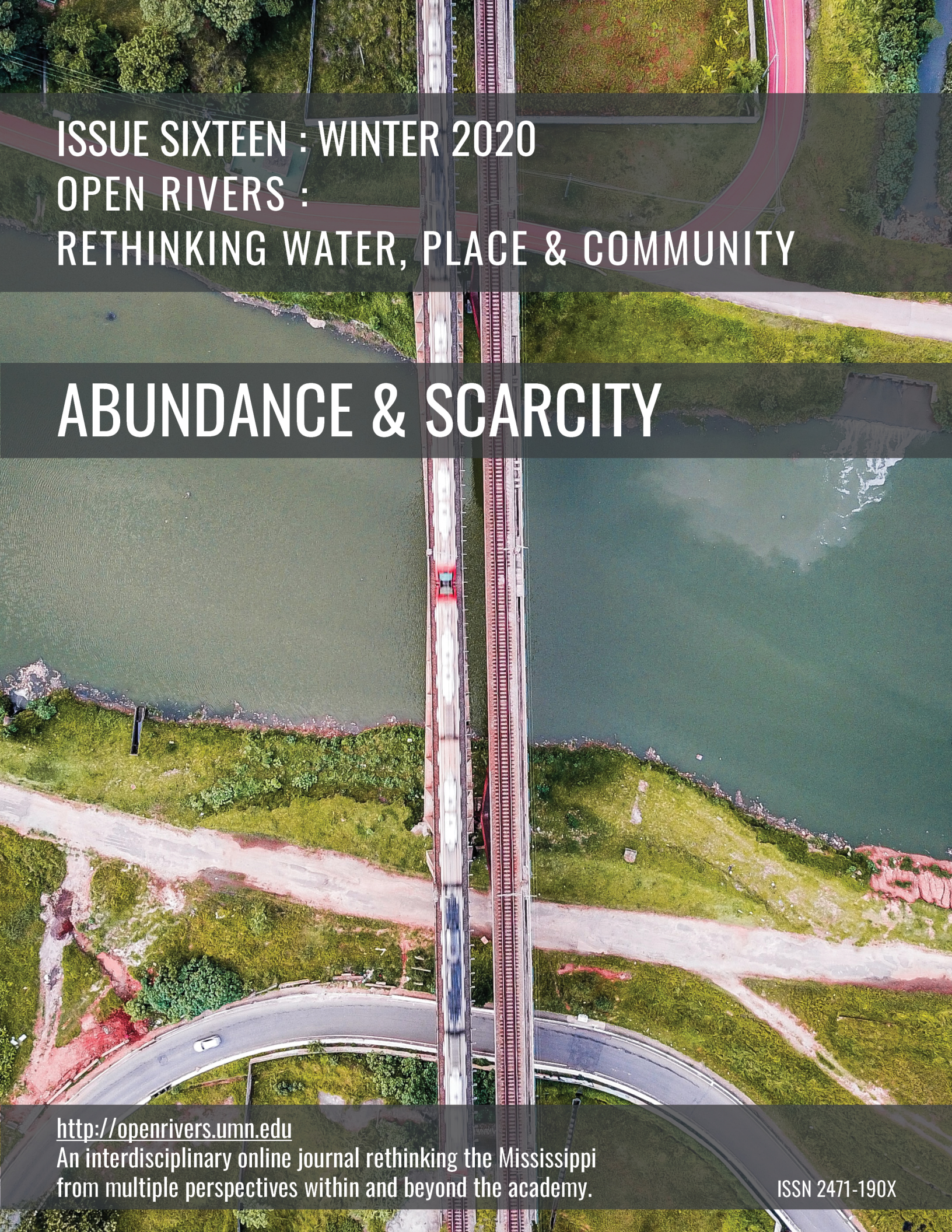

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FEATURE

THE GIFT OF WATER

By Leslie A. Johnson

India today faces a wide variety of issues related to water management. These include flooding during the several-month monsoon season, a lack of water during the dry season, depletion of groundwater stores, and unreliable water pipelines bringing water into cities (Kumar, Kar, and Jain 2011; Sagar, Rajeevan, and Rao 2017; Shah et al. 2003; Verulkar et al. 2010). Yet while India may be a well-cited example of a place struggling to create new forms of water infrastructure, it is hardly alone in the task. Over the past several decades, there has been an increasing awareness globally of the need to manage our water resources in ways that better conserve, reuse, and protect our water supplies (O'Hogain and McCarton 2018, vi). In the world of design and planning,

