Literature

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Keywords: Urban Agriculture, Green Infrastructure, Sustainability, Resilience, Multifunctional Infrastructure

The multi-functionality of urban agriculture (UA) includes increased urban food security, positive social and health impacts, and conservation of the urban ecosystem. This study provides a review of the literature on UA as it applies to urban green infrastructure (UGI) planning in the Global North. It examines how UA provides a significant component of UGI and identifies strategies by which UA is integrated into the larger city infrastructural development in order to explicitly provide services and deliver goods to cities. The review first explores how UA is one potential strategy to support urban infrastructure. It then examines the strategies employed to integrate UA into UGI planning and design. At the end, the study discusses the role of urban planners and designers to foster UA in urban environments and the contributions and limitations of the existing studies on UA planning.

This study represents a qualitative review of the literature published between 2000 and 2022 in urban planning and design journals. It focuses on UA and infrastructural development in the Global North, given its unique local contexts. Scientific and public electronic databases, including EBSCO, ResearchGate, Science Direct, and Google Scholar, were accessed from September 2020 to July 2022, to gather English-only peer-reviewed publications in the analyzed field. The relevant articles were extracted and organized into emerging themes to characterize the integration of UA in GI planning. The analytical framework was based on two general themes—infrastructural functions of UA and planning strategies for integrating UA into the UGI system. Under the general themes, subtopics were categorized by analyzing the content of the articles.

The review examines different strategies for promoting UA as part of GI planning. It shows land ownership, lack of supportive policies, prohibitive zoning laws, and legal concerns have been major obstacles to the growth of UA. There are also concerns about the effects of gentrification and race- and class-based inequality in UA practice. The review suggests that urban planners and designers should develop a new planning paradigm that prioritizes UA in the planning and design process and aligns it with urban agendas for promoting sustainability and resilience. This work has implications for urban planners and designers, as opportunities arise to plan and design UA as part of the UGI to make our cities more resilient.

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Open Space as a City's Response for Airborne Pandemics

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Keywords: Airborne Pandemics, Proactive Design, Open Space, COVID-19

Throughout history, pandemics have influenced the design of cities. The COVID-19 pandemic has presented the need for better management and design of urban areas to address widespread infections. During the COVID-19 pandemic and previous pandemics, many responses of the built environment were reactionary rather than proactive. This study researches patterns in the life cycle of pandemics, which can be categorized into stages, and their impact on cities, so appropriate responses to address each stage can be forecasted. This study uses literature review and precedent review of responses to the COVID-19 pandemic to synthesize programs and built environment interventions necessary in each stage of the pandemic in Bhilai, India as an Example.

There is a historical interconnection between airborne pandemics and urban design as evidenced by historical precedents. A close examination of airborne pandemics reveals the complex nature of these global events. Five common stages of pandemics and their associated attributes can be identified and generally defined. Stage I is characterized by an uptick of virus transmission above average levels, and widespread confusion and fear within the public. Stage II is when a sharp acceleration of transmission occurs, and the beginning of resource depletion. Stage III is the peak of transmission where resource depletion is worst, and the need for supplemental support is most critical. Stage IV is post-peak transmission where resources are still being exhausted. Lastly, Stage V is a large retreat in transmission levels and a lessening need for restrictions and support. The study further focuses on how these different stages were managed in India and how that compares to the general pattern of pandemic stages.

Corresponding to each stage of the pandemic, there are needs that can be identified and met through better planning of open spaces to increase testing capacity, maintaining regular health services, assisting poor and migrant workers, enforcing emergency measures, introducing mental health interventions, and increasing access to official information. Identifying needs during each stage constructs a framework of recommended responses in both the current stage and those expected to follow.

This understanding leads to the development of a series of urban design interventions, particularly in open areas, and is thus important for designers to understand through which the built environment can be better designed to address airborne pandemic-related issues. Such proactive planning can help designers address expected conditions at different stages in future pandemics.

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Landscape + Art: Enticing Long-time Neighbors to a Quickly Gentrifying Riverfront

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Keywords: Waterfront, Community Engagement, Partnerships, Art installations, Equitable access

Until recently, Buzzard Point Marina was a National Park Service waterfront property on the peninsula known as Buzzard Point, which is located at the confluence of the Potomac and Anacostia Rivers. Since the 1950's, the marina was a favorite for the local African American community that lives north of P Street, SW, in a neighborhood of affordable and subsidized housing created between 1945 and 1970. The more private marinas at James Creek and the marinas along nearby Washington Channel were always far too costly for most working-class boating enthusiasts.

