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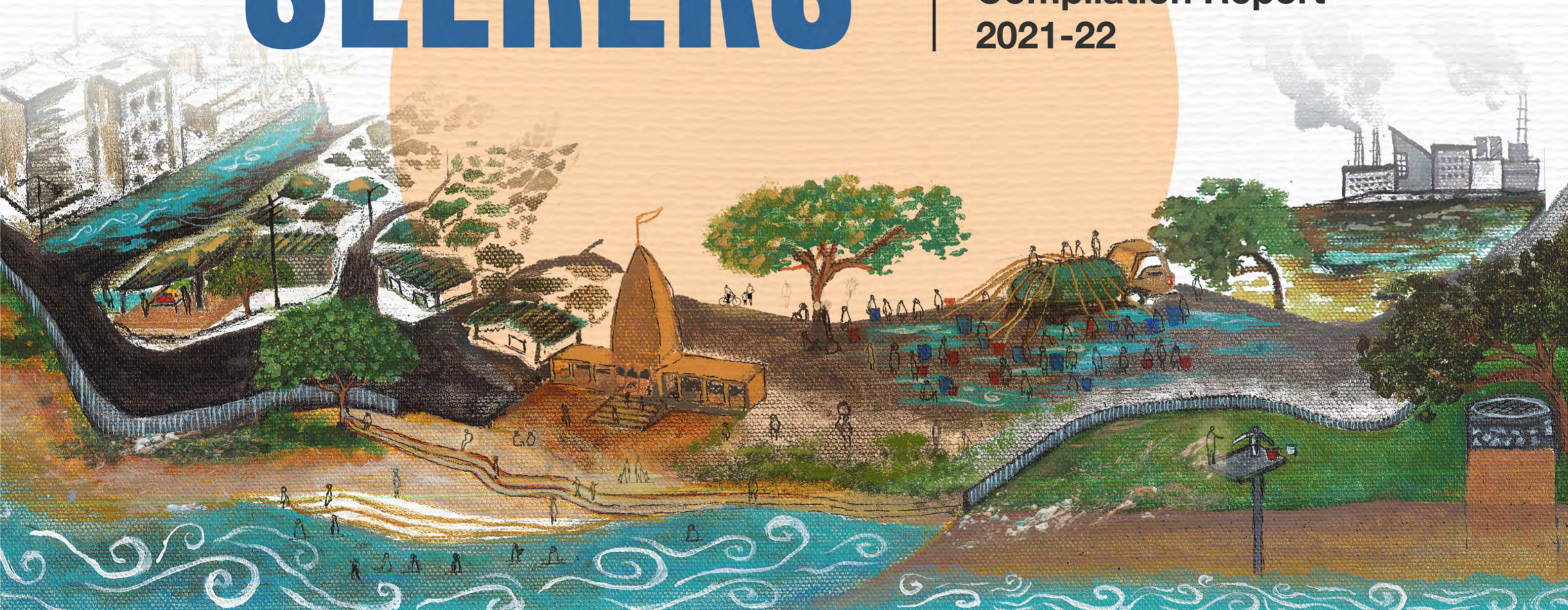
WATER SEEKERS' FELLOWSHIP 2021

The **Social and Political Research Foundation** and the **Living Waters Museum** invite young researchers interested in exploring urban waterscapes in India to apply for six short term visual research-cum-policy-analysis fellowships.

India's rapid urbanisation has thrown up many challenges over the last two decades.

By 2050, half of our population will be living in urban and peri-urban areas. This will put immense pressure on available water resources across the urban space, much of which has limited infrastructure institutional capacity for water management and governance.

The Water Seekers Fellowship 2021 seeks to understand the diversity of this challenge and address it through **visual narratives, case studies and policy research.**

Theme:

URBAN WATERSCAPES

- Watershed management and environmental flows in urban areas
- Fluid heritage, tangible and intangible
- Equity and access to water in informal settlements
- Wastewater management
- Public health and WASH
- Disaster risk management

- Hydropolitics
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Fostering Resilience through *Kulams:*

Traditional Water System
of Southern Tamil Nadu

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"If the history of the dawn of a higher civilisation in Tinnevelly could be brought to light, I have no doubt that the Tamraparni, the great river of Tinnevelly, would be found to occupy the most prominent place in the picture."

Robert Caldwell, 1881

Traditional stone Sluice pillars

Thamirabarani is also known as Porunai in Tamil language. Culturally significant, the river plays host to the Kumbh Mela / Pushkaram festival once in every 12 years to commemorate one revolution of the planet Jupiter.

Fostering Resilience

With the onset of a new decade, climate change is increasingly being acknowledged as a threat to towns and cities. As India reaches the milestone of 75 years of independence, it is inundated with developmental pressures accelerated by climate change. As the nation gears up for the future, it is necessary that we look back at our historic past for traditional knowledge systems to provide guidance. Traditional knowledge on adapting to evolving environments and heritage sites can assist as a repository for fostering resilience to climate change. In 2020, International Council on Monuments and Sites [ICOMOS] declared a Climate and Ecological Emergency to safeguard heritage, mentioning that absence of heritage and traditional knowledge bearers would be a lost opportunity in climate adaptation planning (ICOMOS 2019)

In the Conference of the Parties [COP26] held in 2021, the protection and preservation of heritage, being a catalyst to the global ambition for climate resilience, was vocalised by the Climate Heritage Network's Race to Resilience session (Potts 2021). At the intersection of Climate and Heritage, the traditional knowledge systems of Water Heritage have a critical role to play in building climate resilience through a culture-nature perspective. This perspective aims to build confidence in communities and water managers, by utilising past responses to

changing climate conditions that can aid in conservation and adaptive strategies.

The focus of this study is on the Traditional *Kulam* Water Network System along the Thamirabarani River in Southern Tamil Nadu. Floods are a recurrent phenomenon in India but so are droughts, not only in different regions but also frequently in the same region (Das, Gupta, and Varma 2021). Tamil Nadu is one such region, especially the southern part of the state along the Thamirabarani river basin. After the devastating floods in 2015, conditions of drought prevailed Tamil Nadu with the pitiable rainfall in the last 140 years, including the district of Tirunelveli and Thoothukudi, where the river Thamirabarani starts and ends respectively (Waghmare 2017; Asian Development Bank [ADB] 2017).

"If the history of the dawn of a higher civilisation in Tinnevelly could be brought to light, I have no doubt that the Tamraparni, the great river of Tinnevelly, would be found to occupy the most prominent place in the picture." (Caldwell 1881).

Thamirabarani is also known as Porunai in Tamil language and the archaeological sites of Sivagalai and Korkai are considered to be part of the Porunai civilisation   (Caldwell 1881; Tirumalai 2003: 203). The river is mentioned in *Mahabharata* (epic Indian literature) and Ptolemy referred to the river as *Solen* in Greek literature (Caldwell 1881). Culturally significant, the river is host to the Kumbh Mela / Pushkaram festival celebrated once in every 12 years. Apart from ancient settlements along the river basin of Thamirabarani, it also has a historic water network system to irrigate cities, towns, and villages in the district of Tirunelveli and Thoothukudi. This water system comprises dams and water bodies called *anicuts* and *kulams*. This vast traditional water system dates back to the Pandya period (4th BCE to 14th CE). The earlier settlements built by the Pandyas during the initial two Sangam (gatherings or conferences of writers or poets of eminence) periods were destroyed by frequent floods, receding land, and erosion due to the changing climate around 10,000 BCE - 2000 BCE and the dwindling rainfall from 50 CE to 200 CE (Karashima 2014; Mohanakrishnan 2001).

As a climate-adaptive mechanism, water structures were built along the north and south banks of the Thamirabarani River, utilising the natural geography of southern Tamil Nadu that gradually slopes from the Western Ghats to the Gulf of Mannar. The river emerges from the Pothigai hills and is located in the rain shadow of the Western Ghats, which misses the dependable rainfall of the southwest monsoon. However, it receives more rainwater in short spells from the northeast monsoon, which is less dependable and often accompanied by storms and cyclones. (Tirumalai 2003: 200) This type of geographical and climatic conditions and destruction from the previous Sangams necessitated an annual water storage system, which led to the creation of a hydrological cultural landscape that has cascading water structures. The water flows from one *kulam* to another, creating a sustainable and interlinked water network system; the *kulam* water system.

Significance of Kulams

In Southern Tamil Nadu, especially in the Thamirabarani region, *kulams* are the water bodies that are linked by canals and dams that developed over the centuries to fulfil the needs of the community. The *kulams* in the Thamirabarani region are historic water structures that receive water from the rain as well as from the river. There are many towns and villages in the Thamirabarani region that have names eponymous to the *kulam*. For example, Perunkulam (Perungulam), Sathankulam, and Karunkulam, among others are named after the town or village kulam. In Tamil Nadu, this type of water structure is known by different names. For instance, it is known as *Eri* in Northern Tamil Nadu. The Public Works Department addresses it as a tank. In the larger context of Tamil Nadu, the *Kulams* or tanks play a vital role in irrigation as well as maintaining the local ecosystem where 26% of wetlands are tanks or ponds (Tamil Nadu State Wetland Authority (n.d.). The concept of wetlands is indigenous to the Thamirabarani region. Since the Pandya period, the land in every town or village was categorised under *Nirarambam* (wetlands), *Kadarambam* (drylands), *Thottam* (garden lands), and *Kadu* (forests), among others. To this day, property lands are classified as *Nanjai* (wetlands) and *Punjai* (drylands) (Mohanakrishnan 2001). To an extent, this continuity of the traditional knowledge system has aided in the preservation of these wetlands, however, there is a need for more recognition and conservation efforts for long term sustainability.