Children swinging on the pond's banyan tree. Image courtesy of the author.

this acknowledgment has led to growing support for a shift away from grey infrastructure to green infrastructure; that is, rather than projects relying on pipes, pumps, ditches, and detention ponds, solutions are derived from nature. The necessity behind this shift is evident when discussing issues related to climate change, growing populations, and water quality (Dong, Guo, and Zeng 2017, 281); but, often, issues identified still tend to focus largely on technical aspects of a water system, or utilitarian needs that must be addressed. A changed social relationship between people and their water systems has been less studied. The intention of this article is not to promote any particular physical infrastructure, but rather, to highlight that when designing water management systems, we must consider the sociocultural factors that surround them. That is a shift away from our current practices regarding water management, where a host of infrastructural, legal, and societal barriers create a removed relationship between people and their water systems. Looking to Indian traditional water management offers a refreshing contrast, where water is clearly valued, as their accompanying social and cultural practices imply.

Travels in Dhamori, India

In December 2017, I traveled to Dhamori, a rural village in central India, with Professor Alpa Nawre, a landscape architect and assistant professor of landscape architecture at the University of Florida. With support from the Landscape Architecture Foundation and the Indian Parliament, she led a group including two landscape architecture students (myself included), an engineer, and an architect to Dhamori to address issues of water management. We spent several weeks carrying out research, assisting with workshops to engage the local community, and meeting with village leaders and regional stakeholders. Through these efforts, we created a

View of Dhamori and the village pond. Image courtesy of the author.

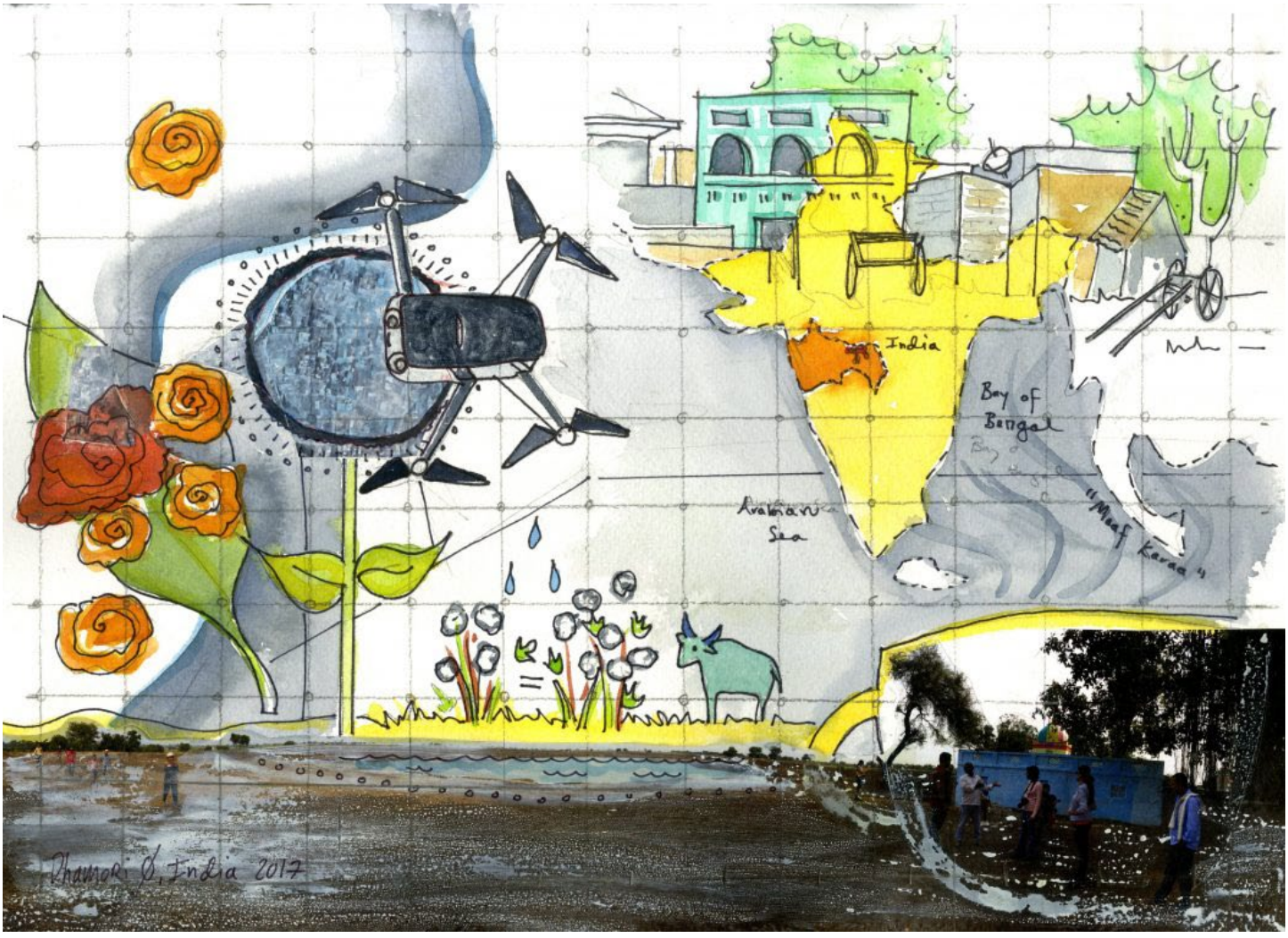
village development plan, which we presented to the village, and we constructed a playground with the assistance of local donors. The final product was a report submitted to the Parliament's existing village development initiative, the Sansad Adarsh Gram Yojna (The Member of Parliament's Model Village Scheme or "SAGY"). To learn more about the Dhamori Village Masterplan, visit https://www.criticalplaces.org/works/dhamori-village-masterplan.

