

GHATS ON THE GANGA IN VARANASI, INDIA: A SUSTAINABLE APPROACH TO HERITAGE CONSERVATION

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1 ABSTRACT

At Varanasi in India, where the Ganga reverses its flow, the 84 ghats (steps and landings) in a 6.8 km stretch are an iconic image of the city. Their built fabric evolved over 800 years from self-organized systems of worship and pilgrimage. The cultural landscape is complex in its layering and detail, and was resilient in its recovery from natural disasters as well as cultural upheavals. This can be interpreted as constituted by situated events, natural--flooding, silting, and changing flow of the Ganga--and cultural--ritual activities and performances in diurnal and seasonal rhythms tied to the Ganga. The riverfront is a complex ecosystem evolving from spatial practices responding to natural phenomena and its cycles that reflect the Hindu understanding of cosmic order. The ecosystem is stressed by over use and unprecedented levels of pollution in the Ganga, posing a challenge to the idea of the river as an archetypal symbol of purity and to the continuity of spatial practices. For sustainable conservation of the ghats, design and management strategies that will ensure a healthy and resilient cultural landscape should be based upon a systems approach. Patrick Geddes' town planning reports in early twentieth century India are a useful precedent in connecting traditional cultural practices with ecological planning. In the proposed framework, the symbolic meanings of nature in traditional beliefs and practices are augmented with utilitarian functions in local energy cycles linking sun, flora, and fauna that will address air and water pollution and increase the capacity of the landscape to recover from flood events.

1.1 Keywords

cultural landscape, heritage, spatial practices, purity and pollution, sustainable conservation

2 INTRODUCTION

At Varanasi, the spiritual capital of India, the holy River Ganga takes a northward turn, describing a crescent sweep of ghats (steps and landings), over which rise the impressive temple spires and palace towers of historic Varanasi (Figure 1). The ghats, having evolved over the last eight centuries into the spiritual center of Hinduism, have recently been the cynosure of attention. Their ill-maintenance, encroachments, solid waste management problems, and increasing pressures caused by three million visitors annually is jeopardizing their iconic image and resulting in loss of many cultural traditions. Although urban infrastructure—sanitation, solid waste management, water supply—in Varanasi has been upgraded and measures have been taken to reduce the pollution in Ganga through schemes launched by the Government of India, the efforts so far have failed to address the issues at the ghats. The top-down, engineering approach is not sensitive to cultural traditions, mythologies, and the local ecology, putting into question the long-term social and environmental sustainability of the on-going projects. A new approach based upon the idea of the ghats as an eco-cultural system will be more effective in engaging local communities in making the landscape healthy and resilient.



Figure 1. Skyline of Varanasi Ghats.

3 VIEW OF NATURE

The cultural landscape of the Ganga Riverfront reflects the ancient Hindu world-view in which the occurrence of natural phenomena is celebrated as manifestation of *rta* or cosmic order. *Rta*, derived from the Sanskrit root of verb *r* meaning to go or to move, is believed to underlie the movement of celestial and terrestrial phenomena, of solstices and equinoxes, of flowing rivers and vegetal growth, and the cycle of seasons. The diurnal and seasonal rhythms of natural phenomena express this eternal order that governs human life as well. The traditional belief is that participation in rhythms of nature brings harmony and happiness and reaffirms the universal order. Time is conceived as cyclical as in the birth and death of all living entities that are part of nature. It is celebrated in festivals tied to seasons and harvests, and in life cycle rituals.ⁱ These cultural practices are spatial in that they produce the landscape through human interactions with the natural phenomena (Sinha 2015, 43).

On the banks of Ganga in Varanasi, the sun and the river are central to spatial practices and are worshipped as transcendent divine entities made immanent through their material form and physical presence. As symbols of natural archetypes of fire and water, they are sources of energy that create and sustain all life. Ganga, deriving from the Sanskrit verb 'gam' meaning 'to go', is the prime symbol of purity in her capacity to cleanse and purify through her flow. She is liquid *shakti* (energy) as Shiva's consort and life sustaining as the mother's milk, known as Ganga Ma (Eck 2015, 240). Her descent to earth nurtures millions living in the plains of Northern India. As a divine goddess and a flowing river that purifies all that it touches, the Ganga's spiritual and phenomenal forms are mutually constituted. The sun, worshipped as *aditya*, generates life as a source of light and heat. Its movement in the sky known as *uttarayana* and *dakshinayana*, beginning with the winter and summer solstices, is an expression of *rta*, bringing forth the seasons. Similarly, the moon's waxing and waning, symbolic of death and renewal, is the basis of the lunar calendar in which the month is divided into auspicious (*shukla-paksh*) and inauspicious (*krishna-paksh*) halves.

