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A Colonial Discourse on 'Urban Water': A Case Study of Hesaraghatta Waterworks in Bangalore, India

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ABSTRACT: This paper examines the Hesaraghatta Waterworks project as a case study of urban water governance in colonial Bangalore, now called Bengaluru. The study investigates how the project's administrative and institutional dimensions sought to reshape the relationship between water and urban populations. The findings demonstrate that the introduction of piped water through the new waterworks coincided with the emergence of a modern water governance framework. This framework was marked by new rules and legal instruments that attempted to alter the dynamics of water-people interactions in the urban context; in the process, however, it also led to unequal access and distribution of water. Based on these findings, the paper argues that the Hesaraghatta project represented a broad transformation in the social construction of urban water, whereby water shifted from being a shared ecological resource to a centrally governed urban utility, which was characterised by an association with institutional governance, legal control, and commodification. The paper further contends that these administrative and infrastructural changes operated as strategies through which the colonial administration sought to exercise its governmental rationality, rendering water not only a material necessity but also a potential tool for population management and social ordering.

KEYWORDS: Urban water, Hesaraghatta Waterworks, Urban Political Ecology, colonial governance, governmental rationality, Bengaluru, India

INTRODUCTION

This paper examines the case study of the Hesaraghatta Waterworks, a colonial-era water infrastructure project that was initiated in urbanising Bangalore[1] during the 1890s. The paper explores the role of this project in the social reconstruction of the notion of urban water in early 20th-century Bangalore. While colonial water governance often prioritised irrigation, the development and administration of urban water resources in colonial cities also emerged as a significant domain of intervention. Urban water became a lens through which the contested dynamics of urbanization and colonial state formation could be understood (Doshi, 2014).

By analysing the infrastructural arrangement of the waterworks project and the process by which it began to deliver the city's daily water supply, I seek to explore the making of a new regime of urban water governance, one that is run mainly by experts and follows practices that are associated with modern imperial science and engineering. I focus on the introduction of a new water bureaucracy, on attempts by the colonial administration to impose new rules and regulations on water supply and usage, and on the different dimensions of the inequalities that were exposed in the process of executing new waterworks. Through this focus, I demonstrate that the Hesaraghatta Waterworks project went beyond the technological triumph that brought more regular water access to the city and its inhabitants, and

[1] Bangalore was officially renamed Bengaluru in 2014. In this paper, I use 'Bangalore' when referring to the city before the renaming, and 'Bengaluru' when the context is contemporary or unspecified.

went on to change the social constructedness of 'urban water' by introducing certain new attributes to it in early 20th century Bangalore.

Based on archival research and data collection, the paper is organised as follows. The paper first offers a brief historical account of water management in Bangalore, tracing developments from the pre-colonial to the colonial period. It then presents the theoretical framework and methodology that guide the analysis. The subsequent section focuses on the making of the Hesaraghatta Waterworks in the 1890s, including its infrastructural design and the method by which it began to supply water to both Bangalore City and the Cantonment. The paper then presents a discussion of the administrative and social consequences of the project, including the emergence of a new governance framework, the codification of rules and regulations, and patterns of unequal water access.

This discussion explores two interconnected themes: how the social construct of urban water began to be reshaped through such colonial interventions, and how these changes reflected the broader efforts of colonial authorities to operationalise governmental rationality through water governance. In the conclusion, I outline the limitations of the study and suggest that the conceptual shifts in urban water that were introduced during the colonial period symbolised colonial water governance, urbanisation, and statecraft.

A HISTORY OF WATER IN BANGALORE

Pre-colonial water in Bangalore

Bengaluru, the present-day capital of Karnataka, is located on the Deccan Plateau at 839 to 962 metres above sea level. The city has historically experienced water scarcity due to the absence of perennial water sources. Situated within a broader semi-arid region of South India, Bangalore had developed an extensive system of reservoirs and lakes from as early as the 5th and 6th centuries CE, during the rule of the Ganga dynasty (Gurukkal, 1986). These water bodies were primarily constructed by damming seasonal streams, and are referred to in the local Kannada language as *kere*. They assumed an important role in sustaining the regional populace, thereby leading to Bengaluru's earlier nomenclature as *Kalyananagara* (City of Lakes) (Nair, 2005).

This indigenous water infrastructure was expanded during the 16th century under the rule of *Raja* (King) Kempe Gowda. This period saw the development of a system of engineered reservoirs that were supported by earthen embankments and bunds. These were complemented by a network of drains and sluices that facilitated water storage and distribution. Based on the region's natural topography, these tanks were strategically constructed along gradients to ensure that overflow from upper tanks replenished those at lower elevations (Rice, 1897; D'Souza and Nagendra, 2011). These water bodies were used for fishing, and also supplied water for agriculture, drinking water, and domestic uses for surrounding settlements (Buchanan, 1807).

Over time, these reservoirs metamorphosed into a 'tank system', grew a socio-political fabric, and became intertwined with socio-political nuances that encompassed power dynamics, caste relations, and political stratagems. They emerged as both a communal resource and 'symbolic capital' that reflected social dynamics, hierarchical standing, and societal honour within the served communities (Mosse, 1997).[2] By the late 18th century, however, this system began to decline, particularly during the regimes

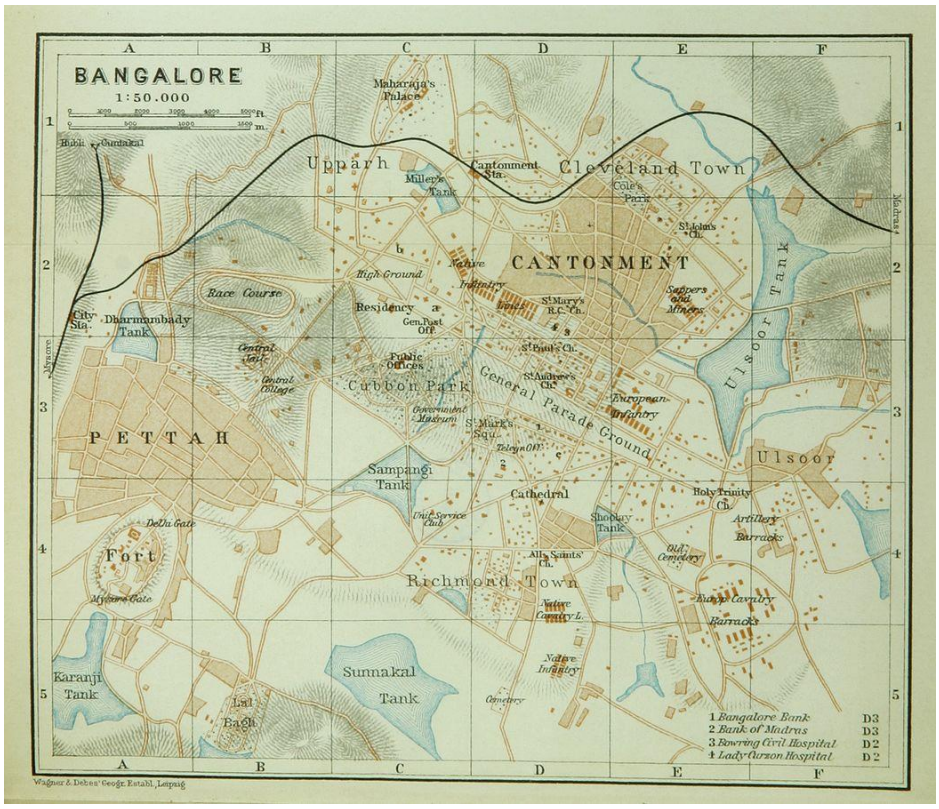
[2] Pierre Bourdieu's 'symbolic capital' concept refers to the value that individuals derive from recognition, prestige, or social honour within a given cultural context. David Mosse employs this concept in his analysis of irrigation tank management in pre-colonial South India, arguing that investments in the construction and maintenance of tanks generated symbolic capital for local leaders, which reinforced their authority and influence. Mosse situates this within a broader discussion of state formation, where control over water infrastructure played a central role (Mosse, 1997, 2003).

