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SPECIAL SECTION: New Epistemologies of Water in India

Imperilled Waterscapes: The Social-Ecological Transformation of Lakes in Bengaluru

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> The water in this lake was very clear. You could see a silver coin in its depths—the water flowed and it was healthy. Today, if you drop a coin into this lake—even if you can fish it out, which I don't think is possible—it will be black. There is no flow. The water is not pure; it is dirty.
>
> – Real estate owner and former agriculturist, 70, Bellandur Lake, Bengaluru
>
> (translated from Kannada; Interview conducted by Hita Unnikrishnan on 20 February, 2015)

Abstract: This paper examines the historical waterscapes of Bengaluru, now imperilled by development. Earlier a garden city, the agrarian landscape of Bengaluru was formerly supplied with water from an interconnected lake system. This system has since been fragmented due to urbanization and changes in land cover, impacting local institutions and livelihoods dependent on the lakes. In this paper, we use the case of the city's largest lake, Bellandur, to demonstrate the transformation of the waterscape from an open semi-arid landscape pre-dating the city into an agrarian water-dependent landscape characterized by flows of water in pre-colonial and colonial Bengaluru, and finally into a concretized landscape and the individualization of lakes in the "modern" city. Claims to and associations with the lake ecosystem have altered through changing hydrological, institutional, and social relations, leading to shifts in imaginations of the lake as well.

Keywords: Waterscapes, Lakes, Urbanisation, Bellandur, Bengaluru

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1. INTRODUCTION

Since ancient times, water has been imbued with various imaginaries depending upon its perceived utility. At the same time, it is feared for its ability to destroy lives through floods, disease, or accidents. Water is simultaneously seen as an economic good, a provisioning service, a common pool resource, a sacred entity, and an untameable force of nature (Rodriguez-Labajos and Martinez-Alier 2015; Wright-Contreras 2018), even in urban contexts (Nagendra 2016; Mukherjee 2018; Goh 2019).

Imaginaries of water play an important role in shaping urban waterscapes—they contribute to a city's resilience and adaptive capacities in today's context of global environmental change (Van Ginkel *et al.* 2018). Contemporary cities are facing unprecedented water availability crises; several cities, such as Cape Town, Chennai, and Bengaluru, are running out of water or are poised to do so in the near future. Most of these cities have polluted their waterbodies. How did this crisis occur? What caused the shift in the meanings ascribed to these important infrastructures? These are some of the questions we address in this article.

We illustrate our case using the former cascaded irrigation tank (now lake) network in the city of Bengaluru. Specifically, we consider the case of Bellandur Lake to demonstrate the link between changing imaginaries of water and the transformation of Bengaluru's waterscape. From a semi-arid region with limited water availability prior to the formation of the city, Bengaluru evolved into a market city characterized by the flow of water, and, more recently, into a global city filled with stagnant and polluted water. We used a mixed methods approach that combined an analysis of historical sources (inscriptions, archival records, historical maps, and oral history interviews) and primary fieldwork conducted by the authors over the past six years. A series of field interviews were conducted in February–May in 2013 and 2014, October–December in 2013 and 2014, July 2018, and April 2019.

2. THE TANK SYSTEM OF BENGALURU

Tanks in South India, as Mosse (1999) points out, are man-made reservoirs created by embanking river water. Apart from irrigation, they help with percolation and groundwater recharge, flood control, and silt capture. These tanks were constructed because the region was semi-arid and lacked any major perennial water source required for agriculture (Gurukkal 1986). This locally crafted system of transforming an essentially semi-arid landscape of thorny scrub to an irrigated one helped craft liveable spaces

out of harsh geographies, although they were often built on a structure of deep social inequity (Shah 2012; Unnikrishnan, Mundoli, and Nagendra 2017).

In Bengaluru, these tank networks date back to at least the sixth century CE, as documented by stone inscriptions. Tanks operated in association with common village grazing lands and wooded groves to support local livelihoods through a system of collective governance (Mundoli, Manjunatha, and Nagendra 2017). The water within the tanks was a resource that was simultaneously venerated and controlled. Successive dynasties attempted to expand their political and territorial domains by creating and extending tank systems; thus, many discourses hold that the system was not exclusively of local design but was also supported by the state (Mosse 1997). Inscriptional sources testify that tanks were also built for different social, economic, and religious reasons (Nagendra 2016).

