PLANNING THE URBAN FUTURES OF A SMALL CITY AND ITS RURAL PAST: GOVERNANCE AND WATER INFRASTRUCTURES IN TIRUPPUR, INDIA

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Nidhi Subramanyam

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Nidhi Subramanyam, Ph.D.

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Abstract

This dissertation examines the governance of water infrastructure in the face of water scarcity amidst rapid economic, demographic, and spatial expansion in Tiruppur, a small industrial city known for its knitwear exports in Tamil Nadu, India. Using a range of methods, including research in municipal, state, and industry archives, ethnography, and participatory action research, a richly detailed account of a hybrid waterscape is presented. This account follows the flows of water in the stages of infrastructure production, operation, and use across Tiruppur's urban core and recently merged rural peripheries over time, and carefully traces the complex ways in which the state and multiple publics interact to produce and address differentiated experiences of water scarcity. The dissertation also interrogates how scale shapes state-society interactions and planning outcomes, where scale is defined as a combination of city size, secondary position in administrative hierarchies, and limited political-economic reach.

The analysis of planning as governance is articulated in dialogue with literatures on public-private partnerships, the material politics of infrastructure, the politics of collective consumption, and political dynamics of access in hybrid waterscapes. In Tiruppur, elite publics, including local capitalists from the Gounder caste, organize through overlapping caste and business networks to partner with higher tiers of the state to produce water infrastructures and planning projects that serve their visions for Tiruppur as an export-oriented growth machine

while providing them with unparalleled access to water. City level bureaucrats and planners are constrained by infrastructural and administrative norms governing water access that emerge from the city's small scale and rural past, leading them to improvise by providing water through a range of non-piped sources. This, and the work of street-level bureaucrats, the "watermen," who operationalize everyday water distribution, help produce Tiruppur's hybrid waterscape. In contrast, non-elite publics who bear the unequal burdens of water scarcity in this hybrid waterscape are unable to organize and contest inequalities in access. In part, this is because their water access and experiences of scarcity are fragmented, shaped as they are by a finely differentiated socio-spatial structure produced by industrial restructuring in Tiruppur, which makes establishing stable material connections to the state difficult. The collective quiescence contributes to persistent, entrenched inequalities in water access despite successive, incremental expansions to municipal piped water infrastructures. Through the case of Tiruppur, this dissertation, thus, demonstrates that planners seeking to expand equitable access and ensure just, water-secure urban futures in rapidly growing small cities must be prepared to address particular socio-material legacies and attend to specific state-society dynamics that underlie governance.

Biographical Sketch

Nidhi Subramanyam grew up in Mumbai, India. She obtained her Bachelor of Architecture from the Academy of Architecture affiliated with the University of Mumbai in 2010. Following a brief stint as a professional architect with award-winning firms based in Mumbai, Subramanyam joined the Department of City and Regional Planning at Cornell University in Ithaca, New York, in 2012, where she earned a Master of Regional Planning in 2014. Subramanyam was the 2015 Research Awardee for Climate Change and Water at the International Development Research Centre (IDRC) in Ottawa, Canada. She obtained a Ph.D. in City and Regional Planning from Cornell University in August 2021. Subramanyam's professional and research experiences span architectural design, economic and community development, climate adaptation planning, and water-sanitation infrastructure planning in Mumbai, Chennai, Tiruppur, Ithaca, Washington DC, Mangaung (Bloemfontein), and Ottawa. Nidhi Subramanyam will join the Department of Geography and Planning at the University of Toronto, St. George campus in Fall 2021 as an Assistant Professor of Environmental Planning.

To all the women who couldn't study but helped me learn:
Women in Tiruppur for the gift of labor
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Ammmamma (3 March 1939 – 1 June 2021) for the gifts of grit and grace. You will be dearly missed.

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Big trees have deep invisible roots. A large research undertaking like the one that follows was nurtured by several individuals, communities, institutions, and relationships spread across the globe.

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me to hold on to and fiercely protect aspects of my work that brought me joy. I can only hope to pay forward my Committee Members' teachings.

Sibley Hall has been my intellectual home for many years. I will always cherish my time here fondly, including the last few months of dissertating alone in the building during the global COVID-19 pandemic. I consider myself lucky to have interacted with all professors in the Department in various capacities, including Jeff Chusid, John Forester, Kieran Donaghy, Stephan Schmidt, Victoria Beard, Jenni Minner, Nick Klein, and late Susan Christopherson. Linda Shi continues to inspire and provide much-needed, behind-the-scenes mentorship and advice on all things academia. The staff at CRP are special and have made my journey smooth in innumerable ways: Tina Nelson patiently answered every naïve question, signed countless forms, and shared pertinent information, all with her characteristic welcoming attitude. Heidi Ingram Berrettini adeptly helped me navigate the nitty-gritty of grant administration. Chris Hinman lights up the building with warmth and cheer on the gloomiest of Ithaca winter days, going out of his way to provide support and make things happen. Beth Sprankle, Andre Hafner, and the facilities and IT staff have helped me by keeping Sibley's physical and virtual workspaces comfortable and ever operational.

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grandparents, who passed away shortly before my defense, and will never get to see me earn my degree or flip the pages of this dissertation. I hope you are resting in peace. I am especially grateful to my uncle and aunt, Dr. Manjunath and Dr. Sumathi, and my cousins, Girish and Jannavi, for providing me a loving home and delicious meals in Chennai, often at very short notice. I thank my parents-in-law, Sivakami and Chandrasekaran, for their support and encouragement to finish a PhD. My mother-in-law took great interest and pride in my achievements, and even helped with crucial data entry when I struggled to find assistance. I am blessed that they raised a wonderful and caring son. Balu Chandrasekaran provided some crucial contacts and context in Tiruppur' knitwear industry. Anirudh Subramanyam, my brother, younger in years, but getting wiser with age, provided sage advice every time I the going got tough and motivated me to finish. I am glad that, too, he will be an academic, so that we can continue to learn from each other.

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List of Abbreviations

ADB	Asian Development Board
ADMK	*Anna Dravida Munnetra Kazhagam* (one of two major political parties in Tamil Nadu with the DMK)
AE	Assistant Engineer
AMRUT	Atal Mission for Rejuvenation and Urban Transformation
BJP	Bharatiya Janata Party (a national-level political party that has controlled the national government since 2014)
BOT	Build Operate Transfer
BOOT	Build Own Operate Transfer
CDP	City Development Plan
CII	Confederation of Indian Industry
CM	Chief Minister
CPHEEO	Central Public Health & Environmental Engineering Organization
CPI(M)	Communist Party of India – Marxist (national, left-leaning political party with a strong presence in Tiruppur)
CT	Census Town
DAT	Dyers Association of Tiruppur
DMK	*Dravida Munnetra Kazhagam* (one of two major political parties in Tamil Nadu with the ADMK)
DPR	Detailed Project Report
FIRE	Financial Institutions Reform and Expansion
GoI	Government of India
GoTN	Government of Tamil Nadu
IAS	Indian Administrative Service
IL&FS	Infrastructure Leasing & Financial Services Limited
INC	Indian National Congress (a national-level political party)
JE	Junior Engineer
JNNURM	Jawaharlal Nehru National Urban Renewal Mission
LPA	Local Planning Area
Lpcd	Liters per capita per day (a unit of water supply)
LSG	Local Self-Government

MAWS	Municipal Administration and Water Supply
MLA	Member of Legislative Assembly (elected official who is the equivalent of a State Assemblyperson)
MLD	Million liters per day (a unit of municipal water supply)
MoUD	Ministry of Urban Development
MP	Member of Parliament (a national-level elected representative, similar to American Congresspersons)
NTADCL	New Tiruppur Area Development Corporation Limited
NGO	Non-Governmental Organization
NREGA	National Rural Employment Guarantee Act
OHT	Overhead Tank
PDS	Public Distribution System
PM	Prime Minister
ppm	Parts per million
PPP	Public-private partnership
Rs.	Indian rupee
SADA	Special Area Development Authority
SCM	Smart Cities Mission
SCP	Smart City Proposal
SFC	State Finance Commission
SIHMA	South India Hosiery Manufacturers Association
SIPCOT	State Industries Promotion Corporation of Tamil Nadu Ltd.
SPV	Special Purpose Vehicle (a type of institutional form)
STP	Sewage Treatment Plant
TACID	Tamil Nadu Corporation for Industrial Infrastructure Development Limited
TADP	Tiruppur Area Development Programme
TCMC	Tiruppur City Municipal Corporation
TEA	Tiruppur Exporters Association
TN	Tamil Nadu
TNA	Tamil Nadu Archives
TNPCB	Tamil Nadu Pollution Control Board
TNUIFSL	Tamil Nadu Urban Infrastructure Financial Services Limited
TWAD	Tamil Nadu Water Supply & Drainage Board

TWIC	Tamil Nadu Water Investment Company
UA	Urban Agglomeration
UIDSSMT	Urban Infrastructure Development Scheme for Small and Medium Towns
UN DESA	United Nations Department of Economic and Social Affairs
USAID	United States Agency for International Development
USD	United States Dollar
ZLD	Zero Liquid Discharge

CHAPTER 1 - INTRODUCTION

Three concerns motivate this study: first, the challenge of building infrastructures and providing services like water, fundamental to life in fast-urbanizing, resource-constrained, small cities and towns in the Global South, and second, centering equity and justice in meeting this goal of expanding water access in small cities. Emerging interdisciplinary dialogues on the material politics of infrastructures trouble prevailing approaches to just water infrastructure planning. Bringing these insights to bear on planning praxis form a third concern.

These concerns inform this dissertation's research focus described in the next section. This section also outlines the analytical approach that guides this study. Thereafter, I define small cities and discuss why the challenge of expanding water access in these geographies is urgent. Following this definition, I interrogate the relevant bodies of literature to explain the theoretical frameworks underlying my analysis. A description of the case context and the methodology follows the theoretical frameworks. The final section of this introductory chapter provides a roadmap of the dissertation.

1.1. Research focus: The scalar and material dimensions of just water infrastructure planning in a small city

This dissertation follows the flows of water in Tiruppur, a small city in southern India, across space and over time (1901-2020) to investigate how the state and multiple publics interact in governance and infrastructure planning to produce and address the differentiated experiences of water scarcity. In following the flows of water, I interrogate the following questions:

(i) In what ways does Tiruppur's small scale shape state-society interactions and planning outcomes at different stages of water infrastructure production, operations, and use in the waterscape?

(ii) In what ways does the materiality of water and the infrastructures through which it is delivered and accessed in Tiruppur influence these state-society interactions and the differentiated experiences of and responses to scarcity in the urban waterscape?[1]

To answer these questions, I follow water infrastructures through the stages of envisioning futures, producing and operating infrastructures, and everyday water consumption.[2] I use multiple methods to investigate the governance configurations at each of these stages to analyze how they are structured by Tiruppur's small scale (a concept defined in Section 1.3.1 below) and the materiality of water infrastructures. In investigating these governance configurations, I center in on specific state actors, diverse publics, and their interrelationships in governance as well as planning goals, practices, and their outcomes to intervene in different scholarly conversations on urban governance in the Global South from the vantage point of a small, ordinary, "off-the-map" city (cf. Robinson, 2002).

In Chapter 2, I use archives, historiography, oral histories, and observations of the physical waterscape to trace the *origins* of Tiruppur's water scarcity, municipal water supply schemes developed to address this scarcity, and governance configurations, especially state-elite interactions, to British-colonial and post-colonial planning practices and the impacts of global

[1] Waterscape refers to the cross-scalar, fluid, contested geographies that result from water distribution in Tiruppur's landscape. The waterscape concept encapsulates the intertwined dialectics between the material and discursive, human and nonhuman, as well as nature and culture that channel the unequal flows of water through the urban landscape (Mehta & Karpouzouglu, 2015 following Swyngedouw, 1999).

[2] Following the flows of resources and power is a common analytical approach in urban political ecology (Swyngedouw, 2004; Rademacher, 2011) and the anthropology of infrastructure (Bjorkman, 2015; Anand, 2017). Planners have recently adopted it to analyze and explain the reasons for 'wicked' urban environmental problems like urban flooding (Goh, 2019).

industrial restructuring in Tiruppur through the twentieth century. In Chapter 3, I follow water in the archives, planning reports, interviews, and public meetings as it flows of local capitalist elites' industrial-economic *visions* and *spatial projects* for Tiruppur's futures in the 1990s after the liberalization of India's economy. I examine how these visions materialize in the form of incrementally developed municipal water supply schemes designed to address water scarcity for industrial production and social reproduction. In Chapter 4, I continue to follow water using participant observation, mapping, and interviews to study how the bureaucracy adheres to planning norms as it *implements and operates* the water schemes and develops parallel water infrastructures to deliver water to diverse publics across the city and alleviate their experiences of scarcity. Finally, Chapter 5 uses data gathered through participant observation and water calendars developed through participatory action research with a Tiruppur-based NGO to examine how diverse, non-elite publics, who inhabit a range of housing typologies and tenancy arrangements, *access water and organize* to contest the differentiated experiences of scarcity in the waterscape. Table 1.1 summarizes this analytical approach that structures the dissertation.

In the concluding chapter, I argue that this multi-method, multi-stage analytical approach of following the flows is a contribution that helps define and explain the wicked problem of urban water scarcity (Rittel & Webber, 1973). It reveals how water scarcity gets addressed and unequally experienced in Tiruppur through state-public interactions at the stages of envisioning futures, producing and operating infrastructures, and everyday water consumption, where selected elite publics can use their proximity to particular state actors to influence planning outcomes, whereas other non-elite publics are unable to do so as their material connections to the state are inconsistent. I contend that underlying these interactions is the local state's incremental approach to expanding piped water supply schemes and meeting growing water needs through recourse to non-piped sources. However, this incremental approach merely expands networked infrastructures without addressing older, entrenched inequalities in the waterscape.

Ongoing policies and investments in infrastructure retain this incremental approach through new governance configurations, technologies, and infrastructure financing mechanisms. As Tiruppur's non-elite groups are also characterized by institutional scarcity like the local bureaucracy, organizations or movements focused on the politics of collective consumption which question prevailing planning approaches that compound inequalities, do not exist. In this context, unequal water access fragments publics and their organizing strategies, resulting in a collective acquiescence to the differentiated impacts of water scarcity. Finally, the conclusion reflects on alternative water infrastructures that can break away from this path-dependent, incremental approach rooted in socio-material practices from a rural and small town past to build just, water-secure urban futures.

Table 1.1 - Analytical framework

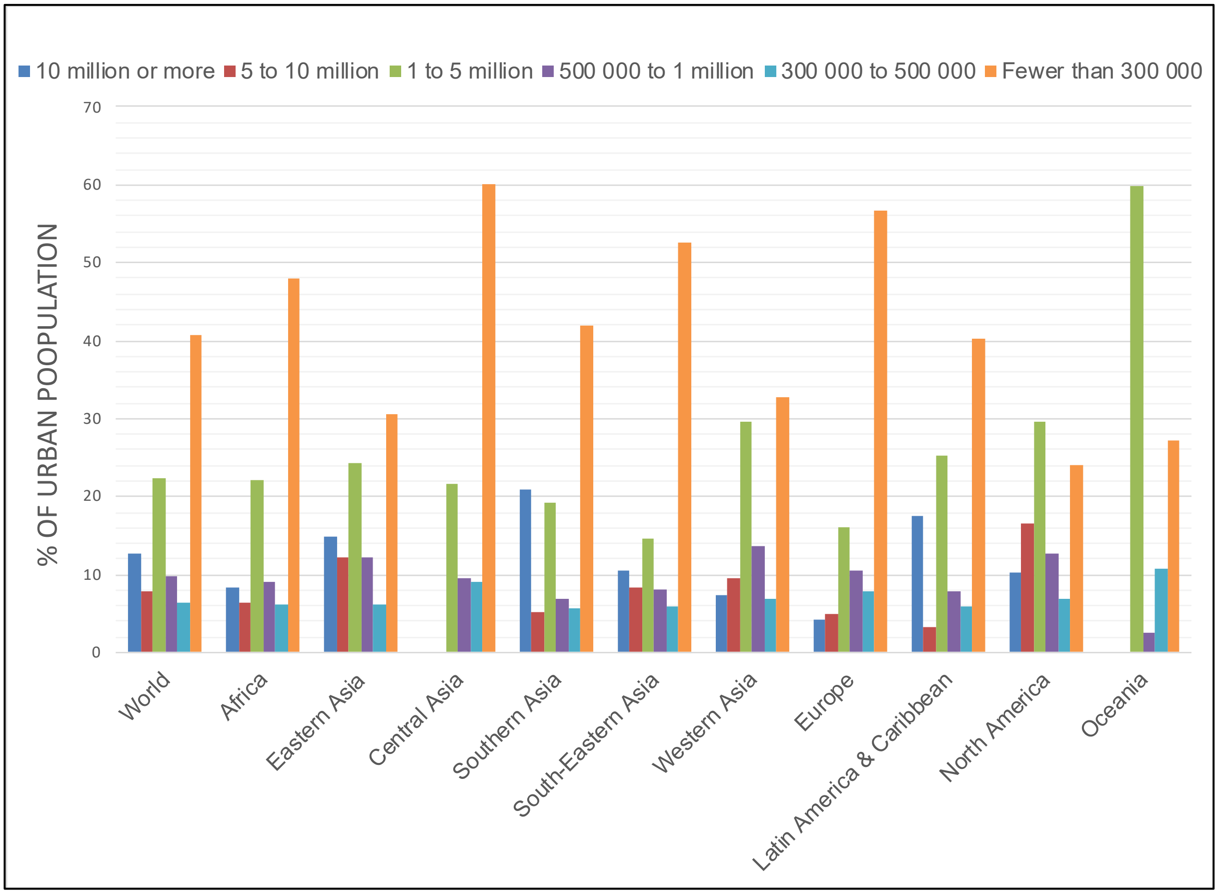
Chapter	Stages of waterscape production or contestation	Analytical focus	
Chapter 2	Historical underpinnings	*Governance: Actors*	All (capitalist elites, British colonial and postcolonial bureaucracy, politicians, and publics)
		Water supply schemes	Kovilveli Scheme, First and Second Schemes
		Methods	Archival research, historiographic analysis, analyses of oral histories and observations of the physical waterscape
Chapter 3	Envisioning futures, and conceiving water infrastructures	*Governance: Actors*	Capitalist elites
		Water supply schemes	Third Scheme (PPP)
		Methods	Archival research and discourse analysis of plans, interview narratives (with capitalist elites, planning consultants, and state planners), and observations at public meetings
	Infrastructure implementation	*Governance: Actors*	Capitalist elites and the multi-tiered state
		Water supply schemes	Third and Fourth Schemes
		Methods	Plan analysis, interviews with capitalists, consultants, and state planners involved in conceiving and building these schemes
Chapter 4	Infrastructure implementation and operations	*Governance: Actors*	Bureaucracy
		Water supply schemes	Third and Fourth Schemes; Parallel water infrastructures
		Methods	Participant observation, mapping hydraulic infrastructures, and interviews with actors in the bureaucracy and operators of parallel water infrastructures
Chapter 5	Everyday water access and consumption	*Governance: Actors*	Non-elite publics in a range of housing typologies and tenancy arrangements
		Water supply schemes	All (First, Second, and Third Schemes); Parallel water infrastructures; Self- and market-provided sources
		Methods	Participant observation; *Water and waste calendars* and surveys developed through participatory action research with a Tiruppur-based NGO

1.2. Defining small cities

The definition and population threshold for what constitutes 'urban' or a 'small city' vary by national, subnational, and historical context (Véron, 2010). The United Nations Department of Economic and Social Affairs (UN DESA) considers small cities as those with less than 500,000 people (UN DESA, 2018). By this definition, approximately 47% of the global urban population lives in a small city (UN DESA, 2018).[3] Figure 1.1 shows the distribution of urban populations across cities of different sizes. The proportion of the urban population residing in small cities is high across all world regions. This population distribution by city size is projected to hold steady for the next 30 years. Population growth in megacities that dominate our urban and policy imaginations will be offset by the emergence of new cities and towns through rural-urban transformations at the bottom of the urban hierarchy (Randolph & Deuskar, 2020).

[3] The UN data need to be taken with a grain of salt. They have been critiqued for using a collection of unharmonized, national definitions of urban, which vary considerably across countries (Randolph and Deuskar, 2020).

Figure 1.1 - Estimated distribution of urban population by city size and world region in 2020



Source: UN DESA, 2018

Defining small cities in India

There is no consensus, either in policy or in the scholarship, on the definition of a small city or town in the Indian context. Much like definitions of 'urban,' the conceptual and operational definitions of small cities vary from state to state within the country (Kudva, 2015). Indian policy defines *metropolitan cities* as those with populations above 1 million residents, but it does not define population thresholds for other city size categories. Small cities are a subset of non-metropolitan cities. Within the literature, the population thresholds for small cities, medium cities, and small towns are 100,000 to 499,999; 500,000 to 999,999; and 10,000 to 100,000 respectively (Véron, 2010; Haque et al., 2018; see De Bercegol, 2017 for a discussion on conflicting definitions in the literature). By these population thresholds, 47% of India's urban population, or nearly 230-million people, live in hundreds of small cities and towns across the country (See Table 1.2). Further, the UN data fail to note that about 5% of India's total population (or about a sixth of its urban population) lives in dense, urbanizing villages that are not classified as urban for policy purposes (Census of India, 2011).

Table 1.2 - Urbanization by city size class in India, 2000-2020

	2000			2010			2020		
City size class	n	Population	% of urban population	n	Population	% of urban population	n	Population	% of urban population
10 million or more	3	44 935 579	15	3	54 248 106	14	6	98 854 060	20
5 to 10 million	3	17 824 618	6	4	30 582 557	8	3	21 873 378	5
1 to 5 million	30	48 822 861	17	41	72 134 704	19	54	101 037 154	21
500,000 to 1 million	37	26 237 849	9	43	30 220 025	8	51	33 913 586	7
300,000 to 500,000	43	16 852 563	6	53	20 327 989	5	77	29 116 014	6
Fewer than 300,000	--	136 676 812	47	--	173 231 173	45	--	198 304 448	41

Source: UN DESA, 2018

In addition to population thresholds, several scholars of urban India also consider the political-administrative (or municipal) status of a city in defining small cities. These categories are politically determined and do not always map onto categories based on population thresholds (see Table 1.3). Generally speaking, large metropolitan cities are organized as Municipal Corporations, Municipalities administer smaller cities, and small towns and villages are organized under the *panchayat* system (Véron, 2010). Population thresholds and political-administrative status guide policies. They dictate the disbursement of government funds and support statistical analyses, but they are limited in providing a conceptual definition of small cities. They also depend on State contexts.

Table 1.3 - City size categories based on population and their distribution by local government type (political-administrative status) in India in 2011

City size class	Population	Distribution by local government type (%)[a]		
		Municipal Corporation	Municipality	Town *panchayat* and others
Metropolitan city (n = 44)	>=1,000,000	100.00		
Medium city (n = 43)	500,000 to 999,999	93.02	4.65	2.33
Small city (n = 380)	100,000 to 499,999	15.53	81.32	3.16
Small towns (n = 3091)	<=100,000	0.06	39.53	60.41

[a] Local government type for each city was obtained from the Town directory of Census of India for 2011. Note that the above table includes only statutory cities and towns.
Source: Subramanyam, 2020.

Across diverse geographic contexts, scholars seem to agree on some concepts: small cities are places that straddle the rural-urban divide (Harriss-White, 2016). They serve intermediary functions at the regional, national, and global scales, mediating flows of people, commodities, services, amenities, and natural resources from smaller to larger settlements and vice-versa (Bolay & Rabinovich, 2004). They have limited political-economic reach and are secondary to the largest urban centers in terms of their centrality in national or global political economies (Bell & Jayne, 2009; Marais et al., 2016). The next section, Section 1.3, on theoretical frameworks contends that these characteristics of smallness structure governance configurations and planning practices in distinct ways to shape socio-spatial outcomes in small cities.

Small city urbanization and the challenges of just water infrastructure planning

Increasing urbanization in small cities and towns has planning and policy implications. At a minimum, infrastructure needs to be put in place to make these cities livable and to support their economies. However, small cities and towns pose some vexing problems for planners and policymakers. On average, small city residents are poorer than their metropolitan counterparts.

Not only do they have lower access to essential urban services like improved water sources, sanitation, healthcare, and primary education, but their governments also lack the necessary institutional capacities to meet the growing demand for these services (Ferré et al., 2012; Christiansen & Kanbur, 2017; Bolay, 2020). Thus, planning for poverty reduction and inclusive, sustainable development in a large number of small cities is a call to action for planners in the urbanizing regions of the Global South (Randolph & Deuskar, 2020).

This challenge looms large in India, where more than 377-million people live in cities and towns. The urban population comprises only about a third of India's total population by official measures. However, in absolute terms, it far exceeds the total population of the next most populated country in the world: The United States of America. India's urban population is growing by at least 11 million persons each year (Shaw, 2019). This growth screams for infrastructural interventions and retrofits to maintain a decent quality of life in small cities and towns.

There is now a growing body of evidence, which argues that the drivers of urbanization and the dynamics of governance in many of these smaller places differ from those observed in Indian megacities (Denis & Zérah, 2017; Balakrishnan, 2019; Gururani, 2019). Similarly, the in-house institutions, resources, and capacities to steer urbanization in sustainable and inclusive ways through planning also vary considerably. We know little about small cities and towns as the volume of published studies on these places is very low; they occupy a marginal position within urban studies in India and globally (Bell & Jayne, 2009; Bolay, 2020). This dissertation elucidates the dynamics of urbanization and practices for water governance in one small city, Tiruppur, to contribute to addressing the challenges of just water infrastructure planning in small cities.

1.3. Theoretical frameworks

1.3.1. Small scale and governance

<u>Planning research on governance</u>

Questions of governance have animated planning research and practice since the late 19th century in North America and the mid-20th century in the Global South (Sanyal, Vale, & Rosan, 2012).[4] Governance is a fuzzy term as it invokes different definitions by discipline, issue area, style of governance, or outcome (see Briassoulis, 2019 for a review). Planners approach governance as a process for steering collective action by multiple actors and organizations to address a societal issue (Miraftab & Kudva, 2014b, Briassoulis, 2019). Planning and policy research on governance usually examines the *actors or organizations* who come together to act on an *issue*. It critically investigates *formal and informal arrangements*, *politics*, and *power relations* structuring actors' interactions as they formulate *goals* and use various *means* to achieve these goals. It is equally concerned with the *outcomes* of such interactive processes to conceive alternative processes and arrangements that can better address the issue at hand (Sanyal, Vale, & Rosan, 2012; Briassoulis, 2019). Empirical research on governance recognizes that governance configurations--which comprise the actors, organizations, issue, arrangements, relations, goals, means, and outcomes, are uniquely shaped by historical periods and national or regional contexts with their distinct development trajectories and state structures. This

[4] Studies of 'governance' and prescriptions on good or better governance started proliferating after Harvey's seminal publication on entrepreneurial governance (Harvey, 1989); they roughly coincide with the adoption and gradual institutionalization of neoliberal ideologies. See McCann (2017) for a review tracing the genealogy of governance scholarship in the Global North. Miraftab and Kudva (2014b) review key debates in urban governance as they pertain to cities of the Global South.

conception of governance configurations informs my analysis of governance at different stages of waterscape production in Tiruppur, India.

Urban governance in India

Recent legislative and policy shifts have reconfigured the governance in/ of Indian cities. Notably, these include the passage of the 74th Constitutional Amendment Act in 1992 for decentralization of service delivery functions to urban local governments, liberalization of the economy in the early 1990s, and a parallel process of state rescaling, where subnational and municipal scales have emerged as loci for urban decision-making. At the turn of the millennium, the Indian National Congress (INC)-led regime at the national level made a concerted effort to address the challenges posed by increasing urbanization. They transformed urban governance by introducing a National Urban Renewal Mission (abbreviated as JNNURM and named after India's first Prime Minister Jawaharlal Nehru). This mission disbursed infrastructure development funds to metropolitan city governments that adopted a comprehensive development plan and implemented key municipal administration and service delivery reforms.[5] In 2015, the Bharatiya Janata Party (BJP)-led regime introduced policies like the Smart Cities Mission (SCM) and the Atal Mission for Rejuvenation and Urban Transformation (AMRUT) to extend these urban reforms and policies to non-metropolitan, secondary cities (more on these policies in Chapter 3). Together, these legislative and policy shifts have led to the arrival of new actors and the (dis)empowerment of old actors and organizations in urban governance. They have transformed governance arrangements, politics and power relations, goals, the means to achieve

[5] Many scholars, practitioners, and policy analysts have described and analyzed this decade-long policy effort and its outcomes at various scales, in different sectors, and across cities and states. See Sivaramakrishnan (2011) for an overview of the policy and its scope.

them, and their outcomes. They have, thus, changed how Indian cities are planned, governed, experienced, and contested (Shatkin, 2013).

The literature abounds with analyses of these post-liberalization and post-reforms governance transformations in metropolitan India. Scholars have observed that many governance reconfigurations have occurred with the implementation of neoliberal reforms. They find that these reconfigurations vary by regional and urban context and include diverse organizational arrangements such as urban coalitions, elite networks, and public-private partnerships that pursue goals as diverse as urban renewal, infrastructure development, and service delivery. These arrangements empower selected actors or organizations, impacting the dynamics of participation in urban politics and planning (Baud & De Wit, 2008; Coelho, Kamath, & Vijayabaskar, 2013; Anjaria & McFarlane, 2011), which produces uneven socio-spatial outcomes across and within cities (Shatkin & Vidyarthi, 2013). As most of these studies center on large cities (usually megacities) in metropolitan regions, we do not know if governance is reconfigured in similar ways and comparable socio-spatial outcomes ensue in non-metropolitan, small cities, and towns.[6] In what ways do these theoretical insights on governance reconfigurations apply to small cities? Do the theories merely scale down, or do smaller places throw up new social processes and political dynamics that provoke new ideas on governance, the operations of power, and the production and contestation of urban inequalities?

[6] The scholarly neglect of small cities is unsurprising given that cities, in general, have only recently received attention in national and state-level policies and the broader scholarship on India (see Weinstein, Sami, & Shatkin, 2013 for a review). However, it is not a small matter since urban experiences for most Indians are far more likely to be based on smaller cities and towns that house the urban majority, and not megacities like Mumbai, Kolkata, Chennai, or Delhi that dominate urban studies. This oversight is not unique to India though. A recent special issue of City & Community (published by the American Sociological Association), focused on North American cities, contends that big cities have historically commanded the overwhelming share of research attention in urban studies (Ocejo et al., 2020).

Small scale and urban water governance: Some hypotheses and a review of observations from India

The existing interdisciplinary scholarship on small cities suggests that state structures, markets, civil society, and intergroup relations differ in these places because of the city's scale. Following the interdisciplinary literature on small cities, I conceptualize city scale to encompass many dimensions of spatiality that include city size, position in administrative hierarchies, distance vis-à-vis centers of economic activity or decision-making, and reach or influence in economic or policy networks.

Size (population and areal) matters for governance because it influences the scale, scope, and complexity of a city's governmental structure (Lofland, 1973 cited in Ocejo et al., 2020). Governmental structures and capacities are critical in implementing infrastructure plans, operationalizing service delivery plans, and everyday infrastructural maintenance. The scholarship on small city governance in India observes that small city bureaucracies typically have lower financial and human resource capacities to plan, execute, and maintain big infrastructures and implement service provision on a day-to-day basis (De Bercegol, 2017; Lele et al., 2018; Kovács et al., 2019; Rayasam et al., 2020). These (in)capacities result from decades-long neglect by state or national governments in policies, smaller tax bases, higher rates of tax delinquency, and a general absence of competent professionals in the bureaucracy (Shastri, 2011; Mathur et al., 2011; Asthana, 2012; De Bercegol, 2017; Kundu & Banerjee, 2018). Neoliberal policies like the institution of hiring freezes, cutbacks in intergovernmental transfers, and a push towards market-based financing of municipal infrastructures further constrain small city governments. These policies deprive them of critical resources required for development, especially when they are experiencing rapid growth and facing new service delivery mandates and responsibilities due to administrative decentralization (Véron, 2010; Rumbach, 2016; Cornea, Véron, & Zimmer, 2017).[7] Many small city administrations have historically never undertaken complex planning functions such as preparing comprehensive city development plans or plans for urban infrastructure development. Neither are they experienced in working with private planning consultants or service providers as per the norms for neoliberal planning and service provision.

Small size engenders proximity between the local state and society, potentially enabling democratic participation and decision-making (De Bercegol, 2017). Empirical studies find that, in practice, this proximity allows certain publics, i.e., local elites to embed themselves in the state and capture state resources or decision-making processes (De Bercegol, 2017; Zérah, 2017). But local governments are one among many actors involved in planning and maintaining cities. In small cities, the size-related constraints on local governments prompt innovations and interventions by civil society as different publics try to make and maintain the conditions that sustain urban life. Small size also engenders proximity between diverse publics belonging to different social groups, shaping the dynamics of intergroup collaboration (or conflict) in civil society (Cook, 2018). Studies on Indian small cities have found that small city size combined with less diverse economies empowers certain higher-caste communities occupying economic niches[8] to dominate the urban political economy and control decision-making processes in the city (Parthasarathy, 1997; De Neve & Donner, 2006; Haynes, 2012; Zimmer et al., 2017; Denis

[7] City-level case studies developed by the School of Habitat Studies at the Tata Institute of Social Sciences in Mumbai illustrate how neoliberal policies address planning challenges in Indian small cities (or not). These case studies can be accessed at: http://urk.tiss.edu/research/india.html

[8] One way in which caste communities get defined is by their traditional occupation. Their hierarchy and relative power in the caste system depend on cultural notions of purity and pollution associated with those occupations.

& Zérah, 2017). In contrast, the dispersal of socio-economic power in cosmopolitan and economically diverse small cities can prevent any one group from imposing their interests on others in urban decision-making (Kudva, 2013; Cook, 2018). Inclusive urbanization in small cities hinges on these variations in intergroup dynamics and forms of elite capture. Therefore, investigating how size structures government, intergroup relations, and state-public interactions in governance is critical to understanding planning outcomes.

Critical scholarship on the political ecology of water in small cities in India has observed how non-networked, local water sources (which constitute the major water sources in small places) like ponds or tubewells become a site for the consolidation and exercise of power by local elites (Cornea et al., 2016; Kundu & Chatterjee, 2020; Zimmer et al., 2020). Kundu and Chatterjee (2020) have analyzed how projects for expanding networked water infrastructures, which are controlled at the city level, transform these localized forms of power and older, entrenched forms of inequalities reinforced through water access practices. Other researchers have examined the recent enclosure of ponds in two small cities (Cornea et al., 2016; Zimmer et al., 2020). They find that alternatives to elite-led enclosures did not emerge in these small cities due to insufficient institutional 'saturation' in the form of environmental activists or civil society groups (Zimmer et al., 2020: 243). My research contributes to these scholarly conversations. I do so by investigating how small size structures local bureaucratic capacities and state-society relations with both elite and non-elite publics in water governance in Tiruppur. I also probe the ways in which building water infrastructures helps elites gain legitimacy and consolidate their hegemony.

Size is just one dimension of spatial scale (Howitt, 1998) that influences urban governance. A city's position in urban administrative hierarchies, especially in countries characterized by unequal distribution of powers and mandates between cities with different political-administrative status, also influences its governance (e.g., see He et al., 2018 for China). We already saw how urban local governments are categorized across India as Town Panchayats, Municipalities, and Municipal Corporations, with categories roughly, though not always, corresponding to city size (see Table 1.3, page 9). These categories denote a position or political-administrative status in a hierarchized system of urban local governments. They each correspond to different policy-making ministries or agencies at the state and national levels, and in turn, are eligible for varying levels of intergovernmental support. Thus, a city's position and administrative status introduce variations in state structures and intergovernmental relations in multi-tiered state systems with consequences for urban governance and planning.

Emerging research has started to investigate how *rural* and *urban* categories shape government structures, politics, governance, and lived experiences across India (Sircar, 2017; van Duijne, 2019; Mukhopadhyay et al., 2020). It argues that these categories shape value-laden, normative ideas about how the state should intervene in certain geographies to develop, improve, or assist their populations (Sircar, 2017). These normative ideas have a bearing on infrastructure planning and service provision. Like rural and urban government categories, urban local government categories also influence planning, governance, and outcomes in cities and towns of different sizes to produce variations in lived experiences (Vidyarthi et al., 2017). For example, norms for municipal water supply and municipal staffing patterns vary by urban local government category, with cities positioned higher in the hierarchy (Municipal Corporations) adhering to higher norms compared to secondary cities (Municipalities) or the lowest tier (Town Panchayats).

A city's distance, i.e., physical, cultural, and experiential distance from political centers of decision-making also mediates its intergovernmental relations and the kinds of issues that get prioritized in State-level or national policies (Rumbach, 2016). Thus, small cities offer a unique vantage point to study how secondary position and distance play a part in influencing planning and municipal administration, which cannot be parsed out in larger, metropolitan cities that usually also function as State capitals. This dissertation examines how a secondary position in urban administrative hierarchies as denoted by the city's government category shapes governance arrangements, intergovernmental relations, local bureaucratic capacities and practices, and planning norms in water governance. It also discusses how and why some urban actors leverage their proximity to centers of decision-making to contest these categories and reconfigure governance.

Much like the hierarchies that a city is part of structure its governance, its location, reach, and influence in economic or policy networks also influences which actors are imbricated in governance arrangements, the resources they marshal from the wider network, the goals they devise and the means they use to realize those goals, and the outcomes (Bolay & Rabinovich, 2004; Bell & Jayne, 2009; Schlichtman, 2020). If the city is a special node in circuits of trade or commodity flows and fulfills some niche intermediation functions at the regional, national, or global levels, it allows certain urban actors to tap into these wider networks. It allows them to gain access to planning ideas, development finance, and networks of consultants, experts, activists, politicians, and policymakers that might otherwise not be available to their counterparts in cities of comparable size or administrative status, where induction into global circuits is mediated through other bigger places (Kudva, 2013; Zimmer et al., 2017; Denis & Zérah, 2017; Sircar, 2017; Cook, 2018; Schlichtman, 2020). My dissertation examines how Tiruppur elite publics' changing social and business networks (re)configure the strategies they use to work with and through the state structure to shape future imaginations, spatial projects, urban water governance, and water distribution in the city.

By illuminating the ways in which the different dimensions of a small city's scale configure its governance at various stages in the production of Tiruppur's waterscape, this dissertation develops a heuristic to analyze how scale structures governance and its outcomes in small cities. It allows us to see why policies that disburse resources by city size or administrative criteria to strengthen the functioning of local bureaucracies—although necessary—might by themselves be insufficient to promote inclusive urbanization lower down the urban settlement hierarchy. Just as scale affects governance, the materiality of water and water infrastructures also shape the politics of waterscape production and contestation. Water infrastructures play an agential role in connecting the state and multiple publics as well as maintaining, exacerbating, or disrupting power relations within governance configurations. They determine agendas and goals, and the ability to achieve them at different stages of waterscape production and contestation.

1.3.2. The material politics of water infrastructures

Water infrastructures are political. They embody the ideologies of the regime that produce them. They are critical sites where political ideologies get translated into practice and subsequently reworked or contested by those affected (Appel et al., 2018). Historically, large water infrastructures like dams or irrigation systems have helped states and regimes centralize power and authority (Leaf, 2017). More recently, anthropologists of infrastructure have argued that water is not just a resource that humans act upon or control to consolidate political power. Water and water infrastructures' material properties—as they manifest differently by context—also affect the everyday government of water by states, planners, and infrastructure operators, thereby complicating the consolidation or exercise of authority through water (Bjorkman, 2015; Anand, 2017). Anand's ethnography illustrates how water's availability, pressure, and leakages influence the politics of water management and its distribution across Mumbai. This dissertation also discusses how the design of water supply schemes and the governance of water supply operations in Tiruppur are shaped by water's taste and the materiality of water storage and distribution infrastructures.

Since water's pressure and leakages introduce uncertainties, Bjorkman (2015) argues that they make it difficult for any one individual or organization to know and control a centralized water network. Her work shows how knowledge about water and the capacity to manage its flows is highly situated and unevenly distributed among a wide range of state and non-state actors. Consequently, informal political power and authority (as it forms through water or in directing its flows) are also highly dispersed across the piped network and the city. The dispersal and exercise of political authority and power in and through water networks influence how diverse publics connect to these authorities, organize to claim citizenship rights, make demands for collective consumption, or remake the city.

The politics of collective consumption and the materiality of politics

The urban sociologist Manuel Castells first developed the concept of collective consumption to refer to the goods and services that the state provides for the social reproduction of labor to aid profitable production by capital (Castells, 1977). In the post-Fordist period, Castells (1983) reformulated his idea of collective consumption. He argued that the nature and extent of the state's role in providing these goods and services was more an outcome of labor struggles rather than a response to capital's production needs (see Cohen, 2016a for a review). Irrespective of the shifts in the politics of collective consumption over time, the following core ideas characterize them: (i) They are struggles over the distribution of the basic goods and services required for survival and decent urban life, where what constitutes a decent urban life changes over time and space. (ii) The state has a role in directly providing or indirectly enabling the provision or regulation of these services. As such, struggles for collective consumption make state policies at various scales their target to secure the basic elements needed for a decent urban life. (iii) Since all the things required for a decent urban life have direct or indirect environmental impacts (like carbon and water footprints), all struggles for collective consumption are struggles over urban environmental futures (Cohen, 2016a). They force those involved in these struggles to articulate who should bear the costs and reap the benefits of these collectively consumed services now and in the future, and how the state must intervene to ensure that the distribution of these costs and benefits is just (cf. Agyeman, 2013). Water—a basic good that is fundamental for life—is an important focus of the politics of collective consumption even as the politics of organizing for water access shift over space and time.

In explaining shifts in the politics of collective consumption in the post-Fordist period, Castells (1983) noted that changing material and socio-spatial conditions played a part in shaping the emergence and trajectories of struggles demanding the equitable distribution of collectively consumed goods and services. Whereas Castells (2006) gestured to the likely role that material conditions play in shaping struggles, it would take another three decades before anthropologists of infrastructure started to investigate, debate, and theorize how *exactly* materials shape struggles for collective consumption.

Recent ethnographies on the politics of water infrastructures offer a methodological and conceptual approach to analyze urban politics, the publics of such politics, and the dynamics of political action outside politics' familiar operations in the media, courts, political rallies or party offices, parliamentary and city council debates, or in the conduct and outcomes of elections (Bjorkman, 2015; von Schnitzler, 2016; Anand, 2017). They argue that urban residents establish material connections to the state through public housing, water or drainage pipes, electricity lines, welfare grants, garbage removal, or state-issued IDs. These material connections become the sites for and means of making political claims from the state or contesting capricious state practices and their pernicious effects outside the formal spaces of liberal democracy.

Anthropologists of water infrastructures have coined several terms to refer to the material politics of urban water infrastructures: pipe politics (Bjorkman, 2015), technopolitics (von Schnitzler, 2016), and infrapolitics (Anand, 2017). With some nuanced differences, these terms essentially refer to forms of politics where materials shape political questions. These concepts "foreground the materiality of politics and political expression" (von Schnitzler, 2016: 10). Material politics also (re)define the publics of politics and the specific infrastructural concerns and grievances they congeal around (Chalfin, 2014; Bjorkman, 2015; von Schnitzler, 2016; Anand, 2018). Unlike populations—an abstract mass of people categorized based on class, caste, or territory, which form the targets of policies, publics are formed through political and material claims to water infrastructures (McFarlane & Rutherford, 2008; Bjorkman, 2015; Anand, 2018).[9] Anand refers to these publics as 'hydraulic publics.' Hydraulic publics are communities of the affected who are constituted, collected, and gathered by their shared experiences of water

[9] Infrastructures may also be used to prevent the formation of publics, as in apartheid-era South Africa (von Schnitzler, 2016).

distribution in the city.[10] However, even as water infrastructure is unequally distributed across the city, hydraulic publics are not delimited by location or by social identity within a location (Bjorkman, 2015). Rather, how water materializes in their life through different infrastructures in the form of variable quantities, pressures, leakages, qualities, tastes, and at different supply times starts to affect if hydraulic publics form, what they organize around, how they make their demands, to whom, and to what ends. Thus, water can galvanize political solidarity across very different socio-economic groups based on their shared infrastructural-material experiences.[11]

The material politics of water, thus, adds greater clarity to Castells' concept of the politics of collective consumption. It shows that struggles over collectively consumed water services are not only contingent in space or time but also in the materialities of waterscapes. I apply this materially grounded approach to the study of the politics of collective consumption in Tiruppur to analyze infrastructural publics, their differentiated experiences of water scarcity, and how they contest these inequalities in the waterscape. First, I trace the different kinds of hydraulic publics by water access practices and varying relationships to the local infrastructural state. Then, I interrogate their organizing strategies for demanding improvements in water access (or lack thereof) and examine if and how they add up to form a wider movement for collective consumption across the city. Second, I seek to understand and hypothesize how the presence (or absence) of such collective consumption struggles disrupts (or maintains) governance configurations that contribute to the incremental production of an unequal urban waterscape.