The *kulam* water system thrives on the interrelationship between the cultural and natural heritage of the Thamirabarani region. It bears testimony to the traditional knowledge systems and climate-adaptive ingenuity in Southern Tamil Nadu. The built heritage of a *kulam* is evidenced through the physical elements of the *ghats* (steps), *anicuts* (dams), stone *madais* (sluices), canals, and channels. The intangible heritage of a *kulam* thrives on the living tradition of the folklores, temple rituals along the ghats, and their daily use. On the nature front, the water system shapes the regional biodiversity, where migratory birds such as flamingos are sighted in *kulams*, for instance in Perunkulam (Perungulam) in Thoothukudi (Ashoka Trust for Research in Ecology and the Environment [ATREE] 2021). The cultural landscape of this water system has been decisively harnessed by the prolific prospectus of the patchwork of wetlands. The hydrological engineering deployed the water flow to cascade, store, and irrigate the towns and villages along the Thamirabarani river basin, while illustrating the dynamic culture-nature interrelationships and interactions through the purposeful modification and design of the river basin.

The *kulams* in the Thamirabarani river basin are harnessed by eight *anicuts* (dams) of which seven were built before the British period (1801) and the last one was built during the British period (Caldwell 1881). The pre-British anicuts show signs of previous restorations. In the past, they were rebuilt in parts by the Pandyas and also by Cheras and Cholas Cholas (Mohanakrishnan 2001). Architecturally, technical creativity was achieved in the design of the *anicuts* (dams) which were built on the riverbed at an inclined angle, either in the form of 'L' or horseshoe pattern, to enable water flow even during low flows. By increasing

the length, the affluxes were contained during the floods in the river. However, this traditional pattern was ignored during the construction of the last *anicut* at Srivaikundam which was built during the British period. Built in a straight line, in 1858, the *anicut* (dam) required additional new construction of 3 k.m. long flood bank (Komathinayagam 2003).

Furthermore, the design of the water network aided in its maintenance efforts, since the chain of *kulams* was planned with the smaller ones at the head/top and the largest one at the end of the chain. By doing this, it was possible to utilize all flood and flash flows to their full potential. In a chain of cascading *kulams* with cascading flows for supply, each kulam is filled before the next lower one gets its supply. To feed the *kulams*, they built dams at higher elevations of the river course and built long canals that connected them. The surplus from the higher source provided water for the lower *kulam* to the extremity, where a large reservoir conserved as much as was possible. Additionally, the series of kulams also served as a safeguard for ensuring equitable distribution of water.

Since the British period, the *kulams* have been maintained by the Public Works Department. In India, the First Irrigation Commission was created in 1901 to report on the irrigation systems of India as a protection against famine. It is considered to be the first scientific-technical assessment made for the entire Indian sub-continent given its geographical diversity and climate variability Cholas (Mohanakrishnan 2001). This report informed on the soil, the types of the crop suited to the soil, and other local conditions. Even though it is mentioned as a first report of such kind, similar tasks or reporting were common regionally during the Pandya period where the chieftain maintained the water systems along with the community through the *Kudimaramathu* system. *Kudimaramathu* was a traditional system in which the community maintained these kulams through restoration activities, including desilting of the tanks, cleaning channels, clearing water bodies of garbage among others. This traditional system has been adopted in the present times by the Government of Tamil Nadu (n.d.) through a scheme called *"nammaku name thittam"* meaning, "we are our own support" to create a self-reliant and sustainable community (Sundar 2017). Historic inscriptions reveal that in 1413 CE, maintenance of the water bodies were considered a meritorious act, *"A ruined family, a breached tank or pond, a fallen kingdom, whosoever restores or repairs a damaged temple acquires merit fourfold of that which accrued for them at first"* Cholas (Mohanakrishnan 2001).

Heritage Protection

In May 2016, the Government of Tamil Nadu submitted a request to the Ministry of Urban Development [MoUD] for Capacity Development and Technical Assistance [CDTA] with the view of strengthening climate change resilience of vulnerable towns in the state, including Thoothukudi. The study shows that the water demand will increase in the two river basins in Thoothukudi i.e. Kallar and Thamirabarani. However, only the Thamirabarani Basin will have surplus water attesting to the significance and value of the historic water network system that is still functioning (ADB 2017).

Enacted in 2012, the Tamil Nadu Heritage Commission Act, no. 24 of 2012, empowered the Tamil Nadu Heritage Commission for protection and conservation of heritage sites that are not covered under the Central Government's Ancient Monuments and Archaeological Sites and Remains Act (AMASR Act 1958, amended in 2010) and the State Government's Tamil Nadu Ancient Monuments and Archaeological Sites and Remains Act (TN AMASR Act 1966, amended in 1971). As of June 2021, the state government is yet to constitute this commission, according to the recent mandate by the Madras High Court (Imranullah 2021). Historically, the Madras Regulation VII of 1817 was one of the earliest laws in India, empowering the government to preserve sites of historical or architectural value (Jha 2019). Underrepresentation and no recognition on heritage lists can be detrimental to the existence of these historic water systems and by extension, damaging to the sustainable development of the urban and peri-urban areas of Tirunelveli and Thoothukudi, through which the river Thamirabarani flows.

In the national context, many cities in India have made their own effort to protect their heritage sites through a listing of heritage sites of local significance, which are managed by the local government. More than 20 years ago, Mumbai was the first city to create such a list, which included water structures such as the Banganga tank as a site of water heritage. In the international context, UNESCO defines cultural landscape as, *"cultural landscape embraces a diversity of manifestations of the interaction between humankind and its natural environment."*(UNESCO n.d. b) The cultural landscape of the kulam water system in Southern Tamil Nadu aligns with this definition, which acts as a repository for climate-adaptive practices and sustainable land use, to maintain and enhance the cultural and natural values of the landscape. Furthermore, UNESCO emphasises the protection of cultural landscapes, *"The continued existence of traditional forms of land-use supports biological diversity in many regions of the world. The protection of traditional cultural landscapes is therefore helpful in maintaining biological diversity."* (UNESCO n.d. b). Similarly, in the neighbouring state of Karnataka, the *'Million wells* for Bengaluru' campaign addressed the revival of traditional water systems to integrate traditional practices and historical elements of the city for a sustainable future by achieving UN Sustainable Development Goals 6, 8, 10, 11, 13, 15, and 17 (UNESCO n.d. a). Furthermore, with the unfolding crisis on climate action, it is important that the State Level Disaster Management Framework includes heritage risk preparedness along with pre-disaster aspects of prevention, mitigation, and preparedness, and post-disaster issues of response, recovery, and reconstruction (National Disaster Management Authority n.d.).

The Future of Our Pasts

"Neerindri Amayathu Ulagu - When water fails, functions of nature cease" – Thiruvalluvar. Now more than ever, the protection and preservation of water heritage are of utmost importance in helping India achieve a climate neutral future, before it is too late.

Water Heritage sites can serve as opportunities for climate heritage research, education, and outreach for water managers, heritage professionals, climate scientists, policy makers and planners among others to understand past knowledge of climate impacts and solutions and develop strategies that integrate the culture-nature perspective.

The study recommends that the Government of Tamil Nadu should constitute the Tamil Nadu Heritage Commission Act and create a list of water heritage sites for protection and conservation. In addition to this, the Disaster Management Plans should include heritage management. which will encourage the local governing bodies to document heritage assets and prepare management plans for risk preparedness. Projections show that by 2050. Thoothukudi would become denser and start expanding towards the peri-urban areas which will make the protection and management of the heritage water structures more challenging. (ADB 2017) Culture and heritage associated with community and culture-nature-based solutions are a key part of the answer to climate action and sustainable development.
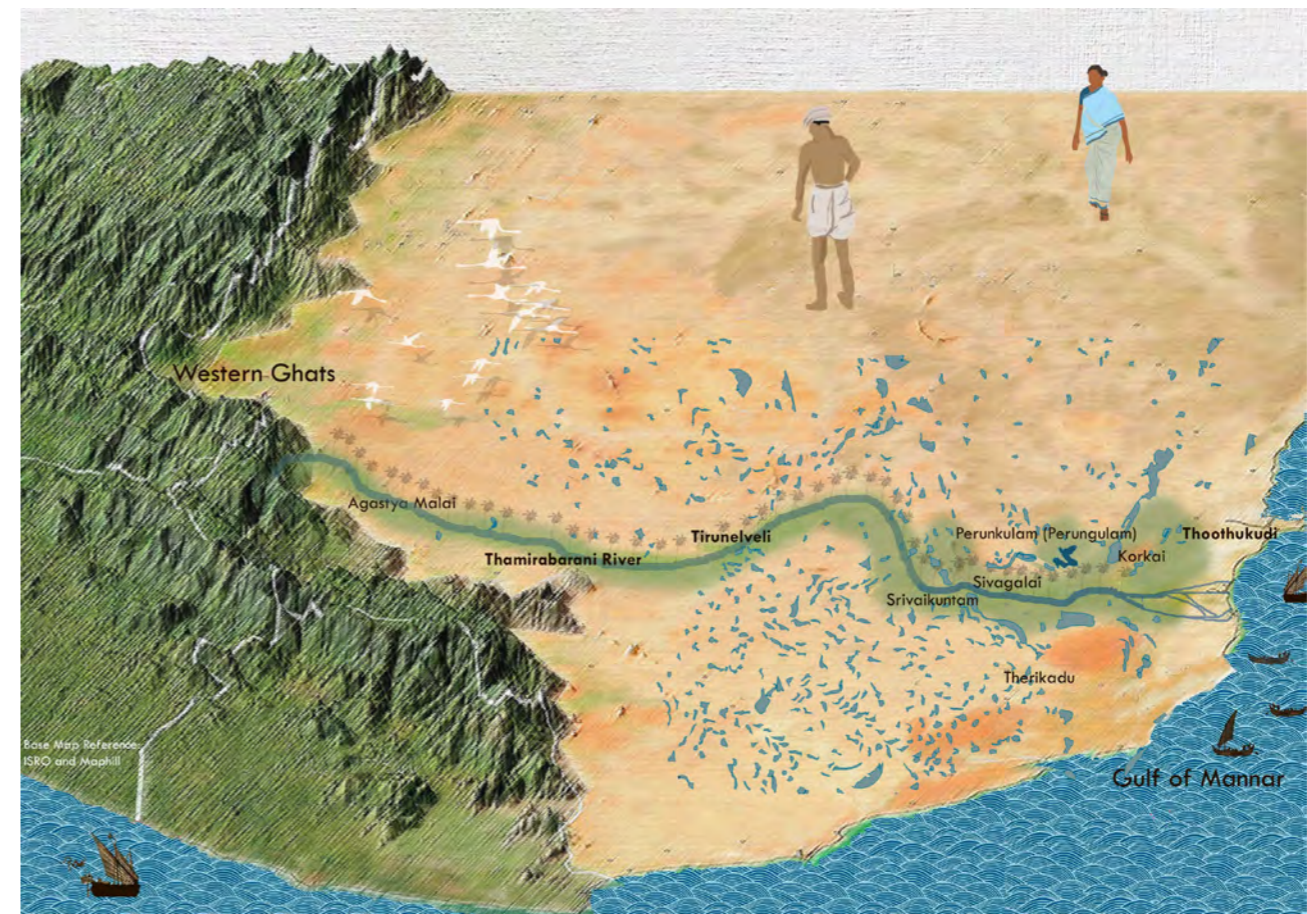
Traditional Water Network System along Thamirabarani river, Southern Tamil Nadu