With the introduction of piped water systems in the mid to late nineteenth century, tanks began to lose their significance. Many tanks became polluted due to the impacts of urbanization (Nagendra 2010). Rapid industrialization coupled with growing real estate demands meant that several tanks and the channels connecting them were repurposed into land for built structures, while others were transformed into conduits for sewage disposal within the landlocked city. Tanks thus lost their interlinkages and physically transformed into stagnant, isolated pools of water in many parts of the city.

A system once characterized by engineered water flow was transformed into one with mostly stagnant water. This change brought with it different perceptions of the waterbodies that testified to changing epistemologies of water within this landscape. Community narratives, which once mentioned a self-sufficient and sustainable social ecology with a flowing waterscape that supported livelihoods, now refer to these waterbodies as inert, static, and barren. Once considered tanks, they transformed in the public imagination into lakes: ecological and recreational spaces, rather than being water reservoirs for irrigation. As such, village communities regard the present lakes as recreational spaces that are patrolled by security guards. Thus, the lakes have been severed from their traditional usage patterns and are no longer seen as a source of livelihood (Unnikrishnan *et al.* 2016, 10).

The next section demonstrates these changing narratives—using the case of the iconic Bellandur Lake—that are representative of Bengaluru's shifting waterscape.

3. CHANGING IMAGINATIONS: BELLANDUR LAKE IN BENGALURU

Bellandur is the largest lake in Bengaluru, situated in the south-eastern part of the city and covering approximately 892 acres. The lake was once a lifeline for 18 villages and supported local economies dependent on agriculture, fishing, livestock, and orchards. In recent years, the lake has attracted international attention because of frothing due to contamination (Sengupta, Pallavi, and Goswami 2017). Residents living close by suffer from a range of health problems as a result of living in close proximity to the contaminated lake.

3.1. Myths, legends, and the production of an urban social-ecological system

The earliest reference to the system of lakes is from a stone inscription dated to 870 CE and attributed to the region's Ganga dynasty (Rice 1915). The inscription reads: "Be it well. In the victorious year of the S'rirajya, under Satyavakya-Permmadi's Kali-yuga Hanuman, Nagattara—the Irvvuliyur odeya, Irugamayya's son Siriyamayya fixed sluices to the two tanks, had the eastern tank built, and obtained the bittmatta of the three tanks. Imprecation" (17).

While not directly referencing Bellandur Lake, this inscription refers to Agara Lake, which is situated upstream, and gives us a sense of how old these waterbodies are. As with anything that represents a connection to people who lived centuries ago, these waterbodies are associated with myths of inception and survival, which have endured through stories that have been passed down over several generations.

In multiple interviews, we heard various versions of the legend of the origin of Bellandur Lake. All versions speak of a hungry and thirsty woman (in some versions she is old, and in others she is young and pregnant) who approached the local villagers for food and water. She is always credited with creating the lake from a barren landscape; the idea of barrenness assumes multiple meanings depending on whether she was offered help or turned away. One version of the legend, narrated to us by an elderly respondent, is this:

> There was a hungry old woman who visited Bellandur Village. There was no lake then; there was only a village here. She went from house to house begging for alms, but not one single person helped her. No one gave her food or water. She became angry, and in her anger, very powerful. She cursed the villagers by creating a flood—the water swept away many people and their homes and

> belongings. The water has remained since then, as a reminder of what happens when people do not help those in need.[1]

Barrenness here assumes a metaphorical meaning—the barren nature of human society was made fluid (and more empathetic) with the influx of water. Water then became a purifier that washed away sins, thus creating a kinder social system.