Part of the development plan drew from traditional water management strategies. While a water tower in the village provides villagers with drinking water, there is a lack of water for irrigation, and our plan recommended additional catchment ponds and wells to supplement their farming needs (Nawre 2017). These farm ponds are a long-standing form of traditional water management and have purposes beyond the single function of holding water. A large, existing pond in the village is one of the primary gathering places for the community and where many of the village's important cultural festivals take place. This versatility, serving both utilitarian and sociocultural needs, is a common feature among Indian traditional water management systems. As we carried out this project in Dhamori, it became clear that the sociocultural aspects of Indian traditional water management systems represent a dimension of water management that is not commonly discussed today. Indian traditional water management systems, and how their communities historically interacted with them, have the capacity to provide valuable insights as we explore new forms of water management and seek to improve our relationships to our water systems.

Presentation of development plan to Dhamori residents. Image courtesy of the author.

Defining Indian Traditional Water Management

Indian traditional water management can generally be defined as the structures that Indian communities built to catch, hold, and store rainwater prior to the British colonization of India in the mid-eighteenth century. Examples include *bandhas*, which are stone check dams that stretch across streams in the Thar Desert to divert monsoon rainfalls and deposit silt onto their farm fields. In the cities of Bikaner and Dwarka, most houses, temples, even some commercial properties use *tankas*, small underground tanks, to collect and store drinking water. *Tankas* consist of small holes in the ground and are often lined with beautiful tile work that also keeps the water cool. *Baolis* or *bavadis* are stepwells, which are stairs that allow access to a water body even as the water levels change. Stepwells, such as the Chand Baori in Rajasthan, are ornately carved and decorated stone structures, and in addition to holding water, are places for "cool, quiet retreats during the hot summers" (Dande et al. 2016, 17–18). The particular physical form of traditional Indian water management varies throughout India, as each of these methods is suited to peculiarities of a certain area. Some areas may use constructed ponds, while other areas build small dams, canals, wells, and trenches. People may use the



Dhamori mapping graphic. Image courtesy of the author.

water gathered from these systems for drinking, irrigation, livestock, cooking, hygiene, and other household chores. While their forms and water uses may differ, however, they have shared qualities. These techniques are locally derived solutions suited to particular environments that developed from people's deep knowledge of their land and their resources. These techniques are appropriate to the given climate, topography, and precipitation patterns. Their systems are usually dependent on only local materials, are typically low cost, and of low environmental impact. They are typically decentralized, meaning they are usually local catchment systems maintained by an adjacent community as a community resource, rather than being conveyed a long distance to serve a distant population.