[10] Planners, like anthropologists and geographers, have recognized that publics form around issues. However, the "stuff" of issues and how they come to shape publics, ethics, and politics, mediate social interactions, and influence planning outcomes have remained under-theorized in planning scholarship (see Beauregard, 2015; Jon, 2020 for reviews).

[11] Planning theorist Ihnji Jon (2020) makes a parallel observation about environments and environmental action. She finds that our feelings and physical experiences of our surroundings and shared experiences of harm potentially help us forge solidarities across differences for collective action.

1.4. The case context and research methodology

This dissertation focuses on the production and contestation of waterscapes in a single case—Tiruppur, a small city in India. As a single case, Tiruppur does not represent the diversity of small cities across India,[12] preventing the generalization of empirical findings (Small, 2009). However, as a single case, Tiruppur allows me to "extend out" (Burawoy, 1998) and build dialogues with the wider scholarship on urban (water) governance in India to make theoretical contributions from the vantage point of a small city and the materiality of its waterscape. I do so by building dialogues with the relevant interdisciplinary conversations on governance at each stage of waterscape production.

1.4.1. The Tiruppur case

> "When we call [Ministries in] Delhi, they ask if we are calling from Tripura (a State in Northeast India). They do not know about Tiruppur. 'Tiruppur in Tamil Nadu,' we have to say."[13]

Tiruppur is not only unknown in Ministries in India's national capital, New Delhi, but it is also equally unfamiliar to many well-traveled, educated, middle-class Indians, who might otherwise have bought and worn garments made in Tiruppur at some point in their life. Much like the person in the Ministry, a planner friend of mine in Mumbai also asked if I was conducting fieldwork in Tripura!

[12] Heitzman (2008) and Mukhopadhyay et al. (2020) classify small cities into various typologies based on their location and political-economic functions. Differences in their typologies attest to the diversity of small city urbanization in a large country like India.
[13] Interview with a Tiruppur-based industrialist, 2 July 2019.

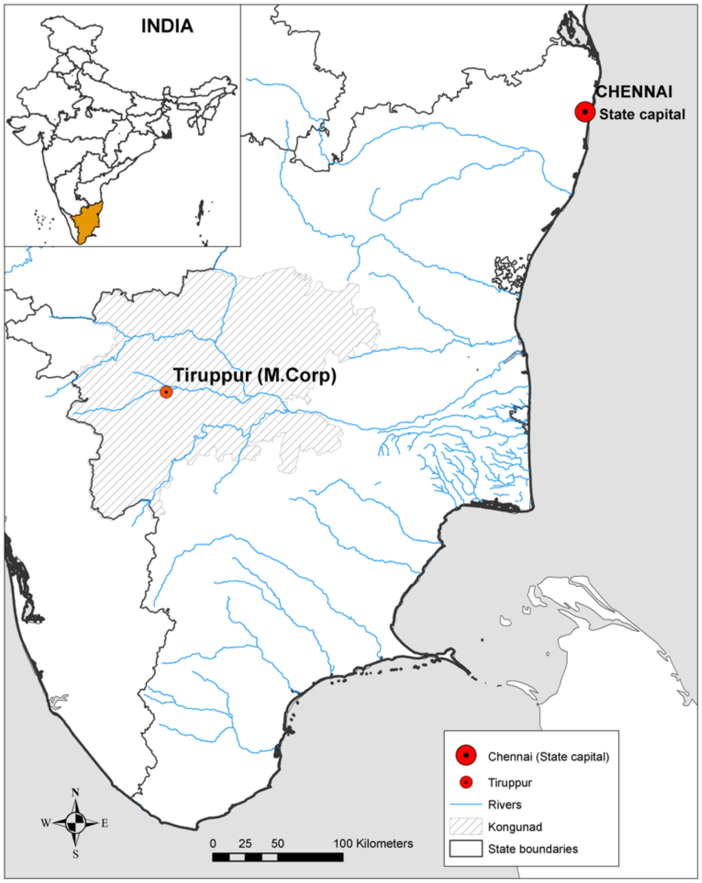
Tiruppur is a small, provincial city in the Kongunad region of Tamil Nadu (TN), one of the five States in southern India.[14] With a population nearing 900,000 by official counts and over a million, in reality, Tiruppur is hardly "small." It would be classified as a medium-sized city based on population in the Indian context. Until a recent redrawing of the city's boundaries in 2011 (which I discuss in Chapter 3), Tiruppur was a small city in population terms as well. However, as the industrialist's and my independent experiences confirm, Tiruppur is a small city in a relational sense—one that lies "off-the-map" (Robinson, 2002) in popular imaginations of urban India. Tiruppur barely makes it to the list of India's top 100 most populated cities, even if it is among the country's fastest-growing small cities located outside a metropolitan or capital city-region.[15] In 2011, Tiruppur was the sixth-largest city in TN. It was the third-largest city in Kongunad, a distinct sociocultural-ecological region in western Tamil Nadu that, to date, has no formal administrative status (Beck, 1979) (see Figure 1.2 for Tiruppur's location in Kongunad, Tamil Nadu).[16]

[14] TN is among India's most urbanized, industrialized, and developed states. 48% of TN is urban—highest among India's large states (Census of India, 2011). Only 11.28% of TN's population is below the poverty line, half the national average (Planning Commission, GoI, 2013: 6). It has the highest share of employment in the manufacturing sector (Vijayabaskar, 2014: 308).

[15] Tiruppur's population grew at the rate of 30.61% between 2001 and 2011, whereas its merged towns and villages grew by 128% on average during the same period. In contrast, the national urban population grew by 31.8% during this period (Census of India, 2011).

[16] Present-day Kongunad covers approximately 7500 square miles and encompasses the districts of Coimbatore, Tiruppur, Erode, Karur, Namakkal, and Salem, which are six of Tamil Nadu's most urbanized and industrialized districts outside the capital region of Chennai. Kongunad is a large upland plain surrounded by small, forested hills in the upper catchment of the river Cauvery, an important river in south India. Until the 9th century AD, it was a frontier region located at the edges of several powerful, warring kingdoms trying to enlarge their territory. It was subsequently colonized and settled by warrior-peasants from the Kongu Vellalar Gounder community, allied to some of these kings (Murton, 1979). Following India's independence from British colonial rule in 1947, Kongunad became a part of Tamil Nadu State and gradually became a prosperous industrial region. What makes Kongunad's ascent particularly striking is that it does not possess any natural endowments that one associates with thriving industrial regions—a bounty of natural resources or location in the proximity of major coastal ports or along important trade routes. A strong entrepreneurial spirit combined with toil among Kongunad's landowning ethnic castes, including the Kongu Vellalar Gounders, underpins this region's growth (Chari, 2004; Damodaran, 2018).

Figure 1.2 - Location of Tiruppur in Tamil Nadu, India



Tiruppur's relative smallness within the nation and the State[17] places it at a distance from centers of political decision-making in the national capital in New Delhi and the state capital in Chennai, affecting the level of intergovernmental support and attention that it receives in urban policies. What Tiruppur lacks in political reach, it makes up for in terms of its global economic reach. Tiruppur is one of India's largest centers for textile manufacturing and an important node in global circuits of cotton knitwear production. A walk through Tiruppur reveals an entire town as a decentralized t-shirt making factory where different parts of a t-shirt are carefully assembled or repurposed in dynamically interlinked large factories, small workshops, streets, and homes

[17] Throughout this dissertation, "State" with a capital "S" refers to India's provinces, i.e., the subnational state (usually Tamil Nadu, unless clarified), and "state" with a small "s" refers to the general concept of the state.

across the city (see Figure 1.3). Together, these workshops and production units produce knitwear or hosiery garments worth approximately USD 3.73 billion for distant US and European markets and nearly USD 0.9 billion for domestic markets annually.[18] This combination of secondary position in political-administrative hierarchies with reach into global networks facilitated by commodity flows structures governance in Tiruppur (see Figure 1.4). In subsequent chapters, I show how selected elites in the city constantly seek to leverage these extra-local and global connections that have expanded with globalization and neoliberalization to overcome the constraints imposed by political-administrative hierarchies or small size and pursue industrial growth limitlessly. Tiruppur, thus, is a productive site that allows me to theorize how small scale mediates global-local encounters in governance and planning, and to what effects for the production, experience, and contestation of inequalities.

[18] Figures obtained from Tiruppur Exporters Association, July 2018.

Figure 1.3 - Tiruppur: a decentralized t-shirt producing factory (a) Women inserting drawstrings into pajamas under a tree; (b) A woman manages a cone-winding facility; (c) Dyeing factories on the banks of the River Noyyal; (d) Cloth is bleached in a bleaching factory; (e) Workers sorting fabric at a Dollar Industries underwear factory; (f) Women clip off extra sewing threads from freshly tailored export garments on the street

Source: All photographs except (d) are the authors' photographs from 2019. Figure 1.3.d is from Conway (2019).

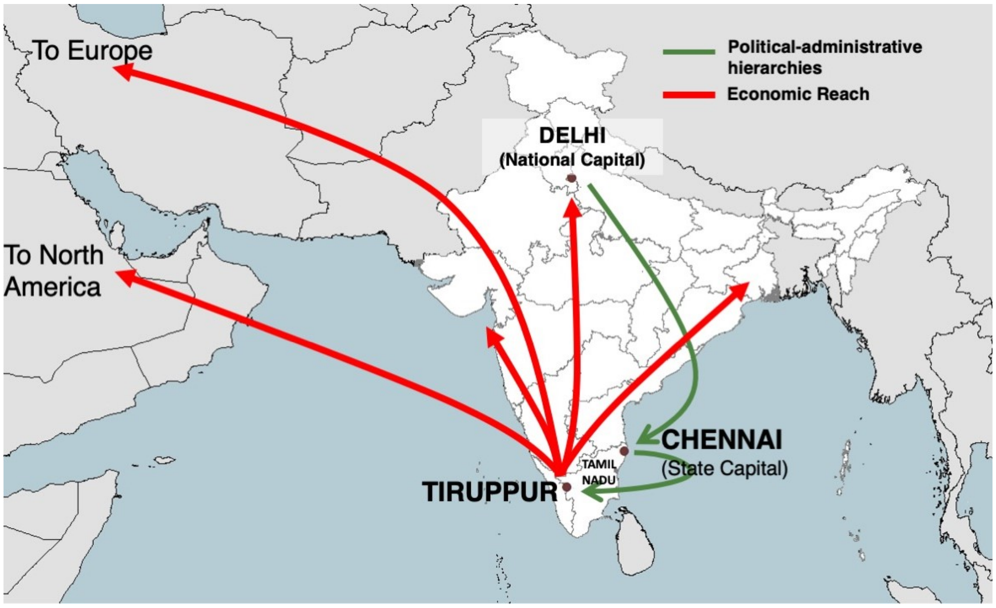
However, Tiruppur is also an exemplary case (Flyvbjerg, 2006; Small, 2009) to interrogate how the materiality of water and water infrastructures shapes governance at different stages in the production of the urban waterscape. Water is the focus of and an active agent animating urban politics and governance in Tiruppur. The textile industry is both a large consumer of water and a major producer of wastewater, which has contributed to the pollution of the River Noyyal, a seasonal river that bisects the city. The hundreds of thousands of workers who produce t-shirts and underwear for exports also need water for their everyday drinking and domestic needs.[19] Each imagination for Tiruppur's urban-industrial growth invariably has

[19] About 71% of Tiruppur's households have access to a municipal water connection, and no more than 26% of its households are hooked to the sewer network that partially covers the city (Census of India, 2011). These connection figures, although seemingly high, mask the ground-level reality that water flows through these

material and ecological repercussions for the city's overstretched water (and wastewater) infrastructures and the thousands of residents who depend on them. Water availability is also a salient socio-ecological and political issue in Tiruppur due to the city's location in an arid, water-scarce region and its dependence on water imports from distant parts of the contested Cauvery River basin, which is one of the major river basins in southern India (Suri, 2018). More recently, a spate of High Court rulings has intervened to regulate industrial wastewater disposal in Tiruppur, affecting industrial operations and livelihoods. These rulings have spurred seemingly 'anti-environmental' but 'pro-industry' mobilizations demanding their reversal (Grönwall & Jonsson, 2017). Following the flows of water in Tiruppur can help us investigate whether and how the material politics of water infrastructures in small cities interact with neoliberal planning processes to either challenge (or maintain and exacerbate) socio-environmental inequalities in the city.

municipal water connections no more than once a week, making resident users turn to a variety of state and non-state sources like borewells, tanker water, and/ or bottled water to meet their daily water needs, which in turn, deepens their experiences of urban inequalities and water insecurity.

Figure 1.4 - Schematic map showing Tiruppur's political-economic reach



Source: Figure by Siddarth Chandrasekaran

1.4.2. Methodology

There is a paucity of published secondary sources of data on places like Tiruppur.[20] The limited data that exists is hard to access. Often, it is outdated or not in a format that enables urban ethnographers or practitioners to easily discern urbanization dynamics or analyze governance, politics, or water flows. Therefore, I had to construct most of the descriptions, narratives, maps, illustrations, and datasets about Tiruppur in this dissertation using primary data or secondary data that is only locally available. I gathered these data through multiple rounds of in-person

[20] Tiruppur is an exception compared to the hundreds of small cities and towns across India, on which there are no publications in academic or popular media. Whereas numerous studies have examined aspects of Tiruppur's economy—its growth, labor relations, work culture, and joint action between firms in the textile cluster (e.g., Cawthorne, 1995; Chari, 2004; Vijayabaskar, 2011; Vijayabaskar, 2017), these studies have not investigated practices for city planning in relation to the textile industry's growth or the broader political economy of urban development. Similarly, the handful of studies that exist on Tiruppur's water-sanitation infrastructure have either focused on industrial water management practices (Nelliyat, 2007; Grönwall & Jonsson, 2017) or the organizational structure and operations of a well-known public-private partnership developed to deliver water for Tiruppur (Mahalingam et al., 2011). These studies have not examined the social and political life of water in the domestic spheres in Tiruppur.

fieldwork in Tiruppur, Coimbatore, and Chennai, conducted between 2017 and 2020. My fieldwork included short-term visits for a cumulative total of six months in the pre-dissertation phase and long-term dissertation fieldwork from March 2019 to January 2020.[21] Tiruppur's small scale, a focus of my analysis, also aided my fieldwork. It circumscribed the distances that I had to travel as I followed the flows of water in the city. It also made parsing relationships within multi-actor and multi-organization governance arrangements much easier.

My methodology varied according to the governance configurations that I examined at each stage of waterscape production in Tiruppur. I used multiple methods to understand and analyze how Tiruppur's scale and water's materiality structured these configurations. My positionality infused my interactions with actors within each governance configuration. However, as positionality is relational, different aspects of my identity (gender, age, caste, class, education, regional origins, marital and motherhood status) intersected to color my interactions with interlocutors at each stage. The rest of this section describes the methodology used to study governance configurations at each stage of waterscape production and contestation. I focus on sources of data, positionality, and analytical strategies.

As outlined in Table 1.1, in **Chapter 2**, I use archival research, historiographic analysis, and analyses of oral histories and observations of the physical waterscape to understand the historical roots of the observed governance configurations and the inequalities in Tiruppur's waterscape. I gathered archival materials from the British-colonial period and historiographic sources on urbanization, urban planning, and policies for water-sanitation infrastructure development in Tiruppur, Kongunad, and Tamil Nadu from the Tamil Nadu State Archives in

[21] Conducting preliminary research in three other similarly sized cities: Erode and Vellore in the State of Tamil Nadu, and Morbi in the State of Gujarat, further helped me see how scalar relationships influenced urban governance across regions and refine my analytical framework. I do not report the results of those studies here.

Chennai, the Kroch Asia Library at Cornell University, and the library at the Madras Institute for Development Studies in Chennai.[22] I obtained reports on Tiruppur's industrial-economic histories from archives maintained by leading business associations in the city. I also conducted open-ended interviews with about a dozen local writers, historians, journalists, and older residents in Tiruppur and across Kongunad to collect hitherto unwritten but embodied histories of city planning and the urban waterscape. I also observed and documented different infrastructural artifacts in the physical waterscape to understand how they influenced water governance through time.

Chapter 3 uses archival research and discourse analysis of plans, interview narratives, and observations at public meetings to investigate the visions that elite publics, the local capitalists who are predominantly from the Gounder caste, have for Tiruppur's future, the spatial projects that they devised to realize these futures, the plans for water supply schemes that resulted from those spatial projects, and the ways in which the capitalist elites contributed to the implementation of those water supply schemes. I acquired copies of project reports detailing the spatial projects and the water infrastructure plans from the offices of New Tiruppur Area Development Corporation Limited (NTADCL) in Tiruppur and Chennai, Tiruppur Municipal Corporation, the regional office of the Tamil Nadu Water and Drainage (TWAD) Board in Coimbatore, and from business associations involved in commissioning or preparing some of these plans.

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[22] I am grateful to librarians Virginia Cole and Bronwen Bledsoe (Cornell), and E. Jegan Parthiban (TN State Archives) for helping me locate copies of planning reports, books, and journal articles from the late British-colonial period in South Asia.

In-depth, semi-structured interviews with 30 capitalist elites and industry leaders from 34 business associations (out of a sample of nearly 50 such associations)[23] in Tiruppur's knitwear cluster helped me understand how they participated in the governance configurations at the stage of envisioning futures and designing water supply schemes to meet water demands corresponding to those futures.[24] I was also able to understand the associational structures and relationships that mediated their participation, their relationships to the multi-scalar state in governance arrangements, their motivations for participating in planning, the socio-cultural and economic bases of their power in governance, and the strategies through which they embedded themselves in governance at different points in time, in relation to changes in the urban political economy. I observed some of these industry elites in action in the civic sphere at two events: an event to declare Tiruppur as a 'Child Labor-Free Zone' organized by my community partner, NGO SAVE, and a rainwater harvesting workshop organized by the Tiruppur Municipal Corporation. I also interviewed planning consultants and planners in the local government and State-level agencies involved in designing and implementing the water supply schemes (Third and Fourth Schemes) that flowed out of the capitalists' spatial projects. My analysis sought to comprehend the discursive framing of plans and their materialization in the technical details on water infrastructure design and implementation. In analyzing these data, I paid attention to how Tiruppur's multidimensional and evolving small scale played a part in empowering selected capitalist elites vis-a-vis other actors and organizations in governance configurations at different points in time.

[23] Some prominent associations maintain a complete list of such associations. It is also published in the local yellow pages equivalent called Tiruppur Guide. There are overlaps in the leadership of some of these associations.
[24] See Appendix 1, Section 1 for the interview guide structuring these interactions.

Most of my interviews with capitalist elites were with an older generation of less-educated, self-made men mainly from the Gounder caste, whose parents had roots in agricultural occupations in Kongunad. The intersectionality of my age (early 30s), gender (female), caste (Brahmin), education (post-graduate), and fluid family origins that are not quite traceable to a particular town or village in South India influenced my interactions with these older men and dictated what they shared in interviews. A particular extreme interaction is revealing of the socio-cultural ties, beliefs, and local know-how that constitute Tiruppur's knitwear industry and pervade capitalists' interactions in governance. I quote at length from my fieldnotes below:

> The interviewee said, "It'll take me at least an hour to go through five years of efforts [for civic initiatives in Tiruppur], and we've been around for nearly 40 years, so, you call and come again." Afterwards, the gathered group of board members from Association X asked me where I live, and I said Y, so they presumed that I could return at a later point in time. The conversation quickly turned to what my "sonda ur" (native place) was. I said my grandfather was from Coimbatore, but had many decades ago, migrated to Mumbai as a child.
>
> Then, the interviewee went on a diatribe saying how much it pained him that Tamil culture was dying out as people [like me/ my family] were moving out of Tamil Nadu and not sticking to their roots. I politely interjected and said that Tamil culture was expanding as out-of-state migrants came to TN and learnt Tamil. He said, "No, it's not expanding if they are in the majority and we're becoming a minority in our own land. It hurts the older generation like me—you won't understand. We have our way of doing things that we would like to preserve. Now, you're a Brahmin, right? (It was a rhetorical question). I'm a Gounder, he's a Naidu, he's a Chettiar, he's a Gounder, he's a Mudaliar,[25] he's a Gounder, Gounder, Gounder (pointing to the Board Members in turn)… We all each have our own caste and family Gods and rituals of worship that we would like to follow and preserve, but if outsiders come, then these get diluted. I'm not saying equality is a bad thing. After all, God has made us equal. If you need blood, you won't ask for Brahmin blood. You'll simply get A+ blood from whoever gives it to you. Even God doesn't believe in differences. Murugan (among the most important Tamil Hindu Gods), whom we

[25] Mudaliar, Naidu, and Chettiar are other common higher caste groups in Kongunad. They are hierarchically equivalent to Gounders. Mudaliars and Naidu (who are Telugu-speaking) are traditionally involved in farming occupations, whereas Chettiar are traditionally from mercantile backgrounds. Tamil caste hierarchy places these castes below Brahmins.

> all worship, married Valli, who is from a lower caste. But despite these equalities at a human level, there are linguistic and cultural aspects that we would like to preserve. You may have a 'PhD' and be well-educated, but I have life experience, and I think that this is necessary."[26]

Chapter 4 relies on participant observation, mapping of municipal water distribution, and analysis of open-ended interviews with 48 actors from Tiruppur's municipal bureaucracy and other state organizations involved in governance configurations at the stages of infrastructure implementation and water supply operations. These state actors included administrators, bureaucrats, engineers (including a retired engineer whom I could track down), former or current elected leaders, and street-level watermen in different organizations at the city, regional, and State levels in Tiruppur, Coimbatore, and Chennai. During interviews and conversations, I probed these state actors to understand organizational arrangements and relationships within the multi-scalar and multi-infrastructural governance configurations for water delivery. I interviewed nearly a quarter of these interviewees more than once. I followed them in the field to gain an in-depth understanding of those arrangements, relationships, conflicts, and planning practices, which are not apparent in planning and policy documents. During interviews and conversations, I probed these informants to elaborate on the technical knowledge, politics, resources, and contingencies that shaped their actions and reflect on how their approaches to water delivery evolved as the city grew, new plans were made, governance reforms were introduced, and new water supply schemes got installed.

In general, repeated visits to many government offices and water tanks (where street-level water providers from the municipal bureaucracy hang out) over many years made me a

[26] Fieldnotes, 9 May 2019.

familiar face. They allowed me to gain the trust of many informants.[27] All informants were hospitable (as is characteristic of Kongunad) even if they were unable or unwilling to help at the outset. Over time, they shared secondary data at their disposal, even if it was partial, and joked about how my research was "never-ending." In July 2019, I participated as an informal but full-time observer and contributor in a planning and reporting process related to the Smart Cities Mission in Tiruppur Corporation. This engagement allowed me to read municipal files on infrastructure planning (that are not publicly available) and make relevant notes for my research. In addition to speaking to those in the bureaucracy, I also interviewed four market-based water providers and two public borewell operators involved in the operations of parallel water infrastructures to understand how these decentralized infrastructures inter-operate with municipal water schemes.

As I analyzed these interactions in the field and later, while writing up, I paid attention to how administrative hierarchies, norms associated with them, and the materiality of the different municipal and parallel water infrastructures that resulted from these norms structured governance arrangements, bureaucratic practice, and how various state actors learnt through embodied practices in Tiruppur. I also sought to understand how actors tried to work with and around these norms, material constraints, and hierarchies as they tried to meet their service delivery obligations.

[27] Cities like Tiruppur are not researched extensively. So, in talking to me, some of these local government informants also interacted with a student researcher for the first time. That I was serious enough to stay in Tiruppur for an extended period signaled a form of commitment that made them gradually warm up to my presence and questions. Often, I found that informants, too, tried to figure out and simultaneously teach me what water research (or planning) was or should be through our interactions, by asking me how the same processes worked back home in Mumbai or New York, and by drawing out comparisons in their responses (cf. Spradley, 1979). I paid careful attention to these interactions to identify what kinds of knowledge and authority were privileged by differently positioned state actors in Tiruppur's planning and governance and how a relational understanding of place shaped their imaginations and practices.

In **Chapter 5**, I use data gathered through participant observation, open-ended interviews and informal conversations on housing and water governance with nearly 60 residents and organizers from unions, NGOs, and civil society organizations, and a *water and waste calendar* survey (n=94) developed through participatory action research with a Tiruppur-based NGO called SAVE. During fieldwork, I also noted observations, drew sketches, maps, and took photographs documenting the waterscape, housing typologies, and urban life in Tiruppur. These observational and interview data allowed me to delineate a range of housing typologies and tenancy arrangements across Tiruppur and understand the publics who inhabited them. The water and waste calendars, described in greater detail in Chapter 5, revealed how these publics access water from different infrastructures, form relations with the local state, and organize to demand improvements to the waterscape.

In sum, I interviewed a total of 130 informants to understand different aspects of Tiruppur's waterscape.[28] An additional 108 water users recorded data in the water and waste calendars. When in the field, I wrote up preliminary analyses and 'hunches' periodically to identify gaps in my knowledge and improvise my research design accordingly. I coded interview and textual data in the qualitative analysis software NVivo to identify where the different data sources converged (or diverged) and organize my data and sources under the various codes and themes that structure this dissertation. Reading and writing are forms of interpretation and sense-making in ethnographic research (Geertz, 1973). Whereas I used the software to organize my data and identify themes, I relied on writing to describe, interpret, and piece together the various

[28] Interviews were conducted either in Tamil, English, Hindi, or a combination of these languages. Interviews or interactions lasted anywhere between 15-20 minutes to several hours. I recorded only 15% of these interviews; many state actors were uncomfortable speaking on the record. In other cases, I was unable to record spontaneous, open-ended conversations with informants. In such cases, I jotted notes, paying attention to vocabulary and points of emphasis, and typed up detailed notes and reflections shortly after these encounters. I translated and transcribed the recorded interviews with the assistance of a Coimbatore-based student.

sources in an iterative manner to construct this text. I argue that this case study (Stake, 1994) on the governance of Tiruppur's waterscape is a contribution in and of itself because the corpus of case studies or the "knowledge" required to guide planning action in smaller places is very limited (Friedmann, 1987). My eclectic methodology that relies on pluralistic approaches to data collection provides a methodological formula for others interested in researching planning and governance in small cities and towns across India.

1.5. This dissertation's structure

Following this introduction, the dissertation is organized more-or-less chronologically into four chapters, beginning with the historical context in Chapter 2 and analyses of state-society interactions in urban governance and water infrastructure planning processes in Chapters 3 to 5 as per the structure outlined in Table 1.1 (page 5).

Chapter 2, *The origins of a thirsty growth machine*, places the coevolution of Tiruppur's political economy, state-society relations, and its waterscape in a historical context. This history helps us understand the antecedents of contemporary governance configurations and practices at different stages of waterscape production, their contributions to the observed inequalities, and the emergence of subsequent struggles contesting these practices. It enables us to see how governance configurations were structured by Tiruppur's evolving small scale and the materiality of water infrastructures at different periods in the city's history. The purpose of this chapter is twofold. First, it sketches out the historical geography of the urban political economy and the municipal waterscape, centering on the First and Second municipal water supply schemes. Second, it advances two arguments about the historical underpinnings of ongoing infrastructure planning processes.

The first argument is that contemporary inadequacies in piped water coverage and state incapacities in small cities like Tiruppur can be traced to British colonial and postcolonial policies. Colonial policies first prescribed and then selectively relaxed norms for water supply based on city size. They also instituted a hierarchical system of double government that coopted traditional, pre-colonial systems of place governance and empowered local caste elites in municipal governance. Postcolonial policies, which overwhelmingly focused on metropolitan cities or rural villages, largely retained these differentiated norms and municipal administration systems in small towns until the implementation of decentralization and neoliberal reforms in the early 1990s. Thus, older inequalities in governance arrangements and in the material waterscapes of smaller places continued and got incrementally entrenched over time. The second argument is that a lack of administrative capacity in the municipal bureaucracy paved the way for private, dominant caste initiatives in governance and planning that gained traction in scripting urban transformations in the post-liberalization period. Overall, this chapter shows that power relations, goals, resources, and practices in present-day governance configurations in Tiruppur are in part a product of the city's historic small size and secondary status in the regional (and national) political economy, even if they are not completely determined by these scalar dimensions.

Chapter 3, *Tiruppur's elite publics and planning the growth machine's futures*, discusses how governance configurations, state-elite relations, and the planning practices involved in producing the urban waterscape transformed after the 1990s with neoliberalization and decentralization reforms and the Tiruppur economy's turn towards export-oriented industrial growth. This chapter focuses on governance configurations and planning practices at the stages of envisioning futures and producing water infrastructures to realize those futures in the face of water scarcity. I center in on the role of elite publics, the local capitalists and their networks in analyzing these governance configurations. The chapter describes two major *spatial projects* pursued by Tiruppur's capitalist elites to achieve greater economic growth: (i) the Tiruppur Area Development Programme, a regional vision for economic development, and (ii) the creation of Tiruppur Municipal Corporation, which involved extending the municipal boundaries to increase Tiruppur's size and political-administrative reach. I argue that these two spatial projects caused the elites to reach into distinct socio-economic networks within state hierarchies and utilize different collaborative strategies to realize their visions for Tiruppur's future. I analyze the comprehensive development plans that flowed out of the two spatial projects, focusing on their material repercussions for Tiruppur's municipal water infrastructures and its waterscape. I describe two water supply schemes in detail, the Third Scheme, an exemplar of one of the few but failed public-private partnerships (PPP) in India's urban water sector, and the Fourth Scheme, whose implementation was underway at the time of fieldwork.

Unlike in larger metropolitan cities, I find that elite coalitions and state-business partnerships in Tiruppur were not a post-liberalization phenomenon. These networks, which existed before liberalization, took advantage of neoliberal reforms to overcome the developmental constraints imposed by Tiruppur's small scale, pursue additional accumulation, and preserve their socio-economic and cultural hegemony. Envisioning futures, conceiving large water supply schemes, or contributing to building water infrastructures was critical to their economic and socio-cultural goals, even if these coalitions were removed from the infrastructures' everyday operations or maintenance. In part due to their aggressive efforts, Tiruppur grew and expanded its political-economic reach during this time. Consequently, more water flowed into Tiruppur, but socio-environmental inequalities in water access persisted. Overall, this chapter argues that older entrenched forms of non-state power as embodied in the city's elite publics have managed to adapt to changing political circumstances and policy environments to retain a firm foothold in Tiruppur's governance, much to the exclusion of other non-elite publics and equity concerns from plans and infrastructures.

Chapter 4, *Government categories and the state(s) of water provision*, investigates how the visions of growth and water infrastructures developed in the post-liberalization period impacted plan implementation and the operations of everyday water provision within Tiruppur Municipal Corporation. This chapter focuses on the bureaucracy and its relationships in the governance configurations involved in the everyday operations of infrastructure, water provisioning, and distribution across the city. I interrogate how these configurations and bureaucratic practices in the old urban core and peripheral villages changed after the redrawing of Tiruppur's municipal boundaries and the creation of Tiruppur Municipal Corporation. The findings draw attention to the role that a city's government category or position in political-administrative hierarchies plays in structuring bureaucratic practice and shaping the materiality of its waterscape. These categories prescribe infrastructure planning norms and dictate intergovernmental support that introduce differentiation in the waterscape. Categories also structure the local bureaucracy and shape its organizational and planning capacities, impacting its ability to engage in long-term, context-responsive infrastructure planning and distribute water equitably. Consequently, the local state improvises piped water supply and relies on easy-to-install decentralized water infrastructures like public borewells to cope with its inabilities and alleviate water scarcity across the city. Although these unplanned decentralized approaches allow the local state to extend water coverage, they externalize the costs of water provision to the environment and future generations. This chapter, thus, argues that increases in global economic reach and city size are not enough to transform the various kinds of planning and their material expressions that intensify the differentiated experiences of scarcity and inscribe inequalities in the waterscape. The Tiruppur case cautions against the uncritical use of municipal boundary extensions as a policy strategy to overcome the limits of small scale and address service provision challenges in the rapidly urbanizing peripheries of small cities.

Chapter 5, *Non-elite publics and their water access politics in Tiruppur's hybrid waterscape*, focuses on the diverse non-elite publics, who inhabit a range of housing typologies and tenancy arrangements across Tiruppur. It analyzes how the water supply schemes and parallel water infrastructures described in Chapters 2 to 4 serve these diverse publics. This chapter utilizes data gathered through a participatory action research project with a Tiruppur-based NGO called SAVE. I describe the 'water and waste calendar' and companion surveys that we developed to understand how these publics access water from an unequal hybrid waterscape consisting of many municipal water schemes, parallel water infrastructures, and other self- and market-provided sources, and in turn, how it shapes their experiences of water scarcity. The survey also examined how these publics are materially connected to the local state, and how they organize through governance arrangements at the property, street, or neighborhood levels to contest their differentiated experiences of water scarcity. Findings reveal that the materiality of the waterscape plays a part in shaping the emergence of struggles that contest inequalities in the waterscape. It fragments access and publics, who coalesce around different issues and grievances with water's materialization in their lives and employ varied political strategies to demand improvements in water access. Fragmented publics and politics combined with the disenfranchisement of the most marginalized in the waterscape and the local state's inability to distribute water equitably prevent the emergence of any sustained struggles for collective consumption. I argue that this collective quiescence allows prevailing elite-led neoliberal visions and projects for Tiruppur's futures to continue to pursue growth at the cost of equity and well-being.

Chapter 6, *Conclusion,* summarizes this study's main arguments and contributions to the different bodies of literature on state-business partnerships in sustainability planning, decentralization and service provision in small cities, and the material politics of collective consumption in small industrial towns in India. I argue that my analytical approach of following the flows of water through governance—state-society interactions at different stages of waterscape production, operations, and use is a contribution that helps explain the multiple interlinked factors that incrementally produce water scarcity and socio-environmental inequalities. Finally, I discuss the implications of my findings for planning research, education, and practice and point to some alternatives that can help us envision equitable futures in smaller places like Tiruppur experiencing rural-urban transitions.

CHAPTER 2 - THE ORIGINS OF A THIRSTY GROWTH MACHINE

> "[Tiruppur] was easily the fastest growing town in Tamilnad in the first half of the twentieth century" (Baker, 1984: 264) (my emphasis).

> "Tiruppur's rocket-like growth […] reflects cotton prosperity […] and indicates the strongly tonic effects of new trade and industry developments plus a central position for communication" (Yeats, **1931a**: 64-68) (my emphasis).

Tiruppur is among India's rapidly urbanizing small city regions. It has experienced many growth spurts in its 100-year history. As the opening quotes indicate, Tiruppur was one of the fastest-growing towns in Tamil Nadu in the 1930s, a period that coincided with the Great Depression worldwide. Political-economic changes at the global scale during this period contributed to urbanization across the Madras Presidency.[29] Urbanization, in turn, led to the establishment of municipal institutions of local self-government, water-sanitation infrastructures, and new systems and relations of urban governance, which varied by city size.

This chapter traces how governance and municipal water infrastructures evolved at key moments in Tiruppur's growth trajectory since its initial incorporation as a small town municipality in the early twentieth century. I describe the conditions that underpinned key junctures of industrial-economic restructuring and demographic growth in Tiruppur through the British colonial and postcolonial periods. In particular, I discuss how the impetus for economic growth clashed with and overwhelmed local water availability and bureaucratic capacity as local capitalist elites, and a multi-tiered state worked to manage and steer unanticipated growth

[29] Madras Presidency refers to the British colonial province that encompassed a majority of the present-day States of Tamil Nadu and Andhra Pradesh and portions of the state of Karnataka.

through planning at key junctures. I analyze historical plans[30] for municipal water supply schemes developed during the different phases of growth to examine how they were simultaneously shaped by and sought to rework Tiruppur's small scale and its influence on governance arrangements, state-capitalist relations, and planning practices in the city.

This brief history of governance and water infrastructures illuminates how one group of Tiruppur's elite publics, capitalists from the Gounder caste, were able to progressively benefit from successive rounds of industrial-economic growth because they used different strategies to embed themselves in governance arrangements and shape planning over time. It also reveals the colonial origins of the planning norms that underlie bureaucratic practices in water governance. I show how these norms varied (and continue to vary) by a city's scale—small size and secondary position in administrative hierarchies to produce differences in intergovernmental relations and municipal water provisioning practices between cities and towns. I argue that the interactions of elite aspirations and bureaucratic capacities in managing unanticipated, vigorous growth and water governance in a context with acute water shortage have together shaped the incremental production of Tiruppur's unequal waterscape. Each successive municipal water supply scheme merely expanded water infrastructures; they did not address entrenched socio-economic power in governance, nor did they reform the norms guiding (and constraining) bureaucratic practice. My work, thus, contributes to an emerging body of work that traces the colonial antecedents of governance and water-sanitation infrastructures in South Asian cities and towns (e.g., McFarlane, 2008; Glover, 2018). However, I provincialize this scholarship by focusing on

[30] These include: (i) original archival documents obtained from the TN State Archives in 2017, (ii) water infrastructure plans and technical reports obtained from various State departments between 2017 and 2019, and (iii) the historiography on urbanization and development in Tamil Nadu accessed through the Kroch Asia Library at Cornell University and libraries at the TN State Archives and the Madras Institute of Development Studies in Chennai, India.

governance relations, planning practices, and their material implications in a rapidly growing small city that was, until recently, on the peripheries of the British empire as well as the Indian national and Tamil subnational states.

This chapter is organized chronologically and consists of three parts corresponding to three periods when Tiruppur experienced growth and significant shifts in governance. The first part of the chapter describes the origins and expansion of Tiruppur town as a cotton market on the peripheries of the British empire and the concomitant creation of municipal water infrastructures and institutions for their governance under British colonial rule in the early decades of the twentieth century. This part shows how the colonial regime's *double government* system empowered local caste elites and *relaxed norms* for municipal water supply in less wealthy, small cities and towns. The relaxation of norms and incremental support for building municipal water supply schemes produced a highly differentiated, hybrid waterscape over time, where people met their needs from many water sources.

The second part provides an overview of the expansion of Tiruppur's domestic knitwear industry in the middle decades of the twentieth century (1947 to late 1980s) in post-independence India. It discusses the accompanying changes to municipal governance and urban water infrastructures. During this period, the State of Tamil Nadu did not reform municipal governance. Governance arrangements from the colonial period persisted in small towns like Tiruppur. Tiruppur's industrialization trajectory further empowered the Gounder caste elites, who came to lead business and civil society organizations across the city. They used their social networks and political connections to make financial contributions for installing municipal water supply schemes in Tiruppur. However, the incremental production of these schemes, which overlooked large sections of the urban publics and their water access practices, could not keep pace with the city's growing water demand. Therefore, hybridity and older inequalities in access persisted in Tiruppur's waterscape.

The third part of the chapter sketches out some shifts in governance and infrastructural plans after the knitwear industry's turn towards exports during the late 1980s when India implemented neoliberal reforms. I show how the gradual decentralization and informalization of knitwear production weakened labor organizing and further emboldened the capitalist elites. Nevertheless, these elite networks, which got internally reconfigured, continued to participate in governance and water infrastructure planning with the aim of making Tiruppur an *export-oriented growth machine*. The concluding section recapitulates how Tiruppur's governance and water infrastructure plans evolved in relation to the city's size, relative centrality (or peripherality) in global trade circuits, and secondary position in urban administrative hierarchies at different moments in the city's history.

2.1. Origins and growth on the peripheries of the British empire, 1901-1947

Early basis in British cotton imperialism

The origins of modern Tiruppur can be traced to expansions in British cotton imperialism during the late nineteenth and early twentieth century. The region of western Tamil Nadu (TN), Kongunad (that houses Tiruppur), emerged as a key frontier region for cultivating cotton that supplied raw material to mills located in Bombay (now Mumbai), Madras (now Chennai), and towns like Lancashire and Manchester in England. Cotton was the world's most important industrial raw material during this period (Beckert, 2014). Kongunad had ample tracts of black cotton soil and a year-round well-based irrigation system operated by industrious and entrepreneurial peasants (Nicholson, 1887; Baker, 1984; Chari, 2004). However, even as

Kongunad became an important part of the cotton empire's periphery, it did not have an organized cotton market before World War I.

During World War I, the cotton mills of Bombay experienced a surge in demand for cloth from the home market and the overseas British army. In 1916, a group of thirty Bombay cotton merchants arrived in Kongunad looking to stock up on cotton. They established a cotton market at Tiruppur, a small cotton ginning town in the heart of Kongunad's cotton tract (Baker, 1984: 268). The establishment of the cotton market, which remained the only one of its kind in Kongunad well into the 1930s, led to the birth and growth of modern Tiruppur.

Tiruppur's cotton market attracted many traders, merchants, and financiers to immigrate into and settle in the town. Between 1901 and 1931, which roughly coincided with the Great Depression worldwide, Tiruppur's population tripled from 6,000 to 18,000. Tiruppur was among the fastest-growing towns in Tamil Nadu during the first half of the twentieth century. Tiruppur became more than an entrepot for cotton cultivated in the countryside; the local cotton pressing and ginning industry started exporting cotton to textile mills that were mushrooming all over neighboring Coimbatore and distant mills in Lancashire and Tokyo. Urban transformations accompanied these growing trade links to distant places.

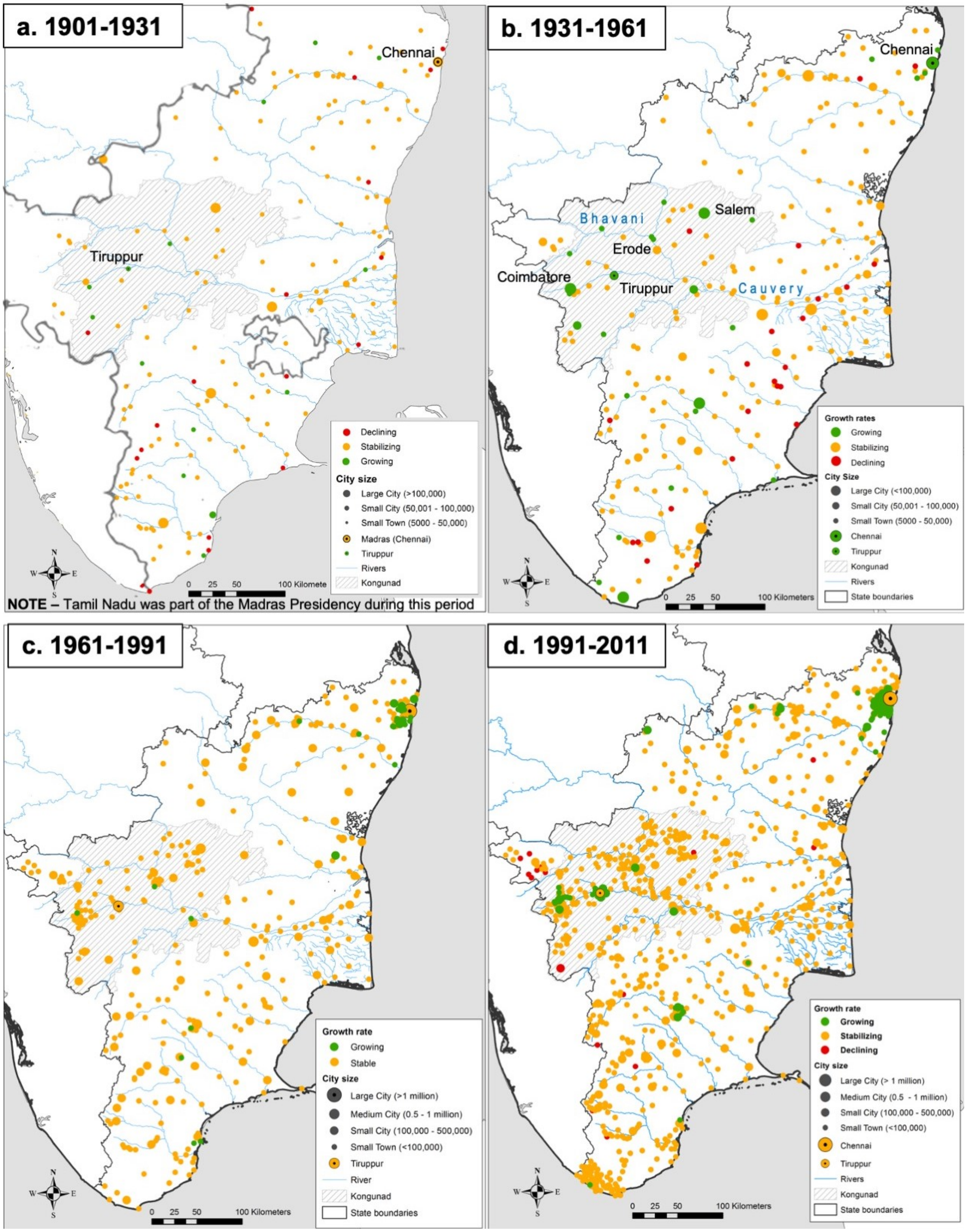
The Great Depression coincided with rapid urbanization across Kongunad. During this period of acute agrarian distress, many peasants of Kongunad pivoted towards the urban economy (Baker, 1984). A few enterprising cultivators invested idle credit in cotton mills and other labor-intensive, agro-processing industries that began to be located in small towns on traditional trade routes or on railway lines that had penetrated deep into Kongunad by the late 19th century. Spatially differentiated investments, which varied by the main crop produced in the surrounding tracts, led to the emergence and growth of industrial-market towns specializing in the production, marketing, and export of particular commodities (Baker, 1984; Rukmani, 1993; Chari, 2004). For example, Pollachi was a center for groundnut processing and trade, Palladam and Tiruppur for cotton pressing and cotton trade, and Erode and Bhavani for handloom weaving. Specialization was accompanied by the emergence of a distinct capitalist caste that controlled the production, processing, and trade of these commodities in each of these towns (Rukmani, 1993).