of Haider Ali and Tipu Sultan (Nagendra, 2016). The decline accelerated following colonial intervention, which introduced new paradigms of urban infrastructure and civic improvements through the construction of roads, drainage, waterworks, and other infrastructure.[3]

Colonial intervention and the emerging quest for stable water

With the onset of British administration, colonial Bangalore underwent a spatial and administrative bifurcation into two distinct zones. The Cantonment, established in the early 19th century and later formalised as the Civil and Military Station (C&M Station), served as a residential and administrative area for European settlers and Indian elites to a certain extent. The Old City of Bangalore or *Pettah*, on the other hand, remained under the jurisdiction of the Wodeyar rulers of Mysore (Hasan, 1970; Nagendra, 2016; Nair, 2005).

Figure 1. Map of Bangalore: The Pettah or Bangalore City is located on the left, while the Cantonment (later the Civil and Military Station) is on the right; the two are separated by parkland.



Source: Baedekar, 1914.

In its initial stage of settlement – at least until the 1870s – the colonial military personnel and European settlers residing in the Civil and Military Station depended primarily on local tanks such as Ulsoor or

[3] Colonial urban governance in Bangalore, as elsewhere in British India, involved infrastructural interventions that were shaped by imperial science, engineering, and planning ideologies. These developments often reflected broader tensions around planning methods, labour deployment, and fiscal constraints (Spodek, 2013; Ramesh and Raveendranathan, 2020). This article does not engage with these aspects in detail, though a range of scholarly work has examined their dynamics in depth, including the debates on planning ideologies and infrastructural regimes.

Dharmambudhi, whose unfiltered water supplied their daily needs (Broto et al., 2021).[4] However, because of recurring irregular monsoons, the famine of the 1870s and escalating epidemics, there arose an urgent demand within the colonial apparatus for stable and filtered water. Around this time, the city also faced the problematic issues of pollution from sewage water entering the tanks.[5] During the 1870s and 1880s, various attempts were made to address these issues, by initiating tank repair works, well construction, the creation of *hondas* (small reservoirs), and the establishment of Millers Tank and Sankey Tank (Digby, 1878; Ramesh and Raveendranathan, 2020; Sudhira et al., 2007; Unnikrishnan et al., 2020).

Nevertheless, with escalating water consumption in both the Cantonment (C & M Station) and the Pettah (Bangalore City), inadequate water storage and the inconsistent water supply became a pressing concern for colonial Bangalore's Public Works Department (PWD) and the Mysore Durbar, under the Maharaja's administration.[6] In the early 1890s, in response to this crisis, a proposal was developed to establish a more stable and reliable water supply system. This resulted in the planning and implementation of the Hesaraghatta Waterworks, a project that employed colonial engineering practices and imperial scientific knowledge. It marked a shift in the governance and management of urban water in colonial Bangalore.

THEORETICAL-CONCEPTUAL FRAMEWORK

This study adopts the framework of Urban Political Ecology (UPE), with a specific focus on the subfield that is concerned with water. A UPE approach conceptualises water not merely as a natural resource but also as a socio-natural entity that is produced and shaped through social, political and economic processes (Swyngedouw, 1997; Swyngedouw et al., 2002). Within this framework, the production and governance of urban water are closely linked to broader urbanisation processes.

In examining the development of the Hesaraghatta Waterworks in colonial Bangalore, this study employs UPE to understand how administrative, infrastructural, and legal interventions around water reflect and constitute transformations in the urban fabric of water-society relations. The rationale for adopting UPE is twofold. First, it provides a framework to conceptualise urban water as a socio-natural hybrid. This perspective allows the study to go beyond purely technical understandings of waterworks projects and to trace the social, economic, and governmental dynamics that inform and are informed by such infrastructure. In this sense, the waterworks project is understood as both a product of and a contributor to changing conceptualisations of urban water.

The second rationale for adopting a UPE approach is that it facilitates an inquiry into hydrosocial relationships, that is, into the interactions between water, institutions, and urban populations. This study is particularly interested in how these relationships were reconfigured with the establishment of the Hesaraghatta Waterworks. Although direct conflicts over water access or explicit expressions of colonial dominance in water management are not central to the archival records that are consulted here, the techniques and strategies deployed by the colonial administration to regulate water supply and distribution nonetheless suggest broader governmental objectives. In this context, UPE offers a valuable

[4] One of the earliest references to the use of water from Ulsoor Lake appears in the Ulsoor Tank Improvement records of 1876 (see *Improvement of the Ulsoor Tank as a Relief Work*, January, 1876, Municipality Vol. 1, Karnataka State Archives Department.

[5] In 1883, an instance is found in a letter from the President of the Municipal Commission to the Resident, concerning a military proposal to restrict public access to the lake for washing and water collection due to concerns over pollution (Subramanian, 1985).

[6] Historically, colonial Bangalore was comprised of the part of the city that was under the Mysore government (Durbar), and the Civil and Military Station that was under the Government of India. Until 1895, water was supplied from unfiltered tanks such as Dharmambudhi, Sampangi, Ulsoor, and Sankey, along with local wells and stepped ponds. In 1892, due to inadequate supply, Dewan K. Seshadri Iyer, along with other engineers, recommended sourcing water from perennial streams (Subramanian, 1985).

entry point for examining the emergence of new forms of governmentality through water infrastructure (Birkenholtz, 2014; Rattu and Véron, 2016).

METHODOLOGY

The methodological framework of this study is grounded in archival research. The data focuses on the planning, execution and administrative trajectory of the Hesaraghatta Waterworks. I obtained the primary source material from the Karnataka State Archives Department, Bengaluru, with particular attention to the indexes and files of the Municipality and the Land and Revenue Department. The collected materials consist of official reports and of internal correspondence between municipal authorities, the Public Works Department and the Dewan of Mysore; I also considered a limited number of letters and petitions that had been submitted by citizens. In addition to archival sources, I have consulted a selection of secondary literature related to the Hesaraghatta Waterworks project at the Mythic Society, Bengaluru. These materials offered historical insights that complemented the primary archival findings.

The analytical process was qualitative which allowed thematic patterns to emerge inductively from the content of the archival documents. While the majority of the archival records reflected the institutional and administrative voice of the colonial administration, I tried to read the archive 'against the grain'[7] (Stoler, 2008; Tozzi et al., 2022); this enabled an engagement with the material beyond administrative intentions, which helped trace the broader socio-political implications of the waterworks project in colonial Bangalore.

AN INTRODUCTION TO THE HESARAGHATTA WATERWORKS

The genesis of the Hesaraghatta Waterworks, also known as the Chamarajendra Waterworks, dates back to its establishment in 1894. Filtered water from this facility was first supplied to the Station on 7 August 1896 (Subramanian, 1985). Historical accounts and physical traces such as Bengaluru's 'Pipeline Road' (named for the water pipeline that was commissioned that year) indicate that water from the reservoir was conveyed into the urban core through three major pipelines. One of these pipelines served an area that corresponds to present-day Malleswaram in central Bengaluru; a second brought water to Yeshwanthpur in the north; and a third extended towards the emerging peripheries, including Dasarahalli (Broto et al., 2021).

The Hesaraghatta Waterworks continued to supply water to colonial Bangalore for nearly four decades; its services were discontinued in 1933, a year after the inauguration of the Chamarajasagara Dam Scheme. While the physical infrastructure and technology of the Hesaraghatta system gradually became obsolete with subsequent advances, the project nonetheless constituted a transitional moment in the city's water history. Its importance lay not only in the provisioning of water services but also in its role in reshaping the governance and social meaning of urban water in early 20th century Bangalore – a theme that I explore further in subsequent sections.

The decision to undertake the Hesaraghatta project emerged in the context of several alternative proposals presented by engineers of the Public Works Department. These included schemes involving the construction of masonry channels to the Dharmambudhi Tank, the augmentation of the Sankey

[7] Ann Laura Stoler (2008), in her book *Along the Archival Grain: Epistemic Anxieties and Colonial Common Sense*, draws on the 19th century archival material from the Netherlands Indies. She argues that colonial archives are not neutral repositories of evidence but rather are shaped by power, memory, and bureaucratic conventions. While Stoler advocates reading 'along the grain', she also highlights the importance of reading 'against the grain'. I adopt the latter approach to uncover what lies beneath the administrative voice and to explore colonial logics embedded in the archival record.

Tank's low-level reservoir, and proposals centred on the Hebbal Tank.[8] The selection of the Hesaraghatta site, however, was informed by a combination of geographic, hydrological and administrative considerations.

A central factor in favour of the Hesaraghatta project was its proximity to the Arkavathi River, which was perceived as offering a more stable and adequate water source than the local tanks. Engineers believed that a perennial stream would offer a reliable basis for constructing a reservoir that would be capable of meeting the city's growing demand. As articulated in an 1892 report by the Executive Engineer, "For an unfailing supply, we must go to some stream partaking as far as possible a perennial character and build across it a reservoir capable of containing a three-year supply. The nearest such stream is the Arkavathi".[9]

Another key consideration was the demand for a scalable and sufficient water supply system that was capable of addressing the needs of both the Pettah (the old city) and the Cantonment (C & M Station). The Dewan of Mysore, K. Seshadri Iyer, emphasised the need to identify a water source that could support a population of 250,000 for a minimum of three years, factoring in evaporation and absorption losses.[10] According to the PWD's assessment, the catchment area required for such a system should exceed 50 square miles (130 square kilometres). None of the existing tanks in or around the city met this criterion, even after proposed modifications. A new infrastructural plan was thus presented which identified Hesaraghatta as the most viable option as it was situated on the urban periphery and featured a large catchment area and riverine proximity.[11] The 1892 engineer's report reinforced this assessment, stating that,

> This [Hesaraghatta] tank has a large catchment basin (far greater than the 50 square miles required) in a valley favourably situated as regards rainfall. Its capacity can, I believe, be measured without difficulty, and there are three excellent sites for pumping stations (each over 3100ft [945 metres] high) almost in a direct line from the tank to the city.[12]

The financial rationale also played a role in the project's approval. Although the estimated cost of the Hesaraghatta scheme was approximately INR 3.1 million, which was higher than the other proposals, it presented two distinct economic advantages. First, the combined supply of water to both the Pettah and the Cantonment was considered more cost-effective than constructing two separate systems; second, the project introduced a system of taxation on water usage that covered both domestic and industrial consumers, thereby enabling public revenue in water services.[13] This monetisation of water use suggested alignment with a broader administrative rationalisation of cost efficiency, allowing the operational costs to be offset without excessive reliance on state funding (Kalpagam, 1997).

[8] In the 1880s and early 1890s, as Bangalore City and the Civil and Military Station sought a new water source, Major Grant and his team examined several options, including Maligal Valley, Hebbal, Rachenahalli, and Hesaraghatta; in the end, they recommended the Maligal Valley scheme. In a report dated May 1893, however, the Chief Engineer of Mysore expressed his preference for the Hesaraghatta scheme (see *Proposals for Supply of Water to Bangalore*, April 2, 1892, Municipality Vol. 1, 28, Karnataka State Archives Department).

[9] From *Water Supply to Bangalore from Hesaraghatta Reservoir*, 1892, Municipality Vol. 1, 1, Karnataka State Archives Department.

[10] Letter from K. Seshadri Iyer to the executive engineer outlining the Hesaraghatta project plan, in *Proposals for Supply of Water to Bangalore*, April 2, 1892, Municipality Vol. 1, 28, Karnataka State Archives Department.

[11] The Hesaraghatta project finally proposed water provision for a population of 250,000 at a rate of 2 cubic feet (.06 m^3) per capita per day, with a reservoir capacity sufficient for three years' supply (see "Report on Project for Supply of Water for Bangalore from the Hesaraghatta Tank, Registered No. 73, Neelamangala Taluk, by the Executive Engineer, Bangalore Division", in *Water Supply to Bangalore from Hesaraghatta Reservoir*, 1892, Municipality Vol. 1, 1, Karnataka State Archives Department).

[12] *Proposals for Supply of Water to Bangalore*, April 2, 1892, Municipality Vol. 1, 28. Karnataka State Archives Department.

[13] *Poll Tax for the Maintenance of the Water Works in the Municipalities*, 1904, Municipality Vol. 2, 22F, Karnataka State Archives Department.

The infrastructural arrangement

The Hesaraghatta Waterworks constituted Bangalore's first protected and centralised water supply system. Inaugurated in 1896, the system sourced water from the Hesaraghatta Reservoir, constructed across the Arkavathi River approximately 20 kilometres northwest of the city. The reservoir initially had a capacity of about 748 million cubic feet (21 million m^3), supplying 31.5 million litres of water per day; it functioned as the terminal storage of a cascading hydrological network comprising 184 upstream tanks that covered a catchment area of 211.8 square miles (548.6 km^2). Later modifications to the upstream weirs increased the reservoir's total storage capacity to over 1047 million cubic feet (29.6 million m^3).

Figure 2. Original hand-drawing of the Hesaraghatta Tank series that contributed to the making of a large catchment area.

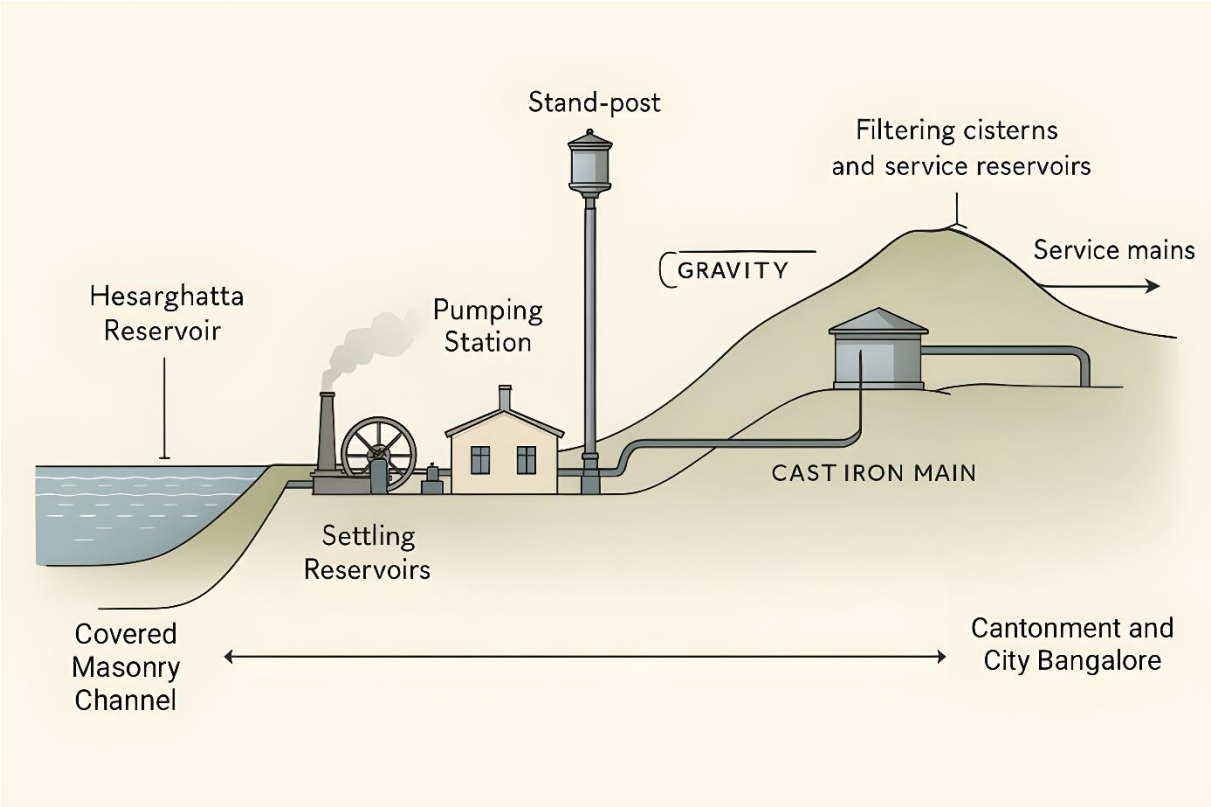
Source: Created by the PWD, Bangalore, in 1893 (see *Water Supply to Bangalore from Hesaraghatta Reservoir*, 1892, Municipality Vol. 1, 1, Karnataka State Archives Department).

Water was conveyed from the reservoir, via a covered masonry channel that was approximately 7.3 kilometres in length, to settling tanks near a steam-powered pumping station located in Bannwar village, adjacent to the Bangalore-Tumkur railway line. From there, the water was lifted to a standpost[14] on Bannwar Hill, enabling gravity-fed distribution through cast iron mains to filtering cisterns and service reservoirs on Mantapam Hill. These reservoirs, which held approximately five days' supply, created sufficient hydraulic head for citywide distribution. The treated water was routed through two primary mains, one of which went towards the Bangalore District Office and the other towards the Cantonment Railway Station, with auxiliary branches supplying both civil and military establishments. Additional treatment occurred at the Jewell Filters in Hebbal, from where water was pumped to the Highgrounds Reservoir to serve higher elevation zones in the city.[15]

[14] In colonial waterworks, a standpipe or a standpost was a vertical cylindrical structure that was typically made of brick or metal; it was used to maintain pressure and store water within distribution systems. During peak demand, these structures were crucial for fire suppression (Waterworks History, n.d.).

[15] The overall infrastructure of the Hesaraghatta water supply project is detailed in the Report on Project for Supply of Water for Bangalore from the Hesaraghatta Tank, Registered No. 73, Neelamangala Taluk, by the Executive Engineer, Bangalore Division, in, *Proposals for Supply of Water to Bangalore*, April 2, 1892, Municipality Vol. 1, 28, Karnataka State Archives Department.

Figure 3. Graphical representation of the waterworks system.



Source: Created by the author based on the description.

The Hesaraghatta Waterworks were celebrated in official discourse as a product of imperial science and technological innovation, particularly for combining the gravitational scheme[16] with a steam-powered pumping system; however, its infrastructural design was also influenced by ecological considerations. These considerations were acknowledged in colonial documentation but were rarely granted agency in shaping the project. Concerns over unreliable monsoon patterns, for instance, was reflected in the Dewan of Mysore's insistence on identifying a water source that was capable of providing at least a three-year supply of water. The adoption of steam engines to lift water from Bannwar village to elevated service reservoirs indicates the influence of topography on infrastructural decision-making; similarly, the emphasis on the need for piped water to supply individual and public consumption in both the Cantonment and Bangalore City aligns with contemporary anxieties about disease transmission and the sanitation needs of colonial populations.

Despite these ecological determinants, the prevailing narrative emphasised the capacity of imperial science to dominate and reorganise the natural environment in the service of urban development. This orientation is reflected in a letter from Dewan K. Seshadri Iyer to the Executive Engineer in 1892, wherein he wrote that,

[16] The Gravitation Scheme, developed in 19th century Britain, involved constructing elevated reservoirs and then piping water under pressure to urban centres. This model was adopted by colonial Public Works Departments and implemented in cities such as Bombay, Colombo, Hong Kong, and Singapore (Broich, 2007).

> Bangalore being on the top of the hill, the idea of supplying it [water] only by gravitation must be abandoned. We can only hope to give a sufficient supply by lifting it. This is not a matter of any great difficulty with modern machinery. People trust their lives to ocean steamers whose safety depends on their engines, and large factories have no difficulty in being worked daily by means of steam engines. Why should not the water supply of a growing town be worked efficiently by machinery and without fear of a breakdown.[17]

Such statements exemplify a technocratic rationality in which the transformation of nature is often positioned as a prerequisite for modernisation, improvement, and urban development. In the sections that follow, we explore some other governmental rationalities that were embedded in the emerging regime of urban water governance catalysed by the Hesaraghatta Waterworks.