Most strikingly, these traditional water management systems are not solely utilitarian. Rather, there are a host of social and cultural values that accompany them, an aspect of water management not typically discussed in the United States. In fact, as these ancient practices were developed, "Water came to be regarded as precious and its conservation and preservation was sanctified by religion" (Dande et al. 2016, 16). Water bodies in Indian communities traditionally were significant social gathering places where people carried out important cultural rituals (Mishra 1993, 42; Nawre 2013, 140; Singh 2004, 4). For instance, the villagers of Mithila still gather by their *dulha taal*, the community pond, to select bridegrooms and honor Sita, the wife of Rama (an avatar of the god Vishnu) (Mishra 1993, 56). In Chhattisgarh, devotees of Rama "were the great specialists in the art of pond-building. The earth work was that of divine nature for them." Families engaged in this occupation "did not cremate their dead. They preferred burial because for them nothing was more valued than earth" (Mishra 1993, 30). Traditional stepwells had varying functions depending on their location. While some stepwells only served as a means of irrigation, stepwells built in the village, on its edge, or along a trade route were often community gathering and resting spaces. There are places in India that still use many of these water management systems, although not to the scale that they were used prior to British colonization.

See aerial video of Dhamori, India.

The decline in Indian traditional water infrastructure is due to many reasons, but largely that its use was devalued and replaced with grey infrastructure systems, which were lauded in the nineteenth and twentieth centuries. These include hundreds of large-scale dams that have been constructed in India over the last seventy years, with the intention of providing irrigation for food security, for generating power, and for drinking water. Yet these massive development projects, such as Bhakra-Nangal Dam and Sardar Sarovar Dam, have also been highly criticized for displacing communities and degrading the environment (Cullet and Gupta 2009, 167–168).

Prior to colonization, crops grown in India were often for sustenance; however, during the period of British colonization, India began to grow more cash crops, requiring more groundwater outputs and exceeding existing local catchment capacities (Gadgil and Guha 1993, 116). There was also a shift in perception of water ownership from being a shared community resource to being a private one (Cullet and Gupta 2009, 161). After India's independence in 1947, the Indian government continued to follow practices similar to the prior government (Cullet and Gupta 2009, 162). In the 1950s, it became increasingly common to build grey infrastructure water systems that transported water resources over far distances, rather than further investment in additional local water catchments (Nawre 2013, 140). These are sometimes known as river-linking projects, the rationale being that some areas of India have surplus water supplies, while other areas have shortages, therefore linking rivers through canals will help distribute water more evenly and protect against flooding. Criticism of these projects parallel social and environmental controversies surrounding big

dams. Interlinking projects are "hugely expensive and not cost effective, will lead to suboptimal use of water resources," and "changed structures of channels may lead to increasing the salt gradient, water loss, seepage and saline pollution of soil in the transporting section" (Cullet and Gupta 2009, 171–172). In his 2009 TEDIndia talk, the prominent twentieth-century water conservationist Anupam Mishra recalls when these canals were constructed. "We had full-page advertisements some thirty or twenty-five years ago when these canals came. They said, 'Throw away your traditional systems, these new cement tanks will supply you piped water.' It's the dream, and it became a dream also." Shortly after construction, many of the canals became filled with sand or were overtaken by water hyacinth. "Soon the water was not able to reach these areas, and people started renovating their own structures" (Mishra 2009).

Today, there is a growing awareness of the value these localized catchment systems bring to communities, particularly for environmental reasons such as groundwater recharge and having backup systems when larger-scale systems fail. As India and the rest of the world explore new methods to support the needs of their communities and environments, Indian traditional water management provides an interesting counter to how many contemporary water systems operate and are maintained. The technical knowledge these contemporary systems provide is of vital importance, but also worthy of study is the strong social and cultural relationship between pre-colonial Indian communities and their water systems. This sociocultural aspect of water management is one that grey infrastructure and even green infrastructure, which mimics the natural water cycle, have explored the least.