The lake was surrounded by open wells that tapped into shallow aquifers that it recharged. Communities had strict rules about managing the waterbody and specific members of the community performed particular roles in relation to this. In the words of another elderly interviewee:

> The *neerganti* (village waterman) would let out the right amount of water into each field using the sluice gates; he would also monitor the level of water in the lake. There was a stone placed on each bank of the lake that would tell us the level of water each year. If the water levels went up or down, we would pray to the lake goddess to help us. The town crier would also make announcements if there was a chance that the village was going to be flooded or if a drought was likely. [2]

Bellandur Lake is associated with two female deities—Gangamma and Dugalamma—who are locally worshipped through practices that evoke the plural ways in which the lake has both sustained and endangered the lives and livelihoods of the nearby communities. The legend of Dugalamma, for instance, is invoked when people are in danger of drowning in the deep waters of the lake. One interviewee told us, "In days long past, there were not as many roads that people could travel on. To get to another part of this area, we had to cross a canal that was deep and dangerous. Before crossing this canal, it was our custom to pray to Dugalamma to protect and return us safely to our families."[3]

Even today, locals worship this goddess, especially when they are about to undertake long journeys. Indeed, present-day road accidents in the locality continue to be attributed to her wrath and are interpreted as a sign that the deity's temple should be renovated or improved.

Different occupational groups had multiple ways of invoking divine protection, often relating to the ways in which they used the lake. Women provided clothes or ornaments as offerings to enhance the well-being of those in the village. Farmers and livestock owners performed other rituals involving the sacrifice of sheep or buffaloes and the sprinkling of sacrificial

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[1] Interview conducted by Hita Unnikrishnan on February 20, 2015.
[2] Interview conducted by Hita Unnikrishnan on February 22, 2015.
[3] Interview conducted by Hita Unnikrishnan with priestess of the Dugalamma Temple on 28 July, 2016.

blood on farmland. There were also village processions and community feasts to pray for adequate supplies of water or to invoke blessings for a healthy crop.

Our interviewees recalled stories of how the daily upkeep and maintenance of the waterbody was considered both important and sacred; further, these everyday practices were intimately intertwined with the cultural landscape of the area. For instance, it was important that silt deposits within the channels and lakebed were monitored and managed. This was done in a rather unique fashion; in the words of one of our interviewees, "It was important to remove the mud from the *kaluves* (channels) and the *kere* (lake). The lake is so big that a few people alone could not do it. So prisoners were brought from the jail to help. This was their community service—they had to remove the mud from the lakebed and channels."[4]

The collected silt was then used to make religious idols, once again invoking the sacrality attributed to the waterbody. All these narratives provide fascinating insights into how the lake, the benefits people drew from it, as well as the dangers associated with the waterbody were highly integrated into the belief systems, rituals, and everyday practices of people. This produced a distinctive urban space that contributed to shaping, and in turn was shaped by, both societal and natural elements of the social-ecological system.

3.2. Engineered flows and transformations within the urban social-ecological system

Oral history interviews conducted around Bellandur reflect the importance attached to the flow of water within the network of lakes and channels. One of our respondents said, "Before all these buildings came up here, water would flow in and out of the lake—it was clean water; it was pure. We could drink it."[5] Another noted, "The water was so pure that it tasted like tender coconut water."[6]

This system of flow represented a fundamental change within the social-ecological landscape of the city. It transformed a landscape devoid of flowing water into one where water could be channelled, harnessed, and used over large swathes of land.

Other commons were associated with Bellandur Lake, including nearby grazing lands and *gunda thopes* (village forests) that provided shelter to

[4] Interview conducted with elderly resident of the area by Hita Unnikrishnan on February 23, 2015.
[5] Interview conducted on September 11, 2018 by Amrita Sen, with a villager from Bellandur.
[6] Interview conducted on September 11, 2018 by Amrita Sen, with a villager from Bellandur.

nomadic communities and functioned as a collective resource for wood. The deity Gangamma was worshipped through a massive celebration (Gange Puje) when the lake filled up and overflowed. During the festival, people cleaned and whitewashed their homes, made lamps, and sacrificed buffaloes and lambs to celebrate. Songs were sung to appease and thank the lake goddess for her benevolence; she was believed to be extremely powerful and was considered the protector of the lake bund.