As a climate-adaptive mechanism water structures were built along the north and south sides of the Thamirabarani River utilizing the natural geography of southern Tamil Nadu that gradually slopes from the Western Ghats to the Gulf of Mannar.

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INTRODUCTION

Social discrimination, stigma, and infrastructural inadequacies make transgender people one of the most marginalised communities in India. The socio-political and economic matrix under which the transgender communities operate encumbers their access to educational infrastructural, safe water, sanitation, and hygience [WASH] facilities, employment opportunities, and modern healthcare (Boyce et al., 2019). This policy analysis maps the current status of WASH practices among the transgender communities in Delhi. It investigates various structural issues that impact safe and equal access to WASH practices and recommends policy measures that would promote equity and inclusion.

The transgender communities' equal and safe access to WASH practices is an area that policymakers have largely ignored. In the last few decades, studies have explored the connection between WASH and gender equality, but it has been mostly limited to women and girls. Most of the transgender community does not find decent accommodation and are forced to live in semi-urban or slums with poor access to toilets and water facilities. Furthermore, the access to resources also depends on intersectional factors such as urban-rural disparity, class, caste, or disability. Similarly, the nature of work many transgender persons are involved in limits their access to WASH resources and puts them at high risk of violence. The International Commission of Jurist (2019), states in its report that "LGBTQ persons, particularly transgender persons and non-binary persons, face or are at risk of facing sexual violence, sexual harassment, physical violence and harassment in toilets, due to gender identity-based discrimination".

METHODOLOGY

Literature and Policy Review

The key documents reviewed were central government policies, supreme court judgement, and guidelines by the Government of National Capital Territory [NCT] of Delhi. These documents were then cross-examined with non-governmental organisations' reports and academic literature. This mixed review of documents assisted in mapping the current status of WASH practices among the transgender groups, identifying the gaps between policy formulation and implementation, and imagining the scope for transgender-inclusive WASH practices.

Figure A: List of Key Documents Reviewed

Supreme Court Judgement(s)
• National Legal Services Authority [NALSA] v. Union of India and others (2014)
National and State Level Interventions
• The Transgender Persons (Protection of Rights) Act, (2019)
• Government of India, Ministry of Drinking Water and Sanitation, Swachh Bharat Mission (2017) 'Guidelines on Gender Issues in Sanitation' New Delhi
• Government of NCT of Delhi, Department of Social Welfare (Financial Assistance -Transgender Section) (2021) 'Order' New Delhi

Key Informants and Stakeholders' Interviews

The documents review was consequently followed by open-ended interviews with four individuals from the transgender communities in Delhi. Informants were told beforehand about the research objective and verbal consent was obtained. In addition, focus group discussions were conducted with members of two grassroot-level organisations, namely the Community Empowerment Trust [CET] and Pehchaan Initiative. Both organisations are currently collaborating to design a safe public space for the transgender community in Delhi.

Site Visits

Multiple site visits were carried out to investigate the current toilet and sanitation facilities for the transgender community in Delhi. The visits were conducted keeping in mind various guiding questions related to location, cleanliness, and accessibility.

Figure B: List of Sites Visited in Delhi

• Near the Press Club of India, Windsor Place
• Rajiv Chowk Metro Station, Rajiv Chowk
• Nehru Place Metro Station, Nehru Place
• DLF Promenade, Vasant Kunj

KEY ANALYSIS

Current Policies and Guidelines

(A) The Transgender Persons (Protection of Rights) Act (2019):

The Transgender Persons Act was passed by the Government of India in December 2019. The act aims to prohibit the discrimination and stigma towards the transgender community by recognising the 'right to self-perceived gender identity' (Section 4.2) and directing the appropriate governments to take all necessary steps for transgender inclusion in society (Section 8.1) through welfare schemes and programmes. Chapter VII of the Act also provides for establishing the National Council for Transgender Persons [NCTP], which will consist of five representatives from the transgender community along with other government officials. The council will advise the Central Government over policies and programmes related to transgender communities (Section 17.a) and also seeks to redress the grievances of the community (Section 17.d).

(B) NALSA v. Union of India and others (2014):

In this landmark judgment, the Supreme Court of India stated that the transgender community would now be legally recognised as the third-gender and affirmed that they are equally entitled to all the fundamental rights granted by the Indian constitution. In terms of public space, especially toilets, the judgement states that:

> *'since there are no separate toilet facilities Hijras/transgender persons, they have to use male toilets where they are prone to sexual assault and harassment. Discrimination on the ground of sexual orientation or gender identity, therefore, impairs equality before law and equal protection of law and violates Article 14 of the Constitution of India' (Para 55).*

As a result, the court directed both the central and the state governments to take measures to provide for welfare for transgender and make sure they have safe access to health and sanitation facilities.

(C) Guidelines on Gender Issues in Sanitation, SBM-Gramin (2017):

In these guidelines, the Ministry of Drinking Water and Sanitation, Government of India, focused on gender inclusivity to achieve open defecation free [ODF] status. Stating that transgender people are often ignored in WASH sector, the guidelines direct the officials associated with SBM to make sure the transgender community has equal access to toilets of their choice, whether in a community setting or a public place (Section 7). The guidelines also went beyond infrastructural issues and sought community engagement to break the social stigma surrounding the transgender community.

(D) Department of Social Welfare, Government of NCT of Delhi:

An order numbered *'F41(341)/FAS/DSW/WMTGP/20-21/18299-18411'* was issued in February 2021 by the Government of NCT of Delhi. It directed all the officials in the capital territory of Delhi to provide separate public toilet facilities for the transgender community within a period of two years. The government, through its order, further directed that until separate facilities for transgender persons are created, all toilets meant for persons with disabilties [PWDs] can also be utilised by the transgender community along with the choice to use any toilets as per their self-perceived gender identity.

Gaps in Current Policies and Guidelines

(A) Acute Shortage of WASH facilities:

The Census of India (2011) estimates a transgender population of 4,213 in Delhi. To cater to their WASH facilities, the Government of NCT of Delhi directed the construction of separate public toilet facilities for the transgender community within two years, starting from February 2021. However, the fieldwork revealed that only one toilet exclusively catering to the transgender community was built in the last eleven months. The toilet was near the Press Club of India, Windsor Place in Delhi. However, the government also directed that all toilets meant for PWDs are made available for use by the transgender community until a separate facility is built for them.

Sunaina[1], a transgender woman, was invited to the inauguration of the transgender exclusive toilet neat the Press Club of India at Windsor Place. However, she complained about the facility's location since the area has barely any presence of transgender groups or persons. During an interaction with the security guards at the toilet, they revealed that only 4 to 5 people used the facilities per week on average. Such instances show the necessity of taking persons from the transgender communities on board when the officials formulate policies for them.

(B) Toilet Design and Infrastructural Inadequacies:

The accessibility to the WASH facilities by the transgender groups can be hindered due to the lack of proper design that suits the person's needs. For example, transmen who have not undergone transition would not be able to use men's urinal stalls or those toilets that lack private stalls. Similarly, transmen who menstruate would require provision for sanitary products as well as means for their disposal. The policies and guidelines mentioned above while directing for transgender facilities are based on the principles that transgender people are a homogenous group, and therefore fails to consider the diversity of identities and experiences and consequent needs.

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[1] All interviewee names are changed.

Trisha, who identifies as a hijra, shared that she currently uses toilets (male or female) based on which is less crowded. She said that the security guards at the metro stations let her use the toilet of her choice, however, she occasionally does receive snide remarks and irritated looks when using the women's toilet. If given a choice, she would prefer to use only a women's toilet rather than a men's toilet or a separate toilets facility for transgender people.