Defining Grey and Green Infrastructure Systems

The value of water that was intrinsic in Indian traditional water infrastructure is not present in many of our current grey infrastructure standards. In terms of physical make-up, grey infrastructure is a type of drainage system usually constructed from concrete and steel (Dong, Guo, and Zeng 2017, 281), although it is not limited to these, as it can also include ditches and detention ponds. An example of a grey infrastructure system would be rainfall hitting the pavement, draining into a street gutter, and being piped away, perhaps to a river or other water body. The purpose is to remove the rainfall from the street as quickly as possible, a linear model of moving the water from Point A (the street) to Point B (the waterbody). A large-scale example may be water pipelines that carry water from mountain reservoirs far distances to meet the needs of people in distant cities. In their book, *A Technology Portfolio of Nature Based Solutions Innovations in Water Management*, O'Hogain and McCarton (2018) explain the linear model of grey infrastructure systems. This system takes water from its source, uses it, treats it if necessary to remove harmful pollutants, then discharges the water into the natural environment. Under this flawed system, water is frequently moved over large distances, whereas rainwater and other surface water flows are often unused, and water infrastructure systems are used to swiftly move this water out of the area (O'Hogain and McCarton 2018, ix).

O'Hogain and McCarton recognize the flaws in such systems. This linear approach "can be said to focus on function and to solve a narrowly defined problem in a given timeframe and for a given cost" (O'Hogain and McCarton 2018, 5). Instead, the authors advocate for solutions that not only address singular problems, but look for opportunities within projects to supply added value. This added value can include "adaptation to climate change, wastewater treatment, ecosystem restoration or resource recovery,

biodiversity, and recreational amenities" (5). Specifically, O'Hogain and McCarton point toward nature-based solutions that are inherently multifunctional, dynamic rather than static, and operate within levels of uncertainty, therefore increasing adaptability of a system. For instance, a nature-based solution to a project that addresses flooding may also provide new habitat areas and account for changing water levels rather than attempting to halt flooding all together (5-6.) To address more efficient use of water, the authors recommend a "circular economy" that does not dispose of water after a single use. Rather, wastewater, and the potential nutrients, chemicals, and particulates within it, are to be seen as resources. Acknowledgment of the worth of water, the authors continue, calls on people to "to act differently, think differently and interact differently" with water and emphasizes the integration of water stewardship into all government, planning, and education considerations and projects (ix). They conclude that a new human-water relationship is required.

Green infrastructure is a step toward the goal of multipurpose water systems. Green infrastructure is broadly defined as a series of "nature-based solutions" that manage resources (Wild, Henneberry, and Gill 2017, 180). Examples include permeable paving, rain gardens, and tree trenches, which are underground storage facilities that capture stormwater for trees and groundwater recharge. Green infrastructure typically includes solutions that are cost effective, low-energy to maintain, and have a positive environmental impact, which parallels with aspects of Indian tradition management mentioned previously. Additionally, green infrastructure can include benefits to increasing biodiversity, improving water quality, and restoring ecosystems. These systems seek to "design nature in," essentially integrating the design into the existing context, rather than the traditional grey infrastructure approach resulting in designs that are "superimposed on natural surroundings" (O'Hogain and McCarton 2018, ix). Proponents of green infrastructure often describe the numerous environmental benefits these systems offer, but they do not typically focus on the relationship between these water systems and the people around them. While green infrastructure provides benefits to a community, it is not always visible, and an individual may easily walk over permeable paving without recognizing it as green infrastructure or as a water management system. While someone may notice the large, healthy trees along a green street, they may not know that it is due to the tree trenches below ground. Green infrastructure has many benefits, but there is still a need to improve awareness and increase human connection to these systems.

The Sociocultural Lessons of Traditional Indian Water Management

The Value of Water

How a community uses their water reflects how they value it. In using grey infrastructure systems that treat water as an inconvenience, such as street gutters with the aim of moving water off-site as quickly as possible, a community is not viewing their water as a valuable resource. The value of water in Indian traditional water systems contrasts with that of grey infrastructure systems, and even goes a step beyond the primarily environmental basis of green infrastructure. Indian traditional water management not only served multiple purposes, as with green infrastructure, but was also imbued with spiritual significance. Elements and actions surrounding Indian

traditional water systems can be described as "operational aspects" and "ideational aspects" (Singh 2004, 3). The "operational" attributes include the functional aspects of how the system works, while "ideational aspects" are the related water beliefs and practices (4).