In the past five years, Buzzard Point has undergone a dramatic transformation, long in the making. The structures that the U. S. Coast Guard previously occupied have since been transformed into luxury condominiums and apartments. Audi Stadium, home of the DC United soccer team, joined with Washington Nationals Baseball Park to create a dynamic sports-centered venue on either side of South Capitol Street. Subsequent hotel and entertainment development has begun to increase the gentrification woes of the local population. And even though the newly rebuilt (and dramatically designed) South Capitol Street Bridge (completed in 2021) is named for social reformer, abolitionist, orator, writer, statesman and former slave Frederick Douglas, the irony of inequity and disparity is not lost on the local community.

Over the last 20 years, University of Maryland students in the Landscape Architecture Program's Urban Design Studio have studied several sites along the Anacostia River, including the Navy Yard, the 11th Street Pedestrian Bridge, Poplar Point, and Buzzard Point. In 2022 Jon Conner, a landscape architect and vice president of Johnson, Mirmiran & Thompson, and Tammy Stidham, Deputy Associate Regional Director for Lands and Planning, invited students to assess recently completed conceptual design plans for the Park Service property on Buzzard Point. Students developed design proposals with their help and with assistance from neighboring developers RiverPoint Partners and Akridge Development, and worked with local residents to determine how best to establish a strong link between their community and the river. With funding ($20,000) from the University's Teaching and Learning Grant for Experiential Learning, students implemented several small-scale art-and-education installations based on these discussions, with the express purpose of enticing members of the Black community to the river—and to help the community feel that this is, indeed, their river.

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Student-Practitioner Partnerships for Transforming Baltimore's Highway to Nowhere Into the Westside Greenway

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Keywords: Partnerships, Collaboration, Experiential Learning, Environmental Justice, Green Infrastructure

Since January 2020, University of Maryland landscape architecture students in both the MLA and BLA programs have developed methods for studying the Highway to Nowhere on Baltimore's west side. West Baltimore is an historic African American community that has struggled with the injustices of segregation, property devaluation, unfair eminent domain, city-wide job losses, depopulation, abandoned homes, financially devastating subprime mortgage lending practices, and intrusive highway construction as "urban renewal". Intended as a fast-moving connection between the downtown and the western suburbs, its construction required the demolition of over 18 blocks of private homes and active businesses on the city's west side before further construction was successfully and permanently stopped by environmental advocates and empowered community members. Interstate 170 was the designation for this 1.39-mile (2.24 km) fragment of a freeway that was supposed to connect with Interstate 70 to the west[1].

The cross-section was a prominent means of looking at the 6-lane stretch of submerged roadbed and steep canyon walls, designed and constructed using interstate highway standards between 1970 and 1978. Equally as instructive and perhaps more memorable was the process of working with design practitioners, property owners and developers, private non-profit agencies, and city planning and transportation departments. With their advice and guidance, students proposed a variety of strategies for how the highway could be transformed into a pedestrian-focused urban greenway.

The Highway to Nowhere has the potential to become a major greenway link between the 1,000-acre Leakin Park within the Gwynns Falls, a 24.9-mile-long stream corridor, less than a mile from the West Baltimore MARC Station at its western end. At the eastern end of the underused freeway, Metro West (c.1978), formerly the Social Security Administration offices, dominates the line of sight as traffic merges into the city streets (Franklin Street and Mulberry Street) in the city's historic commercial center. In September 2022, the City of Baltimore Department of Planning and the Baltimore AIA Urban Design Committee organized a public forum in anticipation of making application to the "Reconnecting Communities Pilot Program", which was established through the Infrastructure Investment and Jobs Act (H.R.3684, 2021)[2]. Student work featured prominently in the discussion and in the exhibit displayed at the event and online. The interaction between students, private and public practitioners, and several community groups proved to be a valuable exchange of ideas and technical knowledge for all participants.

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Reading the Sudbury2050 Urban Design International Ideas Competition - A Toolkit of Potential Design Strategies for Urban Revival and Renewal of North American Towns and Cities Afforded Through Ecological Urbanism

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Keywords: Ecological Urbanism, Urban re-wilding and Re-Naturalizing, Design Competitions, Tactical Urban Design and Planning, Commoning

Many of our North American cities and towns currently find themselves in need of revival and renewal. Disinvestment in the public realm, decentralization – exacerbated during the Pandemic – vacancies and abandonment are some of the many challenges they currently face.