FINDINGS

Following the implementation of the Hesaraghatta Waterworks, a complex network of institutions, technologies, engineering practices and regulatory measures coalesced to enable the effective functioning of the system. While this system marked a moment in ensuring a more regular and controlled water supply to a growing urban population; it also played an important role in reimagining the people's relationship with water. The new system contributed to the reconstitution of water as a more regulated resource, altering its meaning and accessibility through the institutionalisation of new governance frameworks.

This transformation manifested in three key developments: first, the emergence of a formalised urban water governance that introduced piped water services and new modes of state regulation and management of water; second, the introduction of rules and regulations governing access to water that brought shifts in the everyday practices and norms surrounding the use of piped water; and third, the operation of the waterworks that exposed and, in some instances, exacerbated existing inequalities around water access and distribution.

In the subsequent section, I examine each of these developments in greater detail to trace the changing discourse of urban water in early 20th century Bangalore. Based on findings, I argue that these processes contributed to a reconfiguration of the social construct of water in the urbanising landscape and also, to a certain extent, positioned urban water as a potential instrument through which the colonial administration exercised its governmental rationality.

Bureaucratisation of Water

Prior to the introduction of the Hesaraghatta Waterworks, Bangalore's water supply system relied on a traditional, tank-based infrastructure that was managed through localised governance. These tanks, integral to both irrigation and domestic use, formed a key component of the region's livelihood systems and pre-colonial statecraft (Mosse, 2003; Shah, 2012; Nagendra, 2016). The control of these water bodies typically rested with local elites; these included zamindars, priests and specific occupational groups such as the Neergantis and the Voddas, whose members held specialised knowledge of tank maintenance. This system of governance, while deeply embedded in local socio-ecological conditions, also reflected prevailing caste hierarchies and gendered power relations (Shah, 2012).

The establishment of the Hesaraghatta Waterworks, however, marked a shift away from this indigenous governance framework. It introduced a new model of water infrastructure that was predicated on modern engineered technologies and scientific expertise. The installation of machinery such as steam engines, pumping systems, water meters, and filtering equipment necessitated a different form of knowledge and authority. The new infrastructure spanned components such as the Jewell Filters, service reservoirs, public fountains and domestic connections, and its management required skilled

[17] *Proposals for Supply of Water to Bangalore*, April 2, 1892, Municipality Vol.1, 28, Karnataka State Archives Department.

oversight by trained professionals. The administration of water supply thus transitioned into the hands of technical experts; these included civil engineers who managed the system, sanitary engineers and government officials who supervised the pipelines and reservoirs, water inspectors who monitored legal and economic compliance, and licensed plumbers who were responsible for household repairs and maintenance.[18]

The cumulative effect of these developments gradually gave rise to a colonial water bureaucracy that was shaped by the logic of imperial science and the colonial administrative system. This bureaucracy played a central role in reconfiguring the regulation of water access, producing new legal norms, monetising water, and altering spatial arrangements in urbanising Bangalore. This emerging bureaucracy found its expression and legitimacy under the broad umbrella of the colonial Public Works Department. In 1904, as the Hesaraghatta Waterworks matured, the colonial administration formalised this bureaucratic arrangement through the creation of a dedicated *Water Supply and Stores Division* in Bangalore Cantonment. As per the archival record, "Government Order dated 8th February 1904 sanctioned the function of a permanent division called the 'Water Supply and Stores Division' with effect from the 18th July 1904, in the place of the temporary Hesaraghatta Water Supply Division".[19]

This administrative restructuring entailed a redistribution of responsibilities between the Bangalore Municipality and the new division, thereby reflecting the institutional consolidation of water governance. The growing influence of the department was evident in the revised water supply regulations issued in 1911. Key provisions included,

Rule No. 1: To ensure the economical use of water, the supply given for municipal purposes will be charged at concession rates.

Rule No. 3: The limit of annual rental value, which entitles a house to a pipe connection, has been lowered from Rs. 120 to Rs. 100

Rule No. 5: House service pipes will be laid by private plumbers who will be licensed for the purpose.

Rule No. 6: A nominal charge of 4 annas per month will be levied as the hire for meters fixed to house connections, following general practices elsewhere.

Rule No. 9: In certain cases, the Water Supply Department may exercise their power to cut off water connections.[20]

These rules introduced a range of measures aimed at reinforcing the monetisation of water supply, promoting economical usage, and institutionalising access through formal service connections. Their introduction following the initial operational success of the Hesaraghatta Waterworks signalled not only the consolidation of the new water infrastructure but also the emergence of a formalised urban water governance regime. The prioritisation of household connections, the licensing of technical experts, and the imposition of user charges reflected a shift in the urban water discourse – one in which water was increasingly framed as a measurable, chargeable, and regulated commodity.

In an effort to curb water wastage and misuse, the Water Supply Department appointed 'prosecuting inspectors'[21] and issued a notification announcing the Department's collaboration with police and

[18] *Sanctioning Revised Rules for the Regulation of the Water Supply in the Cities of Bangalore and Mysore*, 1911, Municipality Vol. 2, 42H, Karnataka State Archives Department.

[19] *Poll Tax for the Maintenance of the Water Works in the Municipalities*, 1904, Municipality Vol. 2, 22F, Karnataka State Archives Department.

[20] *Sanctioning Revised Rules for the Regulation of the Water Supply in the Cities of Bangalore and Mysore*, 1911, Municipality Vol. 2, 42H, Karnataka State Archives Department.

[21] 'Prosecuting inspector' was a subordinate position in the colonial police hierarchy in the colonial police system (Bhat, 1996).

municipal authorities to identify and legally prosecute offenders.[22] Notably, even local elites who had actively supported the development of the new water infrastructure, by contributing to the establishment of public taps and fountains, were subject to the oversight and control exercised by the expanding water bureaucracy.[23]

The institutionalisation of this bureaucratic framework was further shaped by public health challenges that occurred at that time; notable among these is the outbreak of the plague in Bangalore around 1898, just two years after the implementation of the Hesaraghatta Waterworks. In response to the epidemic, and grounded in the prevailing miasma theory of disease[24], the colonial administration enacted measures that influenced water governance practices. Settlements and tanks identified as potential sources of "bad air" and unsanitary conditions were shut down. J.H. Stephens, a town-planning engineer who was in charge of making Bangalore plague-proof, attributed the spread of plague to the environmental conditions near tanks. In his assessment of *Blackpally*[25], one of the affected localities, he argued that,

> The plague started in Blackpally (…) not very far above it in the same valley were formed the Miller's Tanks, by banking up the valley at a higher level. When the tanks had water in them, Blackpally, lying below, was always damp and always unhealthy. In the old cholera days that disease always showed itself first in that part of the town, and now, with this new supply of undrained water added to the old damp, plague also first showed itself in the town in this place (…) (Stephens, 1914: 37).