One such example includes the practice of installing statues of deities along the pond's banks to offer the pond protection. In times of heavy rainfall, the water level would rise until it touched the deity's feet, after which, surplus water would be released through an overflow drain. This action prevented any threat to the pond's structural integrity, and the pond was "protected jointly by the human and divine force" (Mishra 1993, 36.) Such statues, as well as ceremonial pillars placed in the middle of a pond, also functioned as a way of measuring the pond's capacity. It was a cause for celebration when the water level reached the statue's base or a certain mark along the pillar, as it signaled to villagers that their water supply would last throughout the year (Mishra 1993, 36–37.) These "ideational aspects" are derived from an underlying sentiment that water is a gift to be valued, both for survival and spiritual wellness, and, therefore, in many Indian communities, water bodies were traditionally places of social and cultural significance (Nawre 2013, 140; Singh 2004, 4). Traditional water infrastructure in India was highly functional as a means of gaining water, while additionally serving a social and cultural function for many Indian communities. While the practical components of these systems may be contextually dependent, the relationship between these communities and their water systems can be looked to as examples, as societies around the world examine our current grey infrastructure water management practices.

Community gathering under the pond's banyan tree. Image courtesy of the author.

The Versatility of Water

Opportunities for community gathering have not typically been discussed during the design of grey infrastructure systems, although they occasionally appear in green infrastructure projects. Considering the main types of grey infrastructure—channels, pipes, sewers, ditches, dams, and so on—there has been little to no attempt to entice people to gather around these features. This does not need to be the case. Certain types of Indian traditional water management served a vital social function to their communities. One excellent example is the Indian *talaab*, or pond. Indian *talaabs* are a vital form of infrastructure that has been used for centuries to capture monsoon rainfall and store the water for later use. The monsoon season and its heavy downpours begin around June and can last until the beginning of September, with little to no rain for the rest of the year. *Talaabs* were developed as a form of infrastructure to ensure that people had access to water after the monsoon season had passed. While their primary purpose is that of rainwater capture, they became vital sociocultural spaces, as well. As Alpa Nawre explains in her article, "Talaab in India," the edges of *talaabs* have three commonly found features: "large shade trees,

Dhamori Pond edge. Image courtesy of the author.

steps leading to the water in certain sections, and small temples or other religious markers" (Nawre 2013, 137). Under the trees and by the steps, people often gathered socially for leisure and for religious festivities. Historically, there were often religious markers that signaled to passersby upon their approach to the *talaab* that this was a sacred space, requiring them to take off their shoes and refrain from spitting or littering (Mishra 1993, 42).

There are opportunities to integrate social functions into our grey infrastructure systems. Detention ponds, for example, are used to hold water to prevent flooding, but they can serve a multitude of functions, not unlike that of a *talaab*. In Irene Klaver's (2015) article, "Accidental Wildness on a Detention Pond," she describes how a local detention pond in Texas becomes a place in her neighborhood where people regularly go to walk their dogs. Members of the Hindu community go there to celebrate the Diwali Festival of Light. Pelicans take up residence on its shores (Klaver 2015, 47). This was not the intention behind its construction, but it has taken on unexpected social and environmental dimensions, an "emerging of a cultural nexus and environmental imagination around storm-water structures" (51). Klaver's article describes how green infrastructure offers an alternative

Dhamori Pond and its adjacent path. Image courtesy of the author.

approach for stormwater and wastewater management that lends additional environmental value to a water system. However, she still expresses that, "What is under-developed in these approaches is the potentiality for a cultural component in the projects. How could they be green, but also create situations, places of encounter?" (51). There is potential to include sociocultural considerations into planned water systems that current approaches in grey infrastructure and green infrastructure have left largely unexplored.

The *talaab* and other types of Indian traditional infrastructure, such as stepwells, existed as places that merged utilitarian and sociocultural needs. Designers and planners can help facilitate enhanced social opportunities near stormwater features and other types of gray infrastructure through elements such as shade trees, walking paths, and seating, thereby improving opportunities to create "places of encounter."

In addition to holding water and becoming places for social gathering, ponds added value to their communities through animal and plant life. As Anupam Mishra (1993) writes in his book, *The Ponds are Still Relevant,* aquatic life, such as fish and crabs, could be found in many traditional Indian ponds, which lent additional value as a food source. Trees planted along the pond edges—often mango, peepal, banyan, and goolar trees—not only gave shade for people and helped prevent erosion and evaporation, they could also be harvested. Trees and ponds together were so ubiquitous that they were said to be in a "special relationship," that if one were to fail, the other would be sure to follow (Mishra 1993, 43). This is a vastly different approach to water management than grey infrastructure, which, as defined by the Natural Water Retention Measures (NWRM), is "designed to avoid any type of ecosystem to grow on it" (NWRM 2019). As mentioned earlier in the comparison of the linear versus the circular economy of water, creating systems of water management that support multiple uses demonstrates an improved relationship with our water infrastructure.