The rural-urban intersectoral linkages between towns and the agrarian tracts that surrounded them allowed for agricultural intensification and diversification of rural peasantry into the urban economy at a time of agricultural slowdown. It created tightly knit rural-urban geographies where the boundaries between town and country were blurred in practice even as they were administered under separate legal regimes (cf. Glover, 2018). Rural and urban spaces came to be governed through distinct state structures and policies that contributed to differences in service provision between rural and urban spaces. For example, state-provided welfare, such as public distribution of essential grains and commodities and reasonable minimum wages in major towns, incentivized the rural population to move to urban areas, which further fueled urban industrial growth (Baker, 1984). Overall, during this period, small industrial towns grew across Kongunad, and Madras Presidency (the province which contained present-day Tamil Nadu State) emerged as one of the more urbanized provinces in South Asia.

Small industrial towns like Tiruppur, Pollachi, and Karur sprouted out of large villages in Kongunad, just as small towns like Coimbatore and Salem became large cities (Yeats, 1931b). Simultaneously, centuries-old trading towns and ancient temple cities in other regions of the present-day State of Tamil Nadu (except Madras) either stagnated or declined. They were not part of the new imperial economy or the associated transportation-communication networks developed during this period (Baker, 1984; see Figure 2.1a).[31] As was the case of Madras Presidency and the rest of colonial South Asia, urbanization led to the simultaneous creation of new government institutions and regulations at the town- or city-level as well as the institution (or reconfiguration) of relations between provinces, municipal governments, citizen-subjects, and infrastructures (Dodson, 2020). The next section describes these intertwined institutional, infrastructural, and economic changes in Tiruppur during the first half of the twentieth century.

[31] According to the colonial classification of urban places in India, cities were settlements with more than 50,000 residents, whereas towns were places with distinctly urban characteristics and populations between 5,000 and 50,000 residents. Villages were a residual category (Yeats, 1931b). The "distinctly urban characteristics" that formed the basis of these definitions were never clearly defined (Glover, 2018).

Figure 2.1 - Urbanization in Tamil Nadu from 1901-2011



Data source: Census of India, 2011. Note: Growing cities are those whose population growth rates are 1 Std. Dev. above the mean growth rate for all cities. Declining cities are those whose population growth rates are 1 Std. Dev. below the mean growth rate for that period.

2.1.1. The formation of Tiruppur Municipality and the installation of the first protected municipal water supply scheme

As Tiruppur grew into a bustling town in the early decades of the twentieth century, the villages of Thennampalayam, Karuvampalayam, and Valipalayam[32] that surrounded the cotton market and a cluster of government buildings like the town hall, the courthouse, and the railway station, were consolidated to form Tiruppur Municipality in 1917. These neighborhoods in the vicinity of the old cotton market continue to constitute the old urban core of Tiruppur today.

The Tiruppur municipal council was initially appointed by the British colonial government, and shortly after, was elected by local property owners and elites. On behalf of the colonial government, the Coimbatore District Collector (the highest-ranked bureaucrat in the district) appointed a city council that oversaw municipal administration in Tiruppur. This municipal council reported to the provincial Local and Municipal Department, which supervised all aspects of local self-government, including budget approvals, expenditures, and political and administrative appointments to the municipal government. The provincial government also provided the municipal council with grants and subsidies to carry out their mandates. However, the colonial government gradually developed policies to ensure that the municipality would raise funds for urban services and reduce the financial burdens on imperial revenues (cf. Leonard, 1973).

Tiruppur's first appointed municipal council was dominated by mercantile castes[33] (Chettiars and Mudaliars) and members of the Gounder caste, which was (and continues to be)

[32] 'Palayam' is a common suffix for place names in Kongunad and refers to historic fort-temple complexes that formed the nuclei of villages settled by warrior-peasants in the 14th-17th centuries AD (Murton, 1979). Whereas these historical traces have largely disappeared from the landscape or public memory (only one of my interviewees mentioned it), both old and new neighborhood names continue to retain this suffix.

[33] Mercantile castes had vested interests in joining the municipal council to protect their economic interests by regulating taxes on markets and trade (Leonard, 1973).

among the dominant, property-owning castes in Kongunad.[34] With the enfranchisement of Indian property owners and taxpayers over the next two years, this trend of a Gounder-dominated council continued, and a Gounder man named Ramasamy Gounder was elected as the municipal chairperson in 1921. The colonial government created new institutions and arrangements for urban governance that differed from the pre-colonial period's traditional village councils. However, these new institutions did not disrupt local power relations within Tiruppur.[35] Landowning Gounders from agricultural backgrounds continued to retain local political authority following a *double government* arrangement that has been traced across colonial India, where administrative responsibilities were divided between the local (municipal) and distant upper tiers in a hierarchical but decentralized system (Dodson, 2020).[36] The local tier usually comprised traditional local governance systems that were co-opted in region-specific ways to serve the colonial government's political-economic interests (Baker, 1984).

Municipal responsibilities and mandates

Under the Madras District Municipalities Act of 1884, municipalities were responsible for maintaining public health in towns. They had to construct public infrastructures like drains, sewers, wells, and water pipelines and collect taxes to maintain these infrastructures. District

[34] Kongu Vellalar Gounders (one of the main types of Gounders in Kongunad) formed nearly 45% of Coimbatore district's population in 1921, when the caste census was last conducted (Baliga, 1966). They continue to dominate the population, political economy, and socio-cultural life across Tiruppur (Chari, 2004; Vijayabaskar & Kalaiyarasan, 2014; De Neve, 2015).

[35] Pre-colonial Kongunad was divided into various local regions called *Nadu*, subdivided into villages and hamlets by clan. These villages were governed by headmen from the Gounder caste, who oversaw rituals and disputes (Beck, 1972). Colonial municipal boundaries did not match these pre-existing administrative territories as in Bengal (Sengupta, 2012), nor did the colonial government completely replace traditional power systems.

[36] The colonial government adopted this arrangement as it recognized that it would be impossible to govern and control localities from a distance without adequate knowledge of local conditions. Such a double governance system also intended to curtail violent uprising against a colonial government (Dodson, 2020).

Boards, a type of local government for districts, provided these infrastructures and services in rural villages (Baliga, 1966).

In the early 20th century, the rapid, unforeseen population growth of Tiruppur and a series of failed southwest monsoons, critical to the region's water supply, created an acute domestic water crisis. The fledgling Tiruppur Municipal Council struggled to provide water-sanitation services for an expanding town. Until this population boom, residents of Tiruppur (and Kongunad) relied on a system of private and communal wells for irrigation and domestic uses (Baker, 1984).[37] Many of these wells were cut 30 to 60 feet deep into hard rock and dried up during the hot summer months, particularly when rainfall was scanty (see Figure 2.2 for an example). The municipality found it difficult to enforce sanitary conditions—codified by colonial rulers in policies—around these public wells used by people for drinking water, bathing, and washing.[38] With the transfer of the responsibility for water provisioning to municipal councils, council members and administrators realized that it would be difficult to provide adequate and reliable water for Tiruppur's growing working-class population through a decentralized network of wells.[39] Additionally, as part of their drive to modernize Indian towns, the colonial government actively promoted the construction of centralized, protected municipal water supply schemes across South Asia (Leonard, 1973; Dodson, 2020). The municipal council, thus, decided to build an exclusive municipal water scheme for Tiruppur.

[37] The hydrogeography of Kongunad does not support water supply from rivers or tanks; the rivers are seasonal, rainfall is variable, soils are absorbent. The hot weather evaporates stagnant water rapidly. As early as the 17th century AD, the colonizers of Kongunad realized the significance of wells and groundwater for year-round irrigation and water supply. However, the high costs involved in sinking wells and the difficulty in transporting water against gravity over long distances implied that many wells were individually owned and regulated until the widespread adoption of electric motor pumps in the 20th century (Beck 1979; Baker, 1984).

[38] TNA, LSG Department, PH (Mis.), file no. 1077 dated July 23, 1924.

[39] Copy of the report no. 992 dated October 29, 1920, from Assistant Sanitary Engineer, Western Circle to the Deputy Sanitary Engineer, Southern and Western Circle, Government of Madras. Mimeo obtained from TNA, LSG Department, PH (Mis.), file no. 1327 dated August 8, 1923.

Figure 2.2 - A century old well in Kongunad. Wells like these perforated Tiruppur's landscape prior to the advent of piped water supply or borewells

Source: Author's photograph, July 2019.

In April 1918, soon after it commenced operations, the Tiruppur Municipal Council wrote to the provincial government (Local and Municipal Department) in Madras requesting them to sanction a municipal water scheme for the town. The prospect of developing a new municipal water scheme in Tiruppur was going to be expensive and technically difficult for the new and relatively small Municipal Council to undertake on its own. One of the main barriers in expanding water coverage in small cities and towns during this period was the unavailability of skilled engineering staff in municipalities who could prepare detailed plans and estimates for water supply schemes approved at the provincial level (Westerdale, 1930). Therefore, the Tiruppur Municipal Council asked for financial and technical support to first investigate the feasibility of building such a centralized water scheme and subsequently to execute it.[40]

[40] In a letter (R.O.C. No. 1117/18) dated August 1, 1920, from the Chairman of Tiruppur Municipal Council to the Secretary, Local and Municipal Department, Government of Madras, the former noted, "The Council is very anxious that the work [of developing the water supply scheme] be taken up immediately so as to remove the notorious water scarcity in Tiruppur, more and more keenly felt as the town is growing rapidly in extent, traffic and importance. Large number of people and cattle suffer much." TNA, LSG Department, P.H. (Mis.), file no. 1327 dated August 8, 1923.

The provincial Sanitary Engineer's office provided this technical support to municipalities on behalf of the provincial government. An engineering inspection report from 1920 found that the nearest perennial river water source that could adequately supply 15 gallons (or approx. 56 liters) per head per day for 20,000 residents was located about 25 miles away from Tiruppur at the junction of the rivers Noyyal and Amaravathi (see Figure 2.6a, page 89). The installation costs for this scheme were upwards of Rs. 22,50,000,[41] and the annual maintenance costs were estimated to be Rs. 46,000 (or about half the municipality's annual income at the time). Although the river Noyyal flowed through Tiruppur, the provincial Sanitary Engineer noted that it lacked sufficient flows to serve as a permanent water source because of the construction of multiple check dams upstream and brackish subsoil water. He concluded that drilling deep wells into the Noyyal's rocky bed was unlikely to yield sufficient water for the entire town.

The prohibitive costs of pumping water from distant sites and the unsuitability of the local river meant that the provincial engineering department and the municipality settled on a solution that involved drawing groundwater from a village called Kovilveli. This site was located 4 miles (~6.5 kilometers) to the south of Tiruppur, outside municipal limits (see Figure 2.6a, page 89). They estimated that the scheme at Kovilveli could be developed for a fourth of the original estimate, i.e., Rs. 5,00,000; the annual maintenance costs were projected to be Rs. 1200. The Tiruppur Municipal Council decided to finance this scheme with a combination of a grant and a loan from the provincial government. They expected to repay the loan with fee receipts from the cotton market, which offered the municipality a steady annual income of about

[41] It is difficult to provide adjusted figures in current terms since inflation calculators are not readily available from this period.

Rs.12,000.[42] The Council was extremely reluctant to levy an annual water tax of about 7.5% on the rental value of properties in town to recover the annual maintenance costs, citing the high average taxation per head and the high incidence of poverty among the town's permanent residents.[43] Since the Council consisted of property-owning taxpayers, they were disinclined to raise taxes. Thus, the Kovilveli water scheme did not necessarily institute a culture of paying for municipal water. Financing the water supply scheme through public debt depended on the fortunes of the cotton market, which in turn was pegged to a volatile global cotton economy.

Despite having a healthy municipal budget and tax base, the Tiruppur council struggled to raise the necessary funds to build its first protected water supply scheme. By then, the provincial government's Sanitary Board, which oversaw the development of municipal water supply schemes, also decided to revise its policies to enable small towns like Tiruppur to build these schemes. Instead of financing water supply schemes in small towns through grants or developing solutions to manage decentralized water infrastructures like wells, the provincial government changed the norms associated with the design of water supply schemes in less wealthy towns like Tiruppur. The provincial government decided to mandate just 5 to 7 gallons (~19 liters) of water per capita per day instead of the original requirement of 15 gallons per day, which continued to undergird municipal water schemes in bigger cities and in cantonment towns that primarily housed Europeans.[44] They also asked municipalities to provide this water through

[42] Tiruppur Municipal Council's May 20, 1921, response to Memo No. 3280-1 P.H. dated March 4, 1921. Mimeo obtained from TNA, LSG Department, P.H. (Mis.), file no. 1327 dated August 8, 1923.
[43] Letter (R.O. No. 872 of 1922) dated June 26, 1923, from the Chairman of Tiruppur Municipal Council to the Secretary, Local Self-Government Department, Government of Madras. Mimeo obtained from TNA, LSG Department, P.H. (Mis.), file no. 1327 dated August 8, 1923.
[44] The Madras Sanitary Engineer's surveys had revealed that "5 gallons per head per day amply suffices to meet the wants of a native family." He also noted that it would take some time for Indians to recognize the benefits of piped water, following which there was likely going to be greater demand for it. See Jones, J. A. (1899). The waterworks of the Madras Presidency (including appendix and plate at the back of the volume). In ***Minutes of the Proceedings of the Institution of Civil Engineers, Vol. 137***(3), 2-40. Retrieved June 19, 2021, from: https://babel.hathitrust.org/cgi/pt?id=hvd.32044091980755

public fountains instead of individual house connections. This *relaxation of norms* helped the provincial government's Sanitary Board move away from a "policy of perfection," which had "killed" many schemes in the past due to their onerous technical (and financial) requirements. To move schemes from plans to implementation, rather than let less-wealthy, small towns suffer for want of water even after schemes were approved and plans were made, they decided to create a tiered system of norms by city size (and tax base) (Westerdale, 1930: 2).[45] This approach helped small towns provide water, but it created inequalities in water supply between cities and towns.

Tiruppur Municipal Council could, thus, plan for a scheme based on a relaxed norm of an untreated 5 gallons (~19 liters) per head per day (or a total capacity of 0.4MLD) instead of the initial proposal of 15 gallons per head per day. Tiruppur Municipal Council supplied this water through public taps attached to small overhead water tanks installed across town.[46] The Council did not supply water to the villages that bordered Tiruppur town and housed a majority of its workforce. Water supply in these villages was the responsibility of the District Board. Tiruppur's water infrastructure, thus, embodied the colonial government's planning norms that eventually differentiated infrastructural interventions in cities by their size and tax base. Since these norms only allowed for a limited quantity of municipal water supply per head, in practice, residents of Tiruppur Municipality supplemented (and continue to supplement) municipal drinking water with water from public and private wells for other domestic needs. Thus, *many waters* from centralized networks and decentralized sources have comprised Tiruppur's urban waterscape since the town's beginnings on the periphery of the imperial economy. The centralized network

[45] In the case of colonial Punjab, Glover (2018) has noted the inability of small town local governments to raise sufficient revenues that would help them discharge all their service delivery obligations. He further observes that "towns lacked water-sanitation infrastructure not because of some cultural predilection for disorder but because of a flawed municipal finance and governance model" (60).

[46] Note by the Chief Engineer of the Public Works Department No. 1057 dated February 9, 1921. Mimeo obtained from TNA, LSG Department, P.H. (Mis.), file no. 1327 dated August 8, 1923.

did not necessarily differentiate provisioning by class or race, as documented in other, bigger South Asian cities during this period. Neither did it displace pre-existing localized forms of control over decentralized water sources like communal wells.

After endless intergovernmental negotiations between Tiruppur Municipality and the provincial government that spanned nearly fifteen years, and subsequent compromises by Tiruppur Municipality, the Kovilveli valley scheme was finally installed in 1932-34. It was incrementally augmented over the next few years until 1946, just a year before India's independence from colonial rule.[47] Over the two decades that it took for the scheme to be implemented, and even as the town grew rapidly, the Sanitary Board did not revisit the design or capacity calculations for the scheme. The original calculations became obsolete when the scheme was finally operational. In about 15 years, Tiruppur's population surpassed the projected 20,000 residents for whom the 30-year scheme (which coincided with the debt service period) was originally designed.

The original design calculations for the Kovilveli valley scheme also could not foresee some of the changes in the political economy that would change water demand within the town. The water demand calculations did not account for the floating population of workers, who commuted into town from the surrounding villages to work in the cotton pressing and ginning

[47] The absence of an archival record on how the Municipal Council interfaced with Tiruppur's residents during this period prevents me from making claims about how residents shaped infrastructure development or how infrastructure contributed to the making of citizen-subjects or urban space in Tiruppur during this period (cf. Dodson, 2020). At this time, only 34 municipalities (or less than 10% of the towns) had a protected water supply source, and schemes were under consideration in 12 other small and medium-sized municipalities across Madras Presidency (Westerdale, 1930). Residents of all other places continued to rely on local, decentralized sources of water.

industry initially, and later in the yarn knitting companies[48] in the 1930s.[49] Therefore, an already limited quantity of water had to be distributed to more residents, exacerbating the experience of water scarcity. By 1951, this water scheme only supplied 2 gallons (~7.5 liters) per head per day of water compared to its designed quantity of 5 gallons per head per day, which itself was a compromise specific to small towns (Rajagopalan, 1953). The prolonged unavailability of funds and technical support, which were a function of Tiruppur town's small size and secondary administrative status, and the exclusion of certain water-consuming publics from infrastructure design calculations due to unpredictable and unplanned changes in the political economy, combined to shape Tiruppur's inadequate and unequal waterscape during this period. Planning norms that varied by town size and secondary status also played a part.

2.2. From cotton market to *banian* city in postcolonial India, 1947-1991

The local abundance of cotton and yarn production in textile mills in the nearby city of Coimbatore fostered the development of the cotton yarn knitting and *banian*[50] industry in Tiruppur in the early decades of the 20th century. Between 1950 and 1960, shortly after India's political independence, many local entrepreneurs imported new kinds of knitting machines to Tiruppur. As a result, the number of knitwear companies rose from about 34 in 1950 to about 219 in 1960. They also employed nearly 4000 workers (Census of India, 1961: 71). In addition, these companies exported knitted (hosiery) undergarments to various states across India.

[48] Between 1930 and 1950, about 34 knitting companies were established and operated by entrepreneurs from Muslim, Chettiar, Mudaliar, and Iyer castes in Tiruppur (Chari, 2004).
[49] See Letter (R.O. No. 872/20) dated April 27, 1921, from the Chairman of Tiruppur Municipal Council to the Secretary, Local and Municipal Department, Government of Madras. Mimeo obtained from TNA, LSG Department, P.H. (Mis.), file no. 1327 dated August 8, 1923.
[50] *Banian* is the Indian term for a men's vest or undershirt. *Banian* company is a generic term used by locals to refer to all kinds of establishments that produce knitwear (or hosiery) garments, including but not limited to *banians*.

The emergence and subsequent development of Tiruppur's knitwear industry during the middle decades of the twentieth century have been documented in detail by many scholars. Whereas members of local mercantile castes owned the first generation of knitwear companies, owners from the Gounder caste (a regional landowning agrarian caste) background started to dominate the industry from the 1950s for several reasons (Swaminathan and Jeyaranjan, 1994). These reasons included their ability to raise capital by collateralizing or selling family-owned agricultural land (an asset unavailable to workers of Dalit or other lower castes) and obtaining bank loan referrals, financial support, and work orders from tightly knit caste and kin networks. Many of the nouveau Gounder owners had previously worked in the first-generation companies owned by mercantile castes, where they learned the industry's ropes. However, the actual routes of entry into the ranks of knitwear capitalists varied even among Gounders (see Chari, 2004). Not all Gounders could mobilize caste as social capital to accumulate in the knitwear industry (Vijayabaskar and Kalaiyarasan, 2014). As geographer Sharad Chari explains in his study of Gounder capitalists (Chari, 2004), an ability to toil for hours under strenuous work conditions and supervise labor closely to keep up production for demanding markets were seen as important markers of success among the first generation of Gounder entrepreneurs. State intervention in the form of subsidies to small-scale units and loans from leading public-sector banks that provided working capital were other factors that gave a fillip to Tiruppur's budding knitwear industry. This unplanned but rapid expansion in the knitwear industry led to equally rapid population growth and increasing demand for housing and basic services like water in Tiruppur.

2.2.1. Urban expansion and the development of the First Water Supply Scheme

As the knitwear industry expanded, it drew workers from the neighboring villages to Tiruppur. As a result, the city's population ballooned from 18,000 residents in 1931 to nearly 80,000 by 1961 (Census of India, 2011). Despite this phenomenal growth, Tiruppur was only the fifteenth largest city in the new State of Tamil Nadu (hereafter TN) that was carved out of Madras Presidency in 1956. It, thus, continued to remain a small municipality. During this period, urban population growth in Coimbatore district (where Tiruppur was then located) was four times that across the State as a whole. This growth was evenly spread across towns and cities of different sizes (Rukmani, 1993: 216; see Figure 2.1b, page 51). More than 36% of Coimbatore district towns were industry towns, and they grew faster than other types of towns whose economies focused on the service sector (Rukmani, 1993).

Tiruppur's physical landscape changed with rapid population increase and unregulated growth. However, in the absence of policy interventions to devolve land use planning functions to the municipal scale, the municipality did not regulate physical growth and remained restricted to basic service delivery.[51] This policy vacuum in Tiruppur's land use planning prompted local landowners to develop housing and other amenities independently in an uncoordinated manner. Many Gounder landowners with thick kinship ties to the Municipal Council converted vast tracts of their agricultural lands in and around town into housing layouts. These layouts consisted of streets laid out in a grid interspersed with small open spaces and for-sale plots for single-family residences. Some of the layouts developed during this time, such as Sheriff Colony or Amarjothi

[51] The provincial government-administered land use planning and housing provision during the colonial regime, whereas municipalities remained responsible for service delivery. A rural bias in postcolonial national and State-level policy meant that the State did not invest in strengthening urban local governments until the 21st century; the weak municipal governmental structure inherited from the British remained in place. Consequently, land use planning remained outside the municipalities' purview and delinked from their service delivery functions in the postcolonial period (Weinstein et al., 2013).

Garden along Kangayam Road, are among Tiruppur's wealthiest and poshest residential localities today. Many landowners also built unserviced rows of shacks to cater to growing housing demand from the working class.

The disconnections between economic development planning, land use, housing planning, and service provisioning resulted in unmet water demands. In the 1960s, roughly thirty years after the Kovilveli scheme had been commissioned, Tiruppur Municipality again faced the challenge of upgrading its water infrastructure to sustain its burgeoning population. The supply from the Kovilveli scheme was insufficient for a town whose population had quadrupled over a three-decade period.

Tiruppur's First (post-independence) Water Supply Scheme

In 1965, K N Palanisamy Gounder (KNP), an aristocrat who served multiple terms as Tiruppur Municipal Council's chairman from 1938 to 1957 and was subsequently elected to the Tamil Nadu State Assembly from Tiruppur constituency (1957-1967), worked to get a new municipal water scheme sanctioned for Tiruppur town (Kuppusamy, 2005).[52] KNP's presence in the State Assembly helped the Tiruppur Municipality in obtaining speedy State approvals. Tiruppur's water engineers and residents colloquially call this water supply scheme the 'First Scheme.' The First Scheme was designed to draw water from a point on the river Bhavani located on the outskirts of a town called Mettupalayam, located about 50-km away from Tiruppur (see Figures 2.3; Figure 2.6b, page 89). The costs involved in drawing water from this distance and

[52] KNP's many contributions to Tiruppur's development, including the First water supply scheme, earned him the sobriquet *Tiruppur Tantai* or Tiruppur's father (Chari, 2004).

transporting it to Tiruppur town were very high, and the engineering technicalities were complicated.

Figure 2.3 - The headworks of Tiruppur's First, Second, and now Fourth Water Supply Schemes on the river Bhavani outside Mettupalayam town. The Nilgiris mountains are visible in the background

Source: Author's photograph, January 2020.

What is notable is that institutional relationships and financing mechanisms for municipal water infrastructure planning did not change significantly during the early postcolonial period. The postcolonial government's Madras Public Health Engineering and Municipal Works Department,[53] which emerged from the provincial Sanitary Board, designed and executed the First Scheme. The municipality was entrusted with everyday operations and maintenance. The water supply scheme, which cost Rs. 11,300,000 (or nearly Rs. 85 billion or USD 1.16 billion in

[53] This department was subsequently reorganized to form the parastatal, the Tamil Nadu Water Supply and Drainage (TWAD) Board in 1969. TWAD had autonomous and statutory authority to plan, execute, maintain, and raise finance for water supply and drainage schemes for various rural and urban local governments across the state.

today's terms), was financed in part by the Government of Madras and the municipality (Census of India, 1961). Unlike the Kovilveli valley scheme that only supplied water to Tiruppur town, the First Scheme supplied water to Tiruppur Municipality and other towns and villages that the pipelines passed through. The village *panchayats* (rural local governments) were responsible for distributing water to residents within their jurisdictions, which was usually through public taps.

This First Scheme supplied water at the rate of 68 liters per capita per day (lpcd) to households in a few wards in the southern part of Tiruppur town.[54] The per capita supply was substantially higher than the Kovilveli scheme. Residents paid a user fee of Rs. 1 per kiloliter (or about Rs. 80 in today's terms) to obtain water through a private household connection. The first scheme also provided 24x7 (round-the-clock) water to numerous public taps in villages and towns outside Tiruppur town, including places like 15-Velamapalayam, Anupparpalayam, Periyar Colony, which are now within Tiruppur Municipal Corporation limits. Thousands of people across Tiruppur, who did not have household water connections or indoor plumbing, came to rely on these public taps for potable water. Fifty years later, several interviewees recalled bicycling over 5-10 kilometers each week to these public taps in the 1970s and 80s to fetch their weekly quota of free drinking and cooking water.[55]

Over the next few decades, Tiruppurians developed a liking for the distinct earthy taste of water from the First Scheme, developed as the River Bhavani dissolved soils and organic matter when wound its way through the Nilgiris mountains.[56] Their drinking water preferences came to

[54] As per interviews with watermen, these areas roughly correspond to parts of ward numbers 31, 32, 41, 42, 43, 44, and 45 in 2019, or the old urban core of southern Tiruppur (fieldnotes, 6 May 2019). It is unclear why these wards were chosen, but they formed the urban core of Tiruppur Municipality in the mid-1960s.
[55] Interview WD5705, 9 October 2019.
[56] Conversation with the pump room manager at the headworks, 3 January 2020.

shape water access at the household level. City engineers also leveraged this fact to develop new water schemes in the future (see Chapter 4).

The First Scheme was designed to meet a 30-year need and serve an ultimate population of 125,000 in the year 1991.[57] However, once again, demand had outstripped supply at the time of commissioning the scheme in 1965, suggesting that the approach to calculate water demand failed to consider local growth conditions in Tiruppur. Within four years of the Scheme's commissioning, Tiruppur town's population had crossed the scheme's intermediate (mid-term) population projection of 80,000 residents. Tiruppur's population continued its rapid growth due to economic restructuring, as I describe in the next section, and the First Scheme had to be augmented just as it commenced operations to cater to this additional population.[58] As the municipal water supply proved inadequate, residents continued to rely on wells and, later, on trucked borewell water to meet domestic water needs. The First Scheme continued to form a small but significant part of Tiruppur's waterscape till November 2019 as the originally installed 24x7 public water taps continued to provide drinking water to thousands of households across Tiruppur. In 2019, the Tiruppur Municipal Corporation finally decommissioned this scheme after upstream landslides and flooding damaged the water distribution pipelines.

[57] Urban water supply schemes in India, particularly in TN, are designed according to guidelines and standards developed by the Central Public Health and Environmental Engineering Organisation (CPHEEO), a technical water-sanitation engineering wing under the federal Ministry of Housing and Urban Affairs. According to the CPHEEO guidelines, the total water demand for the design period of a water supply scheme is calculated using various population projection methods. The geometric increase population projection method is used for Tiruppur's water supply schemes (Interview with a TWAD Board Engineer, 28 August 2019). Starting from the base year, which is usually the year when the scheme is commissioned, the population is projected for the intermediate (mid-phase) and ultimate (final) year of the scheme's design period using the chosen population projection method. In practice, the method is backward (rather than forward) looking and relies on Census data, ignoring seasonal or weekly migrants, floating population, and sudden increases due to industrial booms, as was the case in Tiruppur.

[58] Draft Detailed Project Report (DPR) for Water Supply Improvement Scheme to TCMC, December 2013.

2.2.2. Industrial restructuring, population growth, and the installation of the Second Water Supply Scheme

In the early 1960s, when the First Scheme was conceived, knitwear production in Tiruppur tended to be organized under one roof, with full-time shopfloor supervisors managing production across multiple processes. Workers were hired and paid according to a shift system that included employee benefits mandated by the Factories Act. However, during the 1960s, several union-organized factory strikes demanded regular work hours, greater pay, and higher benefits, disrupting production, and creating financial losses for factory owners. The Gounder capitalists from this period started smaller units with fewer than 20 employees or less than Rs. 75,00,000 in capital investment. Smaller units helped them avoid coming under the strict labor regulations of the Factories Act (Krishnaswami, 1989; Srinivas, 2000). Older, large firms, too, began to split up into smaller, networked units to avail of the policy benefits for the designation of small-scale industries.

From the 1970s onwards, industrial production became decentralized both spatially and temporally. Production was distributed through subcontracting and job-working arrangements among these smaller units that provided goods and services at various stages of the knitwear production process (Krishnaswami, 1989; Chari, 2004). These small-scale subcontractor units required smaller investments in machinery, lower working capital, and often smaller factory units. They were overwhelmingly owned by ex-employees, ex-supervisors, or kin members of the former factory bosses, who split off to form their units with the 'blessings' of their former owners. This shift spurred entrepreneurship among the landowning Gounder caste, and small workshops sprung up all over town in residential neighborhoods, on farmlands, or in commercial complexes, causing the entire town to resemble what observers have aptly called *one large,* *decentralized t-shirt producing factory* (Cawthorne, 1995; Chari, 2004). A simultaneous slowdown within the agriculture sector due to declining groundwater levels and the growing allocation of land and labor to non-agricultural uses in Coimbatore district's rural areas also helped draw agricultural labor into Tiruppur's expanding industry (Carswell, 2013).

Industrial reorganization into smaller units transformed labor relations. This process was not unique to Tiruppur; similar trends and the informalization of industrial production have been documented across Europe, East Asia, and Latin America during this period (Portes, Castells, & Benton, 1989). Across Tiruppur, Gounder industry owners tightened their grip over unions and labor organizing by introducing the 'piece rate' system of payment, where workers get paid by the piece and rates per piece vary by process (Chari, 2004).[59] Compared to regular shift-based wages that characterized the knitwear industry in the 1960s, piece rates enticed workers into working greater hours and accepting exploitative work conditions by dangling the carrots of flexible work hours and mobility across units. Piece rates allowed factory owners to save on labor supervision, production, or establishment maintenance costs while speeding up production (Krishnaswami, 1989).

By the mid-1980s, the Tiruppur cluster dominated India's national market for knitwear goods. The cluster consisted of an estimated 1500 small-scale industries that employed close to 40,000 workers who produced more than 60% of the hosiery products within the Indian market (Cawthorne, 1995: 44-45).[60] Industrial expansion caused more workers to migrate to and settle in Tiruppur. Workers no longer came from villages across Coimbatore district or Kongunad alone

[59] Owners argued that piece rates included benefits such as employees' state insurance (a social security and health insurance scheme) and provident fund (pension scheme). However, in practice, they lowered the minimum wage (Chari, 2004).

[60] These figures represented a 650% increase in the number of units and a 1200% increase in the number of workers since 1961 (Cawthorne, 1995: 44).

but from the drought-stricken districts of southern TN, located hundreds of kilometers away. As these workers preferred to live in proximity to their workplaces to save travel costs and maximize working hours and wages by working on more pieces, the spatially dispersed small-scale units generated the need for affordable worker housing in their vicinity.[61] Most neighborhoods in Tiruppur (including if only to a lesser extent the upper-class layouts that I noted earlier) contain a generous sprinkling of *compounds* or single-family plots that have been subdivided into several 100-160 square feet rooms rented out to unmarried workers and working-class families who wish to live close to their work locations. These tenants often share a single water connection and/ or a toilet (see Figure 2.4).

Figure 2.4 - A rental housing compound in a layout in Tiruppur built in the mid-1990s

Source: Author's photograph, September 2019.

[61] According to a survey that my team conducted for the water and waste calendar survey (n=108), 60% of the workers employed in the garment industry lived within 1 to 5-km distance from their workplace.

During the 1970s and 80s, developing rental housing for workers became a form of investment for many landowning Gounders. Rental income and property investments were ways of building wealth that could later be invested in the growing knitwear industry (De Neve, 2015). Gounders also used landlord-tenant relations as an additional means to retain socio-cultural power over entrepreneurs and workers from other castes in a fast-transforming socio-spatial milieu. De Neve (2015) observes that the Gounder caste amassed property to such an extent that it dispossessed future generations of migrant working classes from putting down roots in the city; they could barely afford to buy a single room, let alone a plot of land in Tiruppur. This trajectory of property development had material consequences for water access since access to municipal water connections was bundled with property ownership and tenancy arrangements. Thus, elites within the Gounder caste influenced both the macro-politics of planning and water infrastructure development and the micropolitics of everyday water access, as will be discussed in subsequent chapters.

In 1974, the State prepared the first Master Plan to control land use development in Tiruppur and the surrounding villages. Tiruppur's Local Planning Authority (LPA), which was established as a separate organization in 1974, was chaired by the municipal chairman. However, the LPA had little regulatory authority in a city where large tracts of privately-owned agricultural lands were parceled out and developed incrementally over an extended period by dominant-caste landowners with thick personal networks and political connections to the local state.

2.2.2.1. Tiruppur's Second Water Supply Scheme

As noted in the previous section, increasing population and the neglect of migrant workers in calculations for water demand rendered the First Scheme inadequate by the 1960s, about 25 years before the end of its 30-year lifetime. Since municipal water supply trailed demand, city politicians aimed to improve water availability through the 1970s and 80s. As part of their labor organizing efforts, city-based politicians from the Communist Party of India (Marxist) (hereafter CPI(M)) and its affiliated unions installed community-managed public borewells in many neighborhoods to supplement the shortfall in municipal water supply among working-class households who often relied on shared water connections (Kuppusamy, 2005). They opposed caste-based discrimination at public wells. Simultaneously, some elected officials tried to augment the municipal piped water network.

In 1983, Tiruppur's Member of Legislative Assembly (MLA) (or State Assemblyman equivalent) from the ADMK party used his party connections to the then Chief Minister of TN, M.G. Ramachandran, to get the Second Water Supply Scheme (hereafter Second Scheme) sanctioned for Tiruppur Municipality. The Municipality Chairman at this time, N Kandasamy (a Gounder businessman), worked with this MLA to pursue the installation of the Second Scheme. Like the First Scheme, the Second Scheme was also designed to source water from the River Bhavani outside Mettupalayam town (see Figure 2.6c, pp. 88). The Second Scheme, much like other urban municipal water schemes across the country, was financed through a combination of municipal budgetary sources (including an increase in water taxes), State government grants, and a loan from a public sector investment corporation, the Life Insurance Corporation of India. One of the hurdles that stood in the way of implementing this scheme was the unavailability of funds to purchase nearly 3 acres of land at Mettupalayam to set up the reservoir and pumping station for the scheme.[62] Chairman Kandasamy donated personal funds to purchase this land, as did

[62] Government projects compensate landowners according to State-issued guideline values to acquire land for public projects through eminent domain. Guideline values tend to be depressed compared to market rates as sellers and buyers tend to report lower transaction amounts to save on State taxes related to land sales. When landowners refuse or contest these guideline-based compensation amounts in courts, it delays a public project indefinitely.

thirty other Tiruppur-based businessmen, two-thirds of whom were from the knitwear industry (Kuppusamy, 2005).[63]

With the growth of the knitwear industry in the 1960s and 70s, politics and business got increasingly knitted together in Tiruppur. Some prominent Gounder businessmen like Chairman Kandasamy, who was the Secretary of the South Indian Hosiery Manufacturers Association (SIHMA)[64] (one of two major industry associations in Tiruppur with the Tiruppur Exporters Association) and the founder-president of the Dyers Association of Tiruppur (DAT), served on the Municipal Council.[65] Others like Mohan Kandasamy, another Gounder businessman, and long-term President of SIHMA, got elected to the TN State Assembly. Leadership in these industry associations helped Chairman Kandasamy raise industry donations for broader 'public welfare' whenever the need arose. One example is the land purchase at Mettupalayam for the Second Scheme.[66] Thus, in addition to traditional government sources of financing, private, charitable donations were also critical in funding Tiruppur's municipal water schemes during the late 1980s. In addition to leading industry associations, Gounders also started holding leadership positions in many local elite and secular civil society organizations such as the Lions and Rotary

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Many government agencies now prefer to acquire the land at market rates, but not all have the authority or means to do so. Hence, Tiruppur Municipality was unable to purchase land for the water reservoir at Mettupalayam.

63 The caste of these contributors is unknown. However, since Gounders dominated the industry at this time, we can assume that many of the contributors were from the Gounder caste.

64 In 1956, the knitwear company owners formed an industrial lobby called the South Indian Hosiery Manufacturers Association (SIHMA) to collectively represent their concerns to the various State and national government departments regulating textile production and trade. They also helped their members secure subsidies, tax waivers, and loans and import expensive machinery or technical know-how. More importantly, they helped industry owners resolve labor disputes and collectively bargain with worker unions. See South India Hosiery Manufacturers Association (SIHMA) (2015). *Diamond Jubilee Issue*. Mimeo obtained from SIHMA Office, Tiruppur in 2019.

65 He was also the Municipal Chairman for multiple terms, first between 1971-1976 and later from 1985-1990.

66 The first generation of industry leaders in Tiruppur had initiated a culture of civic engagement through charity among the industry's capitalists. For example, a Muslim man named S.A. Khadar, who was the founder president of SIHMA in 1956, often made public displays of charitable contributions and encouraged other industrialists to do so. He recognized that an embedded industrial cluster needed political support and public legitimacy to thrive (Chari, 2004: 190). Subsequent generations of capitalists continued to uphold this philosophy.

Clubs. They, thus, emerged as the new "upstart elite" to the exclusion of other caste-communities in the city (Chari, 2004: 229). These political offices and leadership positions in associational networks helped them act collectively for business growth and cluster development. Occasionally, these very associational networks also came together in planning and urban spatial development, as in the case of land purchase for the Second Scheme's headworks, and later, for conceiving plans for Tiruppur's industrial-economic futures.

The Second Scheme drew 44 MLD water from the River Bhavani and supplied it to Tiruppur Municipality, three town *panchayats*, and 38 village *panchayats* en route. This water demand was calculated at 110 liters per capita per day (lpcd) for Tiruppur Municipality, 70 lpcd and 40 lpcd for the three town *panchayats* and the 38 village *panchayats*.[67] These different norms for water demand calculations per capita per day by settlement type are built into the Central Public Health and Environmental Engineering Organization (CPHEEO) guidelines (CPHEEO, 1999). These guidelines assume that water consumption in urban areas with underground sewerage systems and household water connections is higher than in villages or small towns where water is supplied through public taps and sewerage systems fed by flush toilets are non-existent. On the ground, engineers recognize that domestic water consumption is not noticeably different across villages, small towns, or cities since rural households, too, increasingly own similar water-consuming appliances as their urban counterparts (fieldnotes, 28 November 2019). However, engineering practice and municipal water scheme implementation continues to be shaped by these guidelines, which dictate the infrastructure designs of all publicly funded water supply schemes. Consequently, inequalities between towns and villages

[67] Data obtained from Draft Detailed Project Report (DPR) for Water Supply Improvement Scheme to TCMC, December 2013.

get built into the waterscapes of these places and come to shape local routines for water provisioning and access.[68]

The Tamil Nadu Water Supply and Drainage Board (TWAD Board) designed and built the Second Scheme. It was commissioned in July 1993. Tiruppur Municipality initially maintained it, but after 1996, it has been maintained by the TWAD Board.[69] A majority of Tiruppur's present municipal piped waterscape is a legacy of the Second Scheme. This Scheme extended private water connections to many more households across Tiruppur and the adjoining Municipality of '15-Velampalayam' that was eventually merged with Tiruppur Municipality in 2011. In the mid-1990s, Tiruppur Municipality hiked water tariffs to a flat rate of Rs. 25 per month (or about Rs. 125 or USD 1.6 in today's terms) for residential connections. Although the Second Scheme commenced shortly after India's move to neoliberalization in 1991, policy imperatives aimed at 'cost recovery' were yet to inform municipal water provisioning practices. Much like its predecessor First Scheme, the Second Scheme was also inadequate in addressing Tiruppur's water demand in two ways. First, the water demand calculations did not account for the presence of seasonal or long-term migrants in the city. With the knitwear industry's turn towards export-oriented production in the 1980s, thousands of migrant workers came to live in Tiruppur. However, neither their presence nor water needs informed the design of municipal water supply schemes. These workers were neglected in the design of water infrastructures meant to serve Tiruppurians for at least the next thirty years. Considering that the First Scheme grossly miscalculated population growth trends, the Second Scheme's planners should have been

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[68] Standardized planning knowledge is formulated to be applied to multiple instances, and routine decisions can be made. Planning is effective when planners interpret standardized knowledge in specific situations (Beauregard, 2015). However, if guidelines and standards do not encourage such discretion to emerge or be exercised, they are likely to be ineffective in meeting local planning needs.

[69] Details were obtained from the Executive Engineer, Siruvani Division, TWAD Board, Coimbatore, in November 2019.

more careful in their population counts and projections of future water demand, even as political-economic changes in Tiruppur introduced much unpredictability. In short, contextual conditions did not inform top-down technocratic approaches to municipal water scheme design.

The TWAD Board engineers, who calculate water demand and design water infrastructures, use data from India's decadal census counts from the previous decades to make future population projections. Older census data did not reflect Tiruppur's unusual growth pattern. Neither did these data count internal seasonal migrant populations in destination cities. Whereas actual numbers on migrant worker populations from this period are hard to come by, this oversight resulted in the neglect of thousands of migrant workers in Tiruppur's water demand calculations. Previous scholarship on water provisioning in South Asian cities has also noted the undercounting of residents of informal settlements in water demand calculations (e.g., Anand, 2017). Thus, Tiruppur's true water demand was a gross underestimate, by at least 20-25%, if not more.[70] Consequently, the quantity of piped water that reaches each person is much lower than the prescribed norm of 110 lpcd. Piped water inadequacy has come to structure households' water access practices. Households continue to rely on a mixture of infrastructural systems that include borewells, wells, and trucked water to meet their domestic water needs. Thus, municipal water schemes did not alleviate households' reliance on alternative sources. Infrastructure planning practices actively reproduced this hybrid waterscape and the inequalities embedded in it, as discussed in greater detail in Chapter 5.

Second, industrial restructuring and urban population growth in the middle decades of the twentieth century introduced some changes in water infrastructure planning in Tiruppur.

[70] In 2020, when migrants were first enumerated during the COVID-19 crisis (albeit unsystematically), some sources estimate that there were about 240,000 out-of-state, seasonal migrant workers in Tiruppur (Press Trust of India, 2021). In contrast, others estimate the number to be nearly 600,000 or a little over half the population (Meenakshi, 2020).

However, it did not change the prevailing approach to municipal water supply planning at the State level for small cities like Tiruppur. Despite its phenomenal growth, Tiruppur continued to be a small city that remained peripheral to urban policymaking at the national or State levels; urban policies did not strengthen administrative or planning capacities in smaller municipalities like Tiruppur. These municipalities maintained and operated infrastructures built by State-level agencies rather than undertake infrastructure planning tasks, including surveying local water needs and use patterns. The State of TN, acting through the TWAD Board, developed large water schemes in Tiruppur and extended pipes across Tiruppur, but not at a pace that kept up with demand. These schemes were developed by distant technical experts using standard calculations and norms that had little relation to water needs or access practices on the ground. More importantly, the idea behind these schemes was based on water delivery and consumption practices in European cities. As municipal water supply trailed demand, the municipal administration and local political state invested in public borewells to prevent an urban water crisis. The materiality of the waterscape changed with the introduction of different municipal drinking water schemes and public borewells that served different constituents across Tiruppur. Differences in provisioning and access, both across settlement types and within small cities, also got inscribed into the waterscape.

Economic changes empowered local caste elites and helped them extend their socio-cultural and economic hegemony to the spheres of urban governance and water infrastructure planning. These elites jumped scales by tapping into their political networks to hasten State-level approvals for large water supply schemes. They also leveraged their socio-economic networks to raise funds for developing these infrastructures. In this way, they started to compensate for the shortcomings of a small-sized and second-class municipal administration. These nascent associations formed in and through planning would later re-activate in subsequent neoliberal efforts to rewrite Tiruppur's futures.

2.3. From *banian* city to India's knitwear exporting capital in neoliberal India, 1981-present

Tiruppur's knitwear economy turned to the international export market in the mid-1980s when an Italian exporter, Antonio Verona, who held nearly 80% of the export quota for the Italian market, started sourcing garments directly from Tiruppur.[71] Until then, Tiruppur-based manufacturers would process orders for export houses in the large cities of Delhi, Bombay, and Calcutta that held substantial shares of country-specific export quotas (Chari, 2004).[72] Several foreign buyers followed Verona to Tiruppur. The demand for exports led to the formation of an *export-oriented growth machine* in Tiruppur.[73]

A distinct class of direct exporters emerged from within the old guard of Gounder industry owners. The majority of these exporters were Gounders and next-generation relatives of the old guard. They undercut North Indian manufacturers in Delhi, Bombay, and Calcutta to secure a larger share of India's export production, producing orders at substantially lower prices by squeezing labor and extracting greater production at relatively lower wages. What was taking

[71] The global Multi Fibre Arrangement governed global textile trade between 1974-1994. It used quotas to restrict the amount of textiles that developing countries could export to developed countries to curb the dominance of developing countries in South and Southeast Asia in global textile trade.

[72] Also, see Tiruppur Exporters Association (TEA). (2014). *Silver Jubilee Bulletin (1990-2014)*. Mimeo obtained from TEA in July 2018.

[73] My coinage of this term is inspired by Harvey Molotch's (1993) seminal concept of the growth machine. By *export-oriented growth machine*, I refer to the informal coalition of actors and interest groups with vested stakes in the growth of exports in Tiruppur. These include knitwear industry owners, regional politicians, unions, property owners who build rental housing for workers, and local businesses who provide essential services for the industry's workers. Much like the actors driving American growth machines, actors in Tiruppur, too, use the political, cultural, and planning apparatuses available to them to intensify export production and make money. They pursue growth at all costs by ignoring the material limits of the physical environment.

place in Tiruppur was one local manifestation of a global process, where manufacturing was being increasingly globalized and displaced to countries and regions with low labor and production costs (Portes et al., 1989), thereby transforming gender, labor, and household relations in places like Tiruppur (Benería & Feldman, 1992). Export production remains cheap in Tiruppur because the manufacturing process is largely informal. Exporters subcontract various parts of the production process to small-scale, unregulated sweatshops that hire women, migrant, and child labor to keep costs low and pay workers by the piece rather than a salary or wage with full-employee benefits.

Export production transformed labor relations in Tiruppur. Female labor was recruited in larger numbers, and many production tasks became feminized, i.e., coded as unskilled and low-wage tasks that women would predominantly perform. These included low-wage jobs unique to export production like trimming, garment checking, finishing, and packing garments to export standards. Many of these tasks could be done at home or in small workshops in one's neighborhood while attending to domestic chores and childcare responsibilities (Krishnaswami, 1989; Neetha, 2002; Chari, 2004). These changes in labor composition and production led to the proliferation of small, informal, women-owned businesses in working-class neighborhoods. Old and young women hunched over bundles of garments, complete with a child in tow and a baby rocking in a makeshift cradle, are common sights across many areas of Tiruppur (see figure 2.5). As observed in other developing country production sites like Tiruppur (Benería & Feldman, 1992), the feminization of labor and the increasing informalization of work transformed labor mobilizing strategies. Intra-household relations also got reconfigured as wages from women's informal work constituted a substantial share of household incomes. However, women continued to bear the unequal burden of family maintenance responsibilities (Feldman, 1992). In Tiruppur, older union strategies that focused on shopfloor politics and a male workforce could not speak to women's differential experiences of the "workplace" (where home and work intertwined), work, or welfare needs.

Figure 2.5 - A neighborhood checking center

Source: Author's photograph, May 2019.

After the mid-2000s, migrant workers from India's northeastern and eastern states (i.e., Odisha, West Bengal, Bihar, Uttar Pradesh, Assam, Meghalaya, Nagaland, Tripura)—both male and female—began to be hired in large numbers. These migrant workers were willing to work at much lower wages and for longer hours. Sometimes, they took over work relegated to women workers in earlier periods and filled new jobs created by the growth in export production. A common response to a question on what these migrants did in their free time was, "We have come to *pardes* (translated to 'abroad' in Hindi) to earn. Why will we do anything else?"[74] Workers noted that wages in Tiruppur were at least 1.5 times that of what they could make back home (where additionally there were no industries), which is why they had moved to a faraway place that was not particularly hospitable towards them. None of the three-dozen out-of-state migrant workers I spoke to intended to settle in Tiruppur in the long run; they also returned home during the lean periods of export production in the months of July-September.[75]

From the capitalists' perspectives, migrant workers were easier to control as they lacked local social networks, had no ties to the local state since they had no local voting rights, or access to State-welfare like food rations distributed through the public distribution system (PDS),[76] and were for the most part, not unionized. Like part-time female workers, they acquiesced to seemingly flexible but highly exploitative work conditions. The presence of an extensive and heterogeneous migrant labor force weakened workplace organizing. The piece-rate system of compensation, which allowed mobility across production units, also weakened unions' workplace-based organizing strategies and bargaining power in the city (Vijayabaskar, 2011). Tiruppur's population was diversifying, but these new residents were neither enfranchised nor organized enough to impact urban politics and planning. Thus, the structural power of local landowning castes remained undiluted.

[74] Interview TIRRE21, 17 December 2019.

[75] Export-production is linked to global fashion cycles. As leading fashion houses avoid maintaining large inventories, they have reduced the lead time for Tiruppur exporters, intensifying production during some periods of the year. At other times, not all workers can manage to find work, so they return home and pursue agriculture or other occupations (Vijayabaskar, 2011).

[76] In India, one can only access PDS in the jurisdiction corresponding to the address listed on one's ration card. Out-of-state migrant workers usually do not transfer their documents or addresses to TN as they do not intend to settle here. Additionally, their families rely on PDS in their home states. Migrant workers' exclusion from state welfare is ironic since TN has one of the best state-wide social security nets targeted at poor households (Vijayabaskar, 2011). However, this does not imply that migrant workers are not reliant on these "welfare" goods. Many locals sell low-quality PDS food grains and cooking oil to their migrant neighbors or tenants for a small premium.

Export-oriented production increased the number of knitwear companies in Tiruppur. From about 2000 firms in the mid-1980s, the number of firms doubled to 4150 in 1995 and climbed to about 6250 in 2010. The monetary value of exports from the Tiruppur cluster increased from Rs. 9-crore in the 1980s (or about Rs. 31-crore in 1995 terms) to approximately Rs. 1600-crore in 1995, and it continued to grow steadily thereafter.[77] In 2017, the value of knitwear exports from the Tiruppur cluster amounted to about Rs. 25,000-crore (USD 3.73 billion), which was about 45% of the total knitwear exported from India.[78] By the early 2000s, Tiruppur had become an important node in the circuits of global textile trade. As the Tiruppur cluster generated export revenues for the Governments of both India and Tamil Nadu, industry actors could bypass the limitations of Tiruppur's secondary political-administrative status and get ahead of the line in getting large infrastructure projects sanctioned for Tiruppur.

Tiruppur town's morphology also changed with the growth in export production. Subcontractor units multiplied in the core areas of town. Very large export houses that integrated all processes under one roof started to grow in the newly developed industrial estate at Mudalipalayam village (located about 10-kilometers outside Tiruppur town) or in peri-urban villages where affordable land was still available. Dyeing and bleaching industries developed along the rivers Noyyal and Nallar and their feeder streams within the urban area. Tiruppur's population continued to grow steadily at about 4% per annum between 1981 and 2001. However, the peri-urban villages and small towns that abutted Tiruppur (and merged with Tiruppur Municipality in 2011) grew faster, ranging from 8.25% to 24.54% per annum during the same

[77] 1 crore = 1,00,00,000

[78] India is among the top five textile exporting nations in the world. Knitwear accounts for roughly 40% of India's total garment exports. Export figures are from TEA (n.d.). *Vision 2020*. Mimeo obtained from TEA in July 2018.

period. The 2001 decadal Indian Census recorded the Tiruppur Urban Agglomeration[79] as among the fastest-growing urban areas in Tamil Nadu, and Tiruppur as the seventh-largest city in the State (Census of India, 2011; see Figure 2.1d, page 51).

Increasing volumes of garment production for exports generated a high industrial demand for water. It takes between 25 to 40 gallons of water to process the fabric required to produce a single t-shirt (Phipps, 2019). The over-drawing of water for growing industrial needs and domestic uses (to compensate for an inadequate municipal supply) caused groundwater levels to fall, resulting in an acute water shortage in Tiruppur.[80] The hardness of the available groundwater, measured in terms of its salt content, also increased to 1400 PPM (far above the recommended 350 PPM for textile dyeing). Groundwater was increasingly polluted due to the unregulated discharge of industrial wastewater into local streams, drains, and injection wells (Srinivas, 2000). Since the textile exports contributed significantly to employment in the region, the State Pollution Control Board overlooked its negative impacts on the environment (Blomqvist, 1996). The available groundwater thus became unfit for industrial or domestic consumption (Gronwall and Jonsson, 2017).

Tiruppur's exporters started to import water from villages located about 30 to 50-km away to meet growing industrial water demand. Nearly 500 water trucks made about 12 trips each day to meet close to 65% of Tiruppur's industrial water demand (75 MLD) during the early

[79] The concept of an urban agglomeration was first introduced in the Indian Census in 1971. Urban Agglomeration (UA) includes the urban core and suburban growth outside the statutory limits of a town or city. UAs do not have any statutory authority from a governance perspective. In 1971, the Tiruppur UA included Tiruppur town and the village *panchayats* of 15-Velampalayam, Chettipalayam, Veerapandi (which were eventually merged with Tiruppur Municipality) and the village *panchayats* of Thirumuruganpoondi and Avinashi that were not merged with Tiruppur Municipality. The merger of Tiruppur town and the neighboring village *panchayats* to form TCMC is addressed in Chapter 3.

[80] Between 1982 and 1993, groundwater levels fell by 8.85m on average across Tiruppur block. See IL&FS. (1998). *The Tiruppur Area Development Programme: Volume V - Environmental and Social Assessment Report* (pp. iv).

1990s. The remaining demand was met through recourse to private borewells within or outside town.[81] On average, knitwear manufacturers spent Rs. 22 per kiloliter on water in 1992-93, which increased to about Rs. 41 per kiloliter in the mid-2000s, with each dyeing unit consuming about 0.1 MLD water on average (Nelliyat, 2007). Further, the quality of water supplied by tankers varied widely, which affected the quality of the dyeing and bleaching process and textile outputs. Increasing groundwater abstraction led to conflicts between farmers and groundwater sellers in the hinterland villages (Jankarajan, 1999).

Tiruppur's exporters soon realized that water imports were fast becoming financially and technically unsustainable. They could not ensure consistent, high-quality, just-in-time production that their foreign buyers expected.[82] The dispossession of rural agriculturalists through groundwater imports and downstream river pollution also posed the threat of lawsuits and conflicts that the exporters were keen to avoid even as they tried to comply with global production standards. Tiruppur's exporters were also well aware that the municipality lacked the financial or water resources to cater to industrial water demand. So, in the early 1990s, these exporters organized through their business and political networks to plan Tiruppur's future growth and build a new industrial-cum-domestic water supply scheme for Tiruppur.

2.3.1. Tiruppur Exporters Association at the helm of the export-oriented growth machine

By 1990, Tiruppur exporters had organized themselves into a business lobby formalized as an association called the Tiruppur Exporters Association (hereafter TEA). The membership of TEA emerged from within SIHMA, the original association for organizing knitwear producers in

[81] IL&FS. (1994). *The Tiruppur Area Development Programme.*
[82] Interview with Dr. Sakthivel, ex-President of the Tiruppur Exporters Association, 11 July 2019.

Tiruppur.[83] TEA's takeover of the industry's governance was uncontested as the leadership of TEA rose from within the familial and fraternal networks of the older generation of Gounder worker-capitalists from SIHMA (Chari, 2004). The first president of TEA, Dr. Sakthivel, is the nephew of SIHMA's longtime president of nearly 40 years, Mohan Kandasamy.

Upon its emergence onto Tiruppur's industrial scene, TEA started to intervene in the public sphere actively. It was able to mobilize latent informal business networks put in place by SIHMA and build on SIHMA leaders' political connections in Chennai and New Delhi. Framed portraits of Dr. Sakthivel with several political dignitaries, including one where he received the fourth-highest Indian civilian honor called the Padma Shri from the President of India, adorn the hallways of TEA's offices in Tiruppur. Under Dr. Sakthivel, TEA negotiated with various state agencies to create infrastructure and conditions conducive for global orientation and export production. TEA's track record of developing large infrastructure projects in Tiruppur and lobbying with higher tiers of the State to wrest concessions for the knitwear industry helped it become the knitwear industry's voice in policy and planning circles. In 2019, 40% of the 34 industry associations[84] I surveyed and interviewed noted that TEA made cluster-level infrastructural demands and negotiated with state agencies in city and regional planning processes. These associations usually deferred to TEA's leadership and guidance on these

[83] By the time of my fieldwork, the criteria for formal membership in TEA had changed. In 2019, to become a TEA member, an exporter had to have exported at least Rs. 50,00,000 (approx. USD 70,000) worth of knitwear in the three preceding years and pay an annual membership fee of Rs.10,000 in addition to an initial fee of Rs. 50,000 (Interview with TEA's Executive Secretary, 2 July 2019). These high entry barriers made membership in TEA highly exclusive and restricted to some of Tiruppur's biggest industrialists. Those who operated on a smaller scale eventually organized themselves into other associations like the Tiruppur Exporters and Manufacturers Association (TEAMA) or the Power Table Operators Association (PTOA).

[84] These industry associations represent producers and firms engaged in different processes within knitwear production. Multiple industry associations may represent the same type of production process, but they might cater to firms of different sizes with varying capital investments, annual turnovers, and production. Nearly all of these associations are not-for-profit, membership-based clubs. In theory, they are politically non-aligned, but their leadership may maintain close ties to certain political leaders for socio-cultural and/ or business reasons.

matters and showed up at planning meetings to support TEA.[85] However, as I discuss in the following chapters, not all of TEA's public interventions benefited small capitalists and labor, nor did they stimulate physical improvements evenly across Tiruppur.

In 1990, soon after TEA's establishment, Dr. Sakthivel foresaw the boost that a continuous, assured water supply could provide Tiruppur's nascent export industry. He approached one of his bureaucrat connections, an Indian Administrative Service (IAS) officer and then secretary for the State department of textiles, to consider developing an exclusive industrial water supply scheme for Tiruppur. The success of another partnership project—an industrial estate in Mudalipalayam village located 10-km outside Tiruppur town that was nearing fruition—prompted the State to consider TEA's proposal seriously.[86] Further, TEA demonstrated the need for a reliable supply of 75-100 MLD of good quality water for the industrial units in Tiruppur (Delhi & Mahalingam, 2012). In addition to lobbying for a dedicated industrial water supply scheme, TEA also approached the Director of Town & Country Planning in the state capital in Chennai to designate a revised Tiruppur Local Planning Area (LPA) or the broader region that had been impacted by industrialization in Tiruppur and prepare a comprehensive plan that addressed its projected demographic growth and infrastructural needs.[87]

With the simultaneous processes of national economic liberalization amidst decentralization of economic development to the provincial scale in the early 1990s, State governments started to prioritize planning in high-employment and revenue-generating regions.

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[85] About a fifth of these associations submitted independent petitions to State agencies. A third did not find it necessary to engage in any city or regional planning or policymaking processes; they only lobbied for policy changes that directly affected their production processes. Leaders of five associations had formed NGOs to lead planning initiatives, including bridge construction, river, and pond restoration (2019 Subramanyam Tiruppur Business Association Survey).

[86] Interview with a senior State-level bureaucrat, who is the Managing Director of NTADCL in Chennai, 30 July 2018.

[87] Tiruppur Exporters Association (TEA). (1992). *2nd Annual Report 1991-92*. Mimeo obtained from TEA in July 2018.

In TN, the Chennai capital region was prioritized through policies focused on developing special economic zones and industrial parks, which led to urbanization through agrarian dispossession in peri-urban villages (Subramanyam and Kudva, 2020). The Coimbatore-Tiruppur region ranked second as a generator of foreign revenues for the Indian economy and its economic contributions to the State economy. However, Tiruppur exporters had to actively advocate for State-level interventions in the city.

TEA's incessant lobbying at the State and national levels (irrespective of the political parties in power), as well as the success of an earlier partnership, led the GoTN to constitute a high-level committee in 1992 chaired by the State's Chief Secretary (the State's highest-ranking bureaucrat) to address Tiruppur's water supply and broader infrastructural needs. This committee entrusted an industrial development parastatal called the Tamil Nadu Corporation for Industrial Infrastructure Development Ltd (TACID) to develop an integrated area development plan for the Tiruppur LPA in 1992.[88] This plan was known as the Tiruppur Area Development Programme (TADP).

In 1992-93, the newly demarcated Tiruppur LPA consisted of the Tiruppur Urban Agglomeration and 16 adjacent villages. The TADP was one of the first comprehensive plans for Tiruppur and displayed foresight in taking a regional approach to infrastructural needs.[89] Instead of 'projectizing' infrastructure development, the TADP approached Tiruppur's infrastructure needs in an integrated and interdependent manner. The plan examined many aspects of Tirupur's infrastructural needs, including roads, telecommunications, electricity, effluent treatment, water

[88] TACID's primary objective was to set up industrial parks/complexes with integrated infrastructure facilities in areas with industrial growth potential across the State. TACID was also tasked with identifying and addressing infrastructural deficiencies in existing industrial areas. It could also undertake infrastructure projects to promote exports and imports (Delhi & Mahalingam, 2012). In 2003, TACID was merged with another industrial parastatal, the State Industries Promotion Corporation of Tamil Nadu Ltd (SIPCOT).

[89] Until the implementation of the TADP, the only big-ticket State-level interventions in urban infrastructure were in the form of the two municipal water supply schemes and grants for building a city bus station.

supply, women's working hostels, research and development centers, and logistics management systems. It proposed commercially financed projects to address identified infrastructural gaps.[90] Chapter 3 delves into the details of the TADP and the now-notorious industrial water scheme (Third Scheme) that resulted from it (See Figure 2.6d, page 89). The chapter will also discuss the plans that flowed out of or followed the TADP in Tiruppur after the 1990s.

We, thus, find that Tiruppur's urban-industrial expansion and increasing global reach through exports positioned it favorably to avail the benefits of liberalization-era economic and infrastructural development policies being developed at the state and national levels. Global reach helped Tiruppur's business fraternity jump scale and overcome the hurdles posed by small size (one of which was the lack of a local planning department or development authority) and secondary position, which would have resulted in being passed over in development policies or funding programs. As I elaborate in Chapter 3, the simultaneous coalescence of the Gounder community into a formidable and wealthy electoral bloc in Tiruppur and Kongunad also played a part in directing the State's attention towards Tiruppur.

2.4. Conclusion

This chapter traced the co-evolution of urbanization, industrial growth, urban governance, and water infrastructure planning at critical junctures in Tiruppur's 100-odd-year history as a cotton entrepot and knitwear-producing center. Figure 2.6 shows municipal boundaries, municipal water supply schemes, and water sources at these junctures. Industrial-economic restructuring and rapid population growth introduced many unanticipated transformations in Tiruppur after the mid-twentieth century. The pursuit of water-intensive industrial-economic growth in a context of

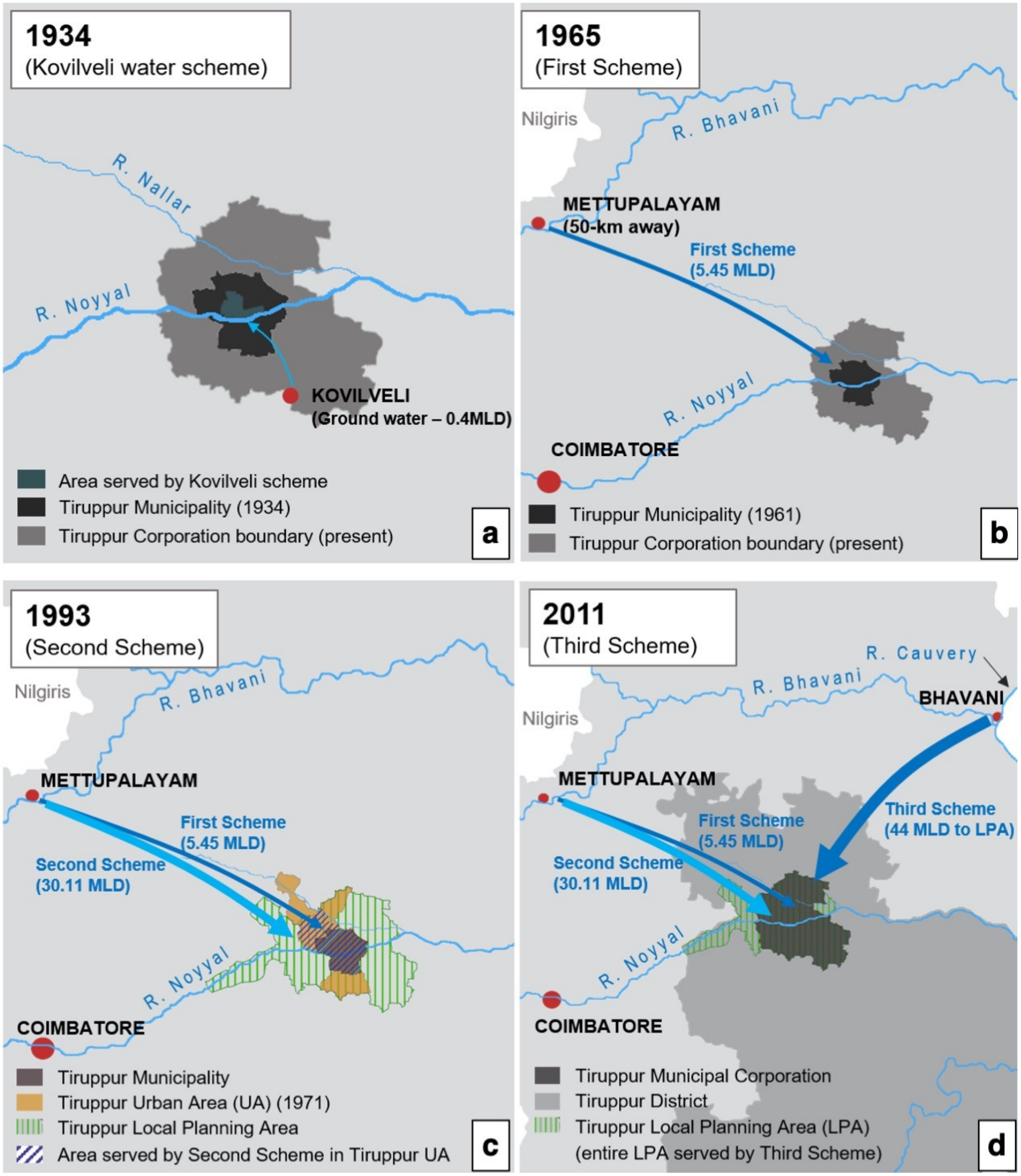
[90] IL&FS. (1994). *The Tiruppur Area Development Programme.*

water scarcity and a lack of municipal administrative capacity, which was a function of Tiruppur's small scale, came to condition Tiruppur's governance and water infrastructure planning during the major phases of the city's growth in the British colonial period, and later, after India's independence in 1947 until the implementation of economic liberalization in the 1990s.

Colonial-era policies for municipal water infrastructures instituted water supply norms that differentiated cities based on size and political-economic importance. They also disbursed noticeably lower levels of financial and technical support to smaller places to develop municipal water infrastructures relative to bigger cities. This support was incremental, fitful, and materialized years (and sometimes decades) after water needs were identified, rendering plans and their outcomes obsolete even before infrastructure installation. As a result, water inadequacy and inequalities in access were etched into the urban waterscapes of places like Tiruppur.

There were inequalities in water provisioning and access between Tiruppur and its surrounding villages too. This was because a different set of norms, legislation and state structures governed water infrastructure planning and provisioning in the villages surrounding Tiruppur town. Unfortunately, the postcolonial government made no significant interventions to transform the rural-urban settlement classification system, redraw city-regional territories, modify structures and legislations for municipal administration and governance, or revise the norms and logics for water infrastructure planning. Instead, the postcolonial State continued similar incremental approaches to planning municipal water supply schemes as its colonial predecessor. For these reasons, colonial-era inscriptions of smallness and rural-urban differences became deeply embedded in Tiruppur's governance structures and waterscapes.

Figure 2.6 - The concomitant development of water infrastructure and municipal territory in Tiruppur, 1931-2011



In the post-colonial period, one of the main departures from colonial-era water infrastructure planning was the turn to distant but abundant riverine sources for water. Whereas drawing water from distant watersheds was common for bigger cities like Madras in the colonial period, this approach was not widely adopted in smaller places like Tiruppur until the post-colonial period. The other change was a regional approach towards water infrastructure planning: water schemes catered to both cities and their surrounding villages, even if in an unequal manner. Although small cities like Tiruppur received less water than bigger cities, they nonetheless received more water per capita than villages. Water schemes were still designed by State-level departments and agencies, with municipalities assuming responsibility for everyday operations and maintenance and distributing water within their jurisdictions.

Political-administrative hierarchies continued to determine which cities and towns would be prioritized in urban policies. However, with the advent of electoral democracy and resulting shifts in party politics in the post-colonial period, city-level politicians began to leverage their social or political party connections to State-level leaders to mobilize support for urban infrastructure projects. Since the State made little to no effort to redistribute political power or property ownership to other castes and classes in small towns like Tiruppur, political-economic power at the city level continued to be concentrated in the hands of property-owning Gounders. Tiruppur's trajectory of industrialization that relied on old agrarian capital further empowered this caste group.

After the 1970s, Gounder caste elites increasingly dominated the political, economic, and civic spheres. City-based knitwear industry owners were proactive in shaping urban plans and projects by serving on the municipal council or making charitable contributions for municipal water infrastructure development. Such initiatives helped cement their power in urban governance. Despite these private innovations, municipal water supply trailed behind actual water demand because of planning norms and inaccurate definitions and delimitations of urban populations in the calculations for water demand. Much like their colonial predecessors, post-colonial design standards for computing water demand distinguished between cities based on their administrative classification and infrastructural attributes, such as the availability of sewerage systems.

The non-inclusion of migrant workers and residents of informal settlements in water demand calculations contributed to widening the gap between supply and demand. As this inadequate municipal water supply infrastructure was inserted into a waterscape with pre-existing relations of access formed around groundwater sources like open or borewells, water access in Tiruppur became further characterized by its hybridity or the simultaneous reliance on multiple water sources.[91]

Despite rapid population and industrial growth in the middle decades of the twentieth century (1960-1990), Tiruppur's small town status in the municipal administrative hierarchy continued to affect municipal administration and the processes for water infrastructure planning. Some features of small town governance that persisted include the relative powerlessness and subservience of the municipal bureaucracy vis-à-vis provincial state agencies in a hierarchical system for water infrastructure planning, and the dominance of local, propertied caste-elites in the urban political economy in shaping planning agendas and their everyday outcomes on the ground (Mukhopadhyay et al., 2020).

The liberalization of the economy and the devolution of economic development to the State level in the 1990s introduced some noteworthy changes in Tiruppur's governance system.

[91] As municipal water coverage to households is substantially lower in small cities and towns across India (Subramanyam, 2020), we can hypothesize that hybridity in water access characterizes most small places. The materiality of this hybridity and the extent of reliance on different sources will vary depending on contextual conditions of hydrogeology, municipal water supply practices, and household-level preferences for different water sources.

This period overlapped with the knitwear economy's turned towards the export market, and Tiruppur emerged as a crucial node in global circuits of textile production. Tiruppur's capitalist class (which overlapped with and grew out of the regionally dominant caste) also leveraged its growing political-economic power and extended its reach into State-level, national, and global networks of policymaking to introduce governance and infrastructural changes in Tiruppur that were unusual for a town of its small size and secondary political-administrative status. For example, they lobbied to install a new water supply scheme developed through a public-private partnership, which will be discussed at length in the next chapter. Consequently, new parastatal agencies, their private-sector partners, and commercial logics started to shape planning and water infrastructure development in Tiruppur, even as older hierarchical relations between different tiers of the State persisted.

The next chapter details how Tiruppur's political economy and governance transformed with liberalization and the simultaneous turn to exports in the knitwear economy. I also describe the various plans that were made to manage, guide, and realize export-oriented growth. The chapter also uncovers the water infrastructure plans that emerged from these planning processes and analyzes how they interacted with the ongoing changes to urban governance during this period. Despite these changes, however, urban governance in Tiruppur was not characterized by a similar ecology of State organizations, planning practices, and development logics as in large metropolitan centers of the State like Chennai or Coimbatore.

CHAPTER 3 - TIRUPPUR'S ELITE PUBLICS AND PLANNING THE GROWTH MACHINE'S FUTURES

Tiruppur's knitwear economy turned towards the global export market in the late-1980s. Subsequently, export-oriented production in the city intensified, leading to socio-spatial transformations that were documented in Chapter 2. The aspirations of Tiruppur's diverse publics, including its industrial elites, for their city's future, evolved in tandem with export and urban growth. With the globalization of the knitwear industry, the new generation of export-oriented industrial elites became increasingly concerned about the dismal living conditions across town. They attempted to conceive and realize an urban image that befitted the town's (and their personal) global orientation. But they sought to do so in ways that helped them retain their socio-cultural hegemony in the face of demographic and spatial change.[92] Much like in previous periods of growth, these elites' collective aspirations put in motion a number of plans to imagine and realize Tiruppur's future. These imaginations and strategies for their realization through concrete plans and projects occurred in relation to neoliberal urban policies developed at the national and State levels.

This chapter is divided into two parts. Each part describes and analyzes a major *spatial project* that industry elites devised or actively championed to construct and realize their vision of Tiruppur as a global export growth machine, one that was no longer chained to its provincial, small town past. However, in pursuing these two spatial projects, the elites used different strategies to articulate their priorities and forged collaborations with different state actors at the

[92] The new generation of exporters was actively trying to project a global outlook in the provincial heartland to appeal to their international buyers. They adopted distinct Western sartorial sensibilities and spoke in English to assert their cosmopolitanism vis-à-vis the traditional attire, Tamil sensibilities, and perceived provincialism of their predecessors who largely catered to the domestic market (Chari, 2004).

subnational and national levels. These two spatial projects with major administrative impacts are: (i) The demarcation of the Tiruppur Local Planning Area and the development of the Tiruppur Area Development Programme (TADP), and (ii) The creation of Tiruppur district with Tiruppur Municipal Corporation as its headquarters. These spatial projects each produced comprehensive plans that addressed several inter-linked city-wide issues that spanned sectors, and these plans are the focus of the analysis. The first part of the chapter describes the main features of the TADP, and the second part focuses on the plans produced by the Tiruppur Municipal Corporation: the 2011 City Development Plan (CDP) and the 2017 Smart City Proposal (SCP).

The analytical strategy involves tracing the actors and institutions who developed these plans and identifying the visions of the future(s) constructed through a detailed reading of the plans and interviews with the actors involved in developing them. I sought to understand how conflicts between economic growth, environmental sustainability, and equity were addressed (or not). I examine the transformations in territory, governance, and infrastructure that these plans envisioned (and introduced) to realize their visions of futures within the context of an evolving urban political economy. A close reading of the secondary literature and State and national policies for urban infrastructure development from this period have allowed me to situate and contextualize observations from Tiruppur within the broader political economy.

The three plans: the TADP, the CDP, and the SCP, also explicitly aimed to improve or retrofit water infrastructures in Tiruppur. As the rest of this chapter shows, the elites, who championed the two spatial projects that produced these plans also shaped water infrastructures to secure water access in the face of water scarcity. The water infrastructures that flowed out of these plans--the Third and Fourth municipal water supply schemes, altered the materiality of Tiruppur’s waterscape, water provisioning, and access practices in the city. As I will demonstrate, these spatial projects, plans, and infrastructures helped local industry-caste elites retain their grip over urban politics and governance despite a rapidly changing socio-spatial milieu. Industry elites did not just contribute ideas and resources for planning; their participation also prevented alternative visions of (just) futures from emerging. In doing so, they maintained their control over Tiruppur's political-economic trajectory.

Part I: The demarcation of the Tiruppur Local Planning Area and the development of the Tiruppur Area Development Programme (TADP)

In 1990, Tiruppur Exporters lobbied the State of Tamil Nadu to demarcate a Tiruppur Local Planning Area (LPA) and prepare a comprehensive plan for its future development. As a result, the State appointed an industrial parastatal agency called the Tamil Nadu Corporation for Industrial Infrastructure Development Ltd (TACID) to develop an integrated area development plan for the Tiruppur LPA. This plan is called the Tiruppur Area Development Programme (hereafter TADP).

3.1. The Tiruppur Area Development Programme (TADP)

Developed in 1992-94 by a private investment bank called Infrastructure Leasing and Financial Services Ltd. (hereafter IL&FS) headquartered in Mumbai, the Tiruppur Area Development Programme (TADP) aimed to enable Tiruppur's growth into a dynamic industrial center for textile exports. In facilitating this industrial growth, the plan is expected to usher in socio-economic benefits such as higher employment, industrial output, and household incomes to Tiruppur town and the surrounding region. Infrastructure was to play a catalytic role in realizing this vision of industrial growth and improving the quality of life for people in the city-region.[93] The TADP sought to develop infrastructures such as water supply, drainage, and effluent treatment systems, roads, and telecom facilities in the Tiruppur Master Plan Area (hereafter LPA). Additionally, it proposed acquiring and developing 200 hectares of land outside but contiguous to Tiruppur town for developing housing, industrial and commercial spaces, rents from which could help finance the other infrastructural components.[94] The entire programme was estimated to cost Rs 13,128 million (~USD 480 million) in 1992-93. Recognizing Tiruppur's peculiar morphology where household- and neighborhood-based informal workshops co-exist with and support formal export-producing units, the TADP hoped that the proposal to develop infrastructural facilities for the industry in town would spill over into improved service provision for households.[95]

Since Tamil Nadu Corporation for Industrial Infrastructure Development Limited (TACID), the Chennai-based State-level agency in charge of leading the TADP, lacked the in-house competencies to develop and implement this programme, it engaged Mumbai-based IL&FS. IL&FS focuses on developing commercially viable infrastructure projects without recourse to public budgetary sources.[96] IL&FS had to assess which of TADP's infrastructure components could be implemented on a commercial basis and develop an implementation plan for these projects.

There were many reasons why the State emphasized TADP's commercial viability. With the liberalization of the economy in the early 1990s and the influence of broader global thinking

[93] Infrastructure Leasing & Financial Services Limited (IL&FS). (1994). *The Tiruppur Area Development Programme: Volume I - Main Feasibility Report*, pages 45-46.
[94] The land acquisition and development proposals were ultimately abandoned since land acquisition costs were higher than expected. The project would also attract opposition from displaced landowners, adding time delays.
[95] See IL&FS. (1994). *The Tiruppur Area Development Programme: Volume I*, page 55.
[96] In 2018, IL&FS defaulted on various loan payments, following which the GoI took over its operations.

on development, there was great enthusiasm for neoliberal approaches to urban infrastructure planning, including private sector participation and the adoption of cost-recovery principles. Tamil Nadu was a frontrunner among the Indian States in adopting these neoliberal reforms. It established dedicated State-level institutions and agencies to support the implementation of such reforms and liaise with international donors and investors (Gopakumar, 2014).[97] International donor agencies like the World Bank, the United States Agency for International Development (USAID), and the Asian Development Bank provided loans and funds for projects that embraced such principles in project design and governance reforms. These agencies promoted market-based or commercial approaches to cut through the red tape and avoid significant time lags and delays that typically accompany government-financed and executed projects (Miraftab & Kudva, 2014a; 2014b). At this point, studies documenting the failure of such neoliberal approaches to deliver on their promises with regards to infrastructure development were nascent (e.g., Loftus & McDonald, 2001; Bakker, 2010) and could not temper the optimism of TADP's planners and proponents, even as there were many voices raising alarm about neoliberal approaches (Escobar, 1995). A senior bureaucrat who was involved in crafting the TADP and was subsequently involved in heading Tiruppur's water public-private partnership (PPP) (more on this soon) noted candidly that the State [of TN] went ahead with the PPP model because it was fashionable at that time. He said,

> It [adopting neoliberal reforms and approaches] made it easier for us [the State] to get donor funding. We did not think through the complexities [of the TADP and water PPP]. We fast-tracked it because it was a 'world class' project."[98]

[97] Because of the strength of the two major State-level political regimes, their concurrence on adopting these reforms, and balancing reforms with welfare measures in other spheres, there has been little political resistance to neoliberal reforms in the State (Gopakumar, 2010).
[98] Interview in Chennai, 30 July 2018.

This turn to commercial approaches to infrastructure development was a sharp break from the past. As we saw in Chapter 2, before adopting neoliberal reforms, the Tamil Nadu Water Supply & Drainage Board (TWAD) Board planned and developed water and sewerage infrastructures in large and small municipalities across TN (except the capital city, Chennai). The TWAD Board relied on limited financial allocations and directives from the Government of Tamil Nadu (GoTN) (and its funders) in developing these infrastructures. The planners of TADP hoped that, if successful, the TADP would serve as "a replicable prototype for the development of infrastructure on a commercial format in other parts of the state."[99]

The TADP consisted of multiple infrastructure projects. The planners recognized that not all of these projects were equally urgent or well-adapted to commercialization. Hence, for the first phase of implementation, they prioritized what they viewed as commercializable components—water supply, telecom, and housing. They expected to use the surplus cash flows generated by these commercial projects to fund non- commercializable elements such as roads and drainage. The planning documents do not specify how planners determined the commercialize-ability of various components.

3.1.1. Tiruppur's Third Water Supply Scheme

The first project that the TADP focused on developing was a water infrastructure project, locally called the 'Third Scheme.' The Third Scheme was mainly developed to supply water to the knitwear industry. It also augmented domestic water supply for Tiruppur town, 16 surrounding *panchayats*, and a newly developed industrial estate at Mudalipalayam village (located about 10-

[99] See IL&FS. (1994). *The Tiruppur Area Development Programme: Volume I*, page 44.

km away from Tiruppur town), which was developed through a partnership between the GoTN and the Tiruppur Exporters Association (TEA). Initially, the Third Scheme was projected to cost Rs 2.5 billion (~USD 91 million), with operating costs estimated to be about Rs 170 million (~USD 6 million) annually.[100] Overall, it aimed to provide water to industry to boost export knitwear production while increasing the quantity and frequency of municipal water supply to Tiruppur's residents as well.

The Tiruppur Third Water Supply Scheme was the first project of its kind to be built and operated on a commercial basis in India. In taking the commercial route, the scheme's planners made several assumptions. They assumed that industrial water users would be willing to purchase water at the same or a lower rate than what they were then paying to obtain groundwater at the time, i.e., Rs 45 per kiloliter. Further, they assumed that the economic rationale embedded in the "attractive" rates would induce 100% of the industrial water users to switch to the Third Scheme once it became operational. Based on these assumptions, IL&FS projected that the water supply scheme would be profitable and generate a surplus cash flow of about Rs. 1200 million, which could then be invested into the other components of the TADP. Since the industrial cluster at Tiruppur generated significant amounts of foreign revenue through knitwear exports, IL&FS was confident about the industrialists' willingness and ability to pay the high user fees necessary for the project to be commercially viable. TEA's buy-in as equity partners inspired additional confidence in the project.[101] However, since there were no precedents of water supply schemes operating on a commercial format in India, planners had to conceive new institutions and procedures for Tiruppur's Third Water Scheme. The next section

[100] See IL&FS. (1994). *The Tiruppur Area Development Programme: Volume I*, page 76.
[101] Interviews with the director of NTADCL, and a representative from IL&FS, Chennai, 30 July 2018.

describes the new governance configurations that emerged to develop and implement the Third Scheme.

The creation of New Tiruppur Area Development Corporation Limited (NTADCL) for implementing the Third Scheme

Since the Third Scheme was going to be implemented on a commercial, for-profit basis, IL&FS had to establish new institutions that could raise market-based finance and profitably operate the infrastructure. However, prevailing municipal regulations and Tiruppur's small-sized municipal bureaucracy with limited operational abilities did not make it a good fit to lead and execute the Third Scheme. Most (if not all) of the high volume of foreign exchange generated by the Tiruppur cluster accrued to the national government. As was a common grouse among local exporters, this amount did not flow back to Tiruppur municipality in the form of taxes or grants for infrastructural improvements. Tiruppur Municipality's small tax base (mainly from local property taxes), rents from municipal buildings, and user fees for services constrained the municipality from developing any large infrastructure project on its own. Municipal regulations also did not permit Tiruppur Municipality from partnering with private actors for executing municipal services.

For these reasons, the project planners decided to create a Special Purpose Vehicle (SPV), a separate legal-institutional entity, to execute and administer the Third Scheme. The SPV had decision-making powers but was insulated from public accountability and scrutiny except to its investors and shareholders. It was responsible for raising commercial finance from international investor markets, providing suitable exit routes for these investors upon project completion, administering debt service through the levy of user charges, and enhancing the entity's credit ratings over time.[102] The SPV that was formed to implement the Third Scheme was known as the New Tiruppur Area Development Corporation Limited (NTADCL).

NTADCL was created in 1995 using a joint venture public-private partnership (PPP) model. The project team considered several PPP models, including the Build Operate Transfer (BOT) and Build Own Operate Transfer (BOOT) models, before settling on the joint venture model. Under this model, both public and private stakeholders collaborate to capitalize on each other's unique strengths to implement and operate the project, unlike a BOT or BOOT model, where the entire responsibility for project operations is transferred to an external private entity (Delhi & Mahalingam, 2012). As a result, the GoTN, IL&FS, and TEA were joint shareholders in NTADCL, with GoTN providing administrative and regulatory support, IL&FS providing technical expertise, and all three shareholders pooling equity.

In the initial project proposal, IL&FS proposed that the initial equity for the project come from institutions and organizations that would directly benefit from the Third Scheme, as the market for water infrastructure finance was non-existent in India in the 1990s. After this initial success, IL&FS suggested public equity participation in the project by listing NTADCL on a stock exchange. Hence, TEA (as representatives of the knitwear industry) and GoTN were equity contributors and shareholders in NTADCL from its inception. Tiruppur Municipality was effectively sidelined as it could not make a financial contribution and had no regulatory power in the process. All decisions were, thus, made at the State level.[103] The joint venture PPP model gave NTADCL a unique competitive advantage. It was 'nominated' to implement the project as a concessionaire instead of bidding and competing with other market players, which is usually

[102] See IL&FS. (1994). *The Tiruppur Area Development Programme: Volume I*, pages 102-106.
[103] Interview with the director of NTADCL, Chennai, 30 July 2018.

the case in similar water PPPs. As a concessionaire, NTADCL had the power to invite international consortia to build, operate, and maintain the project.

Under the principles of cost-recovery and the use of market principles that dominated neoliberal globalized planning, infrastructure projects that embodied commercial principles were better positioned to attract donor funding. NTADCL, too, received technical assistance and funding from an ongoing United States Agency for International Development (USAID) funding program called Financial Institutions Reform and Expansion (FIRE-D). One of the focus areas of the first phase of the FIRE-D program (1994-1999) was to support the development of long-term debt markets in India to finance urban infrastructural projects. It also aimed to build the capacity of urban local and state governments to mobilize resources from these markets by adopting financial monitoring practices, information management systems, governance reforms in service delivery, and issuing municipal bonds (TCG International, 2001). USAID's FIRE-D program organized several workshops, field visits, and training programs for stakeholders from the GoTN, TEA, and Tiruppur Municipality to educate them about the PPP model, create greater acceptance for private sector participation in service delivery, as well as to stress the importance of designing a financially sustainable project.[104] Just as Tiruppur exported t-shirts to the US, it imported "best practice" ideas on infrastructure development and service provision from the US. Ironically, these neoliberal "best practices" for service provision were not working in the US context either (Bel et al., 2010).

[104] Other USAID interventions in TN included support for: the Tamil Nadu Urban Development Fund that issues bonds for municipal infrastructure projects across the state, two pooled bonds that aggregated debt service responsibility for water-sanitation infrastructure across a number of small cities, the completion of credit ratings for 28 cities, the implementation of accrual-based accounting in all urban municipalities, and a BOOT project for solid waste management in Tiruppur. Overall, USAID's approach to urban infrastructure largely aligned with the market-oriented approaches adopted by other multilateral aid agencies such as the ADB and the World Bank at this time. After 2005, however, the availability of federal and state government grant funding for cities through urban renewal programs like JNNURM (2005-14) and later AMRUT (2014-present) discouraged large and small cities from pursuing market-based financing for infrastructure projects (Ecodit LLC and Social Impact Inc., 2018).

Resolving conflicts between economy, equity, and the environment in the design of the Third Scheme using a PPP model

The GoTN developed the Third Scheme as a response to increasing pressure from TEA, which was and continues to be a powerful industrial lobby in the State. Therefore, there was no interest in using the Third Water Scheme as an opportunity to curb increasing industrial water pollution and increasing environmental degradation in the Noyyal watershed.

However, GoTN, headed by welfarist regimes, took some steps to ensure that the for-profit motives of the Third Scheme would not put water out of reach of Tiruppur's working-class, domestic water consumers. To avoid opposition to the PPP model from Tiruppur's unions and the left-leaning Communist parties with a strong political presence in the city, the GoTN laid down certain conditions. First, it ensured that NTADCL's domestic water tariffs remained on par with those set by the TWAD Board for municipalities and village *panchayats* across the rest of the State. Thus, domestic water users would spend no more on water than they were already doing under the Second Scheme. Second, it also ensured that NTADCL would build a domestic sewerage system in Tiruppur town, concurrently with the commercial water supply system, with minimal priority accorded to cost recovery (Delhi & Mahalingam, 2012).[105] The GoTN wanted the drainage system to be built simultaneously because of the inter-related nature of the two infrastructures and to ameliorate environmental pollution due to improper drainage.[106] These

[105] Since there was no pressure to recover costs for the sewerage infrastructure, neither NTADCL nor Tiruppur Municipality had any incentive to expand the sewerage network coverage across town. The Sewage Treatment Plant only operated at 30% of its design capacity (Delhi & Mahalingam, 2012). According to data obtained from TCMC in July 2018, only 26% of the households were connected to the sewerage network within the old Tiruppur Municipality area.

[106] At the time of conceiving the TADP, Tiruppur had no underground drainage system. Domestic sewage and industrial effluents were disposed of in open drains or streams that ultimately drained into Noyyal or Nallar rivers

conditions increased the costs of the Third Scheme and undermined its commercial viability as laid out by its planners.

NTADCL had to devise a novel tariff structure, where higher industrial tariffs would cross-subsidize lower domestic tariffs to make the water scheme commercially viable. Under the proposed tariff structure, village *panchayats* were to pay Rs 3.5 per kiloliter, Tiruppur Municipality was to pay Rs 5 per kiloliter, and industrial consumers would be charged Rs 45 per kiloliter that would be inflation-adjusted each year. In exchange for this graduated tariff structure, the GoTN agreed to implement some regulatory changes. This included legislation to prohibit the industrial extraction of groundwater in the LPA for 15 years so that NTADCL would have assured industrial water demand. Unfortunately, the GoTN did not enforce this legislation and did not punish the many smaller textile dyeing units which continued to surreptitiously buy or pump groundwater as it was much cheaper than buying water from NTADCL. This was another reason why NTADCL ran into financial losses later. On the other hand, as a project partner, the GoTN provided speedy approvals and clearances for this 'world class' project. As part of the formal concession agreement between GoTN and NTADCL, GoTN also guaranteed NTADCL access to river water, uninterrupted power, and the first right of refusal for developing any other water supply or sewerage project within the Tiruppur LPA for the duration of the concession agreement, which is 33 years and ends in the year 2038 (Delhi & Mahalingam, 2012).

Initially, these high industrial tariffs were unacceptable to Tiruppur's industrialists, who were concerned that it would eat into their profits. IL&FS, however, convinced TEA, which represented the industrialists, that these tariffs were designed on an opportunity cost basis, i.e., they were on par with the current and projected costs of procuring groundwater through water

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that passed through town. When these rivers have low flows in summers, sewage and effluents percolated into the ground and polluted the aquifers. Hence, the TADP prioritized the provision of an underground drainage system.

trucks. The Chief Minister of Tamil Nadu met with representatives from TEA and urged them to accept the proposed tariff structure, arguing that it was the only way the TADP could deliver on its social promises of improving the quality of life for Tiruppur's residents through infrastructure.[107] TEA finally relented.

TEA and industrial elites' contributions to Tiruppur's Third Scheme

TEA worked to persuade one of the main industrial water consumers in Tiruppur, the owners of dyeing factories, to acquiesce to the high industrial water tariffs. As described in Chapter 2, Tiruppur's knitwear manufacturers and dyers had a history of coming together to support projects in the public domain. Kinship and professional ties between the dyers and exporters and the structural power of the exporters in Tiruppur's economy also prompted the dyers to accede eventually. The dyers and the exporters collectively invested in NTADCL. Since the bylaws of TEA and the Dyers Association of Tiruppur (DAT) prevented them from investing in a profit-making entity, i.e., NTADCL, they formed a private limited company called the 'Tiruppur Infrastructure Development Company' solely to invest equity in NTADCL (see Figure 3.1).

NTADCL's financial and organizational structure

Between the years 1994 and 2000, NTADCL worked to finalize the concession agreement. It tried to incorporate all the equity shareholders' concerns (GoTN, IL&FS, TEA, DAT), develop detailed designs for the water scheme with TWAD, and design an international bidding process

[107] Tiruppur Exporters Association (TEA). (2003). *13th Annual Report 2002-03*. Mimeo obtained from TEA in July 2018.

for contractors to construct and build the infrastructure.[108] GoTN and NTADCL finally signed the concession agreement in 2001. The Third Water Scheme was formally launched in 2002, after the State-level elections.[109]

By the time the concession agreement was signed, the Third Scheme's estimated cost had risen four-fold to Rs 10.23 billion (or approx. USD 375 million). Nationalized banks, domestic financial institutions, and IL&FS lent about Rs 6 billion (USD 225 million) to the project as term loans. With a debt-to-equity ratio of 1.5:1, the project team assembled nearly Rs 4 billion in equity. Since this was a very large amount, IL&FS decided to incorporate a subordinate debt of about Rs 0.8 billion to reduce the equity contribution to Rs 3.2 billion. The project's lenders preferred that a single entity provide and handle subordinate debt. So, GoTN and IL&FS formed a different legal entity called Tamil Nadu Water Investment Company (TWIC), with 46% and 54% stake, respectively, for this purpose. Figure 3.1 depicts the financial and organizational make-up of NTADCL. This complex legal entity, which consisted of many public and private stakeholders at the local, state, and global scales, now supplied water to Tiruppur Municipality. This marked a major shift from the straightforward hierarchical relationships with TWAD Board and the State that characterized the First and Second Water Schemes in Tiruppur. How this institutional shift transformed Tiruppur's waterscape and the ways in which Tiruppurians obtained water for domestic needs through the Third Scheme is the subject of the next section.

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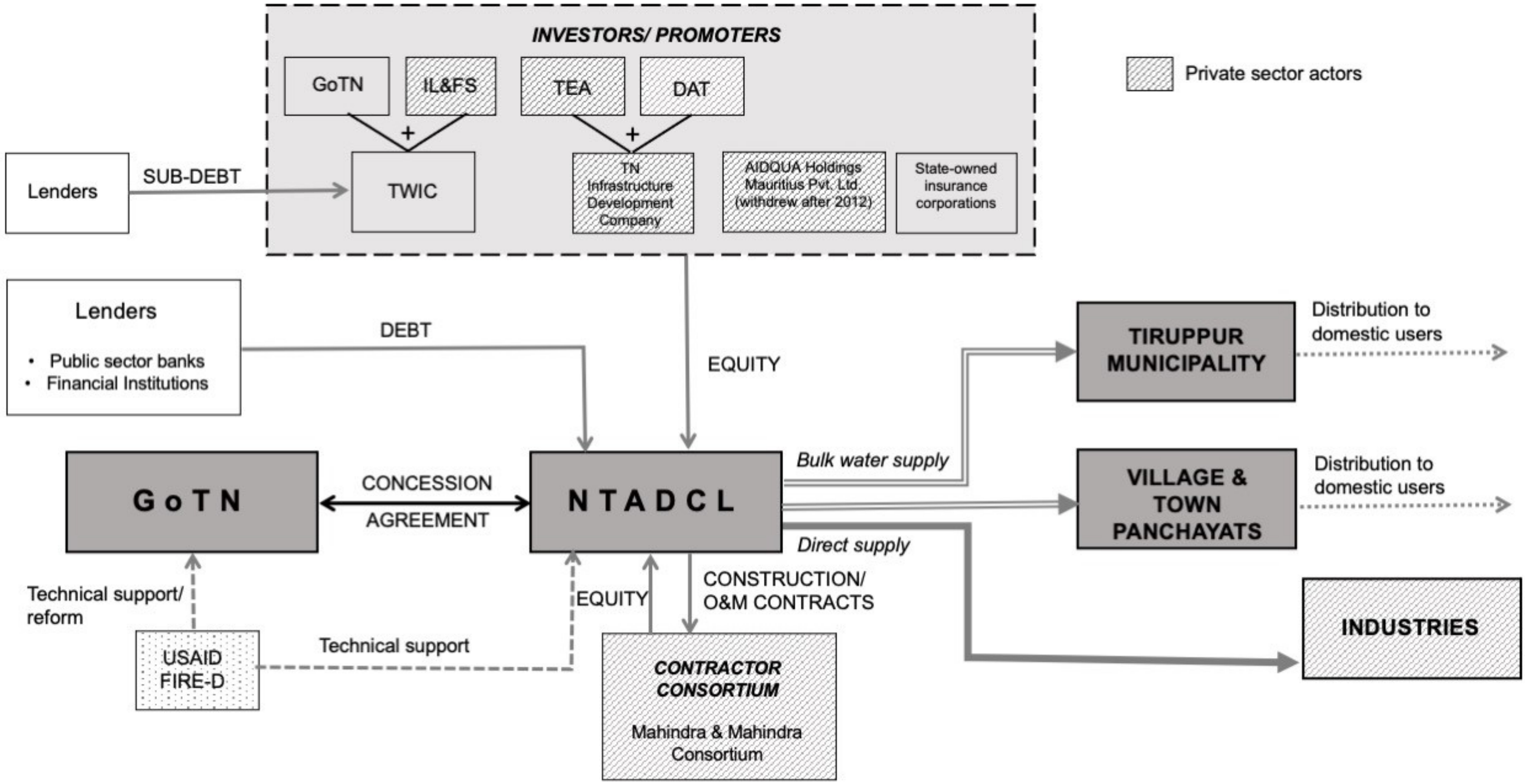
[108] An international consortium comprising Indian and foreign firms, headed by Mahindra and Mahindra, was chosen to execute the project. In addition to their technical repute, NTADCL chose these "reputed" firms to help them raise construction period financing. The consortium also made an equity contribution to the project (Delhi & Mahalingam, 2012).

[109] The project experienced many delays due to opposition from Communist party factions in Tiruppur, who were ideologically opposed to privatization. The impending State-level elections also prevented the ruling party from making any major commitments towards a controversial project.

Figure 3.1 - Financial and organizational structure of NTADCL and its relationship to Tiruppur Municipality



<u>Source</u>: Prepared by the author based on data from Delhi & Mahalingam (2012).

3.1.2. The Third Scheme and alterations to Tiruppur's waterscape

> "Before the NTADCL was implemented, we could see pots lined up for almost a mile or kilometer along the road. Nowadays, we don't see anything like that…"[110]

Figure 3.2 - People queuing up for water in Tiruppur, circa. 1986.

Source: R. V. Studio, Tiruppur

The Third Scheme merely augmented the total quantity of water supplied to Tiruppur Municipality and the village *panchayats*; it did not alter the existing distribution network within Tiruppur town or these villages. In 2005, NTADCL started supplying bulk water to Tiruppur Municipality and the surrounding villages as well as directly to industrial end-users. The Municipality and village *panchayats* were in charge of distributing water to domestic, non-industrial water users in their jurisdictions. Even if the GoTN ensured that NTADCL supplied bulk water to local governments at rates equal to TWAD Board rates, local governments could raise water tariffs within their jurisdictions to pay their dues to NTADCL.[111] NTADCL did not

[110] Interview with an engineer from NTADCL, Tiruppur, 17 July 2018.
[111] Tariff hikes by Tiruppur's local government will be discussed in Chapter 5.

deal with domestic water consumers, neither did it raise tariffs or install devices like water meters to recover costs. Consequently, the Third Scheme did not directly produce splintered patterns of access like other cases of neoliberal water (or other urban utility) restructuring across the globe: well-serviced enclaves that bypass low-income zones (Graham & Marvin, 2001).

NTADCL extracted 185 MLD water from a point on the River Cauvery located about 60-km away from Tiruppur (see Figure 2.6d, page 89). The Third Scheme switched to the River Cauvery because the State decided to reserve River Bhavani water (the source for the First and Second Schemes) for irrigation and drinking purposes only. This switch affected water provisioning and access practices across Tiruppur. Many old-time Tiruppurians dislike the taste of Cauvery water. Interviewees would repeatedly complain that it smelt of chlorine (used to treat water) or that they or their children felt sick after drinking Cauvery water. Some women would note that rice (a staple in South Indian diets) did not cook well or taste as good if it was cooked in Cauvery water. "It is *sappa* [tasteless]," they would say, making a face, likening it to untreated groundwater. This issue with the water's taste prompted unhappy residents to travel to the nearest public tap supplying First or Second Scheme water and bring home a pitcher or two for drinking and cooking each day. Engineers and local officials used people's issue with drinking water taste as a reason for switching back to the River Bhavani for the Fourth Water Scheme, which is currently under construction. In this way, a material property of water, its taste, which is a function of dissolved salts and organic matter, played a part in water infrastructure planning in Tiruppur.

Of the 185 MLD, NTADCL initially extracted, it supplied about 100 MLD directly to industrial units within the local planning area. It provided 48.7 MLD to Tiruppur Municipality, 36.3 MLD to the town and village *panchayats* in the LPA (some of which were later merged with Tiruppur Municipality), and through the TWAD Board, to over 700 village settlements en route. Tiruppur Municipality and the *panchayats* were obliged to buy this quantity of water from NTADCL as per the terms of the concession agreement between the GoTN and NTADCL even though they were not signatories to the agreement. In addition to bulk water supply to the municipalities and *panchayats*, NTADCL sold nearly 1.5 MLD water through four tanker filling stations across Tiruppur to cater to those areas and consumers not adequately served by the piped network.

The Third Scheme did help to alleviate water stress in Tiruppur. Many people felt encouraged to buy a residential water connection because the municipal (or *panchayat*) water supply frequency increased. However, the arrival of the Third Scheme did not necessarily eliminate people's reliance on other water sources. Municipal piped water supply frequency increased, but it continued to be intermittent, unreliable, and inadequate. The Municipality also supplied water from the First, Second, and Third Schemes through private and public connections and public borewells. Thus, the waterscape continued to be characterized by its hybridity. However, Tiruppurians' reliance on different sources began shifting based on demographics, location, tenancy arrangement, and personal preferences, as will be described in more detail in Chapter 5.

Five years after commencing operations, NTADCL ran into a number of financial problems.[112] It did not generate the projected profits and consequently underwent financial

[112] There were many reasons for NTADCL's financial losses. Its planning failure was improper and over-optimistic forecasting (cf. Hall, 1980). First, to jumpstart the project, TEA projected a higher than actual demand for industrial water. This demand did not quite materialize when the project commenced operations. The onset of the global recession in 2008 reduced the demand for exports from the Tiruppur cluster, which reduced the industrial water demand. Since NTADCL did not make enough money from industrial water sales, it could not cross-subsidize domestic supply as per the terms of the concession agreement. Second, the gradual technological adoption of water-efficient dyeing technologies also resulted in lowered industrial water demand. Third, environmental legislations also played a part in reducing industrial water demand. In 2011, the Madras High Court directed the closure of all dyeing units that did not comply with pollution control requirements, which mandated

restructuring in 2012. The PPP model of water supply was not replicated anywhere else across the State or country. NTADCL's financial restructuring had material repercussions for municipal water provisioning practices in Tiruppur. This restructuring included a reduction in interest rates by lenders, an extension of NTADCL's debt repayment period, and a conversion of a portion of the debt provided by GoTN into equity.

One of the main features of the financial restructuring package which impacted water provisioning in Tiruppur was GoTN's commitment to buy an additional 100 MLD water from NTADCL for domestic water supply in the Tiruppur region. GoTN was also going to buy this water at a much higher rate of Rs 21 per kiloliter (versus the Rs 5 per kiloliter that Tiruppur Municipality was paying).[113] The GoTN also agreed to revise the water tariff for the existing 56 MLD domestic water supply to Tiruppur Municipality and the surrounding villages from Rs 5.25 to Rs 7.50 per kiloliter. This amount would be subject to a 6% per annum increase. The State did not consult Tiruppur Corporation or its resident taxpayers before making these financial commitments on their behalf. Hence, six years later, in 2019, many city engineers and employees lamented to me that one of the Corporation's biggest operational expenses was water. Fixed financial outlays towards NTADCL prevented them from taking on other large projects

the adoption of effluent treatment technology that would result in Zero Liquid Discharge (also known as ZLD) (Gronwall & Jonsson, 2017). Many dyeing units that could not afford to switch to the ZLD technology closed down, and therefore, stopped consuming NTADCL water. Many smaller dyeing units also surreptitiously bought or pumped groundwater as it was much cheaper than buying water from NTADCL. The GoTN did not punish these violators. For these reasons, NTADCL ended up supplying only about 40 MLD water to industries instead of its designed quantity of 100-115 MLD (Interview with an NTADCL engineer, 17 July 2018). As a result, NTADCL experienced financial losses; it could not meet operating expenses and debt service obligations. The very assumptions on which NTADCL was built—guaranteed industrial water consumption at a certain rate—did not pan out. In light of these losses, NTADCL underwent financial restructuring in 2012.

[113] Of the Rs 21 per kiloliter, Rs 15 would be a fixed component for capital and debt service costs, and Rs 6 a variable component for O&M costs that would be subject to an annual increase of 6%. Details obtained from Municipal Administration and Water Supply (MA3) Department, G.O. (Ms). No. 25 dated 16 March 2012. Mimeo obtained from NTADCL.

involving significant financial commitments.[114] Thus, NTADCL's financial restructuring impacted municipal water supply operations in Tiruppur, which will be addressed in greater detail in Chapter 4.

Although the Third Scheme was planned to generate profits, it was heavily subsidized by the State in practice. Like other cases of water privatization, the Tiruppur PPP was neither profitable nor did it produce cost savings for the State (see Bel et al., 2010 for a review). It was effectively a white elephant that locked the GoTN into some unsustainable water provisioning practices in the region. Further, as the water project failed to turn a profit, the other components of TADP that were going to be financed with cash flows from the water project remained a pipe dream.

3.1.3. Neoliberalization and transformations in small city governance: Insights from the Tiruppur PPP

Although the TADP and the Third Scheme's promises did not materialize, these projects left material imprints on Tiruppur's waterscape, governance, and everyday water provisioning and access practices. This section discusses how the PPP transformed urban politics and governance in Tiruppur. I situate my findings in the broader conversation on governance through PPPs in Indian cities to parse how Tiruppur's political-economic context and scale at this juncture made a difference to the partnership dynamics.

PPPs can be analyzed from either a functional perspective or a critical perspective (Gopakumar, 2010). The functional perspective examines if PPPs are an effective means for

[114] In 2019, Tiruppur Municipal Corporation paid Rs 11.54 per kiloliter for the originally allocated 38 MLD water, and Rs. 26.23 per kiloliter for the additional quantity that it was now consuming after NTADCL's restructuring in 2012. Tiruppur Corporation routinely struggled to make on-time payments to NTADCL.

service provision and addressing the local government's inadequacies. The critical perspective politicizes the PPP: it investigates the nature of the relationships between stakeholders in partnerships, their objectives, negotiations and interactions in decision-making, relative power in steering governance through the PPP, and the PPP's impacts on urban politics and space (Benjamin, 2000; Benjamin, 2008; Gopakumar, 2010). From a functional perspective, the Third Scheme failed to improve service provision in Tiruppur. It did not produce cost-savings or effective water distribution, as the preceding sections show. In the words of a technical expert in the State Department of Municipal Administration and Water Supply (MAWS), "We [the State] burnt our fingers with NTADCL, so we did not replicate the PPP model elsewhere."[115]

Critical perspectives on urban partnerships in India have observed and analyzed different kinds of PPPs: strategic partnerships between state and business actors (Weinstein, 2014), illicit partnerships between the state and organized crime groups (Weinstein, 2008), partnerships between the state and pro-poor NGOs (Appadurai, 2001) or middle-class neighborhood groups (Zérah, 2009; Ghertner, 2011) in service delivery. The dynamics of these different kinds of partnerships vary by the associational structures through which the non-state actors mobilize, the links that they forge with actors/ agencies situated in different tiers of the administrative and political state, and their planning objectives (Benjamin, 2000; Harriss, 2007). Here, I will restrict myself to state-business partnerships to analyze the Tiruppur case, i.e., the partnership between the Tiruppur businessmen represented by the Exporter and the Dyers and the multi-tiered state.

Case studies of state-business coalitions and partnerships in metropolitan India have employed the framework of urban regimes (see Stone, 1989; Fainstein, 2001; Shatkin, 2007) to examine neoliberal governance (Ghosh, 2005; Chattaraj, 2012; Sami, 2013; Weinstein, 2014;

[115] Interview, Chennai, 9 July 2018.

Heller, Mukhopadhyay, & Walton, 2019). They find that businesses (mainly transnational corporates) mobilize through informal, social ties to State-level ministers or senior bureaucrats to either accumulate through infrastructure development or develop infrastructure that will create conducive conditions for economic accumulation. These partnerships help the State gain resources and ideas for development, and individual actors within the state earn rents (Heller et al., 2019). Businesspersons can make in-roads into fragmented government machinery, exercise power over the trajectory of urban politics and spatial development, and curtail what they see as populist, vote bank-driven development that impedes economic growth (Benjamin, 2000). Overall, such partnerships result in corporate capture of the State, which restricts democratic participation by the poor or other non-elite groups in governance.

The dynamics of the Tiruppur PPP remain distinct from these metropolitan coalitions in at least two ways. Tiruppur's scale—distance from the state, regional reach, and small size—play a part in shaping these dynamics. First, Tiruppur's capitalists had a history of being involved in urban governance to compensate for the local government's failings, unlike the metropolitan corporate coalitions or task forces that were largely post-liberalization interventions and attempts at 'good governance.' Moreover, until Tiruppur's ascent as a specialized node in the global flows of textile trade in the early 1990s, these capitalists and Tiruppur town remained peripheral to State policies (Srinivas, 2000). As many businessmen in Tiruppur love to emphasize,

> "Tiruppur was just a *kukgramam* (a small hamlet) in Mangalam *panchayat* (rural municipality) in Palladam *taluk* (district subdivision) in Coimbatore district that nobody knew of before exports started."[116]

[116] Interviews in Tiruppur, 25 July 2017 and 2 July 2019. This was also TEA President, Raja Shanmugam's proclamation at a public event on 27 June 2019.

Tiruppur's growing economic reach allowed a well-connected, powerful faction of capitalists from among the Exporters to capitalize on neoliberal and decentralization reforms to advance their economic growth and domination agendas. They could access a 'distant' State and force it to take an interest in Tiruppur's development. Much like metropolitan coalitions, they, too, bypassed an incapacitated local administration to develop large-scale industrial water infrastructure in partnership with specialist State-level agencies. Thus, older entrenched forms of power, embodied in these capitalists, have managed to adapt to changing policy circumstances to retain control over Tiruppur's governance in the current moment.

Second, the Tiruppur case also provides insights on how the dynamics and outcomes of state-business partnerships vary by the kind of capital involved in the partnership (cf. Lee, 2017): who embodies the business partner, what are their imperatives, interests, and bases of power in public decision-making processes, how do they organize, and how are they embedded in place. In places like Tiruppur that have urbanized from villages through local trajectories of entrepreneurship, capital tends to be embodied in certain caste and *jati* (sub-caste) groups, as Chapter 2 showed. Consequently, business and caste interests are imbricated in the associational life of such small towns (Basile, 2016). Further, in cities and towns with homogenous economies, as in Tiruppur, these dominant business-caste interests[117] may enjoy undue structural power in part due to the town's small size (cf. Cook, 2018).[118] Acting collectively through highly organized interest groups (re: associations) enables them to not only advance economic interests but also enjoy socio-cultural hegemony in the public sphere. In the absence of deliberate State

[117] A caste group can be referred to as a 'dominant community' if it is numerically preponderant, wields political and economic power, and is not too low in the local caste hierarchy (Sircar, 2017 drawing on Srinivas, 1994).

[118] Certain caste groups dominate business and occupational niches in big cities as well. However, the large number and sheer diversity of associations representing different social and economic interests prevent any one group from dominating public decision-making processes.

interventions that redistribute power and expand democratic participation, these intertwined expressions of traditional socio-economic power persist despite globalization, decentralization, and neoliberal reforms (Parthasarathy, 1997; Harriss-White, 2003; Harriss-White, 2016; Basile, 2016). Thus, these associations and their actions become proxies for public participation in post-liberalization city planning in Tiruppur, even if they do not include or represent the most marginal interests in the city.

The Tiruppur PPP case shows that ties rooted in caste networks and place greased the export growth machine and the partnership within Tiruppur. Even if caste or communal concerns did not influence the partnership or its objectives, caste connections helped TEA obtain buy-in from its membership and organize the industry's share of funds for the Third Scheme. One of the administrators of TEA described business relations in Tiruppur thus –

> "Because a single caste [the Gounders] are operating [in this industry], it is easy for them to share information. If somebody faces a problem, they discuss it among themselves. They treat each other well, not as a competitor. Off late, for the past one and a half decades, most of the marriages [within this community] are taking place within the city only. […] These people are related, or they studied in the same school. They attend the same marriages, condolence meetings, and party functions. The community is fully tight-knit. They share information… if somebody purchases machinery and it does not perform well, the news will spread like wildfire."[119]

The thick socio-cultural embeddedness and economic linkages[120] between firms led Tiruppur Exporters to use the PPP for accumulation and to view it as a way of contributing to their collective social welfare. In the words of one of India's leading textile exporters from Tiruppur,

"There is a sense here… Most of the owners are ex-employees and ex-laborers in

[119] Interview, Tiruppur, 2 July 2019.

[120] Tiruppur's textile industry is an industrial cluster with many forward and backward linkages between firms. Even large exporters acknowledge that they rely on many local firms, laborers, and job workers for their operations. Hence, they cannot easily shift to new locations when business conditions change, neither can they supervise operations from a remote location (Interviews, Tiruppur, 2 July 2019, and 8 December 2019). Therefore, they have an incentive to improve the business environment.

> the same industry. They used to commute here from nearby villages on cycle. They sold their lands, put the money into business, pledged their property for business, then some of them bought more property to provide as security to the bank to expand […] That is how everyone sourced their capital. There is a sense of giving back to society among this group. […] This is the Tiruppurian feeling. […] If anyone proposed something necessary to push the industry or labor welfare or city welfare, then we [here he was referring to TEA] would discuss it collectively and say, 'let's do it.' That's how we started many things. Nobody expected the government to do stuff; we did it on our own." He then went on to describe the industry's collective investment in the PPP and noted, "That is how people come forward for any kind of social projects. That is the culture of Tiruppur."121

Even if the Third Scheme eventually ran into losses, nested as it was within this 'culture of Tiruppur,' projects like the Third Scheme helped TEA build additional public legitimacy and power within Tiruppur's diverse business community.[122] Since water was (and continues to be) a dire need in the city, and the Third Scheme helped improve the frequency of municipal water supply across Tiruppur, many capitalists and users overlooked the Scheme's shortcomings and focused on its benefits. In this perspective, industry actors applaud TEA's (and DAT's) contributions as helping to put Tiruppur "on the map." Encouraged by the Third Scheme, TEA has since pursued many other infrastructure projects to boost production, contribute to civic welfare (even if it is narrowly defined), and steer Tiruppur's future (see Figure 3.3).[123] These initiatives have helped TEA become the face and voice of the industry and the prominent civil society actor in planning and policymaking circles, even if TEA is controlled and represented by only a handful of "big shots"[124] from the industry.[125]

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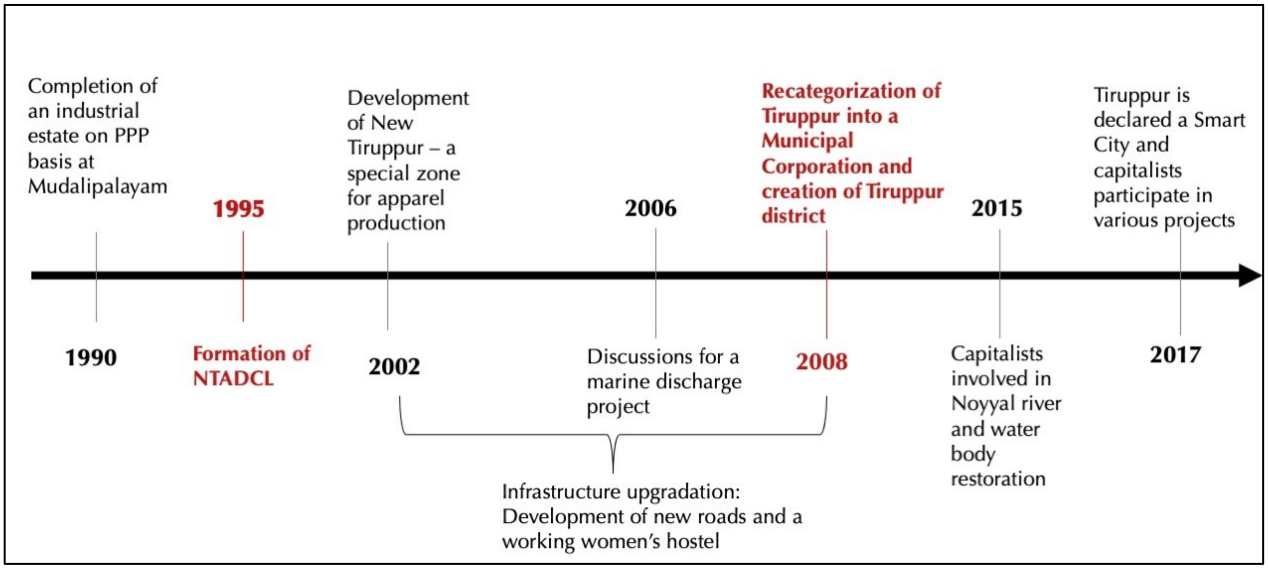
[121] Interview, Tiruppur, 8 December 2019.
[122] This was because the losses did not directly accrue to the business community or Tiruppur's residents, who obliviously continued to pay the same water tariffs.
[123] For reasons of space, I do not describe all these projects and initiatives here.
[124] Interview with the president of an association representing small-scale manufacturers, Tiruppur, 14 June 2019.
[125] Barring a few Leftist unions, nearly every industry or civil society association directed me to TEA to get information about Tiruppur.

Figure 3.3 - TEA's planning and infrastructural interventions in the Tiruppur region, 1990-2017[126]



Part II: The creation of Tiruppur Municipal Corporation

The TADP was one spatial project through which industry elites secured state support to increase export-oriented industrial growth in Tiruppur. However, even as the TADP struggled to raise market-based finance, it also faced opposition from local anti-privatization factions, including the local CPI(M) and its unions. As a result, Tiruppur's business community, elected officials, and administrators continued to seek new ways to realize their goals of transforming Tiruppur into an export growth machine. One consensus that this heterogeneous group reached was that the recategorization of Tiruppur Municipality into a Municipal Corporation would help them realize this goal. The next two sections describe the process and motivations for creating Tiruppur Municipal Corporation at the State level in Chennai and the city level in Tiruppur. The creation of Tiruppur Municipal Corporation also transformed planning, specifically water

[126] I have constructed this timeline based on an analysis of TEA's annual reports from the last 25 years.

infrastructure planning that is of concern here, and a description of the transformations is included.

3.2. Reasons for creating Tiruppur Municipal Corporation

3.2.1. A changing political economy of municipal administration in Tamil Nadu

In the early 2000s, the GoTN (controlled by the ADMK regime) faced a severe financial crunch inherited from the previous DMK regime.[127] It was not in a strong position to devolve large amounts of funds to urban municipalities for developmental purposes or to undertake and maintain much-needed infrastructure projects such as water supply or underground drainage systems through the TWAD Board. This issue was further complicated because TN was among the most urbanized and fast urbanizing states in the country in 2001. 44% of its population lived in 611 town *panchayats*, 102 municipalities, and six municipal corporations across the State. All these urbanites needed access to essential infrastructures like water, drainage, and garbage collection (Census of India, 2001). Based on the recommendations of the first and second State Finance Commissions (SFC)—a body charged with recommending measures to improve the financial position of urban and rural local governments, the GoTN adopted a two-pronged strategy to transform urban municipal governance.

First, it focused on transforming governance in small towns governed by a type of urban local government called town *panchayats*.[128] In 2004, it decided to downgrade a majority (92%)

[127] DMK and ADMK are the two major political parties in TN, and they have alternated in power since the 1960s. Both parties are offshoots of the progressive Dravidian mobilization that challenged Brahmin and North Indian hegemony over South Indian (Dravidian) people.

[128] TN was the first state in India to introduce a new type of local government called 'town *panchayats*' in 1950 to govern villages that were transitioning into towns. To become a Town *Panchayat* in TN, villages need to have at least 5,000 residents and an annual income of Rs 4 lakh (Directorate of Town Panchayats, 2020). Other states with a similar local government category are Karnataka and Kerala in the south and Uttar Pradesh and Punjab in the north.

of these town *panchayats* to village *panchayats*. The conversion of town *panchayats* to village *panchayats* would bring them under a separate legal-institutional governance regime for rural development, thus, opening up new funding streams for these places. The 'downgrading' would also enable the *panchayats* to obtain greater national government funding set aside for rural development.[129] The affected town *panchayats* did not accept this decision readily as it would mean reduced administrative autonomy and loss of revenues as the rates of taxation tend to be lower in villages.[130] The GoTN also seriously considered merging some urbanizing town *panchayats* on the peripheries of larger cities with the city to create municipal entities with a bigger tax base (Vijayabaskar et al., 2011), as was the case in the city of Madurai.

Second, the GoTN also sought to address governance challenges in small cities like Tiruppur that had grown into medium and large cities. Just as the SFC had advised the state to improve the financial position of towns, it recommended that cities, too, be well-positioned to avail grants from the national government through the newly developed National Urban Renewal Mission (JNNURM) program. The national program, JNNURM, promoted by the same market-oriented USAID FIRE-D program that had created the NTADCL, emphasized a strong tax base as a pre-requisite for receiving urban infrastructure grants from the federal government. So, the GoTN proposed to increase the tax potential of corporations and municipalities[131] by extending their municipal limits to include the surrounding contiguous towns and villages that had

[129] Under the GoTN's urban administrative hierarchy, town *panchayats* report to and receive financial grants and technical support through the State Department of Municipal Administration and Water Supply. In contrast, village *panchayats* report to and receive support through the State Department of Rural Development, headed by a different minister and administrator). Additionally, residents of village *panchayats* also pay lower property taxes and service charges for essential services like water supply and waste disposal (Hiranandani and Tandel, 2015).

[130] This decision was reversed when the opposition party (the DMK) came to power at the State level in the next election cycle. It did not necessarily increase federal grants to these *panchayats*.

[131] Municipal Corporations are above Municipalities in TN's urban administrative hierarchy. Typically, corporations govern large metropolitan cities, and municipalities govern small and medium-sized cities. Both are further classified into various grades depending on the city's annual income. Town *panchayats* form the lowest rung of the urban administrative hierarchy below municipalities.

absorbed (or were projected to absorb) urban growth. It also suggested the up-gradation of large municipalities to municipal corporations to increase their tax revenues[132] and improve their infrastructural facilities.

In 2001, the GoTN (under the ADMK government) extended the municipal limits of the city of Madurai and was actively considering a similar proposal for Chennai when the DMK regime returned to power in 2006 (Vijayabaskar et al., 2011). The Madurai case set an important precedent. Within this State-level context of municipal administration transformations, Tiruppur and other small cities were upgraded to municipal corporations, and their municipal limits were also extended. All of this was done on a place-by-place basis: there are no set legal (infrastructural, financial, or demographic) criteria for defining a municipal corporation in TN. Whereas the State Finance Commission recommended a minimum population of 0.5 million and an annual municipal income of Rs 50 crore (~USD 142 million in 1996 terms) for upgrading a municipality to a corporation in 1996, the criteria were never codified in policy (Vijayabaskar et al., 2011) and the decisions to upgrade particular municipalities to corporations are made at the State's (particularly the ruling party's) discretion. Both regimes that have come to power in TN have experimented with the municipal recategorization and redrawing municipal boundaries in various locations across the State. Recategorizing local governments and/ or extending their boundaries are transforming governance and the municipal administration of services in small cities and the towns that abut them, with material implications for daily life.

[132] On average, Municipal Corporations in TN generate 47% of their total revenues on their own. The corresponding figures for Municipalities and Town *Panchayats* are approximately 46% and 31%, respectively (Kundu, 2013).

3.2.2. Extending limits and political-administrative reach in Tiruppur

A coalition of industry elites (led by TEA) and Tiruppur-based politicians wanted Tiruppur Municipality to be upgraded to a Municipal Corporation. They believed that upgrading Tiruppur Municipality to a Municipal Corporation would bring greater attention and investments in line with State and federal policies that overwhelmingly favored larger, metropolitan cities.[133] The growth coalition advocated for carving out a new Tiruppur district with Tiruppur Municipal Corporation as its headquarters, thus elevating the urban status of Tiruppur town from a political-administrative perspective, befitting Tiruppur's recent growth and newfound global turn. Industry elites, in particular, felt that it would give them differential access to (and perhaps control over) State-level administrative services without having to travel to Coimbatore city, the former district headquarters (located about 50-km away) each time.[134] Another reason for pursuing a District and Municipal Corporation status was to gain access to more resources for urban development through newly instituted federal programs for urban development such as the JNNURM.[135] Municipal Corporations in TN have greater autonomy in urban infrastructure

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[133] The federal government gave serious attention to urban development only after 2005 when it implemented the National Urban Renewal Mission (or JNNURM), a reform-linked funding program for urban infrastructure development (Mehta & Mehta, 2010). The JNNURM had an outlay of about USD 26.7 billion in urban infrastructure over ten years, of which more than 66% of the funds were allocated to large metropolitan cities that comprised only 42% of the total urban population (Kundu, 2009; Sivaramakrishnan, 2011; Khan, 2017). Before the JNNURM and its sub-component for small cities and towns called 'Urban infrastructure Development Scheme for Small and Medium Towns' (UIDSSMT), the only other major urban development policies were the Integrated Urban Development Program (active in the 1970s) and Integrated Development of Small and Medium Towns (which was operational in the 1980s). However, both these programs failed to impact development in small cities and towns in any significant way (Shaw, 2013).

[134] There is no systematic literature on the incidence of such municipal recategorization in the Indian context. Recent case studies confirm my observations. They, too, find that small town elites pursue municipal status or reclassification as district (sub-divisional) headquarters for prestige reasons (Sircar, 2017). They also seek to use recategorization to access institutions of governance that would facilitate easy access to State-level decision-making (Sircar, 2018). In Bihar, a State in East India, Municipal Corporations tend to have greater bureaucratic complexity with separate departments for infrastructure, education, solid waste management, healthcare, and water. So, officials of small cities seek to become Municipal Corporations to increase the municipal bureaucracy's capability and gain access to more resources (van Duijne, 2019).

[135] Interviews with a former state assemblyman (25 July 2017), a representative of TEA (2 July 2019), a leading businessman (17 June 2019), and a journalist with close ties to the DMK regime (18 October 2019). I conducted all these interviews in Tiruppur.

development. The threshold for seeking State-approvals for infrastructure projects is much higher in higher grades of municipalities and municipal corporations, giving these local governments wider latitude in infrastructure-related decision-making (Vijayabaskar et al., 2011).[136]

3.3. The creation of Tiruppur Municipal Corporation, 2008-2011

In 2008, in response to increasing informal demands from Tiruppur's exporters, businessmen, and politicians, the GoTN (then headed by the DMK political regime) demarcated a new Tiruppur district[137] that combined parts of neighboring Coimbatore and Erode districts. Tiruppur Municipality was upgraded to a 'Municipal Corporation' in line with emerging State-level approaches to municipal governance. Tiruppur became the headquarters of this new Tiruppur district.[138]

In 2011, the GoTN also extended the nascent Tiruppur Municipal Corporation's (hereafter TCMC) boundaries to absorb eight village *panchayats* and two third-grade (lower grade) municipalities that bordered Tiruppur town (see figure 3.4). The boundary extension was pursued to bring the eight urbanizing 'rural' village *panchayats* under an 'urban' government,

[136] In TN, annual municipal income is the primary criteria for classifying urban local governments into various grades.

[137] As noted earlier, incessant lobbying by Tiruppur-based elites played an important part in these changes. The Gounders of Kongunad were also emerging as a significant electoral bloc in State-level elections in the early 2000s. As a wealthy business community, they had access to resources that could fund political campaigns, and their economic success had helped them gain public recognition among their caste fellows. Gounder politicians from regional, caste-based political parties typically campaigned on the narrative of 'regional neglect' to garner votes. Therefore, DMK and ADMK cadres were forced to accede to regional demands when forming coalition-based governments at the State level (Vijayabaskar & Wyatt, 2013). These were some of the politics behind the creation of Tiruppur district and Tiruppur Municipal Corporation.

[138] Three other small cities in Tamil Nadu—Erode, Vellore, and Tuticorin—were also recategorized as Municipal Corporations around the same time.

i.e., the Tiruppur Municipal Corporation.[139] The State believed that the additional funding that TCMC would get through federal grants could be used to upgrade infrastructure and service provision in these peripheral villages.[140] Due to the extension of municipal limits, TCMC's municipal territory increased five-fold from 28.25 sq. km. to 159.35 sq. km. TCMC's population also doubled from about 450,000 to 884,500. Due to uneven population density across the new territorial unit with lower densities in the village *panchayats*, the density reduced to 5500 per sq. km. from 15,900 per sq. km. in the old municipal area before the merger.

Within Tiruppur and the merged villages, the boundary extension and merger were uncontested. Many of the former village presidents were able to transition into municipal councilors and retain their political power.[141] Minor political functionaries (councilors and ward members in the old village *panchayats*) played along in the interests of their political parties and cash in on 'urban' status and its expected benefits.[142] The merger did not alter constituency boundaries or vote banks for State Assemblymen (MLAs) or Congressmen (MPs), so there was

[139] All the eight village *panchayats* were 'census towns.' Census towns (CTs) are villages that satisfy the Indian census's definitional criteria for being 'urban,' i.e., their population exceeds 5000 persons. They have a minimum density of 400 persons per square kilometer, and over three-fourths of their working male population are employed in non-agricultural activities. However, these CTs are not recognized as 'urban' by their respective states and are governed by 'rural' village *panchayats*. The merger finally brought them under an urban government.

[140] Similar cases of municipal boundary extensions in small cities to pursue JNNURM funds have been documented in Andhra Pradesh and Bihar (Prasad, 2014; van Duijne, 2019).

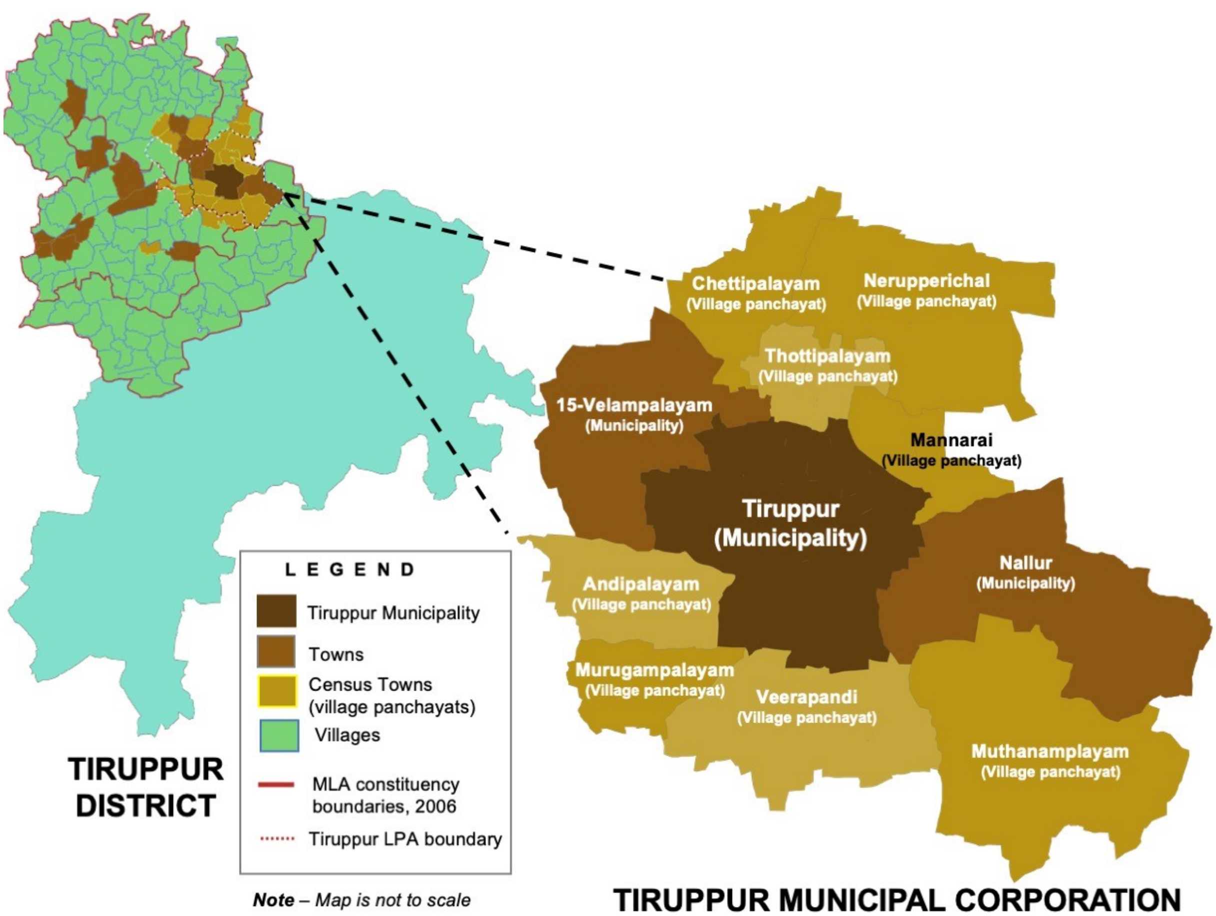
[141] The leaders of CTs surrounding Tiruppur agreed to be merged with Tiruppur Municipal Corporation. However, not all village leaders of peri-urban village *panchayats* acquiesce to such municipal mergers. In the only case study of an ongoing municipal merger in the small city of Samastipur in the State of Bihar, van Duijne (2019) finds that some CTs may opt to remain rural municipalities (i.e., village *panchayats*) to retain access to federal and state development grants that are unavailable to urban places, and which are critical for their residents. These include funds through the National Rural Employment Guarantee Act (NREGA), which ensures at least 100 days of work for people in 'rural' areas. It is a key source of income for low-income and low-caste households. Additional reasons for opting to remain rural include lower obligations to raise their own funds for development, lower taxation rates, and relatively lower (or nearly free) service charges for water and electricity. Fears of diluting democratic representation or participation, increasing land prices, higher cost of living, or losing access to village common property lands also influence the decision to remain 'rural' (Samanta, 2014; Jain, 2018; van Duijne & Nijman, 2019).

[142] Both parties, ADMK and DMK, had experimented with municipal boundary changes. The other major party in Tiruppur, the CPI(M), was in alliance with the DMK regime, and hence, it did not oppose the latter's policies.

no resistance from State-level politicians. Residents in the merged *panchayats* and municipalities were eager to join the Corporation. They hoped that joining the Corporation would enable them to access higher quality services and amenities.

Following the creation of Tiruppur Municipal Corporation and an extension of its municipal boundaries, the city government embarked on preparing a new plan called the 'City Development Plan' to address emerging infrastructural needs across the larger territorial unit. It hoped to use this plan to seek funds from the JNNURM. The next section describes the salient features of this plan and discusses how it diverged from prior infrastructural plans in Tiruppur.

Figure 3.4 - Urbanization in and around Tiruppur in Tiruppur District (left) and the local governments that were merged to form Tiruppur Municipal Corporation (right) in 2011



Source: Author

3.4. The 2012 Tiruppur City Development Plan

The newly formed TCMC bureaucracy initiated the Tiruppur City Development Plan (CDP) in 2010. The main reason for formulating this plan was to access JNNURM funds. The JNNURM program was slated to increase its coverage to include more cities, and Tiruppur wanted to cash in on the funds. It received technical assistance from the Tamil Nadu Urban Infrastructure Financial Services Limited (TNUIFSL) to prepare the CDP.[143] As TCMC did not have the in-house or city-based capacity to prepare this plan, it hired a Chennai-based consultancy called Quadra Architects to prepare the plan and lead the planning process in the city.

As part of the planning process, Quadra Architects held seven consultative planning workshops with various government and non-governmental stakeholders in City Hall and the District Collectorate over fifteen months between April 2010 and July 2011.[144] At the suggestion of TCMC's Municipal Commissioner (the highest-ranked bureaucrat in the city), the planning consultants also held a special meeting with TEA at the TEA office in Tiruppur to incorporate the industrialists' visions for Tiruppur's development.[145] Based on stakeholder feedback, the plan envisioned that Together, all these stakeholders envisioned that "[Tiruppur] would be an

[143] TNUIFSL is a public limited company created by GoTN with equity contributions from several financial institutions. It helps municipalities prepare various plans to access funds from capital markets.

[144] These stakeholders included representatives from the administrative and executive wings of the TCMC and the ten local governments that were to be merged with it in 2011. Representatives from parastatal agencies like TWAD, NTADCL, LPA, TNPCB, utilities like the electricity board, the local police, NGOs, trade unions were also included, along with district officials and journalists.

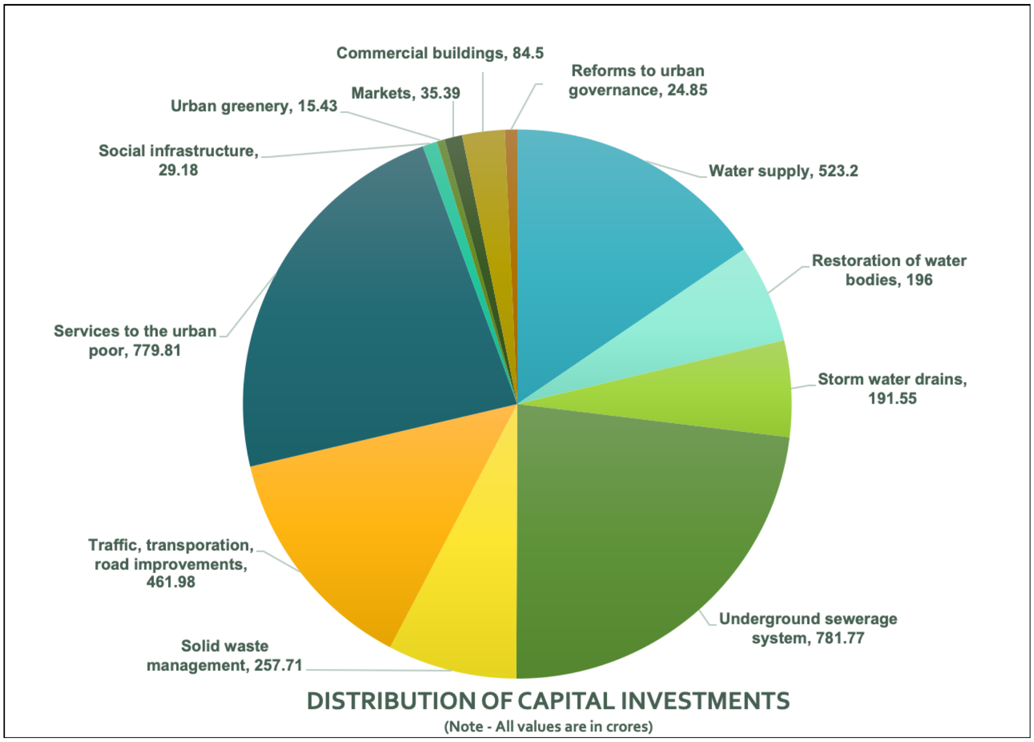
[145] Quadra Architects. (2012). City Development Plan – Tiruppur City Municipal Corporation. Mimeo obtained from TCMC in July 2017, page 53. According to the plan, industry stakeholders demanded that TCMC invest in affordable housing, hostels, and healthcare facilities for industry workers. They also expressed a desire to see 'world-class' amenities like an international convention center, a stadium, and a metro rail system within the city! However, these demands were not developed into detailed project plans since TCMC did not deem them as urgent as water, waste, and transportation infrastructure. In 2019, when I conducted interviews with leaders of business associations, they continued to express similar infrastructural needs, i.e., workers' housing, roads, and public healthcare facilities for their workers.

inclusive city, with a balanced environment, and economic development, providing quality living to its citizens."[146]

The CDP identified development objectives across various sectors to realize its vision. However, it focused on physical infrastructure development.[147] The plan proposed capital investments in water supply, sewerage, stormwater drainage, the restoration of water bodies, garbage disposal, transportation and road networks, parks, and social infrastructure such as schools and healthcare facilities for Rs 3400 crore (USD 6.1 billion). This amount was going to be divided among different projects and sectors, as shown in figure 3.5. Unlike older infrastructure projects in Tiruppur city that were planned and executed by parastatals like the TWAD Board or TACID, the CDP projects were going to be commissioned, executed, and managed by the Municipal Corporation. In the short term, for want of resources, TCMC decided to prioritize urgent needs such as improvements to water supply in the merged villages, solid waste management, the construction of a new bus terminal, markets, and commercial buildings. It also sought to implement governance reforms to improve property tax and water tariff collection to increase its revenues.

[146] *City Development Plan*, page 58.
[147] This was unsurprising because the JNNURM was heavily focused on infrastructure development and service provision in selected cities.

Figure 3.5 - Distribution of capital investments proposed by the Tiruppur City Development Plan, by sector



<u>Source</u>: Tiruppur Municipal Corporation, City Development Plan of 2012, page 8.

3.4.1. Infrastructure plans to close gaps in service delivery between Tiruppur town and the merged villages

The CDP focused on physical infrastructure and service up-gradation in the merged areas for many reasons. The merged areas were growing at a much higher rate than Tiruppur city. There were also vast, visible gaps in water supply coverage and service levels between Tiruppur Municipality and the added *panchayats*,[148] even as service levels in Tiruppur Municipality trailed those in large Municipal Corporations across the State (see figure 3.4 and Table 3.1). Since the combined population in the added areas equaled that in Tiruppur city, elected

[148] I use the terms added areas and merged areas interchangeably.

representatives from these areas were keen to use the CDP to secure grants that would help them upgrade the quality of infrastructure and service levels in their areas and bring them on par with service levels in Tiruppur town. These representatives demanded that 50% or a higher share of the planned infrastructural investments be made in the added *panchayats* to improve water supply, build underground sewerage, rehabilitate natural stormwater drains, and increase sanitary workers.[149] They also wanted TCMC to increase municipal staff, officials, and facilities in the added areas.

Responding to these demands, the CDP proposed a new water supply scheme and extensions to the underground sewerage system. It also included proposals to improve door-to-door garbage collection in the *panchayat* areas by recruiting more sanitary workers, buying additional disposal equipment like pushcarts and garbage trucks, and privatizing the service in some wards to reduce costs to the Corporation. The CDP also planned to restore natural stormwater drains and water bodies to recharge the groundwater table and reduce water pollution resulting from improper wastewater and garbage disposal. For want of funds, and because

[149] Although the GoTN had allocated Rs 75,00,000 (~USD 160,000) to TCMC to extend services to the merged areas after the merger, this amount proved insufficient for the scale of necessary interventions.

corporate-funded non-profits like *Valam*[150] and *Jeeva Nadhi Noyyal*[151] were actively involved in restoring water bodies and stretches of the Noyyal's riverbanks within the city, the Corporation did not pursue these projects in the short-term. Although the CDP remained unfunded, formulating the CDP positioned the TCMC favorably to receive federal grants in subsequent funding cycles. The next section briefly describes the rationale for the Fourth Water Scheme, which was the main water infrastructure proposed through the CDP.

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[150] *Valam* was an organization that was active in the early to late 2000s in Tiruppur. According to one of its core members, it was an elite-led voluntary effort that coalesced around efforts to improve infrastructure in Tiruppur that the State had long ignored. The Municipality at the time lacked the funds to build this infrastructure. No contractors were willing to build the bridge at the budgeted cost as it was very low. So, *Valam* built two bridges connecting the North and South banks of the river to facilitate traffic flows, desilted ponds in Tiruppur, and cleaned up the Noyyal river's banks using donations from industry members (Interview with a former board member, Tiruppur, 10 May 2019).

When one of the founding members of *Valam* died, the group formed another organization called *Sripuram Trust*, which had the backing of a newer generation of exporters. Since the Corporation now had funds to build and repair bridges, *Sripuram Trust* shifted attention to restoring the river and other water bodies in Tiruppur, which it felt was "the need of the day." *Sripuram Trust's* team has professional engineers who are well-connected to the State's Public Works Department (in charge of water bodies). Thus, the Trust is able to coordinate the technical aspects of the river or water body restoration and secure necessary government permissions (Interview with a board member, Tiruppur, 10 May 2019). Sripuram's approach involves dividing the river (or pond) into various stretches and entrusting the fiscal and organizational responsibility for restoring specific stretches to different industry groups. In interviews, several industry association leaders mentioned contributing funds to this Noyyal restoration effort in 2015 (Interview with a trust representative, 13 June 2019). Associations of small-scale producers donated a few thousand rupees each, but larger associations like TEA contributed Rs 40,00,000 (~USD 65,000). *Sripuram Trust* and its partners pride themselves on recharging water bodies in the Tiruppur region in a collective manner by working with other industry partners.

[151] *Jeeva Nadhi Noyyal* (JNN) means 'Living River Noyyal.' This organization/ vision (the organizational status remains unclear to me) was founded by a prominent Tiruppur-based industrialist, Mr. Ahill Rathinasamy. He hoped to "revive the River Noyyal and restore it to its former glory since my generation of industrialists has sadly killed the river in our pursuit of industrial growth. However, reviving it is our responsibility" (Interview, Tiruppur, 17 June 2019). He noted that his vision was inspired by the efforts of Ms. Vanitha Mohan, 'a, granddaughter of Tiruppur,' who had started an NGO named *Siruthuli* to revive the Noyyal river in Coimbatore. Besides ideas and inspiration, there was no other formal exchange of funds or resources between the two organizations because JNN did not operate on a similar budget. *Siruthuli* is a formal, corporate-founded, and funded NGO with full-time staff, a dedicated campus, and committed efforts towards river and water-body restoration in Tiruppur that are often, if not always, supported by the local state (field visit, 10 July 2019).

Jeeva Nadhi Noyyal is a predecessor-of-sorts for *Sripuram Trust*. To me, each of these organizations represents the individual pet projects of different industry groups hoping to showcase their concerns for the city and urban environment. These organizations are not at cross-purposes with each other and typically coordinate their activities. However, Mr. Rathinasamy (as did the other leaders) acknowledged that their combined efforts were only a temporary solution; garbage would pile up in the weeds and bushes along the riverbanks in a few months following their clean-up efforts. They could reach out to industry members and curtail effluent discharge, but they could not address river pollution from domestic sewage or wastewater. Hence, they felt that the government had to implement a long-term solution for pollution control and river restoration.

Table 3.1 – Demographic, water supply, and garbage collection indicators in Tiruppur Municipality and the villages and towns that were merged with it

	Tiruppur Municipality	Nallur Municipality	15-Velampalayam Municipality	Chettipalayam VP	Neruppérichal VP	Muthanampalayam VP	Veerapandi VP	Murugampalayam VP	Andipalayam VP	Mannarai VP	Thottiapalayam VP	TOTAL
Demographic indicators												
Population 2011	450000	72000	85000	35000	55000	25000	50000	28000	25000	18000	41500	884500
Annual population growth rate, 2001-11 (%)	3.06	14.41	8.61	7.34	23.59	16.18	12.89	9.39	12.03	11.19	5.47	6.12 (average)
Total area in sq. km.	28.25	24.87	14.86	9.49	19.67	20.67	5.01	16	9	5.74	5.79	159.35
Density (persons per sq km)	15929	2895	5720	3688	2796	1209	9980	1750	2778	3136	7168	5551
Water supply indicators												
Water supply (MLD)	49.57	2.47	5.41	2.18	2.22	1.21	2.29	1.8	1.81	0.9	2.43	72.29
Water supply (per capita lpcd)	110.16	34.31	63.65	62.29	40.36	48.4	45.8	64.29	72.4	50	58.55	59.11 (average)
Water supply (schemes)	I, II, III	II & III	II & III	II & III	II & III	II & III	II & III	III only	II & III	II & III	II & III	
Total demand (MLD, as per 135 lpcd) [a]	60.75	9.72	11.475	4.725	7.425	3.375	6.75	3.78	3.375	2.43	5.6025	119.4075
Total unmet water demand in 2011[a]	**11.18**	**7.25**	**6.065**	**2.545**	**5.205**	**2.165**	**4.46**	**1.98**	**1.565**	**1.53**	**3.1725**	**47.1175**
Water supply (duration and frequency)	2 hours once every 3 days	2 hours once every 4 days	3 hours once a week	3 hours once every fort-night	3 hours once a week	2 hours once every 10 days	2 hours once every 10 days	1.5 hours once every 10 days	3 hours once every fortnigh t	2 hours once a week	4 hours once a week	

	Tiruppur Municipality	Nallur Municipality	15-Velampalayam Municipality	Chettipalayam VP	Neruppericahl VP	Muthanampalayam VP	Veerapandi VP	Murugampalayam VP	Andipalayam VP	Mannarai VP	Thottiapalayam VP	TOTAL
Number of groundwater sources, 2018-19[b]	529	148	201	50	103	69	46	8	13	44	47	1258
Households water coverage, 2012 (%)	64.89	30.73	76.16	85.71	77.27	73	83.59	84.91	79.48	58.33	69.88	67.22
Water supply tariffs[c]												
Domestic water tariffs in 2011 (Rs. per month, flatrate)	72	71	60	50	30	50	50	50	50	50	50	
Non-domestic water tariffs in 2011 (Rs. per month, flatrate)	120	140	180	--	--	--	--	--	--	--	--	--
Garbage collection indicators												
% garbage collected	95	30	41	25	59	87	59	59	53	68	85	78

Note: *Source for all indicators is the Tiruppur CDP except the following –*
a = Author's calculations
b = Data obtained from ward-level tap inspectors through fieldwork, 2018-19
c = Data obtained from a TCMC Engineer, December 2019

The origins of the Fourth Water Scheme

Chapter 2 noted that the norms for municipal water supply varied by a settlement's municipal status. Hence, there were water supply gaps between Tiruppur town and the added villages. With the merger and the creation of Tiruppur Municipal Corporation, the Central Public Health & Environmental Engineering Organization (CPHEEO) water supply norm increased to 135 liters per capita per day (lpcd) across the entire Corporation. Thus, the water supply in the added villages had to be raised from 40 lpcd to 135 lpcd, whereas in Tiruppur town, it had to be raised from 70 lpcd to 135 lpcd. The new norm created an additional unmet water demand of about 47 MLD (see Table 3.1). This was over and above the gaps in water demand that resulted from ignoring migrant and slum populations in water demand calculations. Table 3.1 also shows how the existing water supply was lower than the required norm of 40 lpcd in some merged areas. It also shows the variation in the prevailing frequency and duration of water supply across Tiruppur city and the merged villages.

To close the unmet water demand gap, TCMC proposed developing a new water supply scheme, informally called the Fourth Scheme. To avoid purchasing water from the costly Third Scheme, TCMC's engineers and administrators invoked the material properties of water, i.e., its taste,[152] in pressing for a new Fourth Scheme. They argued that Tiruppurians preferred the taste of River Bhavani water (the source for the First and Second Schemes) over that of river Cauvery (the source for the Third Scheme). Hence, they proposed to draw water from the River Bhavani

[152] Following NTADCL's financial restructuring, TCMC was paying nearly Rs. 26.33 per kiloliter for the additional water it was buying from the Third Scheme to fill the gaps in water demand. Because of this, it incurred an additional operating cost of Rs. 20-crore (USD 2.7 million) per annum, which ate into its annual water budget of about Rs. 125-crore (~USD 17 million). This additional expense prevented it from undertaking any other capital improvements to its water infrastructure.

for the Fourth Scheme. Although TCMC demonstrated a pressing need for the Fourth Scheme, it was not funded through the JNNURM. TCMC had to wait five more years till PM Modi's government launched the next policy iteration of the JNNURM called Atal Mission for Rejuvenation and Urban Transformation (AMRUT) to finance this scheme. The next chapter, Chapter 4, describes the salient features of the Fourth Scheme and discusses how TCMC tries to close the gaps in unmet water demand in the short term as it revamps its water sources and distribution infrastructures.

3.5. A smart(er) Tiruppur under the BJP regime, 2017-present

I first arrived at the Tiruppur Municipal Corporation office in the summer of 2017. At the time, most administrators and engineers were unavailable to meet with me as they were feverishly preparing Tiruppur's Smart City Plan and wrapping up the contracts for its Fourth Water Scheme. They were proud that Tiruppur had finally been declared a 'Smart City.' The Corporation was going to receive nearly Rs. 1000-crores (USD 140 million) through the national government's Smart City Mission (SCM) to implement a slew of infrastructural retrofits in Tiruppur.[153] Contractors and service providers from across Kongunad had lined up outside the city engineer's office offering services, hoping to dip into this large money pot. A young architect from a Chennai-based consulting firm brainstormed ways to map slums along the Noyyal riverfront with the engineer's assistants as all of us waited our turn for a brief five-minute meeting.

[153] This was a large amount because TCMC's projected municipal income for 2017-18 was about Rs. 40 crores (TCMC, 2017). However, in big cities, the SCM funds are a drop in the bucket and are being used to experiment with digital technologies and data-driven decision-making (Khan et al., 2018). One of my planner friends involved in preparing Smart City Proposals across the State of Gujarat noted, "It is pocket change for a city like Ahmedabad (India's fifth-biggest city)."

Over the next two years, TCMC's engineering department developed (and resuscitated) project proposals for redeveloping the city bus station, improving local markets, installing city-wide surveillance, reviving the Noyyal riverfront, and constructing new water supply, underground drainage, and garbage disposal systems, which amounted to a total of Rs. 925 crores (USD 130 million) to be funded through the Smart Cities Mission. Engineers and administrators seemed busier over time as they shuttled between Chennai and Tiruppur to seek project approvals. The coterie of people who waited on and for them grew bigger. Clerks and technical assistants were stressed about filling out a new report on benchmarks and indicators each day for the GoTN and the Government of India (GoI) as it meant chasing those same busy engineers and administrators for data (that had to be generated) and their signatures. For some residents in Tiruppur, the 'Smart City' tag was a badge of pride, whereas, for many others, it represented a daily inconvenience as roads were dug, century-old trees were cut, and buildings demolished to make way for infrastructures and things that would make no significant difference to their lives. The rest of this section provides a brief overview of the Smart Cities Mission, speculates why Tiruppur was chosen, and describes proposals for improving Tiruppur's water infrastructures in the city's Smart Cities Plan.

3.5.1. A brief overview of the Smart Cities Mission

In 2014, when the Narendra Modi-led Bharatiya Janata Party (BJP) regime came to power at the federal level, it announced two major policies for urban development: the Atal Mission for Rejuvenation and Urban Transformation (abbreviated as AMRUT) and the Smart Cities Mission (SCM). Over four years, the AMRUT program aimed to disburse nearly Rs. 50,000 crores (USD 7 billion) to over 500 cities, with more than 100,000 residents each, to help them extend water and sewerage coverage to all households, develop and maintain parks, expand public transport, and install stormwater drains. Essentially, the program is a re-branded version of the previous regime's JNNURM policy. The SCM is a competitive grant funding program, where cities apply to become a "smart city." They receive funding from the federal government for undertaking 'smart' retrofits in select neighborhoods, incorporating technologies that improve the quality of life.

Although the GoI has branded its urban development agenda as "smart," in practice, many cities like Tiruppur are smart enough to use the money to build basic infrastructure. They have used the funds to close gaps in essential infrastructure (52.5% of all proposed projects), with a few others (~21%) implementing technologies for urban security and tourism enhancement (Smith et al., 2019: 530). Both these programs, the AMRUT and the SCM, give States some control over city-level plans as States nominate eligible cities to receive funding from both programs. States also match a portion of the federal government funds that cities ultimately receive (Smith & Pathak, 2018; Das, 2020).

Once selected as a Smart City, cities create a Special Purpose Vehicle (SPV), a "limited company" that works with private consultants and technology providers to develop detailed project plans and implement projects. Private sector actors can hold equity in these SPVs, which also have nominees from the federal government, State government, and urban local governments on their board (Das, 2020). Commentators have criticized the institutional structure of the SPV as it weakens participation by the public or scrutiny by elected municipal councilors (Khan et al., 2018; Das, 2020). They find that participation has been reduced to up or down voting off-the-shelf projects on Facebook or Twitter. Citizens do not contribute to the formulation of actual project ideas or goals (Khan et al., 2018). Further, these authors argue that the SCM is an example of technocratic nationalism that promotes rule by experts—IT providers, private consultants, and bureaucrats, and hollows out local governance (Basu, 2019). Instead of building technical and organizational capacity for new kinds of planning in municipal cadres, it has made them more reliant on private expertise (Khan et al., 2018).

These critiques of the SCM have borne out in Tiruppur as well. In TN's 12 smart cities, including Tiruppur, the SPV structure has unduly empowered city administrators and engineers.[154] The CEO of Tiruppur Smart City's SPV is an Indian Administrative Services (IAS) officer so that the GoTN can oversee the city's implementation of the various Smart City projects. The Tiruppur SPV routinely invites businessmen and leaders of various industry associations to participate in decision-making around various projects, such as the revival of the Noyyal riverfront. However, it has not extended similar invitations to other members of civil society. Similarly, municipal cadres have not necessarily grown "smarter" in tandem with increasing responsibilities; some officials struggle to turn on a computer or upload data onto government portals. To a new visitor, the municipal bureaucracy appears busy and bloated. However, it largely comprises a shadow, temporary workforce made up of young men and women who perform everyday planning and data management tasks. The Municipal Corporation hires them on a contract basis in response to neoliberal, State-wide hiring freezes to reduce personnel costs to the State budget. Whereas the younger temporary staff are tech-savvy, eager to learn, and leading the transition to e-governance, they lack any real power or institutional memory to enable change, unlike their older, permanent superiors.

[154] The GoTN has not conducted elections in urban local governments since 2016.

Before I describe the salient features of Tiruppur's Smart City Plan, I will digress to speculate on how the industry's proactive planning likely contributed to Tiruppur's selection as a Smart City by a pro-business, conservative regime at the national level.

3.5.2. Tiruppur's selection as a Smart City: Possible industry contributions

Tiruppur was likely selected as a Smart City ahead of its peer small cities because of the business community's active role in urban planning and economic development. When the CDP remained unfunded, Tiruppur's businessmen did not give up. Instead, they pursued independent planning efforts to secure government investments for industrial and infrastructural development in Tiruppur.

Businessmen from the Tiruppur chapter of the Confederation of Indian Industry (CII) and a local non-profit named *Sripuram Trust* hired Grant Thornton, an international business consulting firm, to prepare a 315-page detailed project report in 2015.[155] This report was centered around their 2020 Vision for the entire Tiruppur cluster. Their vision aimed to "quadruple turnover, and progressively contribute to the livelihood of at least 10 million workers and members of the backward-integrated marginal farming community."[156] Eleven other industrial associations participated in the preparation of this report by suggesting detailed strategies and projects to realize this vision. The report proposed industry-specific interventions for raw material procurement, market development, technology up-gradation, workforce training, and the development of supportive enterprises and institutions. More importantly, it also

[155] A small group of industrialists belonging to these two groups was also trying to engineer a coup d'état within TEA to assume control of the cluster. They were eventually successful at gaining control of TEA's leadership, much to the chagrin of the older generation of exporters.

[156] Confederation of Indian Industry, Tiruppur District, & *Sripuram Trust*. (2015). *Detailed Project Schemata for the realization of the Knitwear Cluster of Tiruppur's Vision 2020*. Mimeo obtained from *Sripuram Trust*.

proposed the development of specialized industrial infrastructures like industrial parks, garment research and skill development centers, and basic infrastructure for social reproduction like affordable housing for workers, the development of road, air, and rail infrastructure, an underground drainage system, healthcare infrastructure as well as uninterrupted power supply. The industrialists planned to create project-specific SPVs with government and private partnerships to develop these projects over a five-year time frame, with total investments amounting to about Rs. 22,500 crores (~USD 32 billion). The plan essentially envisioned a Tiruppur that would be marketable to global investors consuming Tiruppur's exports.

The businessmen leading this effort had close ties to the Modi-led BJP regime. They wanted the regime to focus on Tiruppur. At the State-level, the BJP-regime allied with the incumbent ADMK regime, which has a strong base among the Gounder business community in western TN.[157] The BJP regime has been aggressive in promoting the manufacturing sector through policies like 'Make in India' that compete with Chinese hegemony in manufacturing. Tiruppur's potential to compete with China, the industrialists' close ties to the regime, and their proactive planning for economic development that resonated with the regime's neoliberal, technocratic nationalist approach were all likely important factors influencing the choice of Tiruppur as a Smart City.

[157] The Chief Minister of Tamil Nadu, Edappadi K. Palanisamy, and the Minister for Municipal Administration and Water Supply, S. P. Velumani, are from the Gounder caste and belong to the Kongunad region. In the April 2021 State elections, the ADMK regime lost to the opposition DMK regime. However, it swept most of the votes in the Kongunad region.

3.5.3. Water infrastructures in the Smart Cities Plan

The Smart City and AMRUT plans for Tiruppur included two major water infrastructure projects: the Fourth Water Scheme originally proposed through the CDP and the restoration of the Noyyal riverfront within municipal limits.

Fourth Water Scheme

TCMC contracted out preparing the infrastructure design and detailed estimates for the Fourth Scheme to NTADCL.[158] The Fourth Scheme was designed to draw about 262 MLD water (calculated at 135 lpcd per prevailing CPHEEO norms) from the River Bhavani. It was designed to cover the existing shortfall of about 47 MLD due to revised norms and projected water demand of nearly 220 MLD for the next 30 years. The entire Scheme was estimated to cost ~Rs. 1000 crores (USD 140 million), with 50% of the funding coming from the federal AMRUT scheme in the form of a grant, 20% as another grant from the GoTN, and 30% from a combination of the Smart City funds[159] and an Asian Development Bank (ADB) loan to TCMC directed through the GoTN.[160] Tiruppur's industry associations led by TEA (once again)

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[158] TCMC was obliged to appoint NTADCL as the technical planning consultant for this project as per the terms and conditions built into the concession agreement for the Third Scheme.

[159] To get Smart City funds, TCMC proposed to install digital 'smart' water meters for all connections under the 'Fourth Scheme.' This "smart-washing" technique helped the Corporation obtain an additional Rs. 29,00,00,000 for the Fourth Scheme from Smart City funds. On the ground, the Corporation's watermen and tap inspectors often laughed when I asked them about this meter. They knew that this digital meter would make no difference to tariff recovery unless water was available and consumed around the clock, i.e., 24x7. Under conditions of intermittent supply, where the total quantity of water supplied per connection was fixed and measurable, as in the present scenario, they thought that it would be easier and economical to impose a fixed, flat rate tariff.

[160] In 2018, GoTN sought ADB funding for the Tamil Nadu Urban Flagship Investment Program (TNUFIP) to develop water supply, sewerage, and drainage infrastructure in 10 cities located in strategic industrial corridors across the state. So that these industrial corridors become "world-class" and allow TN to remain competitive for foreign investment in industry, secondary cities located in these corridors, including Tiruppur, were chosen to receive funding for large water and sewerage infrastructure projects through this program (TCMC, 2019).

The ADB loan to TCMC was mediated and overseen by the GoTN's Ministry of Municipal Administration and Water Supply (MAWS), acting through a parastatal called the Tamil Nadu Urban Infrastructure Financial contributed money for purchasing land at Mettupalayam for the water treatment plant in an uncanny repetition of history. The Fourth Scheme was under construction at the time of my fieldwork in 2019. Many engineers anecdotally told me that the Scheme would take at least two-three more years to come to fruition.

In addition to augmenting the bulk water supply, TCMC also focused on building new water storage and distribution infrastructure in the added peripheral villages of the Corporation. Since the distribution infrastructure in the added villages was designed to supply water at 40 lpcd, it was insufficient for distributing the additional bulk water that the Corporation planned to obtain through the Fourth Scheme. Chapter 5 will elaborate how this mismatch between the quantity of bulk water to be distributed and the old distribution infrastructure created inequities in municipal water supply between Tiruppur town and the added villages despite the best intentions of the Corporation's water department. Closing these gaps in the frequency of municipal piped water supply between Tiruppur town and the added villages (see Table 3.1) was one of the primary objectives behind rebuilding the water distribution infrastructure.

TCMC awarded the contract for building this infrastructure to the TWAD Board.[161] This distribution infrastructure was going to cost Rs. 262 crores (~USD 375 million). It was financed by the federal AMRUT mission, with contributions from the State government and the Corporation. In rebuilding the distribution network, TCMC hoped to connect 240,000 additional households to the water supply network and increase its revenues by recovering more water tariffs. At this time, neoliberal principles of cost-recovery took root in water infrastructure

Services Limited (TNUIFSL). TNUIFSL deals with ADB on behalf of TCMC. It appraises and oversees TCMC's ability to execute the project and repay the loan. State-level control over city-level infrastructure development and service provision outcomes persists in many Indian states and is more heavy-handed in small cities and towns, despite implementing decentralization reforms in the early 1990s (Cornea et al., 2017; De Bercegol, 2017).

[161] TWAD Board. (2017). *Detailed project report for improvements to water supply distribution system to the added areas of Tiruppur Corporation*, page 2.

planning in Tiruppur Corporation. Lending institutions like the ADB enforced them. Like the bulk water infrastructure, the new distribution system was also under construction during my time in Tiruppur (See Figure 3.6). One engineer conservatively estimated that in about two to three years, when all this bulk *and* distribution infrastructure would be built, the people of Tiruppur (who possessed a household water connection) could hope to get municipal water supply once every two days as opposed to once every week.[162]

Figure 3.6 - Installation of a new distribution system for the 'Fourth Scheme'

Source: Author's photograph, March 2019.

Noyyal Riverfront Development

> Industrialist: "We used to go abroad often. We saw other cities and how good their rivers are. Every time importers came here, they used to ask, 'Why is your river like this? Why don't you take care of it?' We had a discussion and decided, 'Why

[162] Interview, Tiruppur, 27 August 2019.

> don't we do something about it?' That is how we started this group [Valam that later morphed into the Sripuram Trust]. At that point, we had completely restored the river, but in a few months [it went back to its old state] … There was no cooperation from the government. They too discharged garbage in the river."
>
> Author: So, what do you think will allow the [river restoration] project to succeed over time?
>
> Industrialist: "Now the government is spending a lot of money on this. River beautification project has been sanctioned by the State… Rs. 230-crores are allotted, I think. This is apart from the Smart City funds."[163]

The Noyyal Riverfront Development was the second major water infrastructure project proposed under the Smart City Plan. This project proposed revamping and developing the Noyyal river as a central public space in Tiruppur in ways that were palatable to international buyers, just like the industrialist envisioned in the above quote. Several industry associations and business-funded non-profits led by *Valam, Sripuram Trust*, and *Jeeva Nadhi Noyyal* had been involved in cleaning the Noyyal river for the past decade or so on an ad hoc basis. However, these groups realized that they could not address multi-scalar, systemic issues with water pollution through their one-off efforts at beautification that included de-silting riverbanks, clearing weeds and invasive plant species, or removing garbage. They knew that the government had to get involved with an integrated plan that addressed pollution control, encroachments along watercourses, and rainwater harvesting to increase water levels in the river and feeder streams. These groups continued to be involved in the Riverfront Development plan in an advisory capacity.

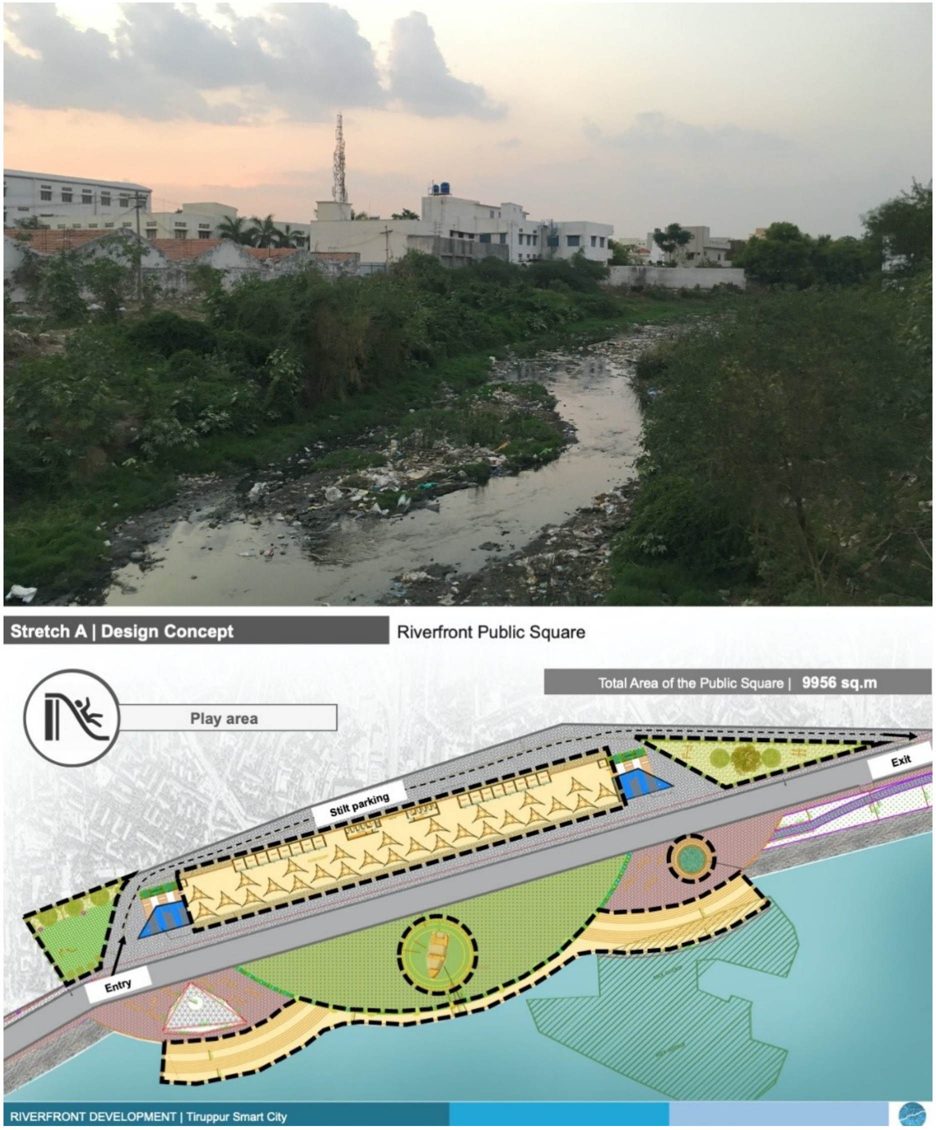
A Chennai-based planning consultancy firm called M/s Darashaw Consultants prepared the riverfront development plan for the Corporation. This plan focuses on intercepting and diverting sewage that flows into the river from different parts of the city and building

[163] Interview with a businessman involved in Noyyal River restoration, Tiruppur, 10 May 2019.

recreational facilities like parks, an amphitheater, walkways, cycling paths, and food courts along the riverbanks. The plan is silent about industrial pollution, which it hopes the State's Pollution Control Board will address. To develop the river as an "aesthetically pleasing" public space (see figure 3.7), the plan also proposes to relocate decades-old slum settlements located on the riverbanks.[164] The Corporation's plan will rejuvenate the Noyyal's watercourse within Corporation limits. The State's Public Works Department will restore the Noyyal outside Corporation limits in partnership with other State departments and civil society organizations. The Chief Minister of Tamil Nadu had allocated Rs. 230-crore for the River Noyyal Rejuvenation project, and the project commenced on 5 June 2020. Overall, the creation of an aspirational global vision for the urban riverfront (Ong, 2011) allowed the stakeholders involved—TCMC administrators, officials from various government departments, and industry elites— to feel like they were building a 'world class' smart city, even as that vision was far from being realized in practice because of the local bureaucracy's inability to operationalize a multi-sectoral, large-scale plan of this nature.

[164] TCMC had issued eviction and relocation notices to residents of riverside slums. However, it had not proceeded with evictions documented in other cities (see Coelho & Raman, 2010 for Chennai). Residents expressed no anger about the project or the impending evictions but were hopeful that this plan, too, would fail like many older promises of development in Tiruppur (fieldnotes, 14 October 2019).

Figure 3.7 - The Noyyal riverfront in 2019 (above) and a rendering of the proposed riverfront development as part of the Smart City Plan (below)



Source: *Above*: Author's photograph, July 2019. *Below*: TCMC, undated.

3.6. Conclusion

This chapter aimed to show how Tiruppur's industrial elites maintained power in the face of political-economic changes after the liberalization of India's economy, the implementation of decentralization reforms, and the Tiruppur economy's turn towards export-oriented growth by attempting to steer urban-industrial growth through spatial projects and their built-in planning processes. I traced how older collaborative relations between the elites and the multi-tiered state transformed through these spatial projects, with material implications for Tiruppur's waterscape. The chapter also followed the implementation of neoliberal reforms in urban planning and governance in a small secondary city. I analyzed how Tiruppur's governance, territory, and infrastructure plans evolved in relation to these reforms and the city's changing scale at this point.

This chapter finds that emerging planning processes, developed after the implementation of decentralization reforms and intended to bring the state closer to people, have ironically helped the industrial elites leverage their proximity to the state to script Tiruppur's urban futures. New plans developed in response to neoliberal urban development policies and grant-funding programs formulated at the national level have failed to widen the scope of participation and include other non-elite publics in planning processes. Because of the elites' structural (caste and class) power, and the many strategies through which they make their contributions to urban governance and infrastructure projects legible and legitimate, Tiruppur Municipal Corporation continues to defer to their inputs on plans for Tiruppur's urban industrial future. These informal public-private partnerships that animate the export-oriented growth machine came alive at a seemingly routine and (likely) inconsequential workshop on rainwater harvesting in July 2019. I recount the workshop briefly below.

> At the start of the workshop, the emcee introduced and welcomed a dozen industrialists to the dais one by one. I recognized most of them from our interviews over the past few weeks. After that, all attendees rose to sing the State song, Tamil thaai, to commence the workshop formally. The City Engineer welcomed the crowd and introduced the subject of the workshop – "Rainwater harvesting and water conservation." He introduced the main speaker for the evening, Mr. Sivaram, the Managing Director of Classic Polo (a famous menswear brand from Tiruppur), and the founder of Vetry Foundation, a corporate-funded NGO for environmental

protection. Mr. Sivaram walked the audience through a booklet that the Corporation had prepared on the subject and distributed to the audience at the beginning.

I noted that the audience had no working-class people—the ones who judiciously collect rainwater in buckets and drums--except for the Corporation assistants who were on duty. It was, after all, very difficult to get to the venue, an upscale banquet hall. I had to walk about a kilometer from the bus stop on the main road, which did not have a good bus service, to begin with. Students from a local government college made up most of the audience. Their professor, who recognized and greeted me, had required attendance for credit. Although uninterested in the topic, the students applauded the speakers enthusiastically. There were only a handful of women in an audience of nearly a hundred, including me. Judging by our clothing and appearance, all of us were upper-middle-class.

TCMC was conducting this workshop as part of the federal government's new scheme for water conservation, Jal Shakti Andolan. Mr. Sivaram began by stating that he had been asked to address the audience at a day's notice, and he had obliged. He started by acknowledging his industry brethren's economic and environmental contributions, referring to them as *Anna* (elder brother in Tamil). Towards the end of his 20-minute-long presentation that covered the impacts of climate change on water availability in general, the state of water resources in Tiruppur, and approaches to rainwater harvesting in dry borewells, he concluded by noting, "I aspire to see a clean River Noyyal in my lifetime […] We all, and not just the government, have to ensure the cleanliness and conservation of our water resources so that future generations can lead a healthy life […] We have to take collective action to address the issue."

Some of the 'we'--the businessmen on the dais said or did nothing (see Figure 3.8) throughout the meeting. However, they sat patiently through the entire 1.5-hour-long workshop. As I tried to make sense of this strange show of planning and power, I could not help but recollect what several of them had told me over the last few weeks, "We live in this city … We contribute to this city since we are from here. That is what pushes us." […] "Only if we pay attention to social causes, the place will thrive." (Fieldnotes, 9 July 2019).

Figure 3.8 - Industry elites and Corporation leadership at a public workshop on rainwater harvesting and water conservation organized by Tiruppur Municipal Corporation

Source: Author's photograph, July 2019.

This workshop was a glimpse into how industry elites participate even in the most banal of government initiatives like a workshop on rainwater harvesting directed at no one in particular. In turn, they use such participation to legitimize their contributions to broader civic welfare Tiruppur. The Corporation relies on elite participation (and endorsement) to justify its plans and interventions. It is a win-win collaboration, even if the process (and its outcome) is exclusive and produces no tangible benefits for Tiruppur's economy or environment. However, this mismatched partnership is not a panacea for low local state capacity for planning and service provision. Tiruppur's business-*men* (overwhelmingly male) imagine and plan futures, and expect the government to implement them. The industry's growing global reach shapes collective aspirations and imaginations. However, these imaginations are ultimately operationalized within the context of a small city bureaucracy. Their realization is equally shaped by the everyday contingencies posed by Tiruppur's material landscape, which itself is a function of its small town past. Together, these contradictions between global reach and a lack of local administrative capacity that stretch the plans and partnerships in different directions produce an incomplete and uneven municipal waterscape.

The next chapter describes how the operationalization of these future visions and plans occurs within a small city bureaucracy and landscape to analyze its effects on water provisioning and access in Tiruppur.

CHAPTER 4 – GOVERNMENT CATEGORIES AND THE STATE(S) OF WATER PROVISION

Chapter 3 described imagined futures and water infrastructure projects in Tiruppur following its integration into global textile markets and its recategorization from a Municipality to a Municipal Corporation. But the infrastructure projects to realize these imagined futures remained out-of-sync with the local bureaucracy's capacities to implement and operate these projects. This chapter focuses on these disjunctures by describing how the local bureaucracy implements infrastructure plans and operationalizes everyday service provision and water distribution across Tiruppur. I show how Tiruppur's (and the added villages') historical small scale and current big scale, as expressed in their government category, influence service provision and, therefore, the differentiated experiences of water scarcity across the city.

As we saw in Chapters 2 and 3, government categories or the political-administrative status of local governments dictate planning norms for water infrastructure design and service provision in cities, towns, and villages. The creation of Tiruppur Municipal Corporation elevated Tiruppur's political-administrative status. However, with the creation of Tiruppur Municipal Corporation, the local government now had to provide water as per the new norm of 135 liters per capita per day (lpcd) across its entire jurisdiction. In addition, it had to harmonize differences in water service frequency and duration between the old Municipality and the peripheral Village *Panchayats* to fulfill new norms and residents' desires for a higher, Corporation-level quality of life. To do so, it embarked on the Fourth Scheme to procure additional water, for which it received technical and financial support from higher levels of government. It is also building new water storage reservoirs (i.e., overhead water tanks) and laying distribution pipes in the added villages to distribute water more frequently and for a longer duration. This chapter analyzes how the local bureaucracy reconfigured municipal piped water supply operations in the old municipal area and the added towns and villages after the merger to fulfill new norms and expectations associated with new government categories. I also examine how material infrastructures from a rural past shaped these reconfiguration efforts and their outcomes.

In hierarchical local government systems like India's, government categories prescribe planning norms. They are also associated with a specific bureaucratic architecture that shapes the local state's planning and organizational capacities, impacting service delivery outcomes for residents. However, Tiruppur was recategorized just as neoliberalization imposed Statewide hiring freezes. So, the city's bureaucratic capacities for operationalizing service provision remained largely unchanged. The bureaucracy met the new "big city" or Corporation-level service delivery norms in an institutional landscape and material waterscape designed to service small towns and villages. How the Corporation bureaucracy did so and how its plans impacted water distribution and access across Tiruppur form the focus of this chapter. The findings demonstrate that paying attention to government categories, their corresponding norms, local state architectures, and practices is important for addressing inequalities in water access in small cities.

This chapter is divided into five parts. First, I briefly review the literature on the relationship between government categories and local state capacity to identify practical and conceptual questions posed by the Tiruppur case. Second, I describe the research design used to examine these questions. Third, I analyze how changes in government categories reconfigure the governance of infrastructure plan implementation and the operations of service provision in Tiruppur after the municipality's merger with the surrounding villages. In particular, this part draws attention to the role that material infrastructure and bureaucratic-institutional structures, as expressions of government categories, play in structuring governance configurations at the stage of infrastructure operations. I also describe the local contingencies and considerations that shape everyday municipal water provisioning and improvising by the street-level bureaucracy in Tiruppur. The fourth part describes how local planners and the bureaucracy cope by installing parallel non-piped water infrastructures to compensate for their inability to provide universal and reliable coverage of piped water supply to all parts of Tiruppur in the face of widespread water scarcity. Finally, the fifth concluding part reflects on the limits to recategorization and extending municipal limits by summarizing how government categories produce and maintain unevenness and differences in Tiruppur's waterscape.

4.1. Government categories and their relationships to local state capacity

Across India, the bureaucratic architecture of small cities and towns differs from those found in bigger cities. Municipalities and Municipal Corporations have different bureaucratic structures, powers and functions, and decision-making autonomy vis-à-vis the State. Large Municipal Corporations may have separate engineering departments for water, roads, drainage, planning, and specialist functions, whereas, in Municipalities, a small engineering department caters to all these different sectoral needs. Village *panchayats* are largely administered by elected leaders and have just one administrator, the *panchayat* clerk, who assists the elected council. Engineering and technical assistance are provided by regional water boards or the district administration. Corporations are not more effective at service provisioning than Municipalities or *panchayats*, but whether they utilize it or not, they have higher organizational capacity.[165] Municipal bureaucracies in small cities and towns, administered by Municipalities, usually operate under conditions of 'institutional scarcity' (Harriss-White, 2003:74). They do not have sufficient organizational resources or personnel to undertake complex tasks or implement programs requiring specialist knowledge. Their under-resourced bureaucracies are overloaded, i.e., a handful of administrators or engineers have to 'firefight' and deal with all kinds of issues, including planning, coordination, implementation, addressing complaints, intergovernmental reporting, and responding to an ethnographer's questions! They have little time, motivation, or ability to allocate for planning, coordination, or functional specialization or develop the competencies required to do so effectively. Such overload often weakens local state capacity to operationalize plans effectively (Dasgupta & Kapur, 2020). At times, it also forces them to improvise.

In States like Tamil Nadu, higher-grade municipal employees are appointed through State cadres. The Municipality or Corporation appoints lower-grade (e.g., assistants) and unskilled workers in consultation with the city council. Frequent transfers, employee turnover, and temporary secondments disincentivize specialization (Harriss-White, 2020).[166] They exacerbate the workload for more permanent staff. Many municipal administrators, engineers, and employees have little understanding of local conditions or a desire to acquire such knowledge; several do not reside in the city or town either (Harriss-White, 2020). Consequently, there is little

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[165] Much like water provisioning norms, municipal staffing norms also differ by government category. The TN State Finance Commission recommends the following municipal staffing norms per 1000 population: 3 in Municipal Corporations, 2.5 to 3 in Municipalities, and 1.75 to 1.9 in Town Panchayats (Vijayabaskar et al., 2011:55).

[166] Transfers and promotions are politically determined. I often heard rumors and gossip about the "bribe" amount that so-and-so paid to obtain a certain posting, promotion, or transfer. Since people have to repay the debts that they took on to pay these bribes in the first place, these bribes encourage additional rent-seeking.

institutional memory within the municipal bureaucracy. Informal bureaucratic practices end up substituting for institutional scarcity and bureaucratic overload. These informal practices include rent-seeking behavior by officials, government capture by specific groups, discretionary decision-making, and poor regulation of tax evasion. Informal practices exacerbate inadequacies and inequalities in service delivery (Harriss-White, 2003; Harriss-White, 2020).

Harriss-White's observations from another town in Tamil Nadu resonate in Tiruppur. Many of Tiruppur Corporation's mid- to senior-level administrators commute from small towns and villages in neighboring Coimbatore district, and each day, are eager to return home early. They know or care little about Tiruppur. Only one senior engineer seemed to know about city planning processes, water infrastructure plans, and water provisioning practices in Tiruppur Corporation. His sudden demise in 2018 meant that much embodied knowledge died with him. In interviews, Tamil Nadu Water Supply and Drainage Board (TWAD Board) engineers often remarked how municipal engineers were generalists who handled projects across sectors from roads to building plan approvals and were not well-versed with the unique technicalities or practical demands of water supply. The municipal engineer who succeeded the dead engineer was one such generalist. He was clearly stretched as he supervised contracts and plan implementation for water, roads, streetlights, and climate readiness. He relied on a friend, a retired TWAD Board engineer, to "unofficially" help him supervise the construction work for the Fourth Water Scheme. Like engineers, the Corporation administration is also stretched thin. In 2017, it recovered only about two-thirds of its property tax arrears (fieldnotes, July 2019). The Corporation administration reaches out to industry elites to raise funds for infrastructure projects, just like it did to purchase land for the Fourth Scheme's water treatment plant. It depends on elites to execute river restoration projects, build roads and bridges, and install security systems across the city. These informal donations and contributions allow elites to influence municipal planning goals and processes.

Post-liberalization attempts by the GoTN to streamline and downsize its municipal cadres for lowering salary and establishment costs have prompted many municipalities to outsource clerical and administrative tasks. Private firms supply temporary workers at a fraction of the cost and help municipalities distribute workloads more evenly. This is certainly the case in Tiruppur Corporation that has a two-tiered bureaucracy, one permanent and formal, and another temporary and shadow-like. The permanent staff has power but no competencies or motivation. In contrast, the temporary staff that reports to them is more qualified but is grossly underpaid, powerless, and ever-hopeful about becoming permanent.

Thus, the recategorization of Tiruppur provokes another set of questions about changes to its bureaucratic structure, capacities, and practices. In what ways did local state capacity and practices for infrastructure planning and service provisioning evolve in Tiruppur with its recategorization? How did the local state's relations with non-elite publics—as they form around water infrastructures—through practices for installing connections, paying/ collecting water taxes, and responding to citizens' grievances change with the recategorization and municipal merger?

4.2. Research design: Tracing changes in the local infrastructural state and waterscape across Tiruppur post-merger

The recategorization of Tiruppur Municipality up-graded its government category to that of a Municipal Corporation. The creation of Tiruppur Municipal Corporation also entailed a municipal merger. Hence, the recategorization process not only transformed norms for water infrastructures and provisioning, bureaucratic architecture and practices that plan and provide water, and the materiality of the waterscapes in Tiruppur city, but also in the added towns and villages. The nature and degree of transformations varied by city, town, and village. They had slightly different infrastructures, state structures, and provisioning practices to begin with, which corresponded to their original government categories. As I described in Chapter 1, I conducted a multi-method ethnography of the *local infrastructural state*, i.e., the assemblage of state actors, institutions, and practices that control water provisioning through different infrastructures and modes of delivery to trace these transformations and interrogate how government categories matter in practice.

I conducted ethnographic research in three *hydraulic zones* (cf. Bjorkman, 2015) across Tiruppur: one each in the old municipal core of Tiruppur, a third-grade municipality, and a village ***panchayat*** that was merged with Tiruppur Corporation in 2011. A hydraulic zone corresponds to the geography serviced by a single elevated water reservoir, also known as an overhead tank (or OHT) in the city's water distribution network. Administratively, the operations of water supply in a single hydraulic zone are handled by the same Tap Inspector who supervises a group of Watermen who operate and maintain the distribution system that supplies water to public and private water connections in the hydraulic zone. Material conditions like the storage capacity and elevation of the reservoir, the characteristics of the distribution network, the population that it can serve, and the neighborhood's topography create variations in hydraulic zone sizes or their boundaries. The boundaries of hydraulic zones may or may not correspond with the boundaries of administrative wards, the smallest unit of municipal administration in an Indian city.

There are considerable differences in the sizes and capacities of elevated water storage reservoirs and distribution networks across the city-town-village transect in Tiruppur because the norms for water provisioning vary by village, town, and city. Consequently, there are differences in hydraulic zone sizes across Tiruppur Municipal Corporation. However, I sampled the three hydraulic zones such that they were all located within a single administrative ward of the Municipal Corporation. This made it easy to obtain and compare ward-level demographic indicators wherever necessary. Throughout the chapter, I refer to the three selected hydraulic zones by their pseudonyms as City Nagar (old municipal core), Town Nagar (merged third-grade municipality), and Grampalayam (merged village *panchayat*).[167]

4.3. Reconfigurations in water infrastructure design, implementation, and operations after the creation of Tiruppur Municipal Corporation

This section first focuses on changes to bulk water infrastructure planning at the Corporation (city) level. Next, I zoom in to the hydraulic zones to analyze how state structures and everyday practices for operationalizing water distribution transformed at the 'street-level' after the recategorization and merger in City, Town Nagar, and Grampalayam.

4.3.1. Planning bulk water supply at the Corporation level after the merger

With the creation of Tiruppur Municipal Corporation, the municipal administration now had to adhere to new norms for water provisioning. As noted earlier, it had to raise the per person

[167] The actual zones themselves were sampled based on convenient access to informants. However, interviews with informants in other parts of the city reveal that the observed patterns hold in other core/merged areas. For reasons of confidentiality, I use pseudonyms for the names of selected neighborhoods and respondents.

quantity of water supply to 135 lpcd across the Corporation. This requirement created a shortfall of about 47 to 50 MLD in the bulk water available to the Corporation from all three municipal water supply schemes. Rapid population growth in the added villages also meant that there would be a growing water demand from these localities in the future. The total quantity of water available from the existing schemes would be insufficient to meet this demand.

In addition to increasing the quantity of water supplied per person, the Corporation also had to ensure parity between the old municipal core and added areas in other water supply indicators. For example, the frequency of water supply in the added village (Grampalayam) had to be raised from about once in 8 - 10 days to once in 4 – 5 days to match the supply frequency in the old municipal core (City Nagar). Further, residents and their elected leaders in City Nagar now wanted water supply frequency to be raised to once every day or every other day, as was common in other large Corporations across the State. In interviews, administrators repeatedly stressed that they strived to ensure that the duration of municipal water supply was equitable across the entire Corporation.

As noted in Chapter 3, to meet this additional water demand and harmonize service levels between the urban core and added areas, the Corporation launched the Fourth Water Scheme. Since plans and finance for the Fourth Scheme took a while to put together, and as the construction is still ongoing, the Corporation administration resorted to buying about an additional 50 MLD water from NTADCL (i.e., the Third Scheme) in the interim.[168]

This additional water purchase imposed massive costs on the Corporation administration, which it struggled to recover from water users through taxes or user fees. In 2019, Tiruppur

[168] The GoTN had committed to this purchase on behalf of the Corporation as part of NTADCL's corporate debt restructuring plan (see Chapter 3, pp. 109-111).

Corporation paid Rs. 11.54 per kiloliter for the 38 MLD water originally allocated to Tiruppur Municipality through the Third Scheme. It paid a little more than double that amount, i.e., Rs. 26.23 per kiloliter for the additional 50 MLD that it bought after the creation of Tiruppur Municipal Corporation.[169] Effectively, Tiruppur Corporation spent an additional Rs. 2,75,000 - 3,00,000 (USD 4000) each day to buy water from NTADCL.[170] Tiruppur Municipal Corporation's elected council approved the purchase of this additional water to improve water supply across the entire Corporation. However, they did not agree to increase water taxes or user fees to finance this purchase. Older water connections in the added areas continued to pay pre-merger water tax rates that they were grandfathered into even if they consumed the same quantity and quality of municipal water as the new connections.[171] For these reasons of high purchase costs and little-to-no cost recovery, the Corporation struggled to pay its water bills each month. Ironically, the solution for its high water bills was the construction of a new municipal water supply scheme. Tiruppur's newfound Corporation status made it eligible to receive funding from the newly launched national urban renewal programs to build this new water supply scheme.

In 2019-20, Tiruppur received about 118 MLD water from all three water schemes (the First, Second, and Third), including the additional 50 MLD purchased from NTADCL (TCMC, 2019) that it supplied to residents across Tiruppur. However, this 118 MLD water fell short by 32 MLD (or the water requirement for nearly 230,000 persons at the rate of 135 lpcd) to fulfill Tiruppur's projected water demand of 150 MLD in the year 2020. A desire to augment the city's

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[169] Data obtained from TCMC files, July 2019.

[170] The Corporation's projected income for 2017-18 was about Rs. 40,00,00,000 (~USD 5.5 million) (TCMC, 2017). This expense on the additional water ate up nearly 26.5% of the annual income.

[171] Interview with TIRENG11, Tiruppur, 19 December 2019.

total bulk water supply to mitigate water shortfall and achieve it at a lower cost motivated the Fourth Scheme.

New approaches to water infrastructure planning with the Fourth Scheme

Tiruppur's First, Second, and Third Water Schemes were planned and executed by the TWAD Board and NTADCL. The local government, i.e., Tiruppur Municipality, only handled the everyday operations of water supply and water distribution to the end-user. However, the newly formed Tiruppur Municipal Corporation had to assume responsibility for planning, executing, and operating the Fourth Water Scheme, a large water infrastructural system. Additionally, it had to continue to plan the distribution of water supply from the first three schemes to water users across the city.

Although the scope of municipal water infrastructure planning changed with recategorization, and the Corporation received additional grants from the State and national governments to execute the Fourth Scheme, its human resource and technical capacities did not increase in tandem. When Tiruppur Municipal Corporation was created, there were no engineers in the added areas that comprised nearly 80% of the new municipal area and about half the Corporation's population. So, the merger did not strengthen Tiruppur Municipality's engineering department even as it extended the area and population that the department had to serve. No new engineer positions were created either. The 20 full-time engineers who work for Tiruppur Municipal Corporation were employees of Tiruppur Municipality who transitioned into their present roles with municipal recategorization. They had previously rotated through other small municipalities across the State. However, they had no prior experience of working in and planning for a Municipal Corporation. In the past, these engineers were largely involved in day-to-day water infrastructure operations and maintenance, not their planning or implementation. In addition to water supply, these engineers also attend to other engineering needs in the city like roads, transportation, drainage, streetlights, building plan approvals, and other construction or building maintenance tasks. Hence, they outsourced the planning and implementation of the Fourth Scheme to other specialist agencies.

Planners from these specialist agencies are not attentive to Tiruppur-specific needs or conditions. They fit off-the-shelf engineering blueprints within Tiruppur's context. For example, plans for the Fourth Scheme do not mention or address the Corporation's dependence on borewell water as a source. They also do not count the floating or migrant worker population in the city in their calculations. These migrant workers constitute at least a fourth of Tiruppur's population.[172] Population projections follow the same approach within these infrastructure plans, whether it is a growing city like Tiruppur with an influx of migrant workers during textile export seasons or a stagnant small city. Thus, the Fourth Scheme's plans do not reflect existing water availability or use practices, neither do they estimate population and water demand accurately. Through their omission of certain populations, the plans inscribe inadequacies and inequalities into the waterscape. In part, the Corporation engineers' inability to plan or inform the planning process in ways that respond to local needs contributes to these inequalities. Thus, the Corporation's inability results from a combination of incompetency, institutional scarcity, and bureaucratic overload.

The recategorization of Tiruppur Municipality to a Municipal Corporation helped it qualify for many intergovernmental grants for urban infrastructure development. These grants

[172] Migrant workers were first registered and surveyed (likely not thoroughly) during the COVID-19 lockdowns in Tiruppur.

introduced neoliberal logics in water-sanitation provision. As a pre-condition for receiving these grants, Tiruppur Municipal Corporation (hereafter TCMC) had to adopt technologies and meet benchmarks for service levels (e.g., minimum service coverage, per capita supply levels, duration, and frequency of supply, or cost recovery) prescribed by national or State funding agencies (and their donors).[173] Usually, these benchmarks tend to be skewed towards neoliberal logics of efficiency and cost recovery over equitable distribution (Carolini & Raman, 2021). Nevertheless, they change local state practices for service provision, with material implications for water users.

To convince TNUIFSL and ADB of its loan-repayment ability and become eligible for State support, TCMC embraced neoliberal logics of water provisioning like increasing coverage, raising water taxes, and reducing losses from non-revenue water. However, differences in the local state's historical structures and capacities across the urban-rural transect within Tiruppur meant that these neoliberal logics got applied unevenly across Tiruppur Municipal Corporation. I describe these logics and their implementation below.

1) *Increasing coverage* - The Fourth Scheme required that the Corporation extend municipal water coverage to 100% of the population. However, municipal engineers sought to cover 100% of the tax-paying properties alone, not the entire population. This logic excluded large sections of the city, primarily low-income residents, living on rent in informal housing that is not assessed for property taxes. Because the ownership of a water connection is linked to a property tax receipt, tenants and those living in informal housing without property tax documents cannot

[173] Details about these service-level benchmarks and how Indian cities may attain them are outlined in manuals like the Ministry of Urban Development's Handbook of Service-level Benchmarking (MoUD, 2010).

apply for or own a municipal water connection independently. The Corporation administration is stricter in enforcing the property tax receipt requirement as a pre-condition for obtaining a water connection in the post-merger period. These new 'rules' seek to disrupt elected leaders' informal practices in the added villages.

Before the merger, Grampalayam's residents could obtain a water connection for about Rs. 2000 to Rs. 4000 (~USD 70). They could even get one without a property tax receipt since connections were approved by the *Panchayat* President, an elected official.[174] He approved connection applications without proof of property ownership or tax payment as an act of political patronage. Following the merger, connections are now administered by Tap Inspectors and Assistant Engineers from the Corporation's water department through a computerized system. The administrators now require "proper" property tax and property ownership documents, including proof of building plan approval for a house located in a planned layout.[175] They also require all property owners to implement some form of rainwater harvesting on-site. A person possessing multiple property tax receipts for a property (done by subdividing the property into multiple assessments) can purchase a water connection for each of those property tax receipts.[176] The initial deposit for a water connection in the Corporation, Rs. 5000 (USD 70), is also prohibitively expensive for working-class families. It is nearly double the rate of a water

[174] Interview with Watermen TIRENG19, 4 December 2019.

[175] Not all property owners possess building plan approvals. Several have built homes on farmlands that they did not convert into 'urban' uses by seeking permission from the Local Planning Area office. The costs for obtaining building plan approvals are very high. It can cost Rs. 50,000 for a 2000-square feet property if one includes bribes and other processing fees. In contrast, the penalty for not having such an approval is a maximum of Rs. 1000 annually. Consequently, many homeowners prefer paying the penalty (if they pay taxes at all) to get a property tax receipt, and subsequently, a municipal water connection (Interview with a TCMC tax collector TIRADM05, 6 December 2019). Some large landlords ask their tenants to buy drinking water and provide borewell water on-site to avoid the upfront and monthly charges of obtaining a water connection.

[176] Since Tiruppur's municipal water supply is intermittent and inadequate, many upper middle-class property-owning residents purchase multiple water connections to attain drinking water sufficiency.

connection in a village *panchayat*. Compliance with the documentary conditions required to get a water connection adds additional costs.

For residents and their councilors in the added villages, the quality of municipal water service or the quantity of water received has not necessarily doubled. Neither are they equal to service levels in the old municipal area to warrant these higher connection rates. They desired "town-level (town referring to Tiruppur city) services for town-level charges." Hence, people who do not want to pay these higher rates have adopted several strategies to circumvent water connection costs. They buy bottled water for drinking and have installed private borewells for all other uses. The most disadvantaged are working-class tenants who are structurally excluded from owning a water connection. Their either share water connections with their landlord or neighbors, fetch water from a public tap, or buy water from private vendors. The Fourth Scheme was an opportunity to address these underlying inequalities in water access based on property ownership. But it did not do so.

2) *Cost recovery* - To assure TNUIFSL and ADB of its cash flows and debt-repayment capacity, TCMC also had to raise water tariffs to recover costs. It raised tariffs to Rs. 200 (~USD 3) per month for every 10,000-liters consumed per connection. However, the elected council, especially councilors representing the added villages, had vehemently resisted any water tariff hike since the merger. Hiking water tariffs (or any local taxes) was a highly politicized issue in Tiruppur. Across party lines, many politicians claimed political credit for blocking tax hikes. In July 2018, I attended a public meeting organized by a local branch of the Leftist CPI(M) party, where the speaker, a party worker, proudly proclaimed,

"In 2016, the Tiruppur Municipal Corporation administration planned to raise water

> taxes from Rs. 600 per annum to Rs. 2400 per annum. To prevent this increase, we gathered thousands of people and organized a protest in front of the Corporation building. Despite having only one CPI(M) councilor in an ADMK dominated council, our protest was successful in halting this increase."[177]

Another ex-councilor in Grampalayam from the ADMK party expressed a similar sentiment by stating,

> "They want to increase the tariff six times, from Rs. 30 per month to Rs. 200 per month. This is unreasonable! They should raise it gradually, in increments"[178]

Some street-level bureaucrats also felt that a lower tax rate for the added villages was justified because they received a less frequent water supply.[179] However, in 2017, the Corporation administration approved the tariff increase on paper only to obtain the ADB loan. They took advantage of the fact that the State had not conducted elections in urban local governments since 2016. The State had entrusted the Corporation administration with everyday governance and decisions. I asked the engineer overseeing the Fourth Scheme if Rs. 200 would allow for full cost recovery to meet debt service obligations. He retorted sharply, "Water supply is not for profit. It is a ***service*** to the public" (his emphasis).[180] Although the Corporation administration adopted neoliberal logics on paper, these logics were yet to penetrate everyday practices of water supply and provisioning. A welfarist 'service' sentiment from an earlier Keynesian era combined with the fear of a political backlash prevented the Corporation administration from enforcing the revised tax rates in practice to meet its bill repayment and debt-service obligations.

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[177] Fieldnotes, 20 July 2018.
[178] Interview TIRPOL10, Tiruppur, 20 December 2019.
[179] Interview with a Tap Inspector TIRENG14, Tiruppur, 17 July 2019.
[180] Interview with TIRENG11, Tiruppur, 19 December 2019.

3) *Reducing leakages* - As is typical of many neoliberal urban water infrastructure projects, the Fourth Scheme also aimed to reduce losses and leakages from leaky pipes, illegal connections, overflows, and non-revenue water, i.e., subsidized or free water connections to maximize its revenues. To reduce unaccounted for 'leakages,' the Corporation stopped installing free public water taps after the Third Scheme.[181] With the Fourth Scheme, municipal engineers started shutting down existing public water taps. It decommissioned one round-the-clock, 24x7 free public tap in Town Nagar. A local leader from the CPI(M) party opposed this move. He assembled a crowd in the ward-level municipal office and threatened to stage a roadblock should the Corporation fail to restore the tap. Engineers cited infrastructural breakdowns at the water source in Mettupalayam to placate these protestors, hoping that their anger would dissipate over time. Over the next few days, as people switched to other sources and infrastructures to cope with this closure, the protest fizzled out. There was no roadblock, but neither was the tap restored.[182] These surreptitious administrative moves of decommissioning taps and the localized nature of the protests in response prevented any collective questioning of the neoliberal logics underlying new infrastructures.

Like bulk water infrastructure planning, everyday water provisioning also changed after the creation of Tiruppur Municipal Corporation. Changes in water provisioning norms and local state structures and practices interacted with material constraints, population growth, and local contingencies to influence water provisioning after the merger.

[181] Interview with a former State Assemblyman (MLA) TIRPOL02, Tiruppur, 25 July 2017.
[182] Fieldnotes, 6 November 2019.

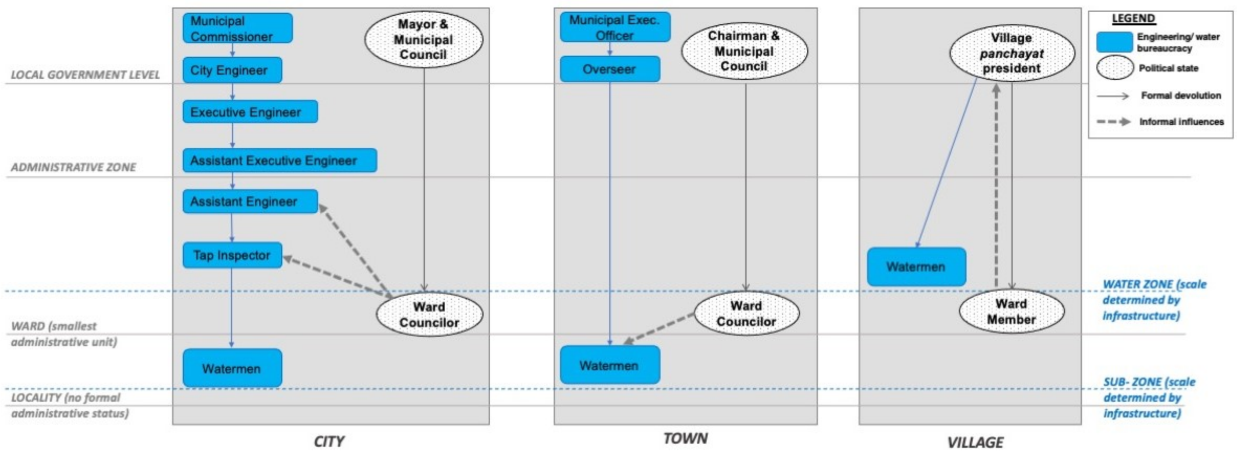
4.3.2. Operationalizing water provision across Tiruppur after the merger

The previous section analyzed how TCMC attempted to obtain additional bulk water to address a growing water demand and the experiences of water scarcity in the city. This section examines how the Corporation planned the distribution of this additional bulk water across the old municipal core and merged areas to alleviate scarcity. As noted in Chapter 3, the Corporation started revamping water distribution infrastructures in the added areas as part of the Fourth Scheme. This upgrade was necessary to address the material constraints posed by these old infrastructures.

The merger also transformed the local state architecture involved in operationalizing everyday water distribution in the added towns and villages. The state structure did not change in City Nagar after the merger. Watermen, who operate the valves that divert water flows from water tanks to household connections, continued to form the point of contact between water users and the local infrastructural state in towns and villages. However, they now reported to Tap Inspectors and Assistant Engineers in the municipal bureaucracy, as was the case in City Nagar. As noted earlier, elected councilors no longer approved connections to the municipal piped water network in villages. Neither did they control watermen's actions or water supply schedules as they did before the merger (see Figure 4.1 for a schematic representation of the local infrastructural state before the municipal merger). However, councilors continued to oversee the day-to-day management of parallel water infrastructures, i.e., the decentralized municipal borewell networks in their respective wards (more on this in Section 4.4). These changes in local state architecture did not affect the frequency, timings, and duration of water provisioning, which was largely shaped by the material constraints posed by water storage and distribution infrastructures and the local state's, especially the street-level bureaucrats'—the watermen's—

attempts to improvise in the face of these constraints. However, changes in the state structure affected how residents accessed the local infrastructural state to seek redressal for their problems with municipal water supply.

Figure 4.1 - Local state architecture across the city-town-village transect before the merger



<u>*Material constraints underlying the frequency of municipal water supply*</u>

Before the municipal merger, elevated storage reservoirs or overhead water tanks (hereafter OHTs) in the added villages had low storage capacity. They could only hold 10,000 to 100,000-liters of water compared to OHTs in Town Nagar (the merged third-grade municipalities), which stored 3,00,000-liters each at a time, or the ones in City Nagar (in Tiruppur City) that could store about 10,00,000-liters each. The village OHTs also had a smaller staging height or the height of stored water above ground level. Since water pressure is a function of staging height in gravity-fed water infrastructures, these small-sized village OHTs could not service many water connections at a time without compromising pressure at the tail end of the pipe. These villages have small OHTs because the CPHEEO norms that I referred to earlier did not require them to supply large amounts of water per person per day. Further, under these norms, village ***panchayats*** could supply water through public taps eliminating the need for investments in expensive, higher-capacity water distribution pipes. But how did these low-capacity tanks and pipes impact municipal water supply once the villages got absorbed by the city?

Driving out of Tiruppur's urban core to the peripheries on the highways that radiate outwards from the city center, one can barely register morphological differences in spatial density, built form, or land use as one crosses the historic, invisible local government boundaries dividing city, town, and village. However, these historical boundaries have produced their distinct physical water infrastructures, manifest in differently sized OHTs, water storage capacity, and distribution networks in city, town, and village. These infrastructures introduce distinct material constraints, which influence how the street-level municipal bureaucracy improvises to provide adequate, frequent, reliable, and equitable water supply in their respective hydraulic zones. Material constraints matter across the urban-rural transect, but they matter to different degrees in City Nagar, Town Nagar, and Grampalayam.

City Nagar, the neighborhood within Tiruppur's urban core, had the highest frequency of municipal water supply of all the study neighborhoods before and after the municipal merger. Water was supplied once every 4 days. In part, this was because of its high-capacity storage reservoir, a 10,00,000-liter OHT built in the early 1990s under the Second Scheme. When it was first built in 1995, this storage system served about 15 sub-zones, with each sub-zone comprising approximately 30 to 50 household water connections. The watermen recalled supplying water once every two days. However, increasing population meant more connections and more sub-zones. As watermen retained the duration of supply (1.5 hours), it took much longer to service all sub-zones one after another. Consequently, the frequency of water supply gradually reduced to once every 4-5 days.

The storage capacity increased to 35,00,000-liters at City Nagar with the arrival of the Third Scheme in 2005, when Tiruppur Municipality added additional underground storage sumps. Mahesh, the Tap Inspector for this area, explained why the City Nagar tank could supply water more frequently after the Third Scheme --

> "After the Third Scheme, we could refill the OHT four additional times each day, which meant that we could supply water to more sub-zones each day. As more areas were serviced every day, the interval between two consecutive supplies to each sub-zone decreased, and the frequency of water supply increased. Water is now supplied once every 4-5 days for 1.5 hours each time. Slum areas receive water once every 2 days [because] they do not have similar in-house storage infrastructure."183 He clarified, "The formation of the Municipal Corporation did not make any difference to water provision planning here [in City Nagar], but the Third Scheme definitely helped to alleviate water scarcity."184

I asked Mahesh and the watermen if the additional water purchased through the Third Scheme after the municipal merger had helped to increase water supply frequency. The watermen clarified that the supply frequency remained unchanged as the population had also increased beyond what the distribution infrastructure was originally designed to serve.

> "Initially, there were 15 valves (sub-zones) in 1995, and now we are at 65! The tank at [another area] services 13 sub-zones in City Nagar since the water in this tank is simply not enough," one of them explained.[185]

Overall, incremental increases to bulk water availability had reduced supply frequency in City Nagar, but it did not change water distribution practices ***within*** the hydraulic zone. Everyone got additional water and received it more frequently. However, the logics guiding the administration of water connections, the duration of supply, and the redressal of complaints remained as they were before the merger. Older inequalities in water access based on property

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[183] Some slums, located on an elevation and not connected to the pipe network, receive water through water trucks that operate on contract for the Municipal Corporation.
[184] Interview with Tap Inspector TIRENG06, Tiruppur, 17 July 2019.
[185] Interview with watermen TIRWO06, Tiruppur, 27 December 2019.

ownership, tenancy, and migration status persisted. Despite its once in 4-day supply frequency that seemed unlikely to change in the near future, City Nagar fared much better than Town Nagar and Grampalayam.

Town Nagar is located about 8 to 10-km away from City Nagar. Until about a decade ago, Town Nagar was part of a small, third-grade municipality merged with Tiruppur Municipal Corporation in 2011. Town Nagar faced higher growth pressures compared to City Nagar. Many houses, shops, eateries, and buildings were built, torn down, and rebuilt within a square-mile radius of this neighborhood through the 11-months of my fieldwork. Farmlands were being converted into houses, apartments, and tenements to accommodate a population that was officially growing at 9% per annum (Census of India, 2011), and in practice, at a much higher rate. This dizzying growth demanded more water than what an over-stretched infrastructure and municipal bureaucracy could satisfy.

Before its merger with TCMC, the 3,00,000-liter capacity OHT in Town Nagar supplied water to a total of about 1500 household connections and a handful of public taps once every 9-10 days. The arrival of the Third Scheme helped to alleviate water scarcity in Town Nagar. Since water supply frequency increased, more residents felt encouraged to buy an individual household connection. Town Nagar's bureaucracy also tried to increase its share of "fee-paying" connections to recover the costs of procuring bulk water from NTADCL. Despite these expansions, municipal piped water did not cover 100% of the population. After the merger, Town Nagar started receiving additional bulk water through the Third Scheme. Town Nagar's watermen were able to increase the frequency of municipal drinking water supply. They now supplied water once every 6-7 days for 1.5 hours. They estimate that the Fourth Scheme's additions: new water storage reservoirs and distribution pipes will further increase the frequency of water supply. However, it was unlikely that they could supply water every day even after this infrastructural upgrade.[186]

As in City Nagar, more bulk water and higher frequency supply did not necessarily address inequalities in access. After the merger, the total quantity of water that a household connection receives in a month has remained roughly the same. But a more frequent supply means that residents store less water each time. They also store water for shorter durations. This helps reduce the incidence of diseases like dengue as mosquito larvae breed in stagnant water.[187] Increasing coverage of piped water supply and a more frequent municipal supply has helped improve water security perceptions among Town Nagar's residents. Everyone I spoke to noted that they were now better off than in the past and compared to residents in many other water-stressed parts of Tiruppur District.[188]

Grampalayam is an urbanizing village located about 12 to 15-km away from Tiruppur's city center. It forms part of a larger village *panchayat* that was merged with TCMC in 2011. The *panchayat* continues to bear traces of its agrarian past in the form of scattered coconut farms (*thottams*), farmlands demarcated into housing plots and narrow mud roads that are unnavigable after a mild rain shower. This *panchayat's* political leadership, too, continues to be rooted in its agrarian past. It remains in the hands of the same Gounder clan that has historically owned large tracts of land and overseen governance in the village for multiple generations. With

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[186] Interviews with watermen TIRENG17, a bill collector TIRADM05, and a former town engineer TIRENG19, Tiruppur, November-December 2019.

[187] Dengue was widespread during my fieldwork. Municipal nurses would routinely enter housing compounds and toss stored water out of drums if they suspected larval or microbial contamination. They would also add disinfectants to water drums to prevent larval growth. All watermen acknowledged that everyday water provisioning would eliminate the need for prolonged water storage and prevent dengue. However, they noted that their distribution practices were constrained by the unavailability of adequate bulk water and the limitations of the storage and distribution infrastructure in their neighborhood.

[188] The water and waste calendar survey, 2019.

the merger and the dissolution of the *panchayat*, the *panchayat* president transitioned into his current political role as a ward councilor in the Tiruppur Municipal Corporation council. Grampalayam's water storage and distribution infrastructure were built between 1998 and 2004 to distribute the Second Scheme water. During our meeting, Muthu and Vijay, the watermen for Grampalayam, pointed out the various OHTs in Grampalayam and noted their year of construction by recalling the *panchayat* president who installed them. The largest of these tanks had a storage capacity of 100,000-liters, which was about a tenth of the storage capacity in City Nagar. The smallest of these tanks had a capacity of 30,000-liters. It could only supply 15-30 connections at a time, which meant it had to be refilled often, affecting supply frequency. Vijay explained the math to me,

> "We assume that one household connection can fill 1000-liters water at a time (for every 2-hour supply) at this pressure. So, if 15-30 connections are supplied at a time, the [30,000-liter] tank will empty and must be refilled again. This [refilling] takes an additional three hours, at which time I switch to supplying water from another tank in the neighborhood. I am constantly hopping around. […] Even if I work day and night, it will take me at least 5-6 days to cover all the valves (sub-zones) in my area."[189]

Vijay's account suggests that under ideal conditions with continuous operations, the infrastructure linked to one small 30,000-liter tank could only serve a maximum of about 150 connections (or its equivalent) per day. Additional delays occurred if the pumping infrastructure broke down or a power cut, which was not uncommon. Both Vijay and Muthu recalled there being an acute bulk water scarcity until 2008, following which the arrival of the Third Scheme helped alleviate some water stress. After the Third Scheme, the *panchayat* council incrementally extended distribution pipes to serve new connections and neighborhoods.

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[189] Interview with watermen TIRENG20, Tiruppur, 4 December 2019.

However, high population growth outdid any efforts to extend coverage or improve supply frequency.

Between 2001-11, the population in Grampalayam grew at the rate of 22% per annum. Tiruppur's residents got pushed to the peripheries like Grampalayam due to land shortage and rising rents in the city center. The number of household water connections in Grampalayam also grew exponentially. They rose fivefold from about 300 in 2005-06 to nearly 1500 in five years, straining the storage and distribution infrastructure designed to supply a much lower quantity of water to a smaller population.

After the Corporation's formation and the increase in bulk water allocations from the Third Scheme in 2012, there was a slight improvement in water supply in Grampalayam. Vijay and Muthu were able to supply water more frequently, i.e., once every 6 to 8 days. The increasing number of connections, the unchanged low-capacity distribution infrastructure, and low state capacity prevented them from improving the frequency and duration of supply any further. After the merger, no new watermen were recruited to reduce Vijay and Muthu's workload. The Corporation added additional layers of bureaucracy in Tap Inspectors and Assistant Engineers who supervised daily operations of water supply. A municipal councilor explained how the historical geographies of the physical infrastructure and the local state interacted to slow any attempts at improvement in the added areas by stating,

> "There is more to do in the added areas. Each waterman has to operate a larger number of gate valves attached to smaller tanks that are all sprawled out. (Tanks are sprawled out because villages were sparsely populated in the beginning). In the Corporation, the tanks are large, located in one site, and a single waterman covers a dense and compact area."[190]

[190] Interview with a former councilor TIRPOL03, 26 July 2017.

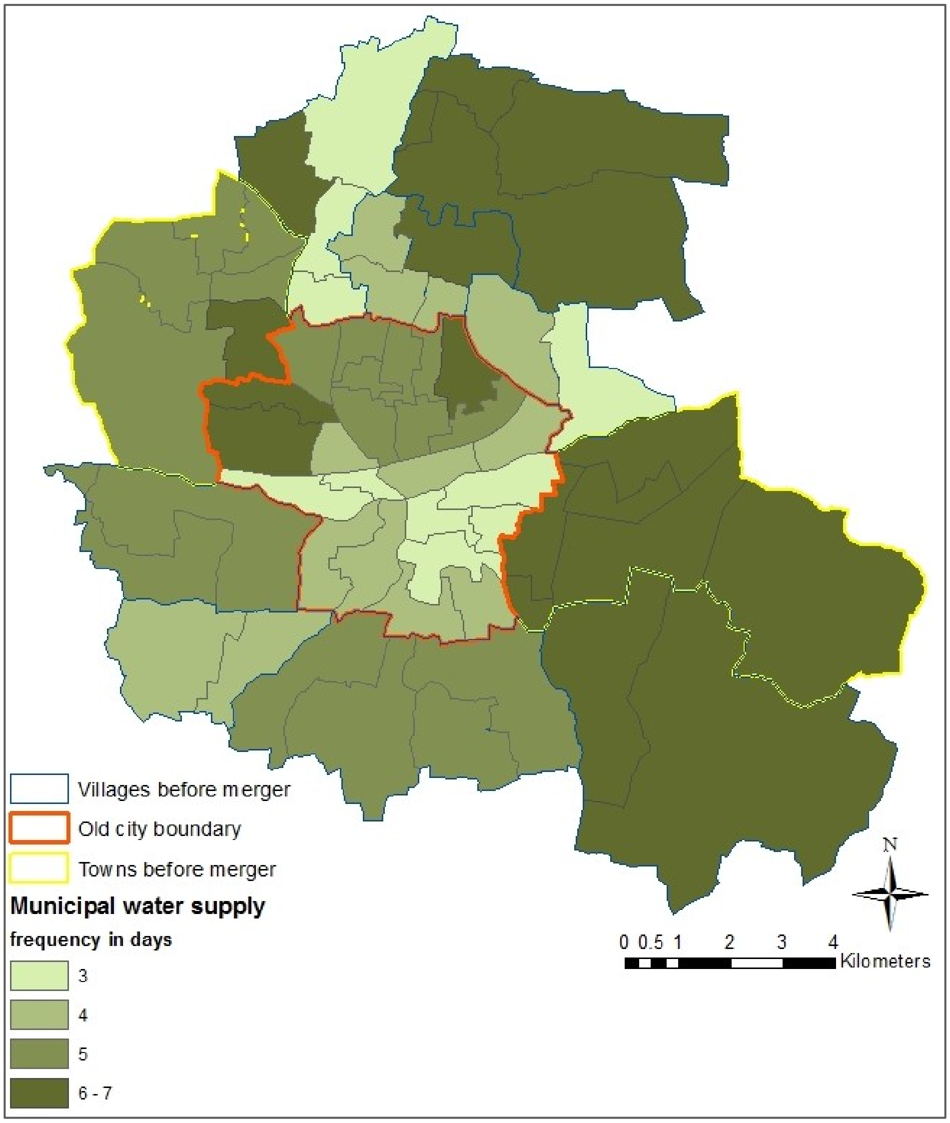
Like City Nagar and Town Nagar, water distribution improved in an aggregate sense post-merger as manifested in a higher supply frequency. However, underlying inequalities in access based on tenancy arrangements remained unaddressed. Despite the slow pace of improvements, Grampalayam's residents and watermen felt that their *panchayat's* merger with Tiruppur Municipal Corporation had improved service provision --

> "We are in a much better situation than some nearby villages (not part of TCMC). They do not get water at all! Because of the Corporation, we have more *Adhikari* (administrators) who work to deliver better services. We now have Second and Third schemes, and the 'Fourth Scheme' is also under construction. So, we are better off."[191]

Although the creation of the Municipal Corporation and the subsequent municipal merger helped improve water availability and supply frequency in the added areas, differences between city, town, and country persist (see Figures 4.2 and 4.3). They are inscribed in the waterscapes of these areas in the form of distinct physical infrastructures and street-level state structures that serve these areas. These differences create material constraints that produce variations in water provisioning practices along the urban-rural transect. The next section describes how the street-level local state, the watermen, learn from practice and improvise to overcome these constraints and respond to local contingencies to lessen residents' experiences of water scarcity.

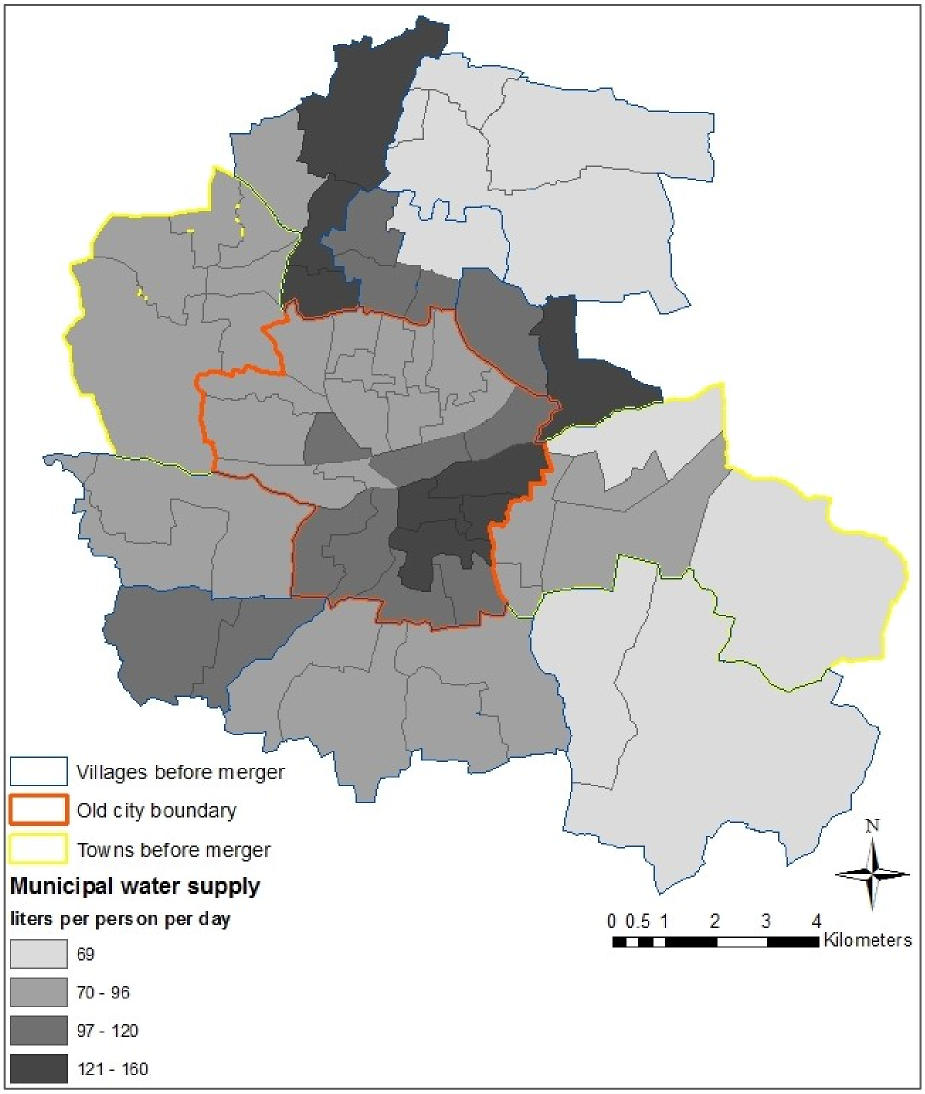
[191] Interview with a waterman in one of the added villages TIRENG12, 5 May 2019.

Figure 4.2 - Ward-wise frequency of municipal water supply in Tiruppur Municipal Corporation in 2019.



<u>Source:</u> Prepared by the author using data obtained from Tap Inspectors in 2019.

Figure 4.3 - Ward-wise quantity of municipal water supplied in Tiruppur Municipal Corporation (litres per person per day) in 2019



Source: Prepared by the author using data obtained from Tiruppur Municipal Corporation in 2019.

Improvising and responding to local contingencies

The above section illustrated how water supply frequency in Tiruppur is a function of tank capacities, the number of valves (sub-zones) linked to a tank, and the duration of water supply. The watermen, tap inspectors, and engineers decide the duration of water supply. It is, thus, easily alterable relative to other things and material obduracies. But the local state is reluctant to tinker with water supply duration for the reasons I detail below.

Water supply duration and schedules

Across city, town, and village, the duration of water supply is usually 1.5 to 2 hours. The maximum duration is 3 hours in one of the added villages where municipal water is supplied only once every 15 days. I asked watermen in city, town, and village if the duration could be reduced to increase supply frequency. Their responses reveal the material and socio-political considerations and the watermen's embodied knowledge (Friedmann, 1987) that underlie the design of water supply duration and schedules.

> Author: So, if you reduce the duration to, let's say, half an hour, then the gap between two consecutive supplies to any one area would reduce, right? Then all areas can get water every day or every alternate day.
>
> Waterman Pichai (City Nagar): We did experiment once. We supplied water for one hour every 2 days, instead of for 2 hours every 4 days. But we received so many complaints… You see these compounds have just one connection and many tenants. Each tenant could fill just 2-4 pots of water. It was chaotic! The councilor also called us…
>
> Author: But 2-4 pots would be enough for a day?
>
> Waterman Pichai (City Nagar): Then they would have to queue up and fight every day instead of once every 4 days. (Everyone laughed) [In that small span of one hour], some households may not get a chance to fill water at all! … These [water-deprived] households complained, and the issue became political. So, we reverted to our old system. Now, each household can fill 8-10 pots of water and get by with stored water till the next supply."[192]

[192] Interview with watermen TIRWO06, 27 December 2019.

Waterman Pichai's explanation revealed how supply times are calibrated with publics' collection practices, which present their unique material and organizational constraints. Working-class tenant families store water in a wide range of discrete containers like plastic and metal pots, plastic drums, vessels, buckets, pitchers, and plastic and concrete storage tanks that occupy every nook and corner of their homes. Collecting and storing water in a large number of small containers is time-consuming, physically exhausting, and emotionally draining, especially if the stored water has to be covered carefully to prevent microbial contamination and budgeted judiciously to make it last till the next supply. Most informants told me that they washed their containers and drums before collecting water each time to eliminate algal growth or any microbial contamination, which added a few more minutes if not hours to their water collection efforts. In many cases, working women took half a day off when municipal water was supplied to complete all these water-related chores. Compared to these efforts, the practice of collecting water in a single, large, covered underground tank that serves an overhead tank and indoor plumbing system is very easy. In this latter case, it would not make a difference if water was supplied every day for half an hour or once a week for two hours. The resident or tenant does not need to be present to collect water either.

The challenge of water collection and storage in discrete containers becomes complicated when multiple tenants and neighbors must coordinate with each other to ensure equal water sharing (or share water proportionate to their monthly rents). In the dozens of compounds where we conducted interviews for the *water and waste calendar* survey (see Chapter 5), landlords and tenants had devised rules for water collection. There were rules for the number and sizes of containers that a single household could fill at a time or the amount of time that a household could collect water at the tap so that every household would get an equal amount of water.

Households carefully marked their containers with their initials or a special symbol so that containers would not get exchanged or stolen. Hence, the municipal experiment that Pichai described failed as it disrupted social order, a carefully devised system of rules, that had evolved in response to supply duration. Chaos ensued.

There was another practical challenge in delivering water for a shorter duration each day. Grampalayam's watermen seemed particularly resistant to the idea. Vijay and Muthu noted that their tanks and valves (sub-zones) were spread out over a bigger area. It would simply not be feasible for them to hop around all day from one valve to another and back to the tank to make this combined system of valves (that equally relied on their labor) work. Vijay said, "In that case, I'll have to live on my motorbike!"

Regardless of where one lived in a hydraulic zone or their water needs, they received drinking water for the same duration to ensure equal water apportioning to all connections. TCMC's engineers, tap inspectors, and watermen had arrived at that magical figure of 1.5 to 2 hours by calculating the amount of time that it would take for a single connection to fill about 2000-liters (roughly 100 pots of 20-liters each) at the prevailing water pressure.[193] They felt that 2000-liters was sufficient for households to manage with until the next supply. It also provided the bare minimum quantity in case families shared connections. There were slight variations in the amount of water that a connection received based on the topography as well. Whereas the Corporation distributed water equally to connections within a hydraulic zone, the ability to cope with intermittent and inadequate municipal water supply was unequal among households. As

[193] Unlike big cities like Mumbai, TCMC did not differentiate between residents living in different housing arrangements, nor did it differentiate between residential and commercial consumers when drawing up water supply duration or schedules (cf. Anand, 2017). Like Tap Inspectors told me, all connections had the same sized pipe; they received water for the same duration from the same tank. The only difference was that commercial connections paid twice the taxes for a similar water quantity and quality (their emphasis).

Cohen (2016b) notes, when water supply is rationed in a zero-sum system, tanks are not only an individual convenience, but they are technologies for systematic inequalities. If the poor fill less water, then it leaves more water for those with underground storage tanks.

Municipal water supply was intermittent, unfixed, and generally unreliable across Tiruppur. There were no fixed daily schedules as in large, water-rich cities like Mumbai (cf. Anand, 2017). The absence of a municipal water supply schedule and a widespread acceptance of this irregularity was striking in a city where the lives of large sections of the population followed the clock. In general, long-term residents knew which day to expect municipal water, but no one could predict supply timings. Watermen would supply valves (sub-zones) in a fixed order for the pre-determined duration. Once the tank emptied, they would have to wait for it to refill and then proceed to operate the next valve, supply water to the next sub-zone in their list, and so on. They maintained monthly logbooks noting when each valve was supplied with water and the amount of water they received from each source (Second or Third Scheme) and when (see Figure 4.4). Long-term residents knew which sub-zone preceded them. So, some would call their friends and relatives in that sub-zone to know when to expect water supply or call the waterman. Watermen reassured people about the supply day but never provided a fixed time. Vijay justified how the present, irregular, and unpredictable supply schedule structured residents' lives,

> "People have learned to manage their water use for 5-6 days. On the sixth day, they will wait expectantly and call us to inquire about the water supply timings to their street. We say, 'we cannot tell you a fixed time, but it will come sometime today.'"[194]

[194] Interview with watermen TIRENG20, 4 December 2019.

According to the watermen (and Tap Inspectors), refilling a tank depended on external variables like timely supply from the water source and reliable electric supply. Repairs, power cuts, or breakdowns at the source or *en* route would invariably delay refills and water supply. Thus, material conditions impacted supply operations, but they were also selectively invoked to eviscerate accountability to various publics. There were no contingency measures, except if the supply was delayed by more than 3-4 days. In that case, the Corporation would send water trucks to the affected areas. Even if there were supply delays, watermen tried to maintain the duration, which, as I elaborated, was a carefully arrived at figure. Prabu, the waterman of Town Nagar, clarified,

> "We can delay the supply so long as we explain it to people. But we cannot change the duration too much, may be 5-10 minutes. We can only increase it slightly if some areas received less water the previous time. Otherwise, it has to be the same everywhere. Else people will take note and complain."

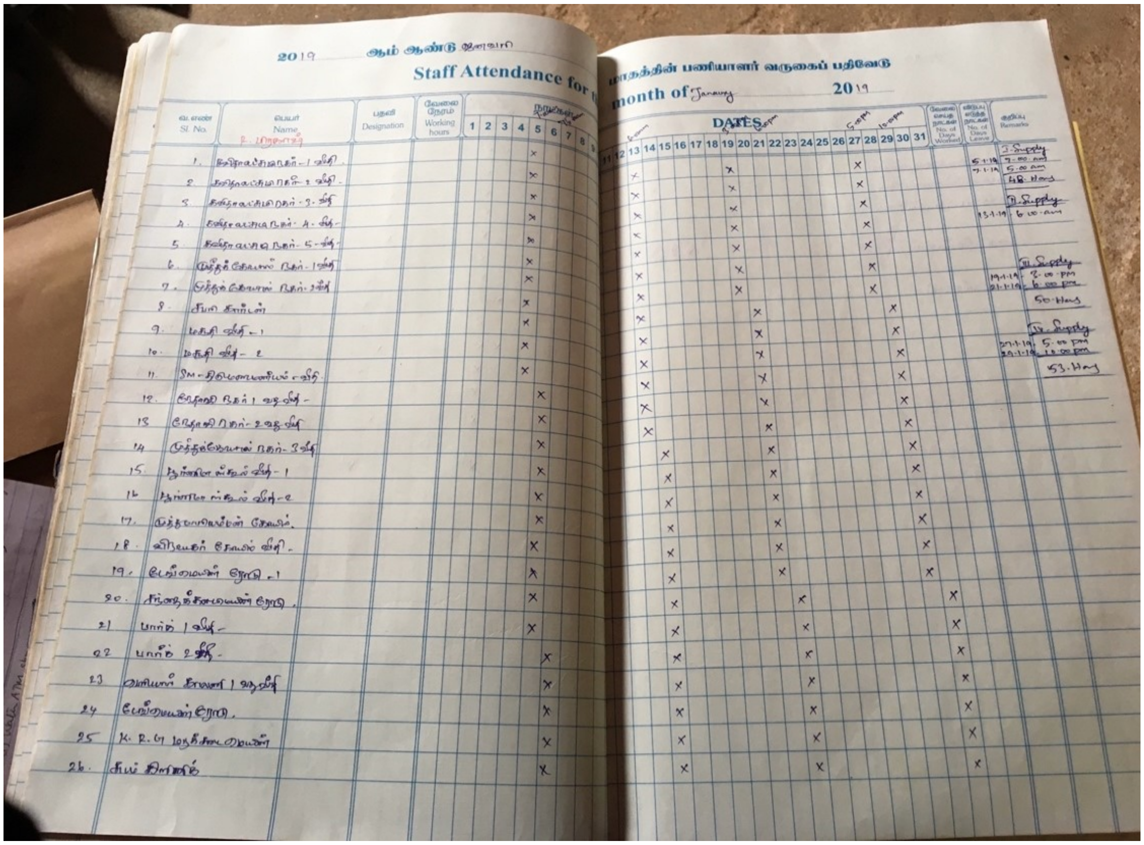
Our job is all about handling people': Water management as relationship management

Overall, since water supply was unpredictable, intermittent, and generally unreliable, street-level bureaucrats like watermen and tap inspectors stressed the importance of 'relationship management.' I asked all the watermen I interviewed how they got their job, and what skills/ qualifications were required to be an effective waterman. For the latter, they would invariably respond with a version of Vijay's response –

> "Our job is all about handling people. It takes about 3 to 5 months to get used to the people and neighborhood. Even the AEs (Assistant Engineers) and JEs (Junior Engineers) don't know the village as well as we do. We know who lives where, does what. We try and solve [water-related] issues in the village on our own as much as we can."[195]

[195] Interview with waterman TIRENG20, Tiruppur, 4 December 2019.

Figure 4.4 – A waterman's monthly logbook from 2019



Source: Author's photograph, December 2019.
(Note: The column on the left has a row corresponding to each gate valve that serves a cluster of 30-60 households (or a sub-zone) in the waterman's service area. The columns on the right indicate which days of the month these valves received water supply. On the far right, the waterman has noted the volume of water received from the Second and Third Schemes on particular dates. Watermen maintained these logbooks to remain accountable to Tap Inspectors and Assistant Engineers if people called to complain and ask why water was not supplied on time).

Across the urban-rural transect, but especially in the added areas of Grampalayam and Town Nagar, watermen were the first responders in solving water problems and facing residents' ire whenever supply was delayed. Often, in the middle of an interview, as if on cue, watermen would answer phone calls from residents and patiently explain reasons for delays, pacify them, and provide an indication of when water would be supplied. After the call, they would turn to me and say, "Whenever people call, day or night, we have to answer the phone and give them proper, convincing responses when they ask about delays in water supply!" Then, we would proceed with the remainder of the interview. Grampalayam and Town Nagar's residents called watermen because there were no Tap Inspectors or Assistant Engineers in their areas before the merger. Watermen formed the face of the local infrastructural state. They operated valves and installed connections for the village president, handled repairs, collected unpaid bills, and undertook minor plumbing tasks. Residents paid watermen voluntary monthly tips and gave them "bonus payments" for the festivals of Deepavali and Pongal to keep them happy and elicit prompt responses whenever there was a water problem. The monthly tips were about Rs. 10 and equivalent to the cost of a cup of tea.[196]

In addition to plugging in for an institutionally scarce *panchayat* administration**,** Gramplayam's watermen undertook repairs and installed connections for monetary reasons. Until 2017, watermen in the merged areas earned only about Rs. 2500 per month (~USD 40). To supplement their meager income, which was lower than the living wage for the region, they would engage in "repair-work," which would help them earn an additional Rs. 300 – 500 per week. Monthly tips helped the watermen earn an additional Rs. 5000 – 7000 per month. Watermen unanimously noted that they did not collect tips from Hindi-speaking migrant households with whom they had no 'relations.' Thus, the 'tip' played an important role in building and sustaining relations with Tamil-speaking clients, where the watermen attended to clients' water-related woes in exchange for these tips. In 2019, after many years of struggles by employee unions (Staff Reporter, 2015; Staff Reporter, 2018), the salary of these *panchayat* watermen was finally raised to Rs. 18,000 (USD 250) per month. They were recognized as

[196] Not all these households owned individual water connections, but they nevertheless paid the 'tip' for the watermen's service. These tipping practices were rare in City Nagar, where watermen were paid well before and after the merger. However, City Nagar's watermen also collected festival bonuses.

permanent employees of the Municipal Corporation. Since then, many have stopped collecting their monthly tips, just as they have refrained from offering repair services to residents unless directed to do so by their superiors.

With the merger and the added layers of bureaucracy in Tap Inspectors and Assistant Engineers (AEs), the administrative authority and power to address issues have become increasingly diffused upwards within the infrastructural state. Vijay, Muthu, Prabu, and their fellow watermen no longer attend to formal complaints, which the Tap Inspectors and AEs handle. Prabu, the waterman from Town Nagar, is relieved that his workload had reduced, whereas Vijay is proud that old-time residents still call him first as they do not feel as "connected" to the Tap Inspectors and AEs. Vijay and the other watermen continue to be responsive to their 'tipping' clients, who continue to pay them an annual festival bonus for Deepavali and Pongal. Prabu noted,

> "Nowadays, complaints have reduced (because the frequency of water supply improved after the merger). Only if supply is delayed by 2-3 days, then people get anxious, start making calls, and complain. In that case, we go to each area and warn them so that they are judicious in water consumption (and complaints)."[197]

These days, Vijay first screens complaints before them directing them upwards to the Tap Inspector. He asks the people who complain to produce their water tax and property tax receipts. "Now, we will not address any issue without proof of payment," said Vijay, who now embodied the Municipal Corporation's neoliberal norms in addition to his street-level knowledge.

Before the merger, ward councilors in Grampalayam and Town Nagar would attend to water-related issues and order watermen to solve them. As water supply and water problems have increasingly become an administrative matter, elected councilors, i.e., the political arm of

[197] Interview TIRENG17, Tiruppur, 22 November 2019.

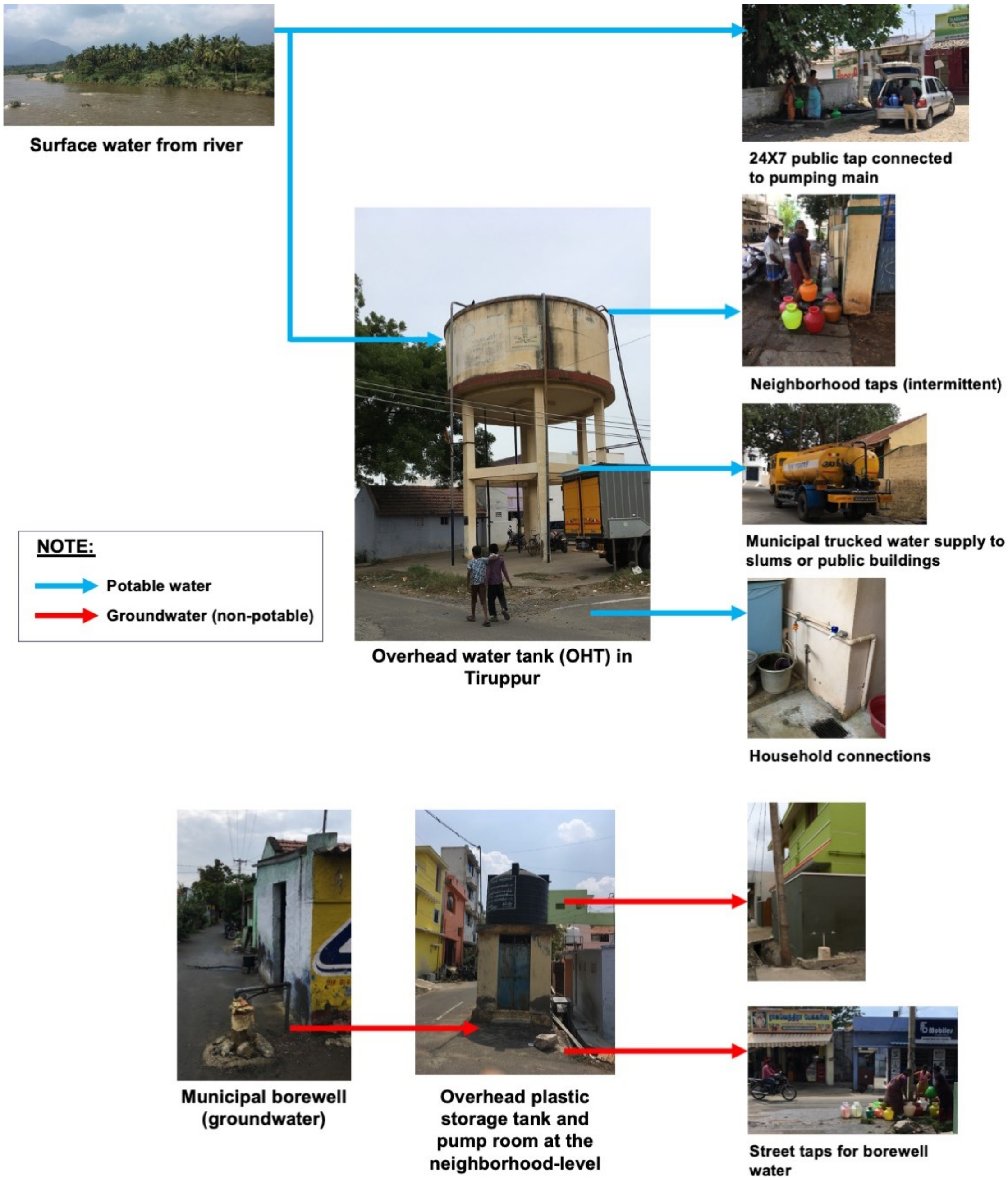
the local state, also approach administrators like the Tap Inspectors or AEs for redressal of issues. Calling Tap Inspectors and AEs and ordering them around to solve issues like they ordered watermen in the past allows ward councilors to show off their institutional reach and '*gethu'* (status) to their constituents in a shifting political-administrative terrain. A Tap Inspector from Town Nagar wryly recounted such encounters to note that they did not make any difference to water supply –

> "They will bring a large group of people and create a '*scene*' (Tamil slang that loosely translates into making a big deal). They will complain about some water issue and order us around. We will do what they ask to show that we are responsive, '*cool*' things down, and allow them to show off. After a few days, things will return to how they were."[198]

The watermen's and the Tap Inspector's accounts reveal how the terrain of accountability to water consumers has shifted with the merger, changes in bureaucratic architecture, and the institution of neoliberal norms in municipal water supply. Despite all the local state's improvisation and relationship management efforts, municipal piped water supply continued to be intermittent, unreliable, and largely inadequate to meet everyone's needs across Tiruppur. To cope with its shortcomings and meet the true water demand, the local state developed what one of my informants in Tiruppur Corporation referred to as '*a parallel water infrastructure*.' Parallel water infrastructures refer to the parallel, decentralized borewell infrastructures that the local state had installed in every part of Tiruppur to augment piped water supply. Figure 4.5 shows how municipal borewell and drinking water supply operate parallelly to satisfy water demand at the household level within Tiruppur. Parallel infrastructures introduce additional hybridity, differences, and inequalities into Tiruppur's waterscape.

[198] Interview TIRENG14, Tiruppur, 10 May 2019.

Figure 4.5 - Schematic diagram showing how potable (surface water) and non-potable (groundwater) municipal infrastructures operate parallelly in Tiruppur



Source: Author's photographs, 2017-2020.

4.4. Municipal borewells: A parallel water infrastructure

In 2018, Tiruppur Municipal Corporation owned and operated nearly 1500 borewells across the entire Corporation. Together, these borewells provide nearly 8 MLD (or 7%) of TCMC's daily water supply. Unlike piped water from the three water schemes, borewell water supply is untreated. In Tiruppur, it is contaminated with microbes, elevated levels of Total Dissolved Solids (TDS), and likely industrial pollutants. As a former *panchayat* leader admitted, "It's basically drainage water that has percolated into the ground."[199] For low-income, water-poor households without access to sufficient piped water, municipal borewell water is a lifesaver. They use it for everything except drinking and cooking. Many other non-poor households also rely on municipal borewell water in case of an emergency or to water their gardens and wash their yards with "free" water.

TCMC does not charge municipal borewell users any user fees. However, it spends Rs. 20,000,000 (~USD 275,000) each year on contracts to maintain the motor pumps used to draw water from borewells. It also spends an additional Rs. 60,000,000 (~USD 725,000) annually on electricity costs to operate these pumps. These are unrecovered costs that drain the Municipal Corporation's funds. "Borewells are a service to the public. Since drinking water supply is insufficient, we provide borewells as a parallel scheme to make up for the shortfall," was the engineer's response when I asked him whether this parallel infrastructure was financially and environmentally sustainable. He added, "We would like to close these borewells as they cost a lot, but political parties will not agree."[200]

[199] Interview TIRPOL10, Tiruppur, 20 December 2019.
[200] Interview TIRENG11, Tiruppur, 29 March 2019.

Municipal borewell water supply is not unique to Tiruppur. This form of provisioning is widespread across Tamil Nadu's other small cities as well. Community-managed wells or borewells managed by small-scale water providers are the main water sources in peri-urban villages in Southeast Asia, too (Spencer, 2008; Spencer & Guzinsky, 2008). What distinguishes the case of Tiruppur, and other Tamil Nadu cities is that the local government concurrently sources from both large-scale centralized systems (bulk water schemes) and small-scale decentralized systems (neighborhood-scale borewells) to meet its growing water supply obligations through a mixed system. Tamil Nadu's urban local governments rely on borewells even as they aspire to achieve water security and sufficiency through surface water sources (Lele et al., 2018). Other small city Municipal Corporations in TN (e.g., Erode, Vellore, Salem, Dindigul) also meet between 0% to 24% (with an average of 4%) of their daily water demand using public borewells. However, Tiruppur's reliance on borewells surpasses many of these cities.[201]

4.4.1. Planning borewells in Tiruppur

Compared to bulk water supply schemes that require approvals and support from higher levels of the State, and therefore, take years to materialize, borewells are localized interventions that can be built quickly and for a fraction of the cost.[202] They do not require complex inter-departmental coordination or inter-governmental negotiations. In Tiruppur, these parallel infrastructures help

[201] Data obtained from TCMC files, July 2019.

[202] At the time of fieldwork in 2019, the cost for drilling a borewell ranged between Rs. 1,00,000 to Rs. 3,00,000 (~USD 4200) depending on the depth of the well, the kind of bedrock, and the difficulty of drilling in a particular site.

the local state fulfill its minimum obligations towards maintaining the social reproduction conditions that allow local capitalists to accumulate.

The Tiruppur Municipal Corporation installs borewells in various locations based on local demand, groundwater availability in the locality, and the availability of space to install the borewell infrastructure. For each borewell, the physical infrastructure includes the borewell itself from where water is pumped to a small overhead plastic tank of about 5000-liter capacity and then supplied via a gravity-fed piped system to different streets (see figure 4.5). Each decentralized borewell network serves a cluster of 4-5 streets (or anywhere between 25 and 100 households), with taps for water collection installed at about 100-meter intervals or at street corners.

When residents in a locality organize and complain about water scarcity to their ward councilor, the latter presents a demand for a borewell to the Corporation Council and administration. The ward AE and Tap Inspector confirm the demand, investigate a suitable site, and install the borewell. The Corporation finances the construction of these borewells with its general fund. The ward councilor also contributes some personal funds to top up the amount. Since funds are limited, the Corporation installs no more than one or two borewells in a ward each year, with the allocation being need-based. However, in Grampalayam and the other added villages, councilors complain that this informal rule, which allocates only one or two borewells per ward, is discriminatory towards them.

> "There is more work to be done here [in the added panchayats] but we get the same amount of funds as the city wards as they cannot distribute money unequally […] There is more money [in the Corporation], but there are more people and more wards, so we get a smaller share. We also need permissions and approvals from the Corporation Council and further up to undertake any major work that costs more

than Rs. 1,00,000 (which invariably included all municipal borewells)."[203]

Occasionally, the Government of Tamil Nadu also funds the sinking of borewells as it did during the drought of 2017. The State provided TCMC a one-time grant of approximately Rs. 100 million to install 120 borewells, build tanks to store and distribute borewell water, and upgrade old handpumps to motor-operated borewells.[204] Once the drought ends, these borewells remain operational till they run dry or fall into disuse, adding to the local government's maintenance expenditures. In 2019, the tragic death of a 2-year-old child who fell into an abandoned borewell in Trichy district (Khan, 2019) forced the State to enforce existing regulations for borewell construction. These regulations (crafted in 2015) are safety-driven; they do not monitor or regulate the amount of water withdrawn from municipal or private borewells. In Tiruppur, too, Tap Inspectors maintained a list of borewells in their wards. However, they could not identify when a particular borewell was built, how many people used it, how much water was consumed daily, or such information that could guide plans for long-term sustainable groundwater management in the Corporation area.

The everyday operations and governance of borewell water supply

Unlike piped water supply, which engineers in the municipal administration oversee, wells and borewells are largely under the purview of the local political state. Borewells are an important means of securing political patronage for aspiring councilors and Members of Legislative Assembly (MLAs). Borewell water tanks are inscribed with their patrons' names and party affiliations, which are painted over each election cycle. Residents make demands for new

[203] Interview TIRPOL09, Tiruppur, 13 December 2019.
[204] Data obtained from TCMC files, July 2019.

borewells or repairs to existing borewells to their ward councilors, who then take it up with the Corporation Council and engineers.

Historically, borewell operations, much like piped water supply, also varied across the urban-rural transect. In Grampalayam, there were no decentralized borewell networks before the merger. The *panchayat* administration owned about six deep borewells, which were installed by the district administration. Watermen supplied borewell water every other morning in the long durée (nearly two weeks) between two consecutive potable water supplies to compensate for water scarcity. They used the same storage and distribution infrastructure that was used to supply potable piped water.[205] Compared to Grampalayam, borewell networks were decentralized and disconnected from the potable water infrastructures in Town Nagar and City Nagar. They continue to be operated in a decentralized manner after the municipal merger. Grampalayam also switched to the decentralized infrastructure model after the merger.

In 2017, there were 13 such decentralized borewell networks in Grampalayam,[206] 25 in Town Nagar, of which 8 were installed in the last five years alone to cater to the growing water demand in recently developed localities.[207] In City Nagar, which catered to a much larger population, there were about 47 borewells.[208]

Across Tiruppur, borewell water is usually supplied for 2 to 3 hours every morning and evening. In Grampalayam, watermen operate and oversee these borewells. In Town Nagar or City Nagar, a local resident, typically a middle-aged woman who is well-respected in the locality, is in charge of borewell operations. The ward councilor appoints this woman (or man).

[205] Interview with watermen TIRENG20, 4 December 2019.
[206] Interview with watermen TIRENG20, Tiruppur, 4 December 2019.
[207] Interview with a tap inspector TIRENG18, Tiruppur, 25 November 2019.
[208] Data obtained from the area Tap Inspector in April 2019.

The borewell operator decides borewell water supply timings, rules for access like queuing, the number of containers that each person can fill at a time, and the monthly 'tip'[209] that each user should pay in consultation with the residents, ward councilor, and the Tap Inspector. During borewell water supply time, she turns on the motor for the pump and monitors water levels in the storage tank to ensure that there is no wastage. She is also responsible for organizing minor repairs to leaky taps and pipes by raising funds from borewell users and liaising with the ward's Tap Inspector or AE to obtain technical support.[210]

As noted earlier, the Corporation has installed borewell water collection taps at about 100-meter intervals on streets. Residents can lobby ward councilors or political party workers in their localities to influence where these taps are placed. Some households have managed to get a tap installed right outside their compounds to avoid carrying water pots over long distances. Small landlords, too, try to get borewell water collection taps installed near their compounds to attract tenants if they are unwilling to (or unable to) afford private borewells like large landlords.[211]

4.4.2. Municipal borewells and persistent hybridity in Tiruppur's waterscape

> "People in Tiruppur love borewell water. It is free water. They will not give it up."[212]

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[209] In some middle- or upper-income neighborhoods where residents may have access to sufficient potable water, the borewell in charge may not collect a monthly 'tip.' The monthly tip usually ranges between Rs. 10 – Rs. 20 per household per month, which is a minimal amount. Borewell water users pay this tip to compensate the borewell operator for their time and service. The tip amount does not reflect the volume of water consumed or the electricity costs for pumping water.

[210] Interviews with women in charge of borewells in Town Nagar (TIRWO05, 3 April 2019) and City Nagar (TIRRE29, 24 December 2019).

[211] Small landlords may have 2-10 tenants in one compound, but large landlords may house over a hundred tenants in a single site.

[212] Interview with a tap inspector TIRENG14, Tiruppur, 10 May 2019.

Following the merger and modest improvements in municipal drinking water supply, the degree of dependence on municipal borewells has reduced across many parts of Tiruppur. However, borewell dependency is unlikely to get eliminated anytime soon if the built-in inequalities in potable piped water provision remain unaddressed. Piped water schemes do not include at least a fifth of the population in their water demand calculations. These schemes also rely on water imports from distant locales and coordination with multiple jurisdictions and State-level agencies. With changing water availability due to climate change in the broader river basin (Revi et al., 2015) and increasing conflicts over transboundary water-sharing,[213] it might be difficult for Tiruppur Municipal Corporation to augment piped water schemes limitlessly. These conditions might force the local state to ration a limited quota of piped water, further deepening differences in access to piped water.

On the one hand, the materiality of the existing piped water distribution infrastructure prevents the local state from distributing water in an equitable, reliable, and adequate manner. Poor quality service prevents the local state from raising tariffs and recovering the costs of water operations. On the other hand, the local state's inability to provide and regulate water connections across various tenancy arrangements also exacerbates potable piped water scarcity for low-income, working-class tenant families. Against this background of material and institutional constraints, largely produced by the city's small town past, municipal borewells emerge as the local administrative state's coping mechanism for its planning incapacities. These borewells are easy to plan and control at the local level. Municipal borewells also allow the local political state to build patronage and political power through water (cf. Bjorkman, 2015). For all

[213] Recently, rural areas in Mettupalayam, where the headworks for many of Tiruppur's existing and proposed water supply schemes are located, have started contesting inter-basin water transfers to distant cities like Tiruppur (TNN, 2020). It remains to be seen how such conflicts will affect water planning in Tiruppur moving forward.

these reasons, parallel water infrastructures like municipal borewells will not be a stopgap measure till there is 100% and round-the-clock piped water coverage (if that is even possible in water-scarce geographies like Tiruppur!). Instead, they will continue to co-exist and inter-operate with centralized piped systems despite rural-urban transitions and the Municipal Corporation constructing a new water supply scheme.

Instead of promoting networked ideals, water infrastructure planning in small cities and towns should embrace this co-existence and inter-operations of water sources and infrastructures (cf. Lawhon et al., 2018). Sourcing from multiple water sources, including borewells, will allow the local government to stretch a limited quantity of treated drinking water to a larger population. It can contribute to resilience, provided the State regulates groundwater use and develops ways to achieve biophysical sustainability (Lele et al., 2018). However, as there are clear class and (local) citizenship dimensions to borewell dependency, it is important that water infrastructure planning with borewells does not actively reproduce socio-environmental inequalities.

4.5. Conclusion: Material and institutional limits to extending municipal limits and improvising provision

Observers find that Indian States are redrawing urban municipal boundaries and merging peri-urban villages with cities to address land use, infrastructure development, and service provision challenges in the rapidly urbanizing peripheries of big and small cities (van Duijne, 2019; Jha, 2020). In some cases, States are recategorizing urbanizing 'rural' places, i.e., Census Towns (CTs), into 'urban' places so that they can get access to an urban municipal bureaucracy and the additional personnel, budgetary allocations, and development grants that come with the urban status (Jain, 2018). Whereas existing studies have analyzed why places agree to get recategorized or merge with other places (or not), they have not analyzed how recategorization transforms planning and service provisioning practices. This chapter makes a contribution towards that end.

Chapter 3 discussed why various elite publics and state actors sought to recategorize Tiruppur's municipal status and redraw its municipal boundaries. This chapter analyzed how Tiruppur's recategorization and its merger with the surrounding villages and towns transformed water infrastructure planning and service provision in the city and merged areas. The findings show that urban elites' aspirations to use recategorization to effect large-scale urban-economic transformations are tempered by the effects of government categories on planning norms, material infrastructures, bureaucratic capacities, and their combined impacts on everyday service provision. I find that the material and institutional legacies of historical government categories linger long after recategorization to maintain socio-spatial differences in water delivery and access. This is because the recategorization process did not address these legacies or their impacts on water provisioning; it only provided new planning norms and funds to achieve them to Tiruppur's local government. Overall, this chapter contributes to the literature on small city governance by illuminating the ways in which government category as one dimension of urban scale contributes to uneven municipal (piped) water supply *within* small cities like Tiruppur.

The Tiruppur case suggests that small cities and towns contemplating (or undergoing) recategorization and merger need to build their municipal bureaucracies' organizational and planning capacities to handle governance and service provision needs across a larger territory. In the short term, they might need to concentrate their efforts and investments in the added areas to close gaps in service provision. They would also need to invest in decentralized infrastructures and reform the criteria for providing and regulating water connections based on tenancy arrangements. On their part, States need to support small cities and towns to build capacities and close gaps in service provision. States should also rethink planning norms associated with different government categories to ensure that they do not impose undue cost burdens on small cities' bureaucracies, residents, or water resources. Infrastructure planning norms need to move beyond a simplistic administrative categorization of urban settlements. They must acknowledge that there are many kinds of cities with varying bureaucratic capacities and provisioning practices located in a range of hydrogeographies. Water supply guidelines and the intergovernmental support attached to them must respond to this diversity.

In addition to government categories' impacts on water governance, this chapter also traced how local exigencies like users' water collection and storage practices, local state-society relations, and relations between the administrative and political local state influence service provision. However, these everyday considerations and the embodied knowledge that they constitute rarely work their way up into formal water infrastructure plans that merely focus on expanding water coverage by building large, centralized networks. Neither are these plans attentive to the impacts of borewells that the local state operates as a quick fix for uneven piped water supply.

Across Tiruppur, uneven piped water supply and municipal borewell supply combine with private and market-based water provisioning to produce a hybrid waterscape. In this hybrid waterscape, users access water from multiple water sources and providers through various infrastructures to meet their daily water needs. Water access is complex and differentiated along social and spatial axes in this hybrid waterscape. The next chapter discusses how different users' water access practices vary within this hybrid waterscape. I will also investigate how this hybridity (and the differences it fosters) affect users' abilities to come together and question the planning processes producing these differences in the first place.

CHAPTER 5 - NON-ELITE PUBLICS AND THEIR WATER ACCESS POLITICS IN TIRUPPUR'S HYBRID WATERSