# The Technopolitics of 'Urban Water' in Colonial India
## A Case Study of Hesaraghatta Water Works in Bangalore

**Akash Jash**
Institute for Social and Economic Change

**Abstract**

This paper employs the analytical framework of Technopolitics to engage in a nuanced examination of the Hesaraghatta Water Works project, a notable infrastructure initiative in the late nineteenth and early twentieth century colonial Bangalore. In place of ascribing mere scientific import to this water supply system, our inquiry discerns its pivotal role in the establishment of a distinctive technopolitical regime. This transformative regime is notably characterized by the realignment of power dynamics inherent to water governance, stringent regulatory oversight over urban space and its denizens, and the emergence of previously unexplored facets of urban inequalities. By comprehensively mapping the societal and political repercussions of the Hesaraghatta project, we argue that it introduced a novel and far-reaching technopolitical construct – 'Urban Water'. This construct, far from being a mere hydrological abstraction, significantly reframed collective conceptualizations of water in the urban context and offered a fertile terrain for the exercise of intricate political and governmental rationality inherent to colonial rule. Our meticulous examination of the Hesaraghatta initiative, situated among several concurrent infrastructural endeavors by the colonial government in India's burgeoning cities, elucidates a pivotal 'technopolitical turn' characterizing the colonial regime during the early twentieth century.

**Keywords**
Technopolitics, Infrastructure, Urban Water, Hesaraghatta Water Works, Political Rationality, Colonial Bangalore

**How to cite**
Akash Jash, "The Technopolitics of 'Urban Water' in Colonial India: A Case Study of Hesaraghatta Water Works in Bangalore". In Ian Morley and Hendrik Tieben (eds.), *International Planning History Society Proceedings*, 20th IPHS Conference, "The (High Density) Metropolis and Region in Planning History," Hong Kong, 2 - 5 July, 2024, TU Delft Open, 2024.

DOI: 10.7480/iphs.2024.1.7606

## INTRODUCTION

Urban water often a time serves as a pivotal framework to explain the complex and often contentious politics inherent in the processes of urbanization and colonial state formation[1]. This paper aims to contribute to the scholarly corpus on 'urban water' in colonial India by critically analyzing the Hesaraghatta Water Works project, a mega waterworks project based in colonial Bangalore in the late 19th century, within the context of the colonial state-building project. By analyzing the grand infrastructural arrangement of the project and its execution process for everyday water services to the growing city, the paper seeks to bring out the political rationale of the colonial state behind the establishment of this waterworks project, which was often veiled within the grandeur of the imperial science, and infrastructural and bureaucratic framework of the project. Based on the analysis of the water project and its influence on the gradual societal change in the early 20th century Bangalore and its urbanization, the paper finally makes an argument over the reconceptualization of 'urban water' under colonial rule as a distinctive category to exercise governmental power in cities.

Utilizing archival research and data collection, the paper is organized into four sections. The first section delves into a brief history of water in Bangalore from pre-colonial to the colonial era. The subsequent section deals with the theoretical framework and the Methodology of this work. It focuses on the theoretical and conceptual foundations of 'Technopolitics' and its pertinence to this study. In the next, I discuss the planning and implementation of the Hesaraghatta Water Works project in the 1890s, including the development of its networked infrastructure to supply water to Bangalore City and the Cantonment. In the fourth section, employing the framework of 'Technopolitics', the paper scrutinizes the political rationale underpinning the project during that period. By relocating the locus of power in water governance, introducing new regulatory processes for spaces and population, and engendering disparities in resource access, the project not only reveals its political logic but also introduces the technopolitical category[2] of 'Urban Water'. This categorization encapsulates water as a scarce urban resource, transformed through a new technological infrastructure of water conservation and supply, and new patterns of user access with enough rules and regulations by the State, that had ultimately converted 'urban water' into a site or a tool, among many others, where colonial governmental rationality, took root and evolved.

## A HISTORY OF WATER IN BANGALORE: PRE-COLONIAL WATER IN BANGALORE

Bangalore, the capital of Karnataka, situated on the Deccan Plateau at an elevation ranging from 839 to 962 meters above sea level[3], has historically grappled with water scarcity, lacking a stable nearby water source like river or sea. Therefore, nestling in the greater semi-arid expanse of South India, the region of Bangalore harbored an extensive historical reservoir and lake system to combat such difficulties that trace its origins to the 5th and 6th centuries AD during the Ganga dynasty[4].

Later, in the era of Raja Kempe Gowda in the 16th century, Bangalore witnessed the establishment of an indigenously developed engineered reservoir network characterized by earthen structures and hydraulic bunds, complemented by a sophisticated network of drains and sluices facilitating water distribution to localities. Based on the natural topography of the region lakes or tanks were created through the regulation of rainwater flow along a topographic gradient, ensuring that water from higher-level lakes supplied those at lower elevations.[5] Over time, these reservoirs metamorphosed into a comprehensive 'tank system', had grown its socio-political fabric, became intrinsically intertwined with socio-political nuances, encompassing power dynamics, caste relations, and political stratagem, and emerged as both a communal resource and "Symbolic capital"[6] reflective of social dynamics, hierarchical standing, and societal honor within the served communities[7].

Both the topographic distinctiveness of Bangalore and the social-political fabric developed around the indigenous 'tank system' were of historical importance to guide the colonial project of the Hesaraghatta Waterworks, which we will try to unveil as we progress in the paper.

## AN INTRODUCTION TO THE HESARAGHATTA WATERWORKS

The efficacy of this Indigenous water network and its governance, although commenced diminishing in the late 18th century notably during the reigns of Haider Ali and Tipu Sultan, had undergone fundamental interventions after the colonial invasion. With the advent of colonial intervention through the British government, the Bangalore region underwent a significant spatial transformation, dividing it into two distinct zones: the Cantonment, established in the very first decade of the nineteenth century, later transformed into the Civil and Military Station in the late nineteenth century, which served as the exclusive residence for Europeans and the military initially and later extended to include native elites, and the Old City or *Pettah*, which fell under the governance of the Wodyer Kings of Mysore.[8]

The genesis of the Hesaraghatta Water Works, later known as the Chamarajendra Water Works, can be traced back to its establishment in 1894. Created to supply piped water to the urbanizing Bangalore, the impetus for this project can be situated within the colonial aspiration for a reliable and long-term provision of clean water services, primarily targeting the residents of the Civil and Military Station. Historical references, such as the oldest 'pipeline' and 'Pipeline Road' in today's Bengaluru, reveal that Hesaraghatta water was conveyed to the central city area via three pipelines, covering areas that correspond to modern-day Malleswaram in central Bengaluru, Yeshwantpur in the northern part, and ultimately extending to the new sprawl of Daserahalli. The Hesaraghatta project continued to provide water services for nearly four decades before officially going out of function in 1933, succeeded by the new 'Chamrajasagara Dam Scheme' in 1932.[9] The networked infrastructure and technologies integral to this project gradually became obsolete with advancements in technology. Nevertheless, as a symbol of colonial modernization and 'imperial science', the essence and impact of the technical assemblages within this project remained crucial to the political reconfiguration and societal dynamics of early twentieth-century Bangalore which forms the landscape of our study.

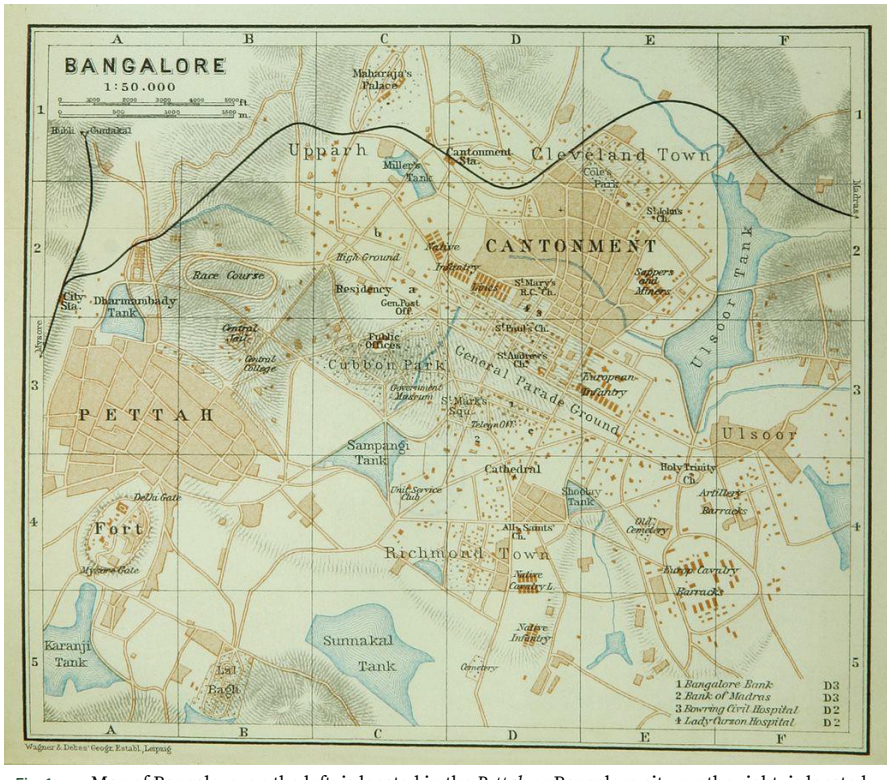


Fig. 1. Map of Bangalore, on the left, is located in the *Pettah* or Bangalore city, on the right, is located in the Cantonment that became the C & M Station, and the two are seen separated by parkland.

## TECHNOPOLITICS: A THEORETICAL- CONCEPTUAL FRAMEWORK

The term 'Technopolitics' represents a relatively recent addition to academic discourse, primarily emerging within the domain of Science, Technology, and Society Studies (STS) and related fields in the social sciences. The term 'technopolitics' was first introduced by Timothy Mitchell in his book 'Rule by Experts (2002)'[10]. Gabrielle Hecht subsequently refined the concept, focusing specifically on the domain of technology and its capacity to (re)shape society and politics.[11] Drawing from the foundational conceptualizations, 'technopolitics' in its most rigorous interpretation serves as a conceptual intervention within an ostensibly technical and innocuous technological infrastructure. Its purpose is to unveil the potent process of politicization and the underlying political rationality inherent in technology and infrastructure. These dynamics are engendered either by colonial authorities or contemporary state-capital alliances.

The invocation of the 'technopolitics' framework proves essential in our work as it serves as a potent tool to shift the focus on the materiality of technological artifacts and infrastructure, recognizing their agencies along with the human ones that make the pervasive presence of

the Hesaraghatta Waterworks visible in the growing landscape of Bangalore. Technopolitics becomes a crucial framework to bring light to the active agency of the infrastructural arrangements of this waterwork to produce crucial societal change. The technopolitical lens, more importantly, offers a critical perspective to question the popular logic of 'colonial improvement'[12], and celebration of imperial science, by focusing on unearthing the covert political and governmental rationality underpinning this project. Employing a technopolitical lens reveals how the Hesaraghatta case was crucial to dismantling heavily an already established power structure associated with Indigenous water governance, a necessary project for the colonial government to solidify its rule.

## METHODOLOGY

Our chosen methodological approach for this study primarily relies on Archival Research, which entails a comprehensive analysis of original archival records to trace the planning and implementation history of the Hesaraghatta Water Works. Our focus centers on the data about this specific project, encompassing details about the material arrangements, institutional functions, and everyday utilization of the infrastructure. The data talks about micro-level governance, evolving water usage patterns, shifting practices, and perspectives in everyday life. These archival records were primarily sourced from the Karnataka State Archives Department in Bengaluru, with a particular emphasis on the Indexes of the Municipality and the Land and Revenue Department. The data and records encompassed official government reports, and correspondence between government officials associated with the Municipality, the Public Works Department, and the Dewan of Mysore. Additionally, there were numerous letters and petitions from citizens to government officials. While these archival records predominantly represent the voice of the colonial administration, our approach sought to read the colonial archive 'against the grain'.[13] Our analysis of the materials was conducted in a manner that allowed thematic patterns to emerge organically from the textual content within the records. In addition to archival records, we relied on historical maps of the project to gain insights into colonial hydraulic plans and to provide further detailed explanations of our work.

## HESARAGHATTA WATER WORKS AND ITS NETWORKED INFRASTRUCTURE

Following the successful approval of the Hesaraghatta project, the planning and execution of this extensive urban infrastructure project unfolded on a grand scale. Utilizing the topographic nature of Bangalore, the Hesaraghatta Water Works went beyond the direct implementation of the 'Gravitation Scheme'[14] to give rise to an entirely new urban water infrastructure amalgamating the power of Steam Engine with the existing gravitational model that resulted in a grand techno-infrastructural arrangement, encompassed with an expansive catchment area of 211.70 square miles, including nearly 183 small and medium-sized tanks.[15]

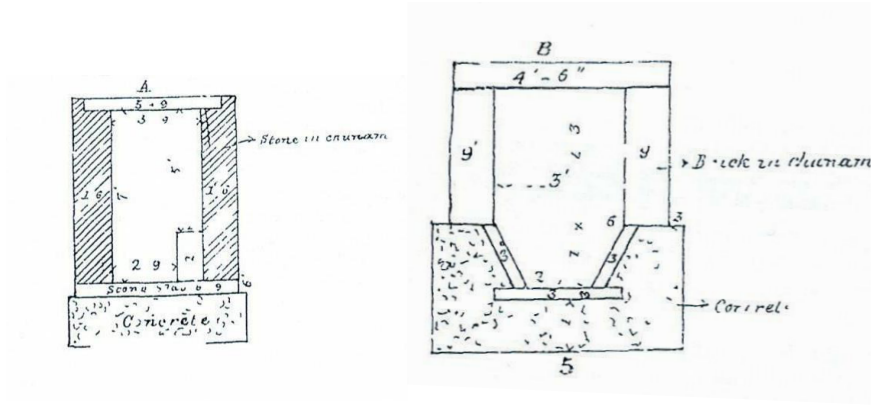


Fig. 2. The Delivery Channels as designed by the Executive Engineer. The two different types of delivery channels had been constructed which were connected to the service reservoirs through aqueducts and drains and were properly fenced with modern engineered planning. In the process of making the construction, a minimum of 12 acres of land had been taken away from the villagers residing in the place. The estimated cost for these delivery channels was Rupees 1,49,790.

To enhance water preservation rates within the reservoirs, the waste weir of the Hesaraghatta tank was raised to an impressive 15 feet. Approximately 12 miles of iron main or cast-iron pipes were laid to transport water to the city, accompanied by a rectangular masonry pipe. According to the PWD report, at the Hesaraghatta tank, a water tower was constructed from which water was conveyed through masonry delivery channels measuring 23,826 ft in length to the settling reservoirs.

The reservoirs were linked to pumping stations located a short distance from Bangalore city. At the pumping station, water was elevated to a standpipe, standing at a height of 42ft, constructed atop a nearby hill. From the standpipe, water was conveyed via a cast-iron main, 24 diameters wide, using gravitational forces, first to filtering cisterns and subsequently to service reservoirs. For the purification of the water, three Jewell Filters had also been constructed in different parts of the city where the water used to come for treatment and to reach finally both the Cantonment and the old city.[16]

As per the records, the water started to be supplied to the city from 7th August 1896 onwards.[17] The waterworks, with a capacity of 747.7 million cubic feet, had initially been designed for an estimated population of 2,50,000 (although as per the Municipality Records, during the 1890s Bangalore had a population of approximately 1,50,000). Other material infrastructural components associated with this project encompassed earthwork and cistern weirs, among others.[18]

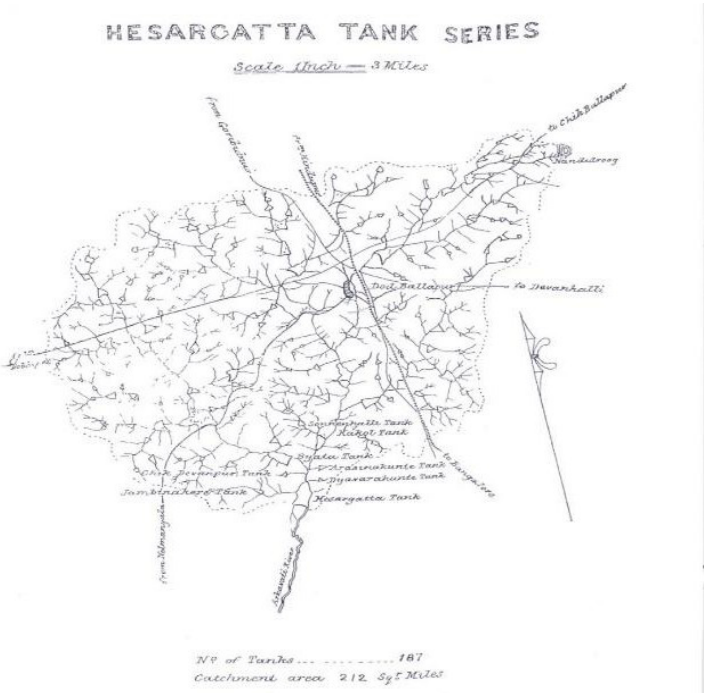


Fig. 3. Original map of the Hesaraghatta Waterworks Catchment Area, created by the PWD, Bangalore, 1893

## RESULTS AND DISCUSSIONS:

### BUREAUCRATIZATION OF WATER AND INTRODUCING A TECHNOPOLITICAL AUTHORITY

In the aftermath of the implementation of the novel techno-engineered water infrastructure, an intricate web of interconnected institutions, technologies, engineered practices, and policy measures emerged, constituting a functional network for the effective operation of this system. The change was primarily evident in the new institutional framework of the Hesaraghatta Water Works. The new water infrastructure at Hesaraghatta necessitated advanced scientific knowledge and technical expertise in various domains, including steam engine power, pumping machinery, water metering, and more. Maintaining the overall infrastructure, including components such as Jewell Filters, service reservoirs, public fountains, and house connections, required expert oversight.

With the implementation of this new infrastructure and its associated governance system, the traditional sources of authority and power over water, including zamindars, priests, and others relying on Indigenous knowledge of water infrastructure and management, found themselves inadequate to function in this modern water governance model. Consequently, authority and control began to shift into the hands of technically proficient and scientifically adept individu-

als, such as Civil Engineers responsible for overseeing the entire system, Sanitary Engineers and government officials tasked with supervising reservoirs and pipelines, Water Inspectors responsible for monitoring the economic and legal aspects of water usage, and licensed Plumbers authorized by the government to conduct repairs on pipelines and individual house connections.[19]

This emerging authority initially found its expression and legitimacy under the broad umbrella of the colonial Public Works Department (PWD). The colonial PWD represented the epitome of the practical exercise of imperial science within the Empire. In 1904, as the Hesaraghatta water works continued to develop, the colonial government established a new water department called "Water Supply and Stores Division", an institutionally authorized body responsible for overseeing water management in the city of Bangalore.[20] Following a decade of successful project implementation, the new technopolitical authority established firm control over water supply and usage within the city. This authority's influence was notably reflected in the revised water supply regulations for Bangalore in 1911. These regulations introduced measures aimed at increasing the monetization of water supply, ensuring economical water usage, authorizing services for house connections, and more.[21] These rules, among others, signified a substantial shift in urban water governance during the early twentieth century in Bangalore, primarily attributed to the new water infrastructure introduced by the Hesaraghatta Water Works project.

The cumulative effect of this institutionalization not only gave rise to a novel colonial Water Bureaucracy but also introduced a regime of "technopolitical authority" – a new regime of authority amalgamated with imperial science, technological efficacy, and human expertise that not only governed the new infrastructure through their professional and technological expertise, but also wielded significant influence over governing the population as a whole, as part of the broader bureaucratic structure of the colonial state, through the means regulating the behavior of the population, changing approach towards the water, producing new laws, and even regulating and transforming the crucial spaces associated with everyday water management in urbanizing Bangalore.

The new regime collectively underscores the displacement of the previous power structure concerning pre- colonial water governance. They exemplify the emergence of a new technopolitical governance framework centered around modern water infrastructure. The replacement of this power structure had been of significant political importance to the colonial state because it had not only dismantled an indigenous water governance framework but in reality, displaced a major pillar of the pre-colonial state that used to exist in this region for a long time and had been a major stepping stone of the pre-colonial state formation in this region.[22] For the colonial state, it was a necessary imperative to replace this system with a new one which will solidify the colonial state-building project in this place. The Hesaraghatta Water Works project was a major stepping stone towards this with far-reaching impacts on urbanizing Bangalore and its relation to water. The replacement also embodied a broader political endeavor in terms of colonial knowledge production. The transition from the pre- existing water system to a new techno-engineered model marginalized in certain ways the indigenous knowledge of water engineering embedded within the former water system and governance structures. This historical dynamic continues to reverberate in contemporary times, manifesting enduring repercussions in the water and lake governance of the city.

## REGULATION OF SPACES AND POPULATION

The next axis pertained to the regulation of spaces and population, focusing on the discourse of everyday water management in colonial Bangalore, which underwent significant transformations upon the implementation of the new water infrastructure. Estimating the population density in the Cantonment and the Old City, and usage patterns in both places, different amounts of water had been allocated for everyday use. The Chief Engineer planned the Hesaraghatta reservoir's capacity, ensuring a continuous water supply for 2 years and 5 months. This duration was considered sufficient, assuming a third consecutive year of drought was unlikely to happen there.[23]

To ensure the judicious use of piped water, the Water Supply department implemented strict rules stipulating that Hesaraghatta water should exclusively serve domestic purposes, including drinking and household chores. In its efforts to prevent the misuse of water, the department appointed water inspectors under Section 176(d) of the Municipal Regulation Act VII of 1906.[24] To oversee these aspects, prosecuting inspectors were employed to enforce regulations on public streets.[25] Alongside these measures, positions such as Sanitary Inspectors and Engineers played roles in promoting spatial regulations intermittently. Crucially, infrastructural elements such as pipelines, stand-pipes, taps, and fountains, which served as essential conduits for water supply, also became tools for the colonial state to exercise regulation and surveillance in public places.

The rise of the Plague as an epidemic in the late 1890s, immediately after the implementation of the new waterwork, further impacted water management severely, controlling its usage and introducing new regulations upon urban spaces and the populace. After surviving the deadliest wave between 1898 to 1905, the colonial government initiated a new town planning project in Bangalore which involved the closure of several tanks that were assumed to be potential disease vectors by the urban planners and the relocation of settlements to newly developed extensions such as Basavangudi and Malleswaram, thus extending the urban boundaries of the city.[26] To mitigate the spread of diseases like Plague, Cholera, and Malaria, the water supply system in these extensions was significantly restructured, shifting from reliance on local tanks to the provision of piped water with household connections. To ensure an adequate water supply for the Old City, the Cantonment, and the new Extensions, the water supply department implemented several measures such as restricting water supply timings to 6:00 a.m. to 11:00 a.m. and 4:00 p.m. to 8:30 p.m., and temporarily reducing the free water allowance for household connections by 25%.[27]

Integrating the new waterworks into post-plague town planning contributed significantly to redefining the concept of 'urban water' in 20th-century Bangalore. It promoted piped water as a 'purer' form of water to be consumed and sought to reinforce the notion of 'urban water' as a scarce resource that necessitated meticulous management by the government in everyday life, which had also potentially facilitated the establishment of a more effective state apparatus for everyday water management in the rapidly urbanizing city.

With the water supply and consumption expansion, state intervention extended to comparatively enclosed household spaces, facilitated by infrastructural and technological components

like House Connections and Water Meters. The 1896 Regulation for Hesaraghatta Water Works supply to Bangalore and Mysore outlined conditions for house connections, specifying that house pipes should be always accessible to water supply officers[28]. Matters concerning rent collection and meter accuracy checks further expanded state access to domestic spaces. The utilization and accessibility of water meters additionally facilitated the calculation of daily and monthly water consumption according to the supply, thereby seeking to shape individual and household behavior to align with more frugal water usage practices. Whereas all of these rules and regulations, activities appeared as part and parcel of the new water management by the colonial government, this 'rule of expertise', which became the official representative of the colonial state, also introduced a new regime of monitoring and surveillance of the spaces that had effectively concealed the flow of power within the material infrastructure and technologies (like engine power, water meter, pipe connection, etc.) transforming these elements into vital agents for the dispersion of power across various positions, both expert and non-expert (from water inspector to the government authorized plumber who all had certain special rights to act on these spaces).

Another influential factor in shaping moral attitudes toward water was its cost. Following an initial allocation of free public water access, individuals (who could afford it) were required to opt for costly private house connections for access to excess amounts of water. In the realm of private connections, the allowance of free water did not exceed 160 gallons per month, beyond which households incurred charges for every unit of water consumed. This intricate and hierarchical arrangement of water distribution sought to bring significant transformation in the collective attitude of the populace (See also Von Schnitzler for other such examples in the context of Africa, 2008).

These alterations in daily activities with water and a conscious effort to bring changes in the behavioral aspects of the population toward water culminated in regulatory behaviors and the institutionalized utilization of water infrastructure in everyday life. Through the material expression of power embodied in the Hesaraghatta water infrastructure, the political rationality of the colonial state took a potential 'biopolitical turn'. The infrastructural arrangements established a dynamic relationship between the state institutions and the population, penetrating private and public spaces, moral and cognitive behaviors, habits, and individual bodies. This ultimately resulted in rendering the population both measurable and regulatable.

## INEQUALITIES IN WATER GOVERNANCE

The third critical dimension in the context of the Hesaraghatta project pertained to unequal access to water, which added new dimensions to the existing inequalities in the growing urban space of Bangalore. The unequal access unfolded across two distinct phases: the first during the project's preparation, and the second following its implementation. During the construction phase, the colonial government undertook nearly 183 small and medium-sized tanks upon which numerous communities and villages depended. To ensure the project's success, at least 33 villages were displaced from their original locations during the years between 1892 to 1896.[29] Consequently, villagers were barred from accessing water resources and lands

in these areas for reasons of sanitation and other considerations.[30] Additionally, the government ceased wet cultivation near existing tank lands to expand the catchment area for the waterworks, thereby compelling Ryots (tenant farmers) to vacate these areas [31].

The unequal access to water became more pronounced in the post-implementation phase of the project, particularly with the commencement of water supply and services to the city—several distinctive features characterized this phenomenon. First and foremost, water had been transformed from a common resource into a public good, marked by centralized governance by the colonial state and the subsequent monetization process. While a certain quantity of water remained publicly accessible at no cost, it proved inadequate in the face of growing urban populations and escalating water usage. Consequently, those who could afford it opted for private house connections, which became a lucrative source of revenue for the colonial state, given increased water taxes, pipe costs, water meters, and other associated expenses[33]. This commercialization of water disproportionately disadvantaged urban households that could not afford private house connections and primarily relied on public taps and fountains.[34] While they were not entirely exempt from water taxes, their tax burden was comparatively lighter.

Racial considerations also played a significant role in the unequal access to water, especially during the project's initial stages. In the execution phase, different supply levels for natives and Europeans were advocated by several Public Works Department (PWD) engineers, citing factors such as habits, behaviors, and attitudes towards water, as well as the locals' customary reliance on tank water in their daily lives. This resulted in an initial allocation of 10 gallons per day per native individual in the old city and 12.5 gallons per day for an adult in the Cantonment, as sanctioned by the Municipality. [35]

The infrastructural challenges and technological limitations exacerbated the problem of unequal water access, compounded by the growing population density with the urban extensions in Bengaluru in the early 20th century. A substantial increase in urban density through the establishment of new extensions as part of town planning and industrial development in the early 20th century resulted in rapid population growth, impacting water governance both directly and indirectly. The colonial government leased several tanks for industrial purposes and drained out some local reservoirs to facilitate new town planning, leading to localized disruptions in water access for certain communities. Simultaneously, the city's expanding boundaries and industrial growth demanded an additional 9 million liters per day (MLD) supply from the Hesaraghatta Waterworks at a later phase which were allocated to industries in and around Bangalore to promote industrial development.[36] As a result of this dual activity, despite multiple rounds of adjustments in water usage and control, and changes in the existing infrastructure and technologies, the colonial government struggled to avert an early water crisis precipitated by the increasing urban density and population.[37] On additional occasions, scholars such as Christian Broto and Hita Unnikrishnan argued that the construction of the pipeline from the Hesaraghatta tank to the city traversed specific localities but denied them access to modern water infrastructure. This resulted in these communities feeling alienated from the project's success, leading to a sense of deprivation and discrimination.[38]

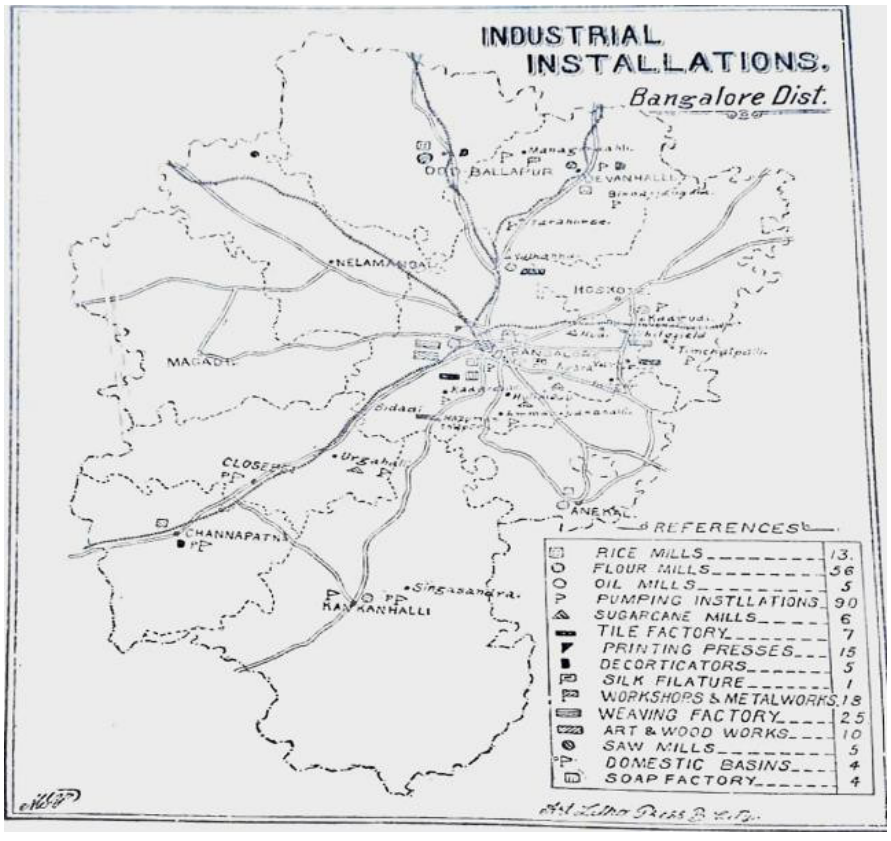


Fig. 4. Growth of the Industrial Belt in Bangalore District in the 1920s. A reference map to indicate the growing urban density and expansion of the urban boundary of Bangalore in the early 20th century.

## CONCLUSION

The discourse of this new water governance guides us on a journey of observing the emergence of a technopolitical regime stemming from ostensibly impartial and innocuous technological assemblages and networked infrastructures. This development is the result of the collective involvement of various individuals, institutions, technological artifacts, geographical features, civil and political programs, and institutional ideologies which precipitated the displacement of established power hierarchies, instigated shifts in civic values and moral conduct among the populace, introduced regulatory and surveillance measures in both public and private domains, transformed patterns of public water consumption, and reshaped the urban landscape. Ultimately, these changes converged to establish a novel technopolitical regime around water governance, keeping 'urban water' and its colonial reconceptualization at its core.

The emergent paradigm of water embraced distinctive attributes and contours congruent with colonial urbanization and its water governance in the early twentieth century. The colonial reign on water governance (re)conceptualized 'urban water' with certain novel characteristics that had been absent in the previous discourses of urban water in these areas – Initially, urban water introduced a technologically adept bureaucratic regime, necessitating institutional procedures and modern technological knowledge for its access and sustenance. The service system governing urban water had also been transformed, transitioning away from the prevalence of extensive manual labour towards minimizing it through engineered and technological amenities. Consequently, the labour associated with urban water governance became more formalized and professional.

Urban water became commercialized and domesticated, shifting from being a localized open water source to becoming accessible primarily through taps and fountains, thereby concealing its primary source from public view. Water now flowed silently within pipes, curtailing its open-ended distribution, and was monetized as a valuable as well as scarce urban resource.

Urban water also started to be upheld as a "pure" source – a sense of purity that emerged from modern chemical analysis, rather than the wholesomeness of water,[39] and thereby, became emblematic of modernity, and a source of exclusive consumption by the urban populace. Thus, urban water also assumed the role of a symbol of civility and progress in the colonies, a tag that is always hard to contest in human civilization at any point in time.

This new characterization of water reflected a symbiosis of transformation in the technological and infrastructural paradigm as well as a transformation into the social and political fabric of water in the early twentieth century. The new geography of urban water could be visible through expansive infrastructural networks, wherein the locus of agency and power both potentially shifted to tangible components such as pipes, filtration mechanisms, and water metering apparatuses, as well as towards the purview of professional human expertise.

The myriad transformations wrought by this new arrangement, the micro and macro-level changes in the usage and functionalities of water in everyday life coalesced into reframing 'urban water' as a technopolitical category that aimed at reinforcing colonial rule in the cities. Imbued with an intricate network of technological artifacts and infrastructural components, as well as representing an abstract facet of urban life, 'urban water' transcended mere technological life. The new water with its technological system, material amenities, intensive supply line, and the new bureaucratic regime had grown with all potential to extensively intervene in the social fabric of the cities, contributing to the project of colonial state-building by governing the population, reproducing the spaces, and even reproducing the structure of power associated with water governance. The process can aptly be conceptualized as a technopolitical venture — creating a locus within the colonial government's repertoire, through which the political and administrative rationality of the colonial state could be introduced, and the power of the state could have been exercised in the early twentieth century.

Towards the early twentieth century, the colonial state thus took a 'technopolitical turn' through initiatives such as urban water spreading across several colonial cities of India

through new waterworks, and other such civic infrastructures. The flow of water starts carrying governmental rationality in disguise of networked infrastructure and the hegemonic presence of scientific rationality governing their operations. The more the water flows, the more the system traverses through the landscape, and 'urban water' as a technopolitical category has strongly been established.

'Urban Water' as a technopolitical category continues to persist in contemporary discourse, albeit with evolving characteristics and definitions. Its enduring relevance has been a recurring theme in academic discourse concerning urban water and its governance within post-independent states and cities. The colonial water governance in the early twentieth-century cities had been a crucial precursor of technopolitical water management that we witness today in ex-colonial cities.

## ACKNOWLEDGMENTS

I am grateful to the Institute for Social and Economic Change for providing me with the opportunity to conduct this research. My sincere thanks go to the Karnataka State Archives Department, Vidhana Soudha, Bengaluru, and the Mythic Society for granting me access to the essential documents required for this study. Their cooperation and assistance were crucial in ensuring the smooth progress of this research.

## DISCLOSURE STATEMENT

The author claims no conflicts of interest.

## NOTES ON CONTRIBUTOR(S)

**Akash Jash** is a Doctoral Fellow at the Centre for Study of Social Change and Development, Institute for Social and Economic Change. With an academic background in Sociology, his research interests lie primarily in Urban Sociology. Contact Information – ajash.ju@gmail.com

## ENDNOTES

1. Doshi, "Imperial Water," 174-175.
2. A technopolitical arrangement results from negotiations involving a specific technology, its cultural and political context, and the various actors involved in its implementation, who vie for influence. In the context of our study, it refers to the politically mediated and charged infrastructural organization of water works designed to govern the state. This arrangement generates novel forms of power, often concealed beneath technological prowess and infrastructural frameworks, while simultaneously engendering new agents of power. In the case of the Hesaraghatta Water Works, the technopolitical authorization was molded by the innovative technological and infrastructural design of the waterworks, as well as the newly established governing institutions. These elements collectively influenced the colonial state's pursuit of governance objectives through the utilization of a fundamental necessity, water, and civic infrastructure, the Hesaraghatta Water Works.
3. Kamath, "Karnataka State Gazetteer." D'Souza and Nagendra, "Public Commons," 842-843.
4. Gurukkal and Gurukkal, "Aspects of the Reservoir System of Irrigation in the Early Pandya State."
5. Rice, "Mysore: a gazetteer compiled for government." D'Souza and Nagendra, "Public Commons."
6. The concept of "Symbolic Capital" has been explicitly given by Pierre Bourdieu, for details, P. Bourdieu, *Distinction; Practical Reason: On the Theory of Action*. The foundation of the concept stems from the theory of conspicuous consumption, initially introduced and elaborated upon in the late 19th century by Thorstein Veblen and Marcel Mauss. The concept denotes the assets accessible to an individual based on their honor, prestige, or acknowledgment, representing their value within a given culture. David Mosse used it in the context of his research where he argues that the protection, construction, or repair of irrigation tanks long involved investments that generated 'symbolic capital' in the form of honor or authority and created domains of influence for individual leaders. For a classic elaboration of this view, see David

Mosse, *The Symbolic Making of a Common Property Resource: History, Ecology and Locality in a Tank-irrigated Landscape in South India*, Development and Change Vol. 28 (1997), 467-504.

7. Mosse, "The Symbolic Making of a Common Property Resource: History, Ecology and Locality in a Tank-irrigated Landscape in South India."

8. Hasan, *Bangalore Through the Centuries.* Nagendra, *Nature in the City*. Nair, *The Promise of the Metropolis*.

9. Broto, Sudhira, and Unnikrishnan, "WALK THE PIPELINE: Urban Infrastructure Landscapes in Bengaluru's Long Twentieth Century."

10. Mitchell, *Rule of Experts: Egypt, Techno-Politics*, Modernity.

11. In Mitchell's formulation, 'techno-politics' seeks to decenter human agency and power when interpreting social phenomena. It highlights the unpredictable power dynamics inherent in technical assemblages, acknowledges the agency of non-human entities in the redistribution of agency, and unveils the intricate internal dynamics characterized by unresolved tensions among multiple actors (Mitchell, 2002; Hecht, 2011). Building upon Mitchell's formulation, Hecht posited that technopolitical arrangements emphasize the deliberate transfer of power to technical artifacts and infrastructures—a shift consciously orchestrated by designers and policymakers to render enduring. Hecht, *Entangled Geographies: Empire and Technopolitics in the Global Cold War*.

12. As argued by Malini Ranganathan, the concept of Improvement is intricately linked to the principles of liberal governance, which emerged within imperial contexts. This idea of improvement is then utilized to advance the state's interests in capital accumulation and spatial expansion. In the colonial context, "colonial improvement" was a fundamental element and ideological justification by the colonizers to establish the path of "modern" urbanization in the colonies. For a detailed discussion on the genealogy of 'improvement', kindly follow the, Ranganathan, Malini. "Rule by Difference: Empire, Liberalism, and the Legacies of Urban 'Improvement.'" *Environment & Planning*. A 50, no. 7 (June 22, 2018): 1386–1406. https://doi.org/10.1177/0308518x18781851.

13. The source of this perspective is Stoler, *Along the Archival Grain: Epistemic Anxieties and Colonial Common Sense*. In this book, Using the 19th-century Netherlands Indies and its extensive archives, Stoler provides the anthropologist's view of colonial archives, through the sometimes-heavy jargon of that discipline, which gives a variety of insights into the nature of archives in general. Stoler's perspective essentially argues that an archival document brings into play many issues of power, control, memory, forgery and fabrication, and other such aspects. Records are not just neutral testaments of evidence waiting to be mined by a researcher, but they are fiction and fact, story and testimony, all rolled up into bureaucratic and societal conventions of recording and remembering. An archival record is not just a flat piece of evidence waiting for its rediscovery, but it is a document full of nuance, depth, and breadth waiting for its interpreter. She tries to persuade us to read against the grain of what the creators of these archives intended these records to serve, seeking to provide archivists and users of archives more insights into the nature and value of the evidence they give us. Her examination of colonial archives enables us to explore a particularly valuable territory about the meaning of archives as documents, institutions, and memory repositories.

14. It is a nineteenth-century schematic work for supplying water to European cities. Later, it was incorporated into the scheme of the newly built Public Works Departments in the colonies like India. The basic scheme says that a reservoir had to be built at an elevation above the city. An aqueduct or iron pipeline will deliver the water from there to the distant city areas. The Gravitation Scheme involved extensive landscape alteration in the hinterlands of cities, including damming rivers, raising lakes, or flooding valleys, followed by piping water under pressure to urban centers, simultaneously reshaping urban environments and societies. For a detailed discussion on the Gravitation Scheme and its relation to the state formation, kindly follow Broich, J. (2007). Engineering the Empire: British Water Supply Systems and Colonial Societies, 1850–1900. *Journal of British Studies*, 46(2), 346–365. https://doi.org/10.1086/510891.

15. Unlike other projects such as Vihar Water Works in Mumbai or Delhi Water Works which adhered to the 'Gravitation Scheme', the Hesaraghatta Water Works had to depart from this established scientific method due to the topographic nature of Bangalore and adopted a more complex and advanced scientific model.

16. Source File: Water Supply to Bangalore from Hesaraghatta Reservoir. *Municipality* Vol. 1, 1-1892. Karnataka State Archives Department.

17. Subramanian, "Bangalore city water supply - a study and analysis," 56.

18. This comprehensive description of the Hesaraghatta Water Works infrastructure serves several important purposes. Firstly, it provides readers with a tangible understanding of the entire infrastructural layout and the integral technical components of the project. Secondly, and perhaps most significantly, it highlights that the Hesaraghatta water project represented a unique amalgamation of steam engine power

and the 'Gravitation Scheme'. Unlike previous water supply proposals for the city, examined by various engineers and government officials, which failed to outline a viable method for providing continuous water to the Cantonment solely through the gravitation system, the Hesaraghatta project harnessed the power of steam engines. It harmonized it with the core principles of the Gravitation Scheme. This successful integration enabled the provision of water to both the Pettah and the Cantonment.

19. Source File: Sanctioning Revised Rules for the Regulation of the Water Supply in the Cities of Bangalore and Mysore. Municipality Vol.2, 42H of 1911. Karnataka State Archives.

20. Source File: Poll-tax for the Maintenance of the Water Works in the Municipalities. Municipality Vol.2, 22F of 1904. Karnataka State Archives

21. Some noteworthy rules, as documented in the file "Sanctioning Revised Rules for the Regulation of the Water Supply in the Cities of Bangalore and Mysore. Municipality Vol.2, 42H of 1911. Karnataka State Archives", were:

**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.

22. Dikshit, Kuppuswamy, and Mohan, *Tank Irrigation in Karnataka: A Historical Survey*. Shah, "Seeing like a Subaltern: Historical Ethnography of Pre-modern and Modern Tank Irrigation Technology in Karnataka, India."

23. Subramanian, "Bangalore city water supply - a study and analysis," 56.

24. These inspectors were tasked with various responsibilities, including preventing water wastage at taps and public fountains, discouraging practices like washing feet and clothes, and discouraging children from using public water sources. Additionally, the colonial government, from the very initial stage of the water management, through a notification dated November 7, 1902, imposed punitive measures for the misuse of piped water and damage to the pipes. Source File: Sanctioning Revised Rules for the Regulation of the Water Supply in the Cities of Bangalore and Mysore. Municipality Vol.2, 42H of 1911. Karnataka State Archives. & Misuse of Pipe water in C & M Station. Municipality Vol.2, 80 of 1904. Karnataka State Archives.

25. This included refraining from practices such as washing their bodies and feet in public spaces, and abstaining from washing cattle, clothes, or carriages, ultimately leading to an all-around effort by the colonial government to make a profound shift in civic virtues concerning water consumption. Source File: Misuse of Pipe water in C & M Station. Municipality Vol.2, 80 of 1904. Karnataka State Archives.

26. Influenced by the Miasma Theory of disease, the urban planners at that time closed several local tanks adjoining various settlements. Although the Germ Theory had been discovered by the end of the 19th century, it took some time to be accepted by the Engineers and the Planners at a grand scale. Post-plague Town Planning is such an example which was based on the Miasma theory of disease. For source, J. H. Stephens, *Plague-Proof Town Planning in Bangalore, South India. Iyer and Rajangam. Discovering Bengaluru: History, Neighbourhoods, Walks*.

27. Source File: Sanctioning Revised Rules for the Regulation of the Water Supply in the Cities of Bangalore and Mysore. Municipality Vol.2, 42H of 1911. Karnataka State Archives.

28. Source File: Reduction of water rate on house service connection pipes in Mysore. Mun Vol.1, 303 of 1893. Karnataka State Archives.

29. Source File: Acquisition of Land for the Hesaraghatta Water Supply Project. Land and Revenue, 59 of 1894-95, 1-8. Karnataka State Archives. For reference, a quote from the Executive Engineer's report on this waterworks, "…Ramasandrapalya and Chikdevanpur on the west of the valley and Herohalli and Gundahalli on the east will be on the margin of the tank, and these 4 villages must necessarily be removed." There are several examples like this. Source File: Water Supply to Bangalore from Hesaraghatta Reservoir. Municipality Vol. 1, 1-1892. Karnataka State Archives Department.

30. In a letter from the Deputy Commissioner of Bangalore district to the Dewan of Mysore in 1895, the unsanitary condition of the catchment area was emphasized, and the necessity of establishing a conservancy system was endorsed by the Chief Engineer. Source File: Acquisition of Land for the Hesaraghatta Water Supply Project. Land and Revenue, 59 of 1894-95, 1-8. Karnataka State Archives.

31. Source File: Proposals for Supply of Water to Bangalore, April 2, 1892. Municipality Vol.1, 28 of 1892. Karnataka State Archives Department.

32. The Municipal Commission imposed a water tax with effect from January 1, 1900. The water tax was at the rate of 6% per annum on the annual rental valuation of all buildings and lands in the Civil and Military Station. Bangalore City had also come under the water tax. Source File: Poll tax for the Maintenance of the Water Works in the Municipalities. Municipality Vol.2, 22F of 1904. Karnataka State Archives.

33. In the case of the Hesaraghatta Waterworks, Colonel Bower's note from 1894 highlights this aspect, indicating that individuals applying for house service pipes were required to pay for the pipe's cost and make an annual payment of Rs. 50 for 12-inch service pipes. Source File: Reduction of water rate on house service connection pipes in Mysore. Mun Vol.1, 303 of 1893. Karnataka State Archives. Again, after the successful implementation of the project, around 1900, the colonial government introduced excess water charges for households at *Rupee* 1 per 1000 gallons, whereas, for shops and trades, water charges had been fixed at a rate of Eight *annas* per 1000 gallons. Both *Rupee* and *anna* are monetary units of India. Source File: Poll tax for the Maintenance of the Water Works in the Municipalities. Municipality Vol.2, 22F of 1904. Karnataka State Archives. For other references, see also Gandy, "Landscapes of Disaster: Water, Modernity, and Urban Fragmentation in Mumbai."
34. To address the risk of water shortages and reduce the misuse of public water, several restrictions have been implemented. These include setting specific times in the morning and afternoon for water supply to public taps, fountains, and households. Additionally, the free water allowance for the public has been reduced periodically, causing some inconvenience for a certain section of the population. Source File: Misuse of Pipe water in C & M Station. Municipality Vol.2, 80 of 1904. Karnataka State Archives.
35. The Executive Engineer of the project argued over the difference in water usage patterns and water sources between the Old City population and the C & M Station population, particularly the reduced need for water for activities such as clothes washing among the Indians, and resorting to wells and tanks for their water needs. Both of these assumptions of the 'need for less water' and resorting to traditional sources of water carry the colonial prejudices of the indigenous population, though in different ways. Source File: Proposals for Supply of Water to Bangalore, April 2, 1892. Municipality Vol.1, 28 of 1892. Karnataka State Archives Department.
36. Subramanian, "Bangalore city water supply - a study and analysis," 56.
37. During the implementation of the project (1890s), the Old City had projected a stable demand of 1.5 million gallons per day for the next decade, while the C & M Station anticipated an annual increase in demand by 200,000 gallons per day, culminating in a demand of 2.5 million gallons per day by the end of the ten years. However, by 1918, Bangalore experienced a water shortage, highlighting the urgent need to increase the capacity of the Jewell Filters and the pumping station in the Hebbal region. Additionally, proposals were made to electrify the pumps, replacing the steam pumps to enhance the overall system. Source File - Subramanian, "Bangalore city water supply - a study and analysis," 56.
38. Broto, Sudhira, and Unnikrishnan, "WALK THE PIPELINE: Urban Infrastructure Landscapes in Bengaluru's Long Twentieth Century."
39. Regarding the Hesaraghatta project also, there was a whole debate on the chemical purity of water versus its wholesomeness that divided chemists, medical practitioners, and sanitary engineers within the Public Works Department. In an era characterized by heightened sanitary consciousness, this debate had far-reaching implications for the Hesaraghatta project. For details of this debate, the source file is – Proposals for Supply of Water to Bangalore, April 2, 1892. Municipality Vol.1, 28 of 1892. Karnataka State Archives Department.

## REFERENCES

### PRIMARY SOURCES

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

Water Supply to Bangalore from Hesaraghatta Reservoir. *Municipality* Vol. 1, 1-1892. Karnataka State Archives Department.

Reduction of water rate on house service connection pipes in Mysore. *Mun* Vol.1, 303 of 1893. Karnataka State Archives.

Acquisition of Land for the Hesaraghatta Water Supply Project. *Land and Revenue*, 59 of 1894-95, 1-8. Karnataka State Archives.

Acquisition of Land for the Hesaraghatta Water Supply, July 6, 1896. *Land and Revenue*, 57 of 1895-96, 1-78. Karnataka State Archives.

Poll tax for the Maintenance of the Water Works in the Municipalities. *Municipality* Vol.2, 22F of 1904. Karnataka State Archives.

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

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

## SECONDARY SOURCES

Broto, Vanesa Castán, H.S. Sudhira, and Hita Unnikrishnan. "WALK THE PIPELINE: Urban Infrastructure Landscapes in Bengaluru's Long Twentieth Century." *International Journal of Urban and Regional Research* 45, no. 4 (February 1, 2021): 696–715. https://doi.org/10.1111/1468-2427.12985.

Dikshit, Giri S., G. R. Kuppuswamy, and S. K. Mohan. *Tank Irrigation in Karnataka: A Historical Survey*, 1993. Doshi, Sapana. "Imperial Water, Urban Crisis: A Political Ecology of Colonial State Formation in Bombay, 1850–1890." *Review (Fernand Braudel Center)* 37, no. 3–4 (2014): 173–218. http://www.jstor.org/stable/90011609

Dossal, Mariam. "Henry Conybeare and the Politics of Centralised Water Supply in Mid-nineteenth Century Bombay." *Indian Economic and Social History Review* 25, no. 1 (March 1, 1988): 79–96. https://doi.org/10.1177/001946468802500104.

D'Souza, R., and H. Nagendra. "Changes in Public Commons as a Consequence of Urbanization: The Agara Lake in Bangalore, India." *Environmental Management* 47, no. 5 (March 23, 2011): 840–50. https://doi.org/10.1007/s00267-011-9658-8.

Gandy, Matthew. "Landscapes of Disaster: Water, Modernity, and Urban Fragmentation in Mumbai."

*Environment & Planning*. A (Print) 40, no. 1 (January 1, 2008): 108–30. https://doi.org/10.1068/a3994.

Gurukkal, Rajan, and Rajan Gurukkal. "Aspects of the Reservoir System of Irrigation in the Early Pandya State."

*Studies in History* 2, no. 2 (August 1, 1986): 155–62. https://doi.org/10.1177/025764308600200202. Hasan, M. Fazlul. Bangalore Through the Centuries. India: Historical Publications, 1970.

Hecht, Gabrielle. *Entangled Geographies: Empire and Technopolitics in the Global Cold War*. MIT Press, 2011.

Iyer, M., K., Rajangam, Indian National Trust for Art, and Cultural Heritage. Bengaluru Chapter. Discovering Bengaluru: History, Neighbourhoods, Walks.INTACH Bengaluru Chapter, 2022.

Kamath, SU. *Karnataka State Gazetteer: Bangalore district*. Bangalore: Lotus Printers, 1990.

Mitchell, Timothy. *Rule of Experts: Egypt, Techno-Politics, Modernity*. University of California Press, 2002.

Mosse, David. "The Symbolic Making of a Common Property Resource: History, Ecology and Locality in a Tank-irrigated Landscape in South India." *Development and Change* 28, no. 3 (July 1, 1997): 467–504. https://doi.org/10.1111/1467-7660.00051.

Nagendra, Harini. *Nature in the City*, 2016. https://doi.org/10.1093/acprof:oso/9780199465927.001.0001.

Nair, Janaki. The Promise of the Metropolis: Bangalore's Twentieth Century. India: Oxford University Press, 2005.

Rice, Benjamin Lewis. Mysore: A Gazetteer Compiled for Government. United Kingdom: Archibald Constable, 1897.

Shah, Esha. "Seeing like a Subaltern: Historical Ethnography of Pre-modern and Modern Tank Irrigation Technology in Karnataka, India." Water Alternatives 5 (2012): 507-538.

Stephens, J. H. Plague-proof town planning in Bangalore, South India. Madras: Methodist Pub. House, 1914.

Stoler, Ann Laura. *Along the Archival Grain: Epistemic Anxieties and Colonial Common Sense*. Princeton University Press, 2010.

Subramanian, D K. "Bangalore City Water Supply - A Study and Analysis." In *Essays on Bangalore Vol.4*, edited by Vinod Vyasulu and Amulya Kumar Reddy, 51-143. Karnataka State Council for Science and Technology, 1985.

Von Schnitzler, Antina. "Citizenship Prepaid: Water, Calculability, and Techno-Politics in South Africa*." *Journal of Southern African Studies* 34, no. 4 (November 28, 2008): 899–917. https://doi.org/10.1080/03057070802456821.

## IMAGE SOURCES

Figure 1 Baedeker, Karl: Indien. Handbuch für Reisende. Verlag Karl Baedeker, Leipzig, 1914, p. 94

Figure 2 Water Supply to Bangalore from Hesaraghatta Reservoir. Municipality Vol. 1, 1-1892. Karnataka State Archives Department.

Figure 3 Water Supply to Bangalore from Hesaraghatta Reservoir. Municipality Vol. 1, 1-1892. Karnataka State Archives Department.

Figure 4 Water Supply to Bangalore from Hesaraghatta Reservoir. Municipality Vol. 1, 1-1892. Karnataka State Archives Department.

Figure 5 The Bangalore District Handbook – 1930, T.Rangaswami. Gazetteer of India – Karnataka State Bangalore District. Sourced from the Mythic Society, Bengaluru.