The Celebration of Water

Indian traditional water management practices included celebrations around water, and language that denoted respect for this resource. These celebrations even extended to the system's maintenance. For instance, for a *talaab* to remain functional, it must be continually desilted. Today, for many remaining ponds in India, this process is viewed as a large administrative problem. However, in past centuries prior to British colonization, the desilting process took place during an annual festival, which the local community undertook together. It was often a festive occasion, and community members donated their labor. Those who participated received the collected silt, viewed as "Prasad," a present, that could spread over fields to enrich the soil (Mishra 1993, 45). This is an approach to water system maintenance imbued with cultural significance and value, rather than a purely utilitarian practice. In Rajasthan, the driest region in India, water catchment ponds are integral to their villages. Thus, many villages have the word for pond, *sar*, in their village name (10).

To share and create water sources, such as ponds, tanks, and communal wells, especially to supply water to the needy, was considered a "virtuous act," and in southern India, creating water basins was historically viewed as "one of the 'saptas-antanas,' (seven kinds of wealth)" (Singh 2004, 5). Even the individual components of the water system were lauded. "Apra" is the Hindi term for the overflow feature in ponds, and it is still a popular name in Rajasthan, meaning "godly" and "top level of intelligence" (Bachpan n.d.; Mishra 1993, 32-33). In Chhattisgarh, the Chher-festival was usually celebrated in the summer, as this was the most advantageous time for pond repairs.

The festival involved people going door to door singing and collecting donations of grain from different households. The grain collected contributed to a public fund, which was used to finance pond maintenance (Mishra 1993, 74). In these examples, people had a personal connection to water systems, and celebrated their creation and ongoing maintenance.

This celebration of water is a far cry from our current relationship with water systems, which tends toward the negative, if thought of at all. Perhaps no example better illustrates this than how those of the English-speaking community relate to water in our language. In Matthew J. Tucker's (2019) work, "Hydrosocial Territories of the Anthropocene," he describes the need for a changed water lexicon, rather than the current vocabulary assigned to water management. When discussing water management strategies in the English language, we often describe these systems using vocabulary such as, "capture, detention, retention, dead storage, impoundment, treatment, infiltration, drainage, discharge" (Tucker 2019, 6). The image of a "detention pond" paints a very different scene than a *talaab*, yet their basic purpose—to hold water—is the same. It is the relationship of people with these catchment systems that diverges. Encouraging people to understand the worth of water, and to celebrate it, is vital to the success of new forms of water management. A changed approach to water management will require a new vocabulary that gives value to water and demonstrates a more positive human-water relationship.

The Fluidity of Water

Borders are one major aspect of water management that differs between grey infrastructure and certain types of traditional Indian water infrastructure. Grey infrastructure, such as concrete canals, sea walls, channels, and dams, creates a starkly defined water to land border. Infrastructure designed in this way is meant to keep water in a specific, predictable location. Compare this to an Indian stepwell or a stepped pond, where stairs descend into the water, allowing people to reach the water's edge as it fluctuates throughout the year. The edge is flexible. People gather along the stepwells for ritual bathing, washing clothing, and socializing (Livingston and Beach 2002, xi). Water is not expected to stay at a certain level or in a certain place. Both on a small and large scale, this allowance for flexibility and fluidity is an advantageous mindset to cultivate, particularly as sea levels rise, and storm surges become more frequent. We are faced with the reminder that water-land borders only exist as lines on a map, and not in reality. Rather than a border between water and land existing as a line, it is more useful and accurate to think of it as a zone or gradient (Matson 2017).

There are places and projects seeking to move past this water-land binary, and create new forms of water management that respect natural processes, such as "floods, erosion, storms, etc.," termed by Saskia Sassen as a "Third Space," where "the boundaries between nature and artifice are blurred" (Tornatora 2018, 138). In Anuradha Mathur and Dilip da Cunha's (2009) book, *SOAK: Mumbai in an Estuary*, they explore ideas for designing a "fluid threshold" between land and sea that allows for inundation of certain areas of Mumbai during the monsoon rains and boosts resilience along the city's edge. The Netherlands has numerous programs that parallel the ideas of a "Third Place." An entire national program called "Room for the River" promoted re-naturalizing edges along Dutch rivers to allow for partial flooding, rather than creating barriers (Tornatora 2018, 138). Much of the city of Rotterdam is below sea level. But rather than building higher levees, their planning perspective is, "In essence, to let water in, where

possible, not hope to subdue Mother Nature: to live with the water, rather than struggle to defeat it" (Kimmelman 2017). The Sand Motor on the Netherland's Delfland Coast is an experimental form of water management where sand is deposited in the sea, and dispersed by natural currents along the beaches, as a means of coastal defense (De Zandmotor n.d.). In China, as well, the work of Turenscape looks for new forms of water infrastructure. Along a section of river in the city of Liupanshui, their project proposed removing its concrete pipes, and instead transitioning to wetlands and ponds to hold increasing water volumes (Tornatora 2018, 138.) When designing new forms of water management, we must challenge the cultural notion that water and land are entirely separate entities and that water must stay within certain lines.

A New Human-Water Relationship

Let us return to where we began, in the village of Dhamori, India. Dhamori does not rely on its traditional water infrastructure today. While the village's largest feature is a sizable pond, the villagers get their drinking water from the water tower filled with water from a reservoir 40 miles away. The pond's water levels fluctuate dramatically throughout the year, filled by runoff and rain during the monsoon season, and falling drastically during the summer. A few farmers run hoses from it to their fields for irrigation. But while the pond's utilitarian function has declined, its social function has remained. Its banks are mostly unvegetated, but there are trees scattered around the edges. A path stretches around the pond's perimeter. It sits along the village's main road, and it is one of the most popular gathering places in town. People stop, sit, and chat under the trees. Children play cricket next to it, and a mosque and a temple are directly adjacent. During certain festivals, such as Durga Pooja and Ganesh Chaturthi, a procession of villagers will

Aerial view of Dhamori Pond. Image courtesy of the author.

walk to the water's edge and submerge a statue of the respective god. The sociocultural aspect of Dhamori's central pond has become arguably its most important purpose.

It would be overly simplistic to say grey infrastructure has no place in modern water management, or advocate for mere replication of Indian traditional water management, whether in India or elsewhere. Water towers, storm drains, and water pipes are undoubtedly valuable, and installing traditional water management systems would not solve all the water-related issues facing the world today. Grey and green infrastructure methods provide important contributions. For instance, when designing water systems such as detention ponds, particularly in residential neighborhoods, one must consider the safety and legal issues accompanying them. A detention pond can be a valuable feature, but for residents to safely use it, its "bounce," the additional volume that the water level fluctuates over its typical water elevation, must be measurable and monitored. Yet approaching this challenge from the standpoint of water as a life-giving element, rather than a life-taking one, radically changes the type of solutions we create. Studies comparing "uniuse detention basins" versus "multi-use detention basins" have frequently found residents more in favor of multi-use systems, even occasionally ranking visual and recreational amenities as more important than their flood-control capabilities (Lee and Li 2009, 8). To yield maximum benefits, solutions likely need to be hybrids incorporating the most advantageous attributes of grey, green, and traditional forms of water infrastructure, and in these new systems, water must be viewed as the precious resource it is.

Water is not merely a utilitarian, technocratic management issue; it is a cultural, social issue, as well. Developing a new perspective of water management is an opportunity for our entire society. The role of people and culture is key, and we can look to traditional water practices for guidance. These examples demonstrate that water management systems can be highly versatile, serving not only functional and environmental purposes, but also social and cultural ones. Indeed, an improved social awareness of water systems will increase people's sense of stewardship for the environment. Water management systems and our language describing them can be positive and celebratory, and an end to a strictly land-water duality will result in more resilient and dynamic land-water borders. Such improved water management will enhance the relationship we have among ourselves, our communities, our environments, and the water that supports us all.

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About the Author

Leslie A. Johnson is a landscape designer working in urban design at the architecture firm Perkins and Will. In 2017–2018, she worked with Professor Alpa Nawre examining water management and rural development strategies in Dhamori, India, which served as the foundation for the ideas of this article and her 2018 capstone, “Water Wisdom,” collaborating with Alpa Nawre, John Koepke, Rebecca Krinke, and Vinay Gidwani in the University of Minnesota’s Department of Landscape Architecture. She wishes to extend special thanks to Alpa Nawre and John Koepke, whose insights proved invaluable in the writing of this article.