Expert recommendations rooted in miasmatic understandings of disease, thus, led to the closure of several tanks to domestic use and prompted a renewed emphasis on household piped water connections (Stephens, 1914; Broich, 2007). Sanitation became a key concern to urban water governance, with renewed regulations developed under the Hesaraghatta scheme and reinforced by discussions in early 20th century All India Sanitary Conferences.[26] These developments contributed to a reframing of piped water as being closely tied to notions of purity, scientific rationality and urban progress.

A key aspect of this transition was the prevalence of expert knowledge and scientific practices in the administration of water; this constituted a shift from precolonial water management that had been embedded in local, caste-based, and informal control systems. In contrast to tanks, piped water systems came to symbolise cleanliness, health and modernity. With the integration of expert oversight, rule-based access, commercialisation, and public health concerns in the governance framework, urban water turned increasingly into a finite and regulated public utility.

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[22] *Misuse of Pipe water in C & M Station*, 1904, Municipality Vol. 2, 80, Karnataka State Archives Department.

[23] *Poll Tax for the Maintenance of the Water Works in the Municipalities*, 1904, Municipality Vol. 2, 22F, Karnataka State Archives Department.

[24] The miasma theory mainly suggested that diseases are due to unhealthy or polluted vapours rising from the ground, or because of decomposed material. 'Miasma' explained why cholera and other diseases were epidemic in places with the stagnant foul-smelling sewage. Miasma theory influenced early public health reforms, though it was eventually replaced by germ theory (Kannadan, 2018).

[25] Shivajinagar was historically known as 'Blackpally', the name deriving from the Kannada *Bili Akki Palli* (white rice village), which referred to the white rice cultivated by early settlers. As the British Cantonment expanded nearby, Blackpally and Ulsoor developed into native settlements that catered to the needs of the surrounding indigenous populations (see *St. Mary's Basilica, Bengaluru*, https://en.wikipedia.org/wiki/St._Mary%27s_Basilica,_Bengaluru; also see *Neighbourhood Diaries: Blackpally,* https://neighbourhooddiaries.wordpress.com/hoods/blackpally/).

[26] Concerning the question of sanitation and hygiene, the Hesaraghatta project was the subject of a debate within the Public Works Department concerning water's chemical purity versus its wholesomeness. This debate divided chemists, medical practitioners and sanitary engineers, and had important implications for the project (see *Proposals for Supply of Water to Bangalore*, April 2, 1892, Municipality Vol. 1, 28, Karnataka State Archives Department and *Sanctioning Revised Rules for the Regulation of the Water Supply in the Cities of Bangalore and Mysore*, 1911, Municipality Vol. 2, 42H, Karnataka State Archives Department).

Although traditional tanks continued to exist and there is no conclusive evidence to suggest the outright dismantling of indigenous water governance systems, public reliance on tanks for domestic use declined markedly in the early 20th century. Archival and historical records indicate a trend toward the conversion of urban tanks into other built infrastructures (Unnikrishnan et al., 2016, 2020). Moreover, many of these tanks were repurposed for industrial use or leased to specific industries by the Water Department, further signalling a shift in the functional role and governance of urban water bodies in Bangalore.[27]

New rules and regulations

The second key development was the implementation of rules and regulations guided by new policies around water supply and access that aimed to reshape people's relationship to water. To promote the judicious use of water, the Water Supply Department issued regulations for domestic purposes, including drinking and household activities. In line with these regulations, two water inspectors were appointed under Section 176(d) of the Municipal Regulation Act VII of 1906.[28] These inspectors were tasked with various responsibilities; they included preventing water wastage at taps and public fountains, discouraging practices such as washing feet and clothes at public taps and discouraging children from using public water sources. Additionally, a government notification issued on 7 November 1902 introduced punitive measures for misuse of piped water and for damage to pipelines. Prosecuting inspectors were appointed to enforce these rules in public spaces.

Interventions of the water authority extended to private household spaces, facilitated by infrastructural and technological components like House Connections and Water Meters. The installation of water meters became mandatory for completing a House Connection.[29] These meters facilitated the calculation of daily and monthly water usage and served as a basis for rent collection and tariff enforcement, which indicated towards an institutionalized regime of regulation and accountability in water use. While these technological artifacts facilitated the conveying of water into private residences for individual and household uses,[30] they had also become tools for monitoring household-level water use and access. Regulatory provisions such as those specified in the 1896 Regulation for Hesaraghatta Waterworks required that household pipes remain accessible to water supply officials.[31] This insistence on accessibility was echoed similarly in the revised 1911 water supply rules, which authorised the Executive Engineer or their agents to disconnect private pipes from public mains under certain conditions. These conditions included, for example, if water was allowed to flow wastefully despite prior warning, or if water was used in violation of the terms under which the connection had been granted, provided that written notice was issued six days in advance.[32]

[27] In 1922, the colonial administration leased the city's Agrahara Tank to Binny Mills and Co. (see *Sale of a portion of the Agrahara Tank to the Bangalore Woollen, Cotton, and Silk Co. Ltd.*, 1928, Municipality Vol. 3, 12, Karnataka State Archives Department).

[28] *Sanctioning Revised Rules for the Regulation of the Water Supply in the Cities of Bangalore and Mysore*, 1911, Municipality Vol. 2, 42H, Karnataka State Archives Department.

[29] ibid.

[30] Initially, household water services were only available to those who could afford them, that is, wealthier people. Following the plague epidemic, however, the colonial administration sought, on the advice of experts, to extend such services throughout the city (see, *Reduction of Water Rate on House Service Connection Pipes in Mysore*, 1893, Municipality Vol. 1, 303, Karnataka State Archives Department; also Stephens, 1914).

[31] *Reduction of Water Rate on house service connection pipes in Mysore*, 1893, Municipality Vol. 1, 303, Karnataka State Archives Department.

[32] *Poll Tax for the Maintenance of the Water Works in the Municipalities*, 1904, Municipality Vol. 2, 22F, Karnataka State Archives Department.

Civic bodies were also brought under administrative scrutiny in an effort to enforce economical water use. Circulars were issued against "misuse of water"; they discouraged certain practices at public water sources such as bathing and washing of bodies, feet, clothes, cattle or carriages.[33] These measures signalled the administration's broader objectives of reforming public behaviour and inculcating a perception of piped water as a finite and regulated resource.

Collectively, these new rules and regulations introduced a legal and regulatory framework that reshaped both water use and access. Water became not only a regulated resource but also one that was subjected to active monitoring and surveillance by the state. While framed as necessary measures to manage scarcity and prevent misuse, these interventions should also be seen as efforts by the colonial administration to redefine the population's relationship to water. The imposition of fines, surveillance over household connections, and restrictions on public water use effectively repositioned water as a state-managed resource that was subject to bureaucratic control and legal authority. Colonial intervention thus introduced a more centralised and institutionalised model of water governance, in which rights over water access and use were increasingly mediated by the state.