Figure C: Conceptual Model exhibiting Sanitation-related Psychosocial Stress using a gendered lens.
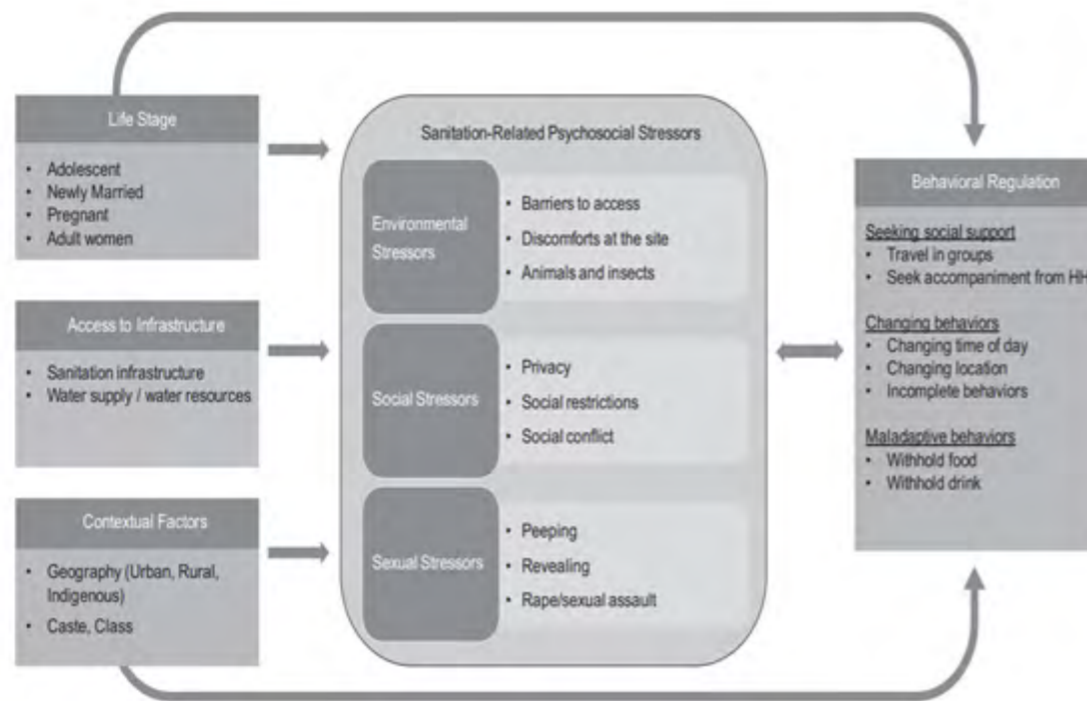
Source: Sahoo et al. (2015).

(C) Discrimination and Stigma:

The toilets facilities remain a site of violence for the transgender communities, and there is constant psycho-social stress when using the public toilets. When using toilets for women, transgender people are seen with suspicion, asked to vacate the facility, and often verbally abused. Similarly, when using the men's toilet, their presence is often interpreted as soliciting commercial sex work and therefore subjected to sexual harassment. During a group discussion with CET and Pehchaan Initiative members, they pointed out that toilets emerge as a site of violence quite early in a transgender person's life. It is mostly during the adolescent years that individuals become aware of their gender dysphoria for the first time and a serious conflict when accessing gendered toilets in schools. Similarly, the recently published training manual by National Council of Educational Research and Training's [NCERT] Department of Gender Studies (2021) titled 'Inclusion of Transgender Children in School Education: Concerns and Roadmap' also emphasised that lack of gender-responsive WASH facilities in school leads to both mental and physical harassment of transgender children as they

are subjected to bullying and sexual harassment.

Sakshi, a transwoman with disabilities, recalled how she was called humiliating names, subjected to bullying and inappropriate gestures by the boys when she would use toilets during her school days. However, she continued, this did not change when she went to college. She would receive homophobic remarks and inappropriate stares from students and professors because of her appearance and disability.

(D) Health Hazards:

The acute shortage of WASH facilities for the transgender communities has a detrimental effect on their health. The lack of safe toilet and sanitation facilities force many transgender people to avoid drinking water or not relieve themselves for a long stretch of time. In case of an emergency, they defecate in open and isolated spaces like behind bushes or street corners. This puts them at risk of frequently contracting urinary tract infections [UTIs] which hinders their daily life, and puts an extra financial burden on them to meet the medical expenses.

Ishleen Kaur, a rapporteur at the Consultation on the Contribution of Swachh Bharat Mission [SBM] Towards Achieving Sustainable Developemt Goals - 6 SDG-6 in India for WSSCC, FANSA, and Global Interfaith WASH Alliance (2019), held at Rishikesh, Uttarakhand, in December 2019, explained that transgender persons with immunosuppressed conditions such as HIV/AIDS need specific requirements for their conditions. She described that transgender people with such conditions avoid using public toilets as poor hygiene conditions increase their chances of catching deadly infections.

STRATEGIES FOR SOCIAL INCLUSION: RECOMMENDATIONS

Policy Designing and Formulation

1. Transgender communities should be recognised as equal stakeholders and consulted by the officials for setting up the WASH facilities, from policy formulation to implementation. This way, suitable areas can be identified, specific requirements of the community taken into account, and alternative solutions devised.

2. Policy designing and legislation need to perceive the transgender communities as heterogeneous groups whose identities and experiences differ vastly. These identities are further complicated by the intersection of vectors such as class, caste, gender, age, disability, etc.

3. The policies should not simply provide a technical solution but aim towards the larger goal of capacity building and empowerment of the community. It should include strategies that combat the issue of discrimination and stigma as well.

4. Any policy formulation directed towards providing WASH facilities may refer to the reach, enter, circulate and use (RECU) principle.

Level of Implementation

1. Emphasis towards Community-Led Total Sanitation [CLTS] programmes where transgender communities are mobilised to take community ownership of the WASH facilities. This means increasing involvement in the design outputs, as well as managing the facilities by themselves.

2. Expanding the scope of public spaces vis-a-vis the WASH facilities to include schools, colleges, workplaces, places of worship, and other such institutions. Functional toilets that cater for the need of transgender communities need to be established at all such locations.

3. Increasing focus to achieve greater awareness and sensitisation of the general public and government officials and sanitation workers towards the needs of the transgender communities to tackle discrimination and violence.

4. Creation of information, education, and communication (IEC) tools that provide innovative ways to understand and disseminate sanitation and hygiene issues among the community. For example, body-mapping tools that use illustrations to explain multiple aspects about people's bodies and lives.

5. Going beyond the technical infrastructures towards other required practices of sanitation. For example, menstrual hygiene facilities for transmen and non-binary people, friendly facilities for transgender people with physical disabilities, needs of transgender children, or issues of privacy.

Policy Monitoring and Evaluation of Interventions

1. Framework for monitoring and evaluation needs to be designed so that personal biases and prejudices that reflect gender-based discrimination can be avoided. It should be comprehensive, data-driven, and transparent.

2. Robust involvement of National Council for Transgender Personal [NCTP] and WASH based NGOs to evaluate the implementation process and provide feedback periodically.

3. Detailed review of the process to figure out other societal and institutional barriers that affect transgender communities' access to safe WASH facilities. For example, a lack of official identification documents such as Aadhar Card results in denial of SBM incentives.

CONCLUSION

From the acute shortage of WASH facilities and infrastructural inadequacies to discrimination and stigma attached to their gender identities, transgender people have been pushed to the margins of society, leading to an unending circle of social-economic exclusion. Therefore, when designing transgender-inclusive WASH facilities, it is important to consider not only the basic requirements but also issues of inclusion, rights, and dignity. Recognising the diversity of their identities and experiences, as well as the subsequent WASH requirements, is an essential part of engaging with the community. Correspondingly, these requirements must be contextualised within the larger discussion about the provision of legal recognition and rights that affirm gender equity.

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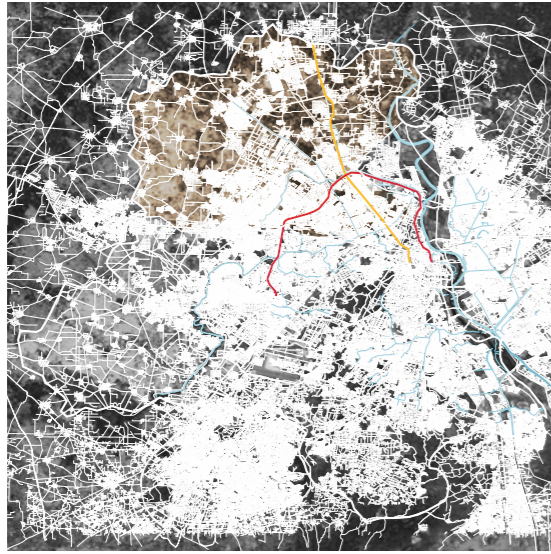
A Wasted Landscape

Delhi's Bhalswa at the Intersection
of Urbanism and Ecologies

Gunraagh Singh Talwar

Water Seekers' Fellow 2021

PREFACE

Bhalswa in Delhi.
Source: ESRI Satellite

Bhalswa in North Delhi.
Source: ESRI Satellite

HISTORY

The historic landscape

Bhalswa Today

Home to over 200,000 people, Bhalswa-Jahangirpuri is a town in the north of Delhi. Known today primarily for its dumpsite, Bhalswa was once home to a lush wetland ecosystem around its historical horseshoe lake. Although left out of Delhi's historical development, it was included as a part of the city during its modern evolution. In this, it was zoned in 1962-1981 as Delhi's green belt, in 1981-2001, an agricultural area, and in 2001-2021, it was an urban area.
However, it was also designated as a site for a sanitary landfill, which, owing to unchecked growth, has turned into a towering dumpsite in the last decade. This has destroyed its ecosystem, contributing to the worst living conditions in the city.

With water being susceptible to toxins from the dumpsite, and other solid wastes generated by resident communities, Bhalswa's hydrologies are especially vulnerable. The impact is empirically observable at its lake, with significant loss of biodiversity, especially along its western front. The lake's east, in stark contrast, is a vivid lakefront with public amenities and year-round footfall. The dichotomy presents a simple understanding that communities and ecologies can coexist with proper infrastructural development and resource management. A deeper dive into the lake through this case study highlights pain points contributing to its current state. Finally, as the city finds itself transitioning between masterplans, this brief ponders upon remediation strategies for the landscape.