At the ghats, time, space, and cultural practices come together in commemorating divine nature and engaging with its material forms. Ganga liberates one from the cycle of death and rebirth when cremation occurs on her banks. Circadian rhythms are affirmed in daily worship of the sun at dawn in the ritual *namskar* and in the evening *aarti* (waving of lamps) to Ganga. Shrines to *aditya*, the sun-god on the western bank were located to align with the sun's position in the sky, marking *yantras* (triangles formed of visual axes), thereby inscribing a certain order in the landscape (Singh 1994). Most of these shrines are now lost, but a few remain and their tanks are used for bathing on the auspicious occasion of *Makar Sankranti* (January 14) when the sun begins its northward journey. Festivals such as *Ganga Dusshera*, *Mahashivaratri*, *Kartik Purnima*, and *Deva Deepavali* are celebrated in accordance with the lunar calendar, when devotees take a dip in the holy waters and the ghats are lit with lamps (Eck 1982, 253). They commemorate the descent of Ganga, Shiva whose matted locks break her fall, the fortnight of the annual visit of ancestors to earth, and *lila* (deeds) of Vishnu avatars, Ram and Narsingh.

4 CHALLENGES

The built fabric of the ghats—its steps, landings, historic palaces, temples, and shrines—was shaped by cultural practices based upon the value assigned to being in harmony with natural rhythms and belief in purity of Ganga. The riverfront landscape evolved as a complex ecosystem in which culture and nature are in a symbiotic relationship (Ramakrishnan 2003). Human activities are synchronized with the dynamic natural phenomena, both affirming the transcendent cosmic order. The ancient settlement was situated on the west bank on the Rajghat plateau at the confluence of Ganga and Varanasi. Behind the high ridge were lowland water bodies amidst forests that gradually disappeared as the city expanded southwards (Singh 1955, 15; Eck 1982, 48). Small settlements around inland lakes gave way to the sprawling city and the riverbank was transformed over time from a natural wooded area dotted with ashrams (hermitages) to the heavily built-up urban edge today used for the cremation of 32,000 corpses every year and with 35 drains and sewers emptying untreated wastewater and untreated sewage (Naskar 2014). Biological oxygen demand (BOD) levels in the river are over 40 mg/l in Varanasi when they should be 2 mg/l or less.

The ghats being the public commons of the city are intensively used for recreation and myriad other activities—washing clothes and buffaloes, open air defecation, transporting goods, and discharge of sullage.

The riverfront is severely stressed today with the core beliefs and practices beginning to lose their validity. As pollution mounts in the river, the Ganga's centrality in Hindu imagination as the ultimate symbol of purity is weakening. Cultural practices valorizing Ganga's divinity are themselves generating waste that contributes to the local point source pollution (Conaway 2015). There is a disconnect between ideology and reality, and a mismatch between the concepts of Ganga as pure (*shuddha*) and clean (*swatcha*). Priests at the ghats believe that Ganga will always be pure even though not clean, leading to lack of religious mobilization in state efforts to clean Ganga (Alley 1998). Rituals paying homage to the powers of the Ganga have become spectacles and are in danger of losing their meaning as beliefs are challenged by all too visible evidence of widespread environmental pollution. Diesel boats plying on the river with low-grade engines and incomplete combustion of fuel, contribute to air pollution (Singh 2016). Many inland water bodies have been filled up and have become dumping grounds for waste leading to groundwater contamination. The Ganga in Varanasi, far from nourishing life, is a source of water-borne enteric disease for those who bathe in it and drink its waters.

Efforts to control pollution in the Ganga have been unsuccessful in part because of the top down approach in wastewater infrastructure projects constructed under the aegis of the Ganga Action Plan launched in 1986. Alley (2016) points out that sewage pumping stations and sewage treatment plants do not function to their full capacity because of intermittent electric supply and the state monopoly has led to corrupt practices that make the system even more inefficient. The more recent *Namame Ganga Scheme* announced in 2014 has recommended bio-remediation and in-situ treatment of waste water flowing through the open drains in addition to new sewage and effluent treatment plants. This would require considerably less energy and has the potential to involve local communities. A combination of decentralized, bottom-up and top-down, central approaches may have a higher rate of success in tackling what is proving to be an intractable problem.

5 METHODS

Heritage conservation in South Asia has been largely a state enterprise and has continued the colonial legacy in preserving monumental buildings (Sinha 2017, 2). New government initiatives such as HRIDAY and PRASAD on sacred and historic cities focus on developing their infrastructure.ii Neither effort considers the cultural landscape that sustains tangible and intangible forms of heritage and is a product of a culture's relationship with nature. Patrick Geddes' bio-centric approach as demonstrated in his planning reports for cities in India in early 20th century is a useful precedent to consider in developing an alternative framework for urban heritage conservation. While Geddes' report on Varanasi can no longer be traced, his work in other Indian cities exemplifies the importance of decentralization, civic responsibility, and collaborative planning (Tyrwhitt 1947). As his letters to friends show, Geddes understood that nature is sacred in Varanasi and creation of new life follows from destruction (Lannoy 1999, 600). In his diagnostic survey of historic cities, proposals for conservative surgery of dilapidated structures, and improving sanitation through sewage gardening, Geddes emphasized renewal and placed human needs above all (Khan 2011). He believed that planning for individual and societal development should occur by applying cultural insights to ecological niches.

A century later, the Geddesian approach is valid for planning the Ganga Riverfront in Varanasi. The cultural heritage embodied by the ghats is at grave risk when the core belief in Ganga's purity cannot be sustained and traditional practices lose their meaning. The complex layering of historic and vernacular built forms, spatial practices tied to seasonal and circadian rhythms, and stresses caused by pollution resulting from mechanized traffic and activities of millions of people make it imperative that conservation goes beyond historic structures and engineering projects, and address issues holistically in a system-based approach. In systems thinking, landscapes are inter-connected webs of spaces, events, and flows of energy and sustainability is 'the quality of not being harmful to the environment or depleting natural resource, and thereby supporting long term ecological balance' (www.dictionary.com).

For a sustainable approach towards cleaning Ganga and ensuring a healthy and resilient riverfront, the spiritual and phenomenal aspects of nature need to coalesce in conceiving planning and management strategies. The chasm between Ganga's divinity and her material properties should be bridged such that her transcendent powers are perceived to be immanent in her earthly flow. Similarly, sacred symbolism and utilitarian values of sun, flora, and fauna should be integrated in developing strategies for managing the complex eco-cultural system of the ghats. The following set of design strategies were developed based on mappings of flows of animals and people, cultural practices, waste, flooding, and sun and shade on the ghats.iii The mappings were developed from REAP (Rapid Ethnographic Assessment Procedure) at the ghats using multiple research tools—observations, interviews, and visual documentation. The mappings spatialized and interpreted the data, enabling understandings of complex inter-relationships between cultural practices and landscapes processes. They provided the framework for developing design strategies for preserving cultural heritage and promoting environmental health of the riverfront.

6 SUN

The sun is worshipped daily and during festivals especially during the festival 'Loraka Chauth' 'Lorark', the 'trembling sun' is venerated at the shrine and kund close to Assi Ghat (Singh and Rana 2006, 109). This ghat, at the confluence of Ganga and Assi Nala is an auspicious site for bathing, especially on Makar Sankranti when the sun sets on its northward journey, *Uttarayan*. However, its energy remains untapped. In January and June, the coolest and warmest months respectively, between 85% to 92% of the

ghats receive sunshine between 9 am-2 pm. Solar energy can be harvested from this abundant sunshine in solar panels mounted in the vacant site south of the Ghat where the riverfront is not actively used. Given the erratic supply from the grid in Varanasi, this renewable energy can be an alternative source of electricity to be used in powering boat engines, in charging stations for mobile devices, and lighting the ghats (Figure 2).

The solar lighting system will increase safety and accessibility as the ghats are presently unevenly lit. Bollard lighting on the pilgrim trail, spot lighting on heritage buildings and signage, and evacuation lighting during emergencies, can be installed at low cost. The ghats support many small vendors who do brisk business by selling tea and snacks. They rely on biomass fuels such as coal or wood for cooking which contributes to air pollution and is harmful to the health of those cooking. Solar energy harnessed by sun ovens is clean and inexpensive and can be used for cooking in small restaurants and food stalls. Their parabolic shape, shiny surfaces, and adjustability allow harvesting the maximum amount of sunshine at any given time of the day. Sun ovens can also be mounted on mobile carts thus increasing the mobility of vendors.

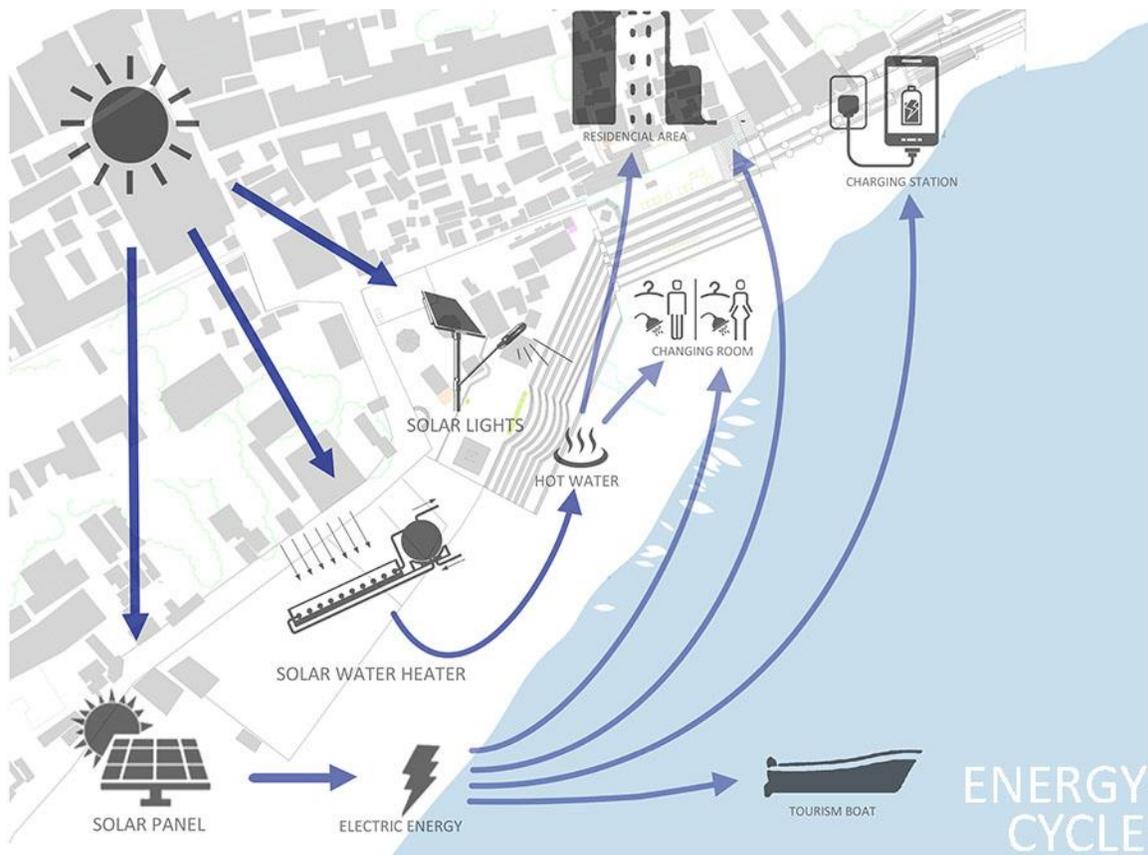


Figure 2. Solar energy cycle.

7 FLORA

Vegetation is sacred in Hinduism because of its associations with powerful gods and goddesses. The bel tree is symbolic of Varanasi's ruling deity Shiva and numerous shrines containing *shiva lingas* are found under bel and other trees such as *pipal* and neem. The densely built-up southern part of the ghats has a few tree-shrines; the tree cover becomes denser near the confluence of Varana and Ganga where seasonal farming occurs on the river embankment. The flood plain soils on the east bank support seasonal farming as well. Among flowers, lotus of the *Nymphaeaceae* family occupies a very special position in the culture. Its emergence from the waters signifies the birth of cosmos itself. As the seat of gods and goddesses,

particularly Vishnu's consort Lakshmi, it is a symbol of stability as well the dynamic life force, *shakti*, that caused form to emerge out of watery chaos (Sinha 2006, 40). Marigold flowers are extensively used in ritual worship. The symbolic meanings of plants rest upon their material attributes, in particular their curative and remediating powers; it is this aspect that can be harnessed for addressing air and water pollution on the ghats. The utility of vegetation can extend beyond its shade giving property and as a source of food (cereals, vegetables, fruits) to its ability to filter pollutants and use treated waste as fertilizer.

Untreated sewage from the city is the major source of pollution with the two major drains, Nagwa and Khirkhi, located at the southern and northern ends of the ghats, emptying untreated sewage into the river. In addition, domestic wastewater from the old city is carried to the river in surface drains (*nalis*) on the ghats. A large amount of solid waste is generated at the ghats and by the adjoining urban neighborhoods. The shoreline at the popular ghats is littered with rubbish and it is not uncommon to stumble into rotting piles of ritual offerings (Figure 3). Local point source pollution stems from flower offerings, food scraps, plastic bags, clay pots, lumber from old boats, washing of clothes and bodies, animal waste, ash from cremations, charred human flesh, and animal carcasses. Non-point-source pollution from industrial effluents and agriculture adds to the overall contamination levels, causing the biological oxygen demand (BOD) to increase by more than 500% in the Ganga after she passes through Varanasi.



Figure 3. Waste mapping at Dashashwamedh Ghat.

Phytotechnology- i.e., a plant based system for remediation--is natural, uses solar energy, and is low cost (Kennen and Kirkwood 2015, 7). Free water surface constructed wetlands are effective in wastewater treatment, easy to operate, and can be maintained by local communities as shown by their performance in historic Warangal (Jayakumar and Dandigi 2002). They can complement the industrial STPs that are resource intensive in terms of energy use, space, and engineering skills. For example, where Assi Nala empties into the Ganga, phytoremediation will be useful in treating wastewater and sillage carried by the stream. The old streambed of Assi Nala that was channelized to build Ravidas Ghat is proposed to be restored and widened to construct rain gardens. This will enhance the water retention ability of the Nala and

prevent flooding during monsoons. Plants in the rain gardens will absorb pollutants and filter waste. Another major pollutant at Manikarnika and Harishchandra Ghats is ash generated from cremations, about 1.8-2.7 kilograms per body, and scattered directly into the Ganga. These ashes can be collected in biodegradable urns to be planted on the alluvial flood plain of the east bank. The urns will have a top layer of soil containing seeds, which after germination will penetrate and use the ashes in the lower layer as a fertilizer. The recycling of ashes in the memorial grove will not only be environment friendly but also a powerful symbolic gesture.

At Manikarnika Ghat, popularly known as the 'burning ghat' because of its perpetual cremation pyres, the air is always thick with smoke and cinder from the burning logs with temperatures reaching 60 degrees Celsius in the scorching June sun, and the surrounding buildings are covered with soot. The dominant wind direction is from west to east, spreading smoke, ashes, and dust to the Ganga. Shade trees such as neem, *pipal*, and banyan will improve the microclimate. Small gardens can be planted at ghat edges, especially where silt deposits after the monsoons and is difficult to remove. Local organic waste such as leaves, flower and food offerings, and clay pots that are strewn on the steps can be collected and treated in compost tumblers to fertilize the silt gardens here and at other ghats. The proposed compost program for transforming waste into a productive growing medium requires trash receptacles, compost bins and tumblers to be located at strategic points along the ghat stretch.

The landscape of the unbuilt east bank is contingent upon the river flow and its shifting patterns, its convex shape unstable as the river meanders and streamlines diverge. Since the flood plains of the concave (western built edge) and convex edges are inter-related on the bend of a river, it is likely that increasing sedimentation will impact the ghats (Choudhary et al 1996). Sand should be dredged from the shoreline and deposited further inland in the low-lying areas where the memorial grove can be planted. Constructed wetlands planted with grasses in low-lying areas, interspersed with higher sand mounds, will filter the agricultural waste from upland farming. The intermediate level with rich alluvial deposits will be for seasonal farming that is already occurring with watermelon and bitter gourd. The highest level, accessible even during the monsoons, is planned as *maidans* for public use (Figure 4).

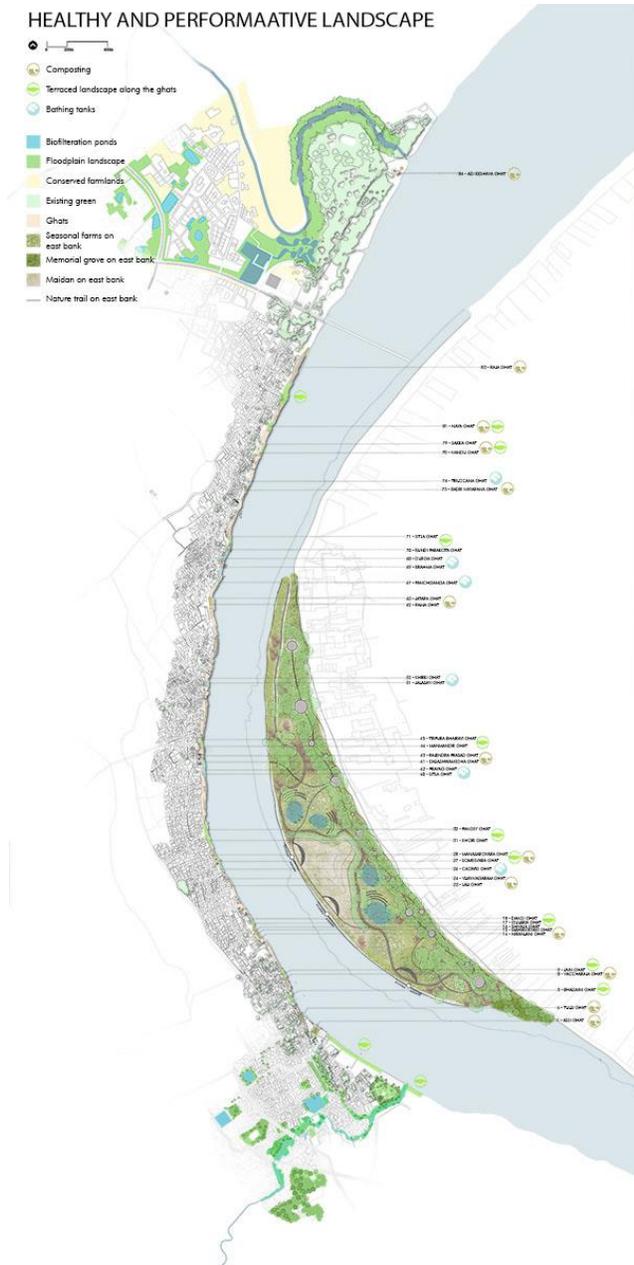


Figure 4. Site Plan for a healthy and resilient landscape.

8 FAUNA

Bovines are very much a part of the ghat scene, ambling up and down the steps, resting on landings, eating out of garbage, munching marigold offerings, and bathing in the Ganga. Their ubiquity in public spaces and a lack of restriction on their movements are based upon the respect accorded to the cow in Hindu culture. The cow is revered as mother or '*gau-mata*' and is given protection, her slaughter a grave sin in Hinduism. She is a symbol of earth in its generosity and support of all living beings, and of wealth and prosperity. She is associated with Krishna and ascribed divinity in her form as '*Kamadhenu*', the cow of plenty who gives all asked for. Her milk and milk products are used in many sacred rituals and her dung is used as fuel, fertilizer, and disinfectant. Nandi bull, the vehicle of Shiva, is visibly present in sculptured stone at the threshold of shrines and temples. Decorated cows are often paraded around and the chant

'*gau hatya pap hai*' (killing cows is a sin) can be frequently heard at the conclusion of a ritual ceremony on the ghats.

The 'zoogeography' or study of cattle movement (Hui 2015) on the five ghats revealed dung piles in lanes and stepped landings, adding to other biodegradable forms of waste. The roaming cattle and goats at the cremation sites on Manikarnika Ghat disturb the solemnity of funerals, and at the other two crowded ghats—Dashashwamedh and Panchganga—add to congestion. At Assi and Raj ghats, buffaloes are found in large numbers, resting and bathing in the river. The widespread presence of cattle means that their dung is produced in large enough quantity for it to be treated as a resource. Vandana Shiva (2002) describes the cow as a keystone species for sustainable agro-ecosystems and performing a critical function by converting organic matter into nutrients for plants. The symbolic status of the sacred cow in Hindu society is derived from her utility as an economic resource.

At the ghats, animal dung, instead of flowing into the Ganga, can be systematically collected and used to generate biogas and fertilize gardens. At Assi Ghat, a milk cooperative society is proposed in the adjoining *maidan*. Here the roaming buffaloes can be gathered in a buffalo farm, fed flower offerings from rituals occurring all over the ghats, and their dung collected in the biodigester. Anaerobic digestion will treat the manure to produce biogas that can be used for cooking milk-based sweets, in great demand as *prasad* (offerings) to the gods in Varanasi temples and shrines. At Adi-Keshav Ghat, a *gau-shala* (cattle shed) is part of a proposed ashram next to the Adi-Keshav Temple where *panchkroshi* pilgrims stop before completing the final leg of their journey. Cows will be an integral part of the ashram life, their milk, and curd and ghee made from it used in ritual ceremonies. Their dung as well as other organic waste collected from Raj Ghat will be treated to produce biogas and the digestate will be used as fertilizer in the community gardens planted on the embankment to grow fresh vegetables for the ashram (Figure 5).



Figure 5. Proposed energy cycle at Adi Keshav Ghat.

9 CONCLUSION

Ganga's pollution is a grave threat to her centrality in Hindu thought as a symbol of purity. The reduction in local point source pollution is necessary to sustain rituals tied with holy waters that are a cornerstone of cultural heritage of Ganga and her ghats. The resilience of this cultural landscape has been proved time and again; however, climate change and unprecedented levels of pollution may cause irreparable damage to this legacy. The sustenance of heritage for future generations is tied to planning policies and design interventions that can be effectively implemented using local resources and energy. The complex eco-system of the ghats had evolved from self-sustaining cycle of human activities integrated with natural rhythms; it is unbalanced and stressed today as its carrying capacity has been exceeded many

times over. Although the public spaces of the Ganga Riverfront are a civic responsibility, the government has been ineffective in filling in the vacuum left by the loss of royal patronage in independent India. Top-down planning practiced so far should be complemented with the bottom-up approach as a new and more effective way to deal with the challenges in keeping Ganga clean and preserving the cultural heritage of the ghats. The design strategies were presented to stakeholders—Municipality, Public Works and Town Planning Departments, local NGOs and concerned citizens—as a framework open to adjustment to ground realities and input from local communities in the course of site specific implementation.

The banks of the Ganga should be protected from any further development that is not ecologically sustainable, which means designing with water, sun, flora, and fauna. This would create new cycles of energy production and consumption and of waste transformed and recycled, all embedded within the age-old cycle of spatial practices tied with natural rhythms. This approach is in keeping with the Geddes' framework of bio-centric planning in which urban settlements are parts of regional ecology and where community development is a function of working with traditional practices that are in harmony with natural processes. On the Ghats in Varanasi where nature is worshipped based upon the powers of Ganga to create and sustain life harnessing the energy of sun, it is important that the transcendent status of nature deities and their earthly physical forms are not considered separate, and their symbolic and utilitarian values be combined in planning for a healthy and resilient landscape.

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- All figures courtesy of Department of Landscape Architecture, University of Illinois at Urbana Champaign)

ENDNOTES

- ⁱ Rta Ritu: An exhibition on Cosmic Order and Cycle of Seasons. Indira Gandhi National Centre for the Arts, New Delhi, January 4--March 30, 1996.
- ⁱⁱ HRIDAY (Heritage city development and augmentation yojana) scheme is for heritage cities and comes under the Ministry of Urban Development while PRASAD (National mission on pilgrimage rejuvenation and spiritual augmentation drive) is focused on pilgrim cities and implemented by the Ministry of Tourism. Varanasi is covered by both schemes.
- ⁱⁱⁱ In two-week long site workshops in Varanasi (January 2014 and 2016) conducted with B.N. College of Architecture, Pune, India, the ghats were studied extensively by undergraduate and graduate students in Landscape Architecture and Architecture. The project reports *Ghats of Varanasi on the Ganga in India: The Cultural Landscape Reclaimed* (2014) and *Envisioning a Resilient Cultural Landscape: Ghats on the Ganga, Varanasi, India* (2016) summarizing design studio work at University of Illinois at Urbana Champaign, USA campus can be accessed at: <http://landarch.illinois.edu/india-projects>
- ^{iv} This project was developed by Reina Patel in the Grand Challenge Learning Course for Freshmen (GCL 129) taught by Amita Sinha at University of Illinois at Urbana Champaign in Spring 2016.