How might we begin to revive and renew our cities and towns, addressing these challenges? What ecological urbanism's agency as a strategic design framework, and an alternative to more formal urban strategies operating at both the bottom-up and middle-down and situated between the informal and formal? Restoring currently fractured ecologies might begin to form the underlying connective urban framework which might re-stitch our spaces through a landscape recovery of the Commons. These issues are explored through the Sudbury 2050 international ideas competition for which the author served as a juror -https://sudbury2050.ca/

The competition brief (2020) prompted a critical re-thinking North American cities the size of Sudbury (160,000) through "creating *a new vision for the urban core of the City of Greater Sudbury 2050 that is far-reaching and one that will serve the city well in a rapidly changing global environment".* Seminal contemporary design competitions which have critically re-thought the city through Ecological Urbanism Strategies will be reviewed. Further, the value of ideas competitions and a historical review of how past competitions have affected practice, trends and urban design education will be probed.

Many design proposals operated within an ecological urbanism framework including: the remediation of natural and industrial landscapes; new uses of rail corridors; designing from Indigenous perspectives, and re-greening strategies writ-large.

Our paper will distill and present several innovative design strategies resulting from the competition. Further, it will compare these with real precedents already built and developed in other cities of the same population. Feasibility issues encountered in their implementation will be examined and distilled as useful lessons. Aspects of the competition which are being considered for implementation by the City of Sudbury and the findings and solutions for restoring fractured ecologies will be discussed.
In conclusion, the paper will distill the innovative ecological urbanism strategies from Sudbury2050, positing these as catalysts for re-imagining smaller North American towns and cities that might become increasingly sustainable and viable. Further will be establishing critical dialogue on the re-thinking of smaller cities as places for specific civic infrastructure interventions and how their implementation will have the capacity to affect positive change in the lives of the people living in them.

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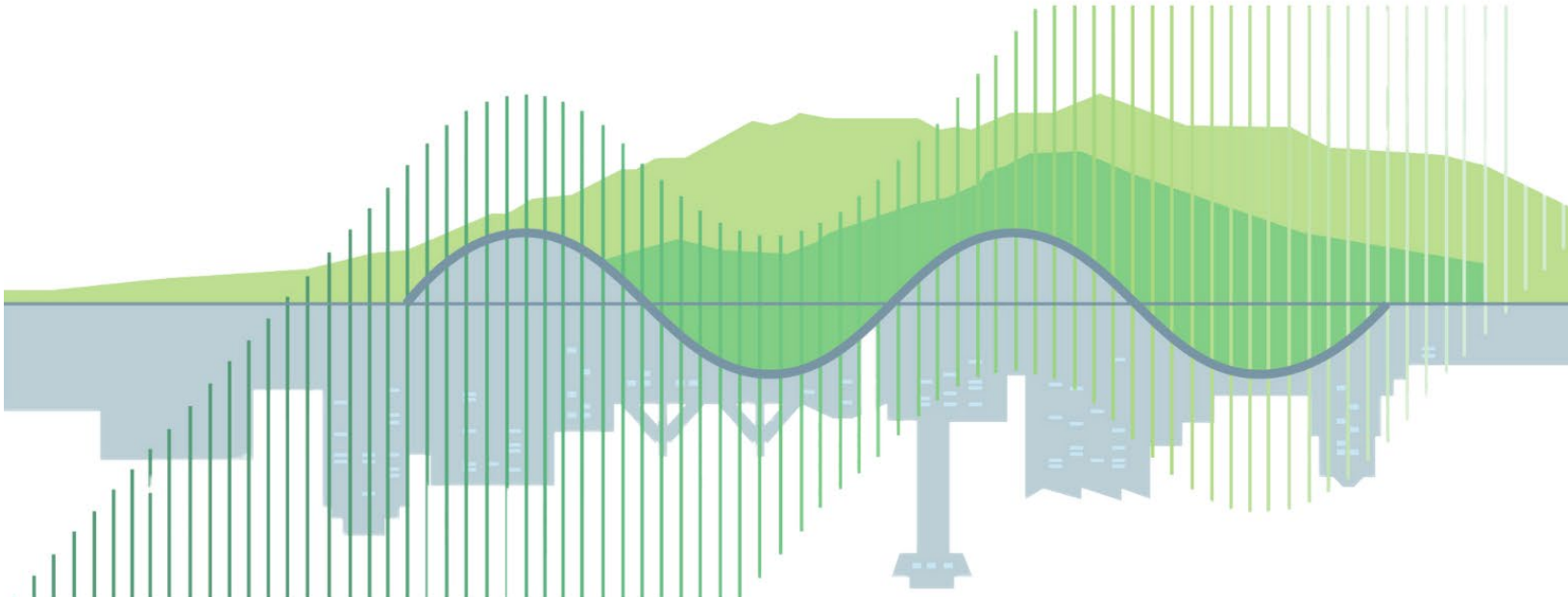
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