The earliest existing record of Bhalswa's relation to the historic cities of Delhi is a sixteenth-century Lodhi-era monument along the GT Karnal Road called Maqbara-e-Paik, a mausoleum to the messenger. A better understanding of the larger landscape comes through the 1807 Sketch of the Environs of Delhi by F.S. White. The sketch renders two great lakes connected to the Yamuna in the east. Of these, only one remains today. This is the Bhalswa Horseshoe lake. The landscape brought a rich wetland ecosystem, remnants of which continue to exist even to date. White also captures the villages of Bhalsoouh (Bhalswa), Jahangeerpor (Jahangirpuri), and Mukundpur, surrounding the wetlands.

Source: Guerrieri (2017)

Following this, Bhalswa finds no cartographic mention as subsequent maps focus on the Mughal and Imperial cities of Delhi. In supporting the growing city, however, the northern part finds a developing infrastructural system. A turning point from the ecological standpoint is between Murray's 'Map of the Country Road' (1924) and Delhi and Vicinity (1962), where the Najafgarh Jheel Cut is termed as the Najafgarh Drain, a name it still holds.

BHALSWA THROUGH THE AGES
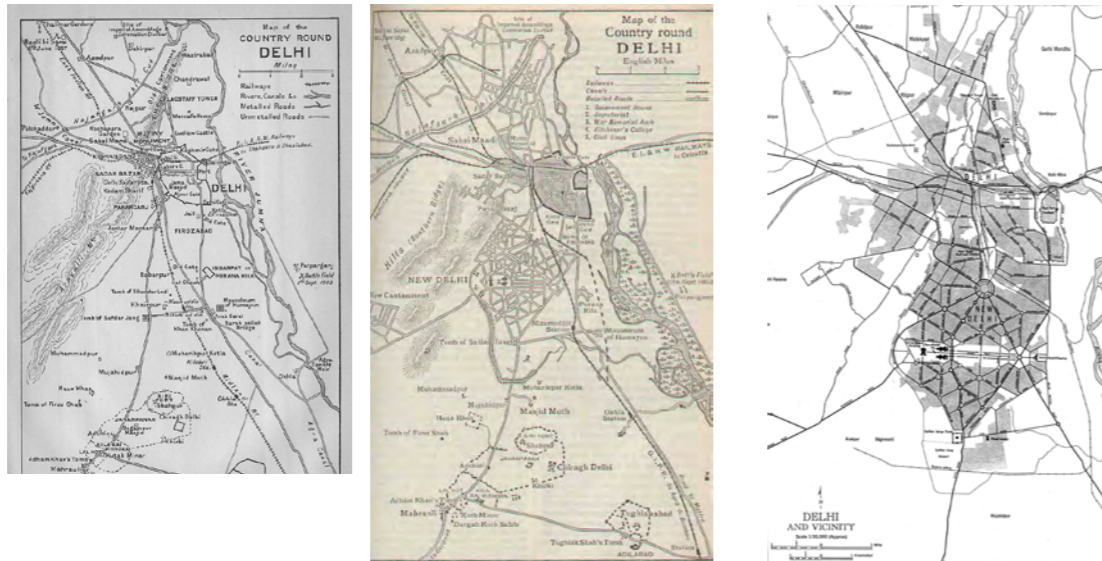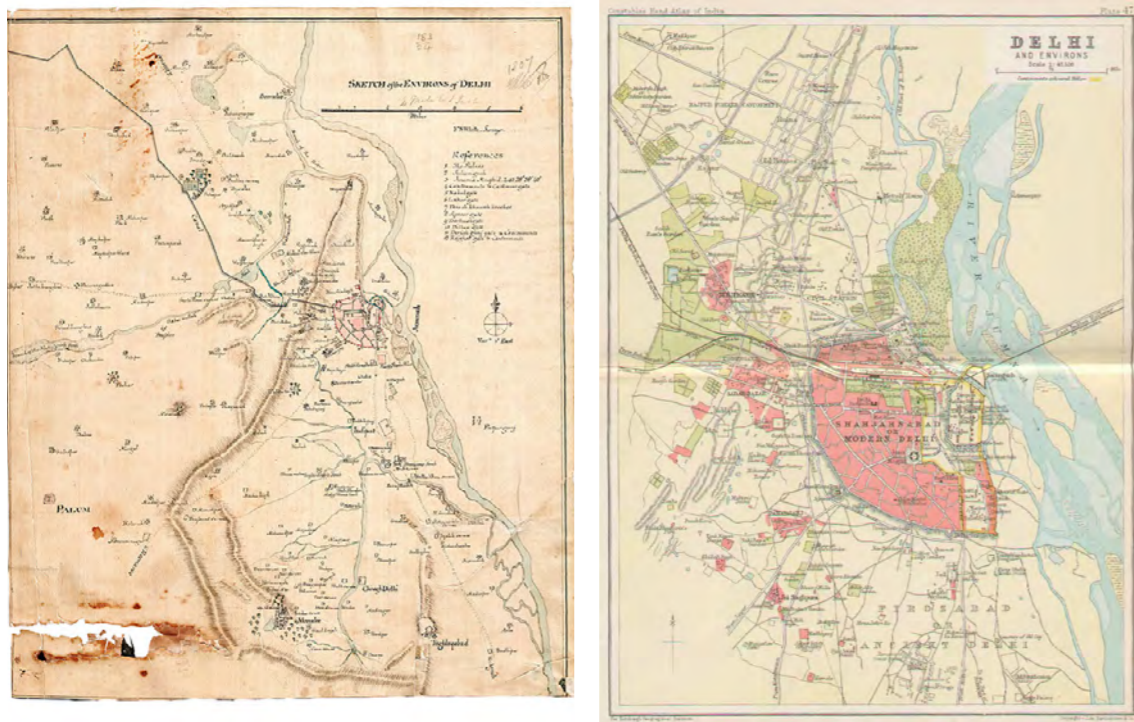
Source: (Guerrieri 2017) and (Alday and Gupta 2018)

EVOLUTION
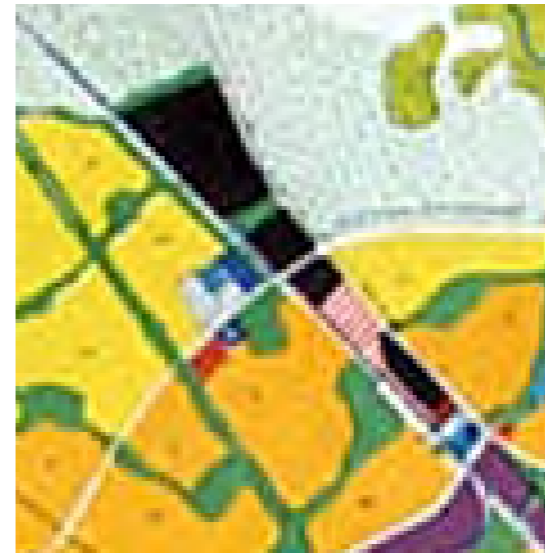
Bhalswa in the first masterplan
Source: (DDA 1962)

Bhalswa in the second masterplan
Source: (DDA 1996)

Bhalswa in the third masterplan
Source: (DDA 2007)

Bhalswa finds itself included in the free nation's capital through its first master plan (Delhi Development Authority [DDA] 1962), where the city's development limits fall just short of the area along its Ring Road. An area that is neither in the city nor far enough to be a part of its 'Ring Towns', Bhalswa was in the city's inviolable green belt of agricultural land. This period also introduces Bhalswa with the Bhalswa dairy farmwards and a new demographic, occupation, and subspecies - the cattle. The inviolable aspect found itself soon shattered when "cut-up and low-lying land" around the Old Khadar floodplain was reclaimed by hygienically conducted sanitary earth fills with garbage" (DDA 1962).

The following masterplan, introduced in 1981 for 2001, reinforced this logic. Considering Bhalswa as an area beyond development limits, it allotted 70 acres of land to develop a sanitary landfill. While the plan acknowledges the

lack of an essential "water prevention layer" (DDA 1996) in an existing dumpsite at the ring road near Sarai Kale Khan, it finds the development to be "satisfactory" (DDA 1996) While the plan does not lay adequate emphasis on the city's natural features, it does seek the development of water bodies in the urban extension as "major lung spaces and to attract migratory birds and for improving the micro-climate" (DDA 1996). Two contradictory forces emerge at Bhalswa - the development of the sanitary landfill and the acknowledgement of the Bhalswa lake in the development plan.

DESOLATION

The Bhalswa Dumpsite

Bhalswa 2001
Source: Google Satellite

Bhalswa 2021
Source: Google Satellite

Initiated in 2001, for the year 2021, the third master plan brings a bold vision for the city as a global metropolis and a world-class city (DDA 2007). For this, the city expands its urban limits. Allocating a green belt in its peripheries, it considers everything inside these limits to be "urbanisable land" (ibid.). Bhalswa was subject to rapid housing development through optimised land utilisation. This brought forth an array of authorised and unauthorised developments leading to a densification of the area. Although the plan sought the integration of unauthorised colonies in mainstream development, informal settlements of Kalander Colony, Vishwanath Puri, and Basant Dada Patil Nagar still lack basic sewage infrastructure and water supply.

The third master plan acknowledges a waste management concern assuming serious proportions due to increasing population, urbanisation, changing lifestyles and consumption patterns (DDA 2007). Projecting the city's waste to grow to upwards of 15,570 tonnes by 2021, it understands that a "major part of solid waste, especially non-biodegradable, has to be disposed of in sanitary landfills" (ibid.) In its sensibilities, a suggestion for a "buffer zone of 'no development' around landfill sites" (ibid.) was made, though this does not find recognition at Bhalswa. The period experienced an unprecedented landfill growth, exceeding capacity in its midterm and soaring to a monumental 62M high. With unchecked growth and unmonitored waste disposal, the landfill isn't really a landfill anymore. As Atin Biswas, from the Centre of Science and Environment, claims, "landfills are scientifically engineered sites, where non-hazardous and non-reactive waste is used to fill or level the land. They're designed so that waste dumped does not percolate into the groundwater. This is not the case in Delhi. The national capital has dumpsites – where garbage is literally dumped." (Munjal 2021). While this reality exists on-ground, it reflects poorly on North Delhi's Zonal Development plan, where the dumpsite's extents are marked as 'District Park' in an oversimplification of fact.
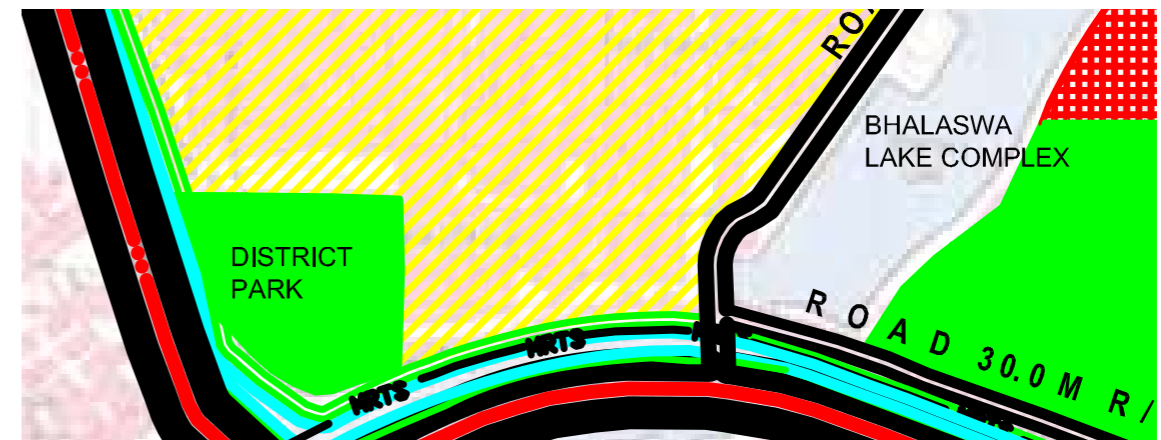
Bhalswa in the Zonal Development Plan

Source: DDA (2007)

THE NEED FOR REMEDIATION

Bhalswa today
Illustration: Ipsita Choudhury

Today, after decades of environmental degradation, Bhalswa's landscape is a living apocalypse (Alday and Gupta 2018). Breathing here is injurious (Lavakare 2020), with hazardous air pollution levels year-round. Groundwater is no different, with nitrate concentrations over thirty times the acceptable limits.

The dumpsite calls for remediation, a process that is yet to be actioned. Following judicial rulings, current efforts involve reducing the dumpsite's height. As a strategic action, the municipality has scooped out legacy waste and toppled it on the side. Although lower in height, these new formations often lack adequate supporting strength. In the last two years alone, two incidents of the dumpsite collapsing over surrounding settlements have damaged public and private property. Leachate from the dumpsite flows untapped, reaching people through the very drainage they rely on.

Groundwater Concerns
Illustration: Ipsita Choudhury

Basic Infrastructure Concerns
Illustration: Ipsita Choudhury

Efforts to decrease its volume, a more significant indicator of the problem, is nowhere to be seen. While shifting incoming waste to a newer landfill in Narela may be a preemptive solution, is this not giving birth to another Bhalswa?

Roadblocks to a Better Bhalswa
Illustration: Ipsita Choudhury

TOWARDS A BETTER BHALSWA

Informal Settlements by the dumpsite
Illustration: Ipsita Choudhury

In making the city's fourth master plan, the Delhi Master Plan 2041, the city is moving to a renewed vision. This one is to "Foster a Sustainable, Liveable and Vibrant Delhi" (DDA n.d.). In this, the draft plan devises six objectives to achieve its goals. For the first time, the city's development themes are not split as programs but devise themes towards development. This shows promise of integrated development but must also reflect in development policies so initiated. If the DDA's fourth master plan is to be enacted, it should reflect holistically in the zonal development plan and by-laws that are to emerge later.

Legacy waste from the dumpsite is a
physical risk to the landscape

Solid wastes from settlements post a
concern to the historic lake

The development of the zonal development plan has special value in fostering a better Bhalswa. The current zonal development plan, as approved in 2010, reflects poorly on the aspirations and ideals that should go into the remediation of a degraded landscape. Herein, it has the potential not to be a blind appropriation of the overarching master plan but to add value by contextually rooting the set guidelines and providing development suggestions. This, however, is not possible without establishing a dialogue with existing communities and stakeholders in the area.

The drafting of the localised plan invites the possibility of the synergy of bottom-up and top-down administrative planning. It must be understood that Bhalswa, although in a larger zone P-II, is of great concern to the city's overall health and security. It should therefore be treated with the importance it has missed through the previous development plans. If the future master plan acts as a remedial measure of a landscape that has been a playfield in the past three, considerable attention is required. A suggested way forward is to call for rooted neighbourhood improvement plans to support an immediate action plan for Bhalswa.

This sets in motion the need for another exercise - the setting up a dialogue between administrative departments for the area. In the case of Bhalswa, while the land is primarily owned and operated by the DDA and DUSIB, public facilities and infrastructure, including that of the dumpsite, are administered by the North MCD. Herein, caught amidst political interests and separation of powers, concerns raised for the area are often turned into a political blame game. Neither the North MCD nor the DDA has taken any accountability in actioning prevalent solutions on healthcare or sanitation. The future master plan is technologically empowered, utilising GIS systems to develop its land-use plan in the first instance. If implemented in the localised development, this can override overlaps and ensure accountability for development. While the land use map may be a governing policy, overruling administrative authority is also of the essence.

IMMEDIATE ACTION

The Delhi State Wetland Authority [DSWA] is expected to soon release its first draft for notification for the city's lakes. The first phase recognises the Bhalswa Lake, amongst others such as Sanjay Lake and Hauz Khas as wetlands. This promises protection against future deterioration. According to an article in Hindustan Times, the draft will mention a zone of influence for each wetland, including its buffer zone, enabling recreational activities like cycling and walking while restricting commercial activities, including grazing. Further, is the intent of developing long-term plans for the wetlands, including revival and long-term maintenance. Manu Bhatnagar, a part of the panel, speaks of the Bhalswa lake as "(it) was once comparable to the Naini Lake in Nainital, now suffers from excess sewage dumping. Each water body has specific problems that will need a specific solution" (Gandhiok 2022).

With empanelled experts working towards the goal, the DSWA shows certain promise in its intent for the wetlands' remediation. The revival of Bhalswa lake involves an in-depth study of the landscape and working through its pain points.

Since early 2020, Better Bhalswa has been working to uplift the urban situation through on-ground engagement and research. Through the holistic understanding of the landscape, proposed is a set of 5 propositions in making a better Bhalswa.

A Five Point Proposition for Landscape Remediation
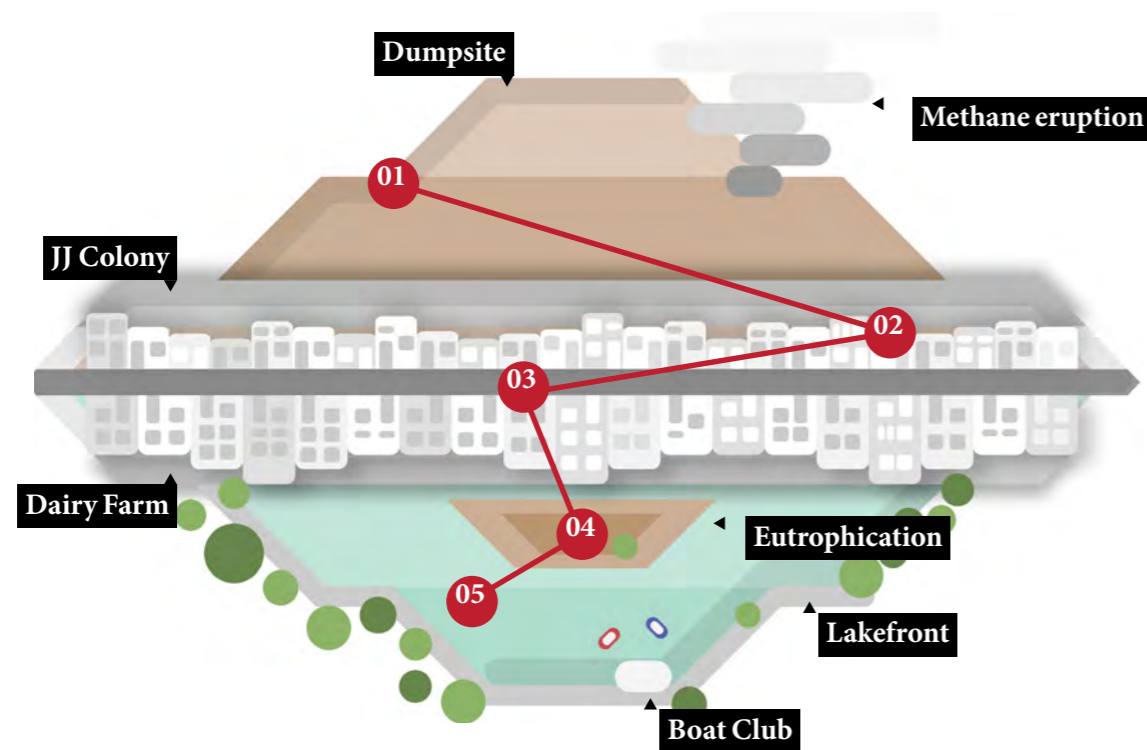
01

Leachate and Legacy Waste

Even when it does not rain, for the most part, the dumpsite acts as an over soaked sponge - its organic matter decaying and leaching out toxins. This leachate is a predominant waste and polluting agent for Bhalswa's landscape. The North Delhi Municipal Corporation (North DMC) is currently trammelling the dumpsite to generate inert soil, a resource that it does not have a viable solution for aside from filling low-lying areas in the city. Arguably, the city's low-lying areas are also parts of the several wetlands that the DSWA is currently seeking to protect. As an unsustainable practice, with no alternative solution, the dumpsite's inert soil presents a significant concern as a supplement to its volume. Since 2020, Better Bhalswa has been working on small placemaking initiatives, pioneering sustainable building through material innovation. One outcome, is the use of the earthbag technique, where the inert soil, stabilized with a minor percentage percentage of quicklime, is compacted in jute bags, and used for urban furniture, fenestration This is a viable alternative, as it has the potential to develop urban furniture, landscaping, and playscapes. Another alternative recommendation is prototyping construction blocks for mainstream construction or, as pavers. This requires significant R&D, but it can prove a viable solution for dumpsites across the nation if successful.

02

Waste Management

As discussed in earlier sections of the brief, waste management at Bhalswa proves to be a constant challenge owing to the difficulty in administering behavioural change management in an area with communities living by the city's waste sink. The area also lacks much-needed waste management infrastruc

ture, such as operating waste reclamation centres, or dhalaos. In such instances, waste produced by resident communities ends up accumulating in public space, posing a severe health and safety hazard. Waste often also ends up in stormwater drains, polluting the potent resource. Here, infrastructural development and community sensitisation are of great relevance. Waste management through public placemaking is a tactical yet practical solution.

03
Stormwater

Connecting the landscape's highest point – the dumpsite's peak, to its lowest point – the horseshoe lake, are Bhalswa's stormwater drains. Rainwater flowing from the dumpsite carries leachate through the drains, flowing through informal settlements of Kalander and Shraddhanand Colony and the Bhalswa dairy farms. Ultimately, the water ends up untreated into the lake, where the nutrient rich waste leads to a loss of biodiversity in a process known as eutrophication. The North DMC's responsibility is to check the dumpsite and maintain a lining to prevent the flow of leachate-rich water into the landscape. At the informal settlements, nonprofit organization efforts, especially from Chintain, where the organization is working to help communities develop kitchen gardens is commendable. This is substantiated with rainwater harvesting and stormwater management can serve well in preserving the rich resource.


04
Wastewater

While informal settlements lack basic wastewater management infrastructure, Bhalswa also contributes several other wastes, an abundant resource being cow dung at the Bhalswa dairy farms. This nitrate-rich substance accumulates at

the lakefront, creating so-called 'dung islands' where there should've been wetlands. Though sanctions are a means to check the same, dung at Bhalswa has no alternative endpoint. In closing this loop, suggested are ideas of cooperative industries working with dung. Dung to log machines is a cost-effective and viable solution to managing this waste in the absence of a proposed biogas plant.

Next is the concern of wastewater management in the area, as suggested in the SWM Rules 2016 and the Delhi MPD 2041, decentralised systems can be well adopted. Suggested locations for these include a 2-hectare plot of land at the lakeside currently reserved for the storage of mobile toilets by the DUSIB.
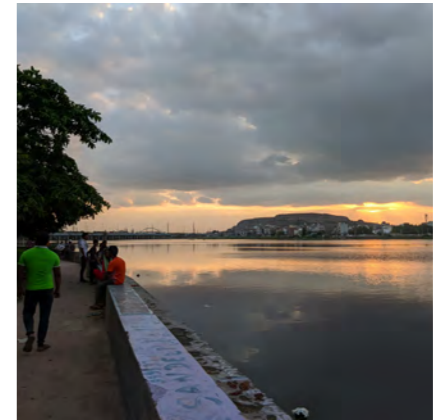
05
Lake Remediation

Although the DWSA's proposed action plan will focus on Lake Remediation, the plan's enactment and enforcement is an eventual case. As a landscape requiring immediate relief, potentially frugally developed constructed wetlands, such as those in the case of Hauz Khas lake, can be effective pilots. Public cleaning attempts for the lake by organisations like Karwaan Mission are commendable, but cleaning on the western front requires adequate machinery and equipment.

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Policy Brief

Exploring the Escape Plan - Hand Hygiene in Healthcare Facilities

sprf.in | livingwatersmuseum.org

Devi Divija Singal Reddy

Water Seekers' Fellow 2021

INTRODUCTION

Bunty's refrain of "dhote jao" (keep washing) from the 2013 Lifebuoy advertisement garnered cult status in 2020, as the world began to embrace hand hygiene as one of their primary strategies to survive the pandemic, on the recommendation of the World Health Organization [WHO]. Since hospitals are the primary battleground against the virus, it is imperative to prioritise hygiene here and improve efficient management. This will also help achieve goal 3 of Sustainable Development Goals that aims to "Ensure healthy lives and promote well-being for all at all ages." (United Nations n.d.).

A patient's disease interacts with the hospital staff, attendees, and other visitors in hospitals. If necessary precautions are not taken, these exchanges could lead to Healthcare-associated Infections [HCAI], which can develop either as a direct result of healthcare interventions such as medical or surgical treatment or from being in contact with a healthcare setting (National Health Service n.d.).

A WHO study indicates that at any given time, the prevalence of HCAIs varies between 5.7% to 19.1% in low and middle-income countries and between 3.5% to 12% in developed countries (World Health Organization n.d.). Infections acquired in medical facilities are thus a major global health problem. Another survey, involving data from 54 low-and-middle-income countries and representing 66,101 facilities, shows that 38% of healthcare facilities do not have an improved water source, and 35% do not have water and soap for handwashing (World Health Organization 2015). This lack of infrastructure compromises the ability to provide basic hand hygiene amenities to all the parties at a healthcare facility. Therefore, it becomes vital to minimise such avoidable infections for all parties. Unsafe and unhygienic patient care can even crumble any public health infrastructure.

OVERVIEW AND ASSESSMENT OF CURRENT GUIDELINES

Hands are our foremost means of interacting with the physical world. Therefore, hand hygiene is one of the key methods to prevent HCAIs (Mathai et al., 2010). Against the backdrop of prevention and control measures against COVID-19 and other infections, it is essential to understand the various guidelines in India for healthcare facilities, specifically concerning hand hygiene, as these are high-risk settings.

The Clinical Establishments (Registration and Regulation) Act (2010), was enacted by the Union Government to "provide for registration and regulation of all clinical establishments in the country with a view to prescribe the minimum standards and facilities and services provided by them". This Act applies to clinical establishments in both public and private sectors, except those run by the Armed Forces. The minimum standards notified under the Act, for Level 1A hospitals requires that it shall have the 24-hour provision of potable water for drinking and hand hygiene. Further, it mandates that a functional handwash basin shall be provided for a general ward of 12 patients (Ministry of Health and Family Welfare n.d.).

Indian Public Health Standards (Government of India 2012) are a set of uniform standards intended to improve the quality of healthcare delivery in the country for sub-centres, primary health centres, community health centres, sub-district/divisional hospitals, and district hospitals. These guidelines are expected to "act as the main drivers for continuous quality improvement and serve as the benchmark for assessing the functional status of health facilities" (ibid.). While these standards vary based on the type of facility, the following services are listed as essential services in a district hospital: water supply (plumbing), sanitation, handwashing facilities in all OPD clinics, wards, emergency, ICU and OT areas, compliance to correct method of hand hygiene by healthcare workers, promotion of hand hygiene, and practice of universal precautions by healthcare workers. Additionally, with respect to patient amenities, potable drinking water, functional and clean toilets with running water and flush, dedicated disabled-friendly toilets with running water facility and flush are considered essential as well. Under the desirable services category, providing locally-made hand rub solutions in critical care areas like ICU, nursery, burns ward, etc., is recommended to ensure hand hygiene by healthcare workers.

The infrastructure requirements are as follows:

Fitments	Hospitals for inpatient wards for males and females	Hospitals with outpatient wards for males & females
Toilet suite (1 water-closet + 1 wash basin + 1 shower)	Private room upto 4 persons	For upto 4 patients
Washbasins	Two for up to 24 persons; add one for every additional 24 beds	One for every 100 persons

National Guidelines for Infection Prevention and Control in Healthcare Facilities (Government of India 2020) list detailed hand hygiene protocols for the healthcare personnel to follow. Further, the policy for visitors and attendants suggests that they should clean their hands before entering and leaving the room. An alcohol-based hand rub should be available at the entrance of the facility/unit/ward, along with a poster displaying instructions for using the hand rub. Attendants should be taught to practice hand hygiene before and after touching the patient, and at the same time patients must also be informed about hand hygiene practices in the wards.

During the COVID-19 pandemic, Guidelines for Setting up Isolation Facility/Ward (Government of India n.d.) were created. It mentions the formation of IPC [Infection, Prevention, and Control] committees to monitor hand hygiene practices of healthcare workers and to ensure adequate hand hygiene by patients, caregivers, and visitors. Though the guidelines recognise hand hygiene as a component in healthcare facilities, there is inadequate emphasis on it as they do not address certain crucial elements concerning hand hygiene infrastructure.

Throughout the above mentioned documents, there is a nearly singular focus on hand hygiene of healthcare workers to minimise HCAIs. While healthcare workers' compliance is highly critical to reducing the burden of HCAIs, it is equally important to address the infection spread from patient to patient and patient to healthcare workers/visitors (Centers for Disease Control and Prevention n.d.). Guidelines such as National guidelines by Government of India (2020) for Infection Prevention and Control in Healthcare facilities and Guidelines for Setting up Isolation Facility/Ward, where hand hygiene practices of patients and visitors get a brief mention, do not explore it in more detail.

Moreover, there is little recognition of the importance of running water and soap alongside alcohol-based hand rubs for patients and visitors. The minimum standards fixed for water supply and the number of washbasins is rarely fulfilled in reality as these facilities are usually nominal and non-functional. The availability of soaps, alcohol-based hand rubs and sanitiser dispensers within easy accessibility for those other than the healthcare staff is overlooked. An assessment of 343 healthcare facilities in India (WaterAid 2018) reported that the handwashing stations are poorly equipped with soap and instructions for handwashing. Fur-

ther, even though the hygiene amenities may be available in these facilities, their adequacy, accessibility, functionality, and quality are unsatisfactory. In contrast, a place for washing hands was available in 97% of households as per the National Family Health Survey [NFHS-4], 2015-16. It was also noted in this survey that soap and water were observed in 60% of the handwashing locations, while only 16% had water. In households where handwashing was observed, only 9% did not have water, soap, or another cleansing agent (International Institute for Population Sciences and ICF 2017).

The National Sample Survey [NSS] 76th Round (Government of India 2019) has also conducted a study on drinking water, sanitation, hygiene, and housing conditions in India in 2018. It reported that 35.8% of household members washed their hands with soap before eating, and 74.1% washed their hands after defecation. Another Indian household survey (WaterAid 2020) concludes that many individuals altered their handwashing practices during the pandemic. However, they lacked knowledge of COVID-19 appropriate handwashing protocols such as handwashing after contact with a sick person, after contact with commonly used surfaces and objects, and handwashing after sneezing. This makes it evident that detailed instructions for handwashing in the hospital premises for the benefit of patients and visitors must be taken into serious consideration while drafting guidelines for healthcare settings. Though the guidelines address the accessibility of handwashing stations for disabled persons, even the presence of prescribed infrastructure has failed to achieve the intended objective. In addition to this, user experience of hand washing stations is entirely neglected within hospitals, for instance, accessible infrastructure to children is absent.

The guidelines for setting up isolation wards during the pandemic overlook the significance of handwashing facilities and sanitiser dispensers in the line of sight. Ensuring hand hygiene compliance by patients, caregivers, and visitors is limited to the isolation wards and not the rest of the hospital. Further, design nudges for handwashing stations, which have emerged against the backdrop of COVID-19 (United Nations Children's Fund 2020), that limit cross-contamination between users while also increasing the attractiveness and ease of use, have been ignored.

RECOMMENDATIONS

Altogether, the existing guidelines on hand hygiene in healthcare facilities are fragmented, making it vital to bring all the elements of hand hygiene together. The situation can be vastly improved by adopting a comprehensive hand hygiene policy which accounts for the following factors: basic hand hygiene services, associated water services, hand hygiene supplies in line of sight depending on the size of the hospital, promotional activities, and accessibility of handwashing stations to people with limited mobility and vision, as well as children. The scope of possible design changes in the infrastructure and behavioural interventions to increase hand hygiene compliance alongside detailed feedback mechanisms from all stakeholders in a hospital space must also be included.

This development of a comprehensive hand hygiene policy in healthcare facilities bearing in mind the patients, caregivers and visitors alongside the healthcare staff is imperative to ensure implementation and monitoring in a coordinated manner such that it contributes to an overall safer public health infrastructure. Currently, India does not have any reporting system on the HCAI levels or hand hygiene infrastructure in healthcare facilities. The availability of this data will demonstrate the state of India's hand hygiene in hospitals and enable it to accelerate hand hygiene progress and rise up to emerging challenges such as the COVID-19 pandemic.

INDICATORS

Basic hygiene services

Functional taps

Soap

Alcohol-based hand rub

Hand washing station near toilets (<5m)

Hand hygiene promotion

Near hand washing station

In hospital

Activities to promote hand hygiene

Accessibility of hand washing stations

To people with limited mobility

To children

Hand hygiene supplies

Sanitizer dispensers in line of sight

Improved water sources

Piped/protected/ packaged resources

Water continuity

24*7 water supply

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Adi Ganga:
Enmeshed Water Heritage of Kolkata

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A highly polluted stretch of the river

Today, rivers are perceived as amenities and objects "rather than as active agents in urban formation" (Way 2018). European and North American case studies on urban rivers confirm this trend (Neri Serneri 2005; Deligne 2012; Barles 2012; Stradling 2017). In the Indian context, Urban Political Ecology studies have shown how urban waters are used as dumping sites and have become residences for the emerging squatter population (Baviskar 2011; Coelho and Raman 2013; Mukherjee 2020; Singh, Parthasarathy, and Narayanan 2018).

This trend is evident in the case of Adi Ganga-Tolly Nullah, an old channel of the Ganges weaving through the dense localities of southern Kolkata to eventually join the Bay of Bengal. Between colonial excavations on the river's stretch by Major William Tolly to serve the dual purpose of navigation and sewerage and construction of modern-day Kolkata metro, this ancient river today resembles a sewer, reeking of foul odour and abandonment.

The question of the river's survival is vital to the ecological stability of the city. Chakrabarti (2017) reports that according to a 2017 study by SAFE-IWMI, Adi Ganga-Tolly's Nullah continues to be the only flood relief line for water-level resilience in the Kolkata municipal area. As noticed, recent monsoons have increased the city's flash floods and waterlogging problem. Residents of the area and Kolkata Municipal Corporation workers, responsible for the river's daily clean up, suggest a lack of awareness on waste segregation and disposal. They also suggest that the absence of intervention in the treatment of sewage is responsi-

ble for the river's current condition.

In 1985, as part of the Ganga Action Plan Phase II, the Tolly Nullah was provided with some renovation. This included preliminary works of dredging and evicting almost 800 'encroachers' from the river banks. The Kolkata High Court's 1998 order to clear over several thousand people from the banks of Adi Ganga reiterated the state's perception of the river's pollution as something that only resulted from the squatter settlements and drew protests from various grassroot organisations in the city. Beside this, the Metro railway construction between the Garia-Tollygunge drew heavy criticism from several environmentalist groups for the state's lack of ecological cognisance of the river's role in the city. In January 2017, the National Green Tribunal's eastern zone bench ordered the 75km-stretch of Adi Ganga to be included in projects undertaken by the National Mission for Clean Ganga, as opposed to the initial plan to fund the rejuvenation of only 15km of the original stretch.

The recent *Amphaan* and *Yaas* cyclones have also had a noticeable impact on the flooding of the vast area in Kolkata. These regions include the Kalighat and Kudghat stretches where the Adi Ganga had overflowed due to a lack of desiltation initiatives. The flooding of Adi Ganga has now become an annual monsoonal occurrence, with the sewage-laden river overflowing onto the streets and into the houses.

The cultural attachment to the river also plays a pivotal role in the river's need for conservation and awareness policy. The Kalighat temple, set on the banks of Adi Ganga is one of the holiest shrines in Hinduism and is visited by pilgrims all over the world, who partake in various ritualistic practises such as dips in the river or collecting the water from the river for performing rituals at home. In 2021, the Bengal government floated a global tender to clean River Hooghly along with Adi Ganga. Upon inspection, it has been noticed that from the 1980s, the sewage treatment plans under the Ganga Action Plan were hardly functional, making it clear that the devotees were using the toxic and untreated sewage water in Kalighat for their sacred rituals.

The field interactions with the KMC workers involved in the river clean-up shed light on another set of challenges. In case of infrastructural obstacles, workers in both the Kalighat and Kudghat stretch have highlighted the lack of enthusiasm from the upper-tier government officials in maintaining the river. Tenders are floated, contracts are handed, and orders are issued. Even then, according to the ground-level workers, none of the engineers sitting in offices try to understand the river's structure and problems on ground. For them, this is just another river, and a 'one for all' solution is the best strategy for maintaining the canal.

While Kolkata's heartland doesn't have a separate sewage treatment plan, East Kolkata's Wetlands act as an organic wastewater treatment resource for the city's sewage. Though the Adi Ganga acted as the sole flood relief line for the

city's municipal area, the metro construction and the untreated waste dumping have lessened the efficiency of the river to draw off the storm water from the city. Engagement with the residents, state officials, and groundworkers provide an understanding of the current challenges of the waterbody.

This leads us to the following suggestions. It's critical to:

1. Facilitate multi-stakeholder engagement with the waterbody and its ecology, the development of river literacy and awareness programs among the residents (programmes in schools, regular community-KMC meetings, interactions with the settlers) of Adi Ganga's banks.

2. Put more emphasis on the sub-regional water governance that integrates local nature-based solutions with cost-effective and innovative water management strategies, facilitating river-resident interdependence.

3. Develop a decentralised sewage treatment plan for urban rivers and waters. This would include setting up more Sewage Treatment Plants across the river stretch. These Sewage Treatment Plants will help tackle the influx of increasing waste disposal in the context of changing urban demographics, stormwater management, and regular monitoring of the river water quality index.

4. Implement a Blue-Green Infrastructure policy that perceives land and water in urban planning as an integrated concept.

5. Recognise Adi Ganga as part of the city's environmental and cultural heritage through policy frameworks and interactive audio-visual workshops. To understand the historical context and transformation of the river and enable further urban river management schemes in flood-prone cities.

The existence and survival of Adi Ganga-Tolly Nullah permeates a larger context of its survival, one beyond a river holding centuries of history and heritage. Globally, the current climate change scenario has proven the risks run by a deltaic city in the past few decades[1]. Despite being a water abundant city, Kolkata faces severe flood-risk challenges as a result of the multiple anthropocentric interventions[2] over time. Adi Ganga must survive through the above mentioned challenges while maintaining the flood balance of Kolkata's dense municipal areas. The fight for its survival offers a critical opportunity for the state to introspect the sustainability of present urban water governance and work towards the river's restoration and the integrated city-nature coexistence in the region.

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[1] The climate change resulting rising sea/ocean levels pose a threat of complete submersion to cities close to water. Kolkata is about 5 meters above mean sea level, facing the severe threat of marine transgression.

[2] Anthropogenic interventions to the city, in many cases flouting natural norms of slope, rapid scale of urbanisation and inadequate infrastructure to deal with the fluvial and pluvial floods.

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