Distribution and access to water

The third dimension of the Hesaraghatta project pertains to the issue of unequal access to water. The intensification of existing inequalities around water access and usage was manifested in two distinct phases, the first during the execution of the project and the second following its implementation. During the construction phase, the colonial government expanded the catchment area of the Hesaraghatta Reservoir by appropriating several existing tanks and surrounding lands. This process involved the acquisition of cultivated land and the displacement of rural settlements. Although official records suggest that compensation was provided, the project led to the dispossession and disruption of a number of established ecological and agrarian systems. Archival materials from the Land and Revenue Department (1893) indicate that at least 33 villages were displaced to facilitate the reservoir's development.[34] Following this, water sources and lands were rendered inaccessible to former users, with authorities citing sanitation concerns.[35] Tanks and adjacent lands were also repurposed to support the reservoir infrastructure. Modifications such as the raising of weirs led to the submersion of wet and dry cultivated lands.[36] Several documents record that the expansion of catchment areas for the waterworks led to the cessation of wet cultivation near existing tanks, compelling *ryots* (tenant farmers) to vacate the area.[37]

Through such policies and infrastructural changes, the colonial administration orchestrated a systematic process of displacement and compensation, accompanied by ecological reconfiguration. Rural communities were compelled to relinquish access to their traditional water sources in order to support the development of urban piped water systems. The overall making of the waterworks project reflects an ecological transformation of the countryside, wherein natural geographies were altered to serve the growing water demands of urban populations. This indicates a broader history of dispossession that is linked to the creation of modern water infrastructure and the associated conceptualisation of urban water.

[33] *Misuse of Pipe Water in C & M Station*, 1904, Municipality Vol. 2, 80, Karnataka State Archives Department.

[34] *Acquisition of Land for the Hesaraghatta Water Supply Project*, 1894-5, Land and Revenue, 59, 1-8, Karnataka State Archives Department.

[35] In 1895, a letter from the Deputy Commissioner of Bangalore District to the Dewan of Mysore described the unsanitary condition of the catchment area and recommended the establishment of a different conservancy system to protect the catchment area from sanitation issues. These actions further restricted local access to water and land (see *Acquisition of Land for the Hesaraghatta Water Supply Project*, July 6, 1896, Land and Revenue, 57, 1-78, Karnataka State Archives Department).

[36] *Proposals for Supply of Water to Bangalore*, April 2, 1892, Municipality Vol. 1, 28, Karnataka State Archives Department.

[37] Ibid.

Notably, this pattern was not unique to Bangalore; similar processes were evident in other colonial cities across India (Gandy, 2008; Broto et al., 2021). Scholars such as Broto, Sudhira and Unnikrishnan (2021) have also noted that although the pipeline from the Hesaraghatta Tank passed through several localities, many of these communities were excluded from accessing the water infrastructure. This exclusion fostered a sense of alienation and inequity, intensified disparities in water access and affordability, and reinforced the enduring rural-urban divide (Bakker, 2010; Broto et al., 2021).

The unequal access to water became more evident in the post-implementation phase of the Hesaraghatta project, particularly with the commencement of the piped water supply and associated services to Bangalore. One of the initial steps was the introduction of the water tax. The Municipal Commission imposed this tax from 1 January, 1900, charging 6% per annum on the annual rental value of all buildings and lands in the C & M Station; Bangalore City, by comparison, had a slightly lower rate which ranged from 3% to 4.5% of the annual rental value. Additional charges were levied for excess domestic water use at a rate of 1 Rupee per 1000 gallons (3785 litres), and trade use was taxed at 8 annas per 1000 gallons.[38] This water tax structure reflected the gradual prioritisation of trade activities over domestic use, in recognition of their greater scope for revenue generation.

Exemptions from this tax were granted to buildings and lands that were being used for military purposes, public offices, and residences of persons employed by the Secretary of State; by 1903, charitable institutions were also included in the exemption list (Subramanian, 1985). These exemptions reflected the differentiated access and priority given to certain institutions, and also indicated the uneven distribution of water services based on institutional and administrative affiliations. While a limited amount of water remained publicly accessible at no cost, this provision became insufficient in the face of urban growth and increasing consumption, and those with financial means thus opted for private household connections. This became a source of revenue for the colonial state, given the increased water taxes, pipe costs, water meters, and other associated expenses (Gandy, 2008); in the Hesaraghatta scheme, for instance, the water meter cost 4 annas and the installation of pipes cost approximately 25 rupees, according to the 1895-96 report.[39]

With this monetisation, the presence of class relations became very prominent in terms of water access and usage. Households with greater financial resources were able to secure a reliable water supply through private connections, while economically weaker sections depended on public taps and fountains where, despite a relatively lighter tax burden, their access to water remained limited. This underscored the structural inequalities embedded in the urban water distribution system. These disparities were further exacerbated when the city experienced its first significant water crisis. Although the system initially operated effectively, by the end of the first decade of the 20th century, it became evident that demand was outpacing supply. It was estimated that Bangalore City required 1.5 million gallons (5.7 million litres) per day, while the C & M Station could sustain a daily demand of 2.5 million gallons (9.5 million litres) (Subramanian, 1985). Limited storage capacity, however, posed a challenge in meeting daily needs; this was particularly the case in the C & M Station, which faced water shortages. In response to this situation, the administration implemented restrictions:

1. Water supply was limited to specific hours: 6: 00 a.m. to 11: 00 a.m. and 4: 00 p.m. to 8: 30 p.m. and

[38] *Poll Tax for the Maintenance of the Water Works in the Municipalities*, 1904, Municipality Vol. 2, 22F, Karnataka State Archives Department.

[39] *Reduction of Water Rate on house service connection pipes in Mysore*, 1893, Municipality Vol. 1, 303, Karnataka State Archives Department.

2. The free allowance of water was reduced by 25%.[40]

These measures further restricted water access for lower-income populations and reinforced a public perception of scarcity associated with piped water.

During the implementation phase of the water supply scheme, proposed disparities in distribution were evident through differentiated allocation plans between the City (Pettah) and the Cantonment (C & M Station). Engineers from the Public Works Department (PWD) justified this proposal of unequal distribution by citing perceived differences in the water-use habits of the native population.[41] In response, the Dewan of Mysore advocated for equal distribution and, in 1897, he successfully negotiated an agreement with the colonial Bangalore government to ensure parity in water supply between the City and the Station.[42] These overall developments illustrate that unequal water distribution often operated through a combination of demographic considerations, economic reasoning, and culturally embedded assumptions.

DISCUSSION

Based on my above findings, I would posit that the introduction of the new waterworks in Bangalore marked a shift in the conceptualisation of urban water under colonial governance. While the term 'urban water' is not novel in academic literature and the presence of urban water systems has been a feature across ancient, medieval and modern urban civilisations, the distinctiveness of this period lies in the redefinition of urban water within the colonial framework. This redefinition was shaped by two central pillars: the deployment of imperial science and technology, and the establishment of a modern bureaucratic administration for water management.

During the early 20th century, Bangalore's waterworks project and its programme of urbanisation proceeded in tandem. They shared a reciprocal relationship in the course of improving civic infrastructure (including water, housing, roads and drainage) and introducing new industries such as textile manufacturing to the region's broadly ruralised landscape. As it was conceived by the urban planners and engineers, the waterworks initiative was explicitly tailored for an urban milieu. In colonial correspondence, both native and colonial rulers often expressed themes that symbolised an urban shift, including 'growth of population', 'civilisation', and 'industrial and domestic use'. The incorporation of advanced technologies and modern materials such as pipes, filters and valves also created a modernised environment that had previously been unfamiliar to the Pettah, an old city that had hitherto been accustomed only to rural practices.

This emergent paradigm of water embraced distinctive attributes and contours that were congruent with colonial urbanisation and its water governance in the early 20th century. First, it introduced a technologically mediated bureaucratic system. Access to water was no longer based solely on physical proximity to natural sources but was instead regulated through formal institutions and technical expertise. Water provision now involved household connections, taps and engineered supply systems,

[40] *Sanctioning Revised Rules for the Regulation of the Water Supply in the Cities of Bangalore and Mysore*, 1911, Municipality Vol. 2, 42H, Karnataka State Archives Department.

[41] In his 1892 report, the Executive Engineer argued for a lower water allocation for native residents by emphasising their relatively lower need for water for activities such as washing clothes, and by pointing out their continued use of traditional water sources. This rationale, by framing Indian practices as inherently less water-intensive, reflected colonial biases regarding lifestyle and hygiene (see *Proposals for Supply of Water to Bangalore*, April 2, 1892, Municipality Vol. 1, 28, Karnataka State Archives Department).

[42] By the early 20th century, however, the Civil and Military Station had developed into a major urban centre. As its population grew, the water administration revised the 1897 agreement, allocating a greater share of water to the Station at the expense of the City (Subramanian, 1985).

which reduced the role of manual labour and increasingly formalised the workforce associated with water management.

Second, urban water was commercialised. It became a commodity that had to be purchased, thus reflecting a shift in the status of water from a common resource to one that was managed and distributed by the state. As Swyngedouw (2009) notes, the experience of scarcity in such contexts often stemmed not from the physical unavailability of water but from the lack of financial resources to access it. This transformation was also accompanied by a degree of discipline and regulation in everyday water access and usage.

With sanitation becoming an important focus area in new waterworks, urban water started to be upheld as a 'pure' source; this sense of purity emerged from modern chemical analysis, rather than from a sense of the wholesomeness of water. Urban water thus also assumed the symbol of civility and progress in the colonies, a tag that is always hard to contest in human civilisation.

Finally, urban water was brought under a legal and regulatory framework. Access was managed through new rules and procedures, and periodic inspections were introduced to oversee compliance. While the effectiveness of these regulations and the performance of the new bureaucratic apparatus can be debated, it is clear that the waterworks project and the institutional structures it introduced had brought new dimensions to how water was accessed, valued, and used in the city.

The colonial waterworks project in Bangalore thus marked a departure from earlier forms of urban water management. It introduced new technologies, legal regimes, and administrative rationalities that together redefined urban water as a state-managed, commodified and regulated entity; in the process, it attempted to reshape public access and usage patterns, as well as the broader relationship between citizens and water.

The success of the extension of piped urban water to the populations of both the Civil and Military Station and the City (Pettah) can be inferred from the gradual decline of the tank system in Bangalore's urban landscape. Changes in the physical infrastructure of tanks, their shifting purposes, and their eventual repurposing reflect a reduced dependence on traditional water bodies. Many urban tanks were drained or converted into built-up areas (Unnikrishnan et al., 2016; 2020); others were leased for industrial purposes, such as the leasing of the Agrahara Tank to the Binny Textile Mills in 1922 by the colonial government. During epidemic outbreaks, tanks were increasingly described as "filthy" and "unsanitary" and were designated as unsuitable for public use (Stephens, 1914; Dhanpal, 2023). In later years, several tanks and their surroundings were transformed into public recreational spaces such as parks, squares, or ornamental water bodies; this removed them even further from their original role as decentralised sources of domestic water.[43] These developments suggest a gradual decline in public reliance on tanks, particularly within the city limits.

These shifts signal a broader transformation in the governance and conceptualisation of water in colonial Bangalore. The emergence of piped water infrastructure introduced a notion of urban water that became increasingly disconnected from direct interactions with natural sources such as tanks. Notably, this shift did not occur through direct coercion, but rather through a gradual negotiated process that involved state authorities and urban residents. It was shaped by institutional mechanisms such as bureaucratic administration, regulatory frameworks, and new norms of access and distribution (Rattu and Véron, 2016).

I believe that examining the Hesaraghatta Waterworks project and the social and economic processes it generated offers a scope to argue that the colonial Bangalore's city administration made an attempt, through this waterworks project, to turn urban water into a potential tool for exercising governmental rationality upon the population. Through a series of interventions that included the formalisation of

[43] *Draft Bye-Laws for Regulating the Use of Parks, Gardens, Squares in Bangalore City Under the Municipality*, 1936, Municipality Vol. 4, 63, Karnataka State Archives Department.

service delivery, the introduction of new legal instruments, and the monetisation of water as a commodity, the new water governance represented an effort by the colonial administration to show how urban populations are accessed and regulated through water. The colonial administration used its knowledge, and occasionally its authority, to construct a new governance framework that not only governed water in the city, but also attempted to govern public's approach to water through strategies such as regulations and rules, piped water services to public spaces and private households, inspections and legal bindings on water access, reduced access to tank water use, and other such measures that are discussed in this paper. I contend that these measures were used as techniques to rationalise the population's approach to water access and usage.

The construction of this new socio-technical system around water thus gradually served broader governmental objectives of statecraft. Urban water became a means to cultivate specific rationalities around public health, domestic hygiene, and infrastructural discipline. Urban water thus became more than a civic utility; it emerged as a site through which the colonial state could enact its broader rationalities of governance. In early 20th century Bangalore, urban water was increasingly configured as a strategic instrument through which the colonial administration sought to manage both the resource and the population.

CONCLUSION

The Hesaraghatta case study provides a lens through which to understand how urban water was reimagined under colonial governance in Bangalore. Rather than being solely an engineering solution to urban water scarcity, the project signalled a deeper transformation in how water was organised, accessed, and understood. This study argues that the Hesaraghatta Waterworks project's introduction of piped supply, formalised bureaucracies and legal codification, as well as the accompanying displacement of people and ecological spaces such as tanks, means that it was not simply a new infrastructure, but was rather a new regime of water; through this new regime, urban water was reconceptualised and became a means to regulate aspects of urban life. Even as the project was shaped by material concerns such as population growth and disease control, it was also animated by administrative logics that sought to render water visible, measurable and governable. These changes introduced enduring distinctions between public and private water, between modern and traditional sources, and between those with and without access.

While the study is limited by its reliance on colonial archives and lacks the direct voices of the governed population, it nonetheless attempts to read these materials 'against the grain'. It traces the contours of governmental mechanisms that are embedded in the mundane decisions of infrastructure planning. The argument made here is not that colonial water governance fully succeeded in remaking public life around it, but rather that it instituted a set of practices, categories and logics that symbolised colonial rule. In framing urban water as a historically contingent and socially shaped construct, this article contributes to broader debates on water governance, urbanisation, and statecraft.

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