The advent of piped water in Bengaluru during the late eighteenth century signalled the arrival of a new era of transformation within the social-ecological system. The luxury afforded by pipes bringing water from distant sources meant that the lakes no longer occupied a central position in meeting the needs of villagers. Although Bellandur was located outside the main city of Bengaluru then, many smaller lakes within the older parts of the city were connected to Bellandur Lake. Some of these lakes and their interconnecting channels were slowly built over, while others were filled with sewage. Several smaller lakes began to dry up as connectivity and, therefore, the flow of water into these lakes reduced. Other lakes within the network transformed from seasonal, rain-filled lakes into perennial, sewage-filled lakes because of the continuous supply of sewage into them. The quality of water deteriorated, and native fish populations declined. Most agriculturists moved away or adopted other occupations, and the domestic use of the lake water reduced.

The associated cultural practices also evolved. Today, lake deities are not worshipped in relation to the waterbody with which they were once associated, but for their own characteristics (such as providing protection to people undertaking a long journey). Additionally, ceremonies associated with the flow of water are not practised anymore or have dramatically reduced. In the words of one of our interviewees, "We go to the lakes every day, but we don't use the water. We go to the bund to perform religious rituals, but we take clean water from our homes. The frequency of annual worships has also decreased. I won't feel sad if this polluted lake dries up. I'll actually be happy if this dirty water clears out of here and the menace reduces!"[7]

3.3. Negotiating previously networked waters as standalone waterbodies

Every year since the early 2000s, Bellandur Lake has attracted both national and international attention as it froths up during the monsoon. Headlines such as "It's not Switzerland! Bengaluru's Bellandur Lake Spews 10-ft High

[7] Interview conducted by Hita Unnikrishnan on 20 February, 2015.

Toxic Foam" are accompanied by dramatic pictures of the toxic foam (The Economic Times 2018).

Barely a few yards from this foam, real estate boards advertise the benefits of their premium "lake-facing apartments", lending irony to this scene of chaos. Local governments assure citizens that the lake will be cleaned and sewage diverted and promise to allocate large sums of money for these activities. Several community collectives have been formed to organize clean-up drives, protests, and online petitions to restore the lake. These diverse and often conflicting activities around Bellandur Lake have one thing in common—an internalization of the new static identity of Bengaluru's lakes. Bellandur Lake is now seen as a standalone waterbody, whose connections to lakes either upstream or downstream have been rendered invisible. The significance of lakes within an interconnected system loses ground, thus giving way to isolated and compartmentalized attempts at restoring them, which do not often succeed due to a lack of systemic engagement with the dynamics of this complex social-ecological system.

3.4. Changing epistemologies and an evolving waterscape: conclusions

Despite the physical transformation of the landscape and the discursive shifts in the way the lake is perceived, in many ways, Bellandur remains an integral part of the city's fractured waterscape. The froth and fire that disrupted life around this lake are, in part, the effects of activities occurring upstream. Similarly, water flowing out of the lake affects other areas and lakes downstream. Where connections between individual lakes have been lost, monsoons wreak havoc, causing widespread flooding and damage, especially in those areas formerly occupied by a waterbody or its channels. It is these systemic connections that need to be re-engaged within this waterscape. The idea is that the water contained within these lakes is part of a larger urban circulatory network and that actions taken in one part of the city can indeed affect events occurring elsewhere.

The history of Bellandur Lake informs us that restorative activities should be directed at the network and not just at individual lakes. This leads to the key message of this article—the need for cities, municipal bodies, and policy analysts to recognize the effective role that lakes as "systems" can play in augmenting urban environmental resilience. Systemic activities also need to recognize that a lake is not just a hydrological or ecological entity, but a social-ecological space. Restoration needs to move beyond the current focus on hydrology and technology and aim to bring back the cultural connect to the waterbody. This can be achieved by making decisions that

include under-represented voices and engaging with local traditions that respect the flow of water, while providing incentives to continue such engagement. In doing so, the city of Bengaluru must seek to make invisible epistemologies of water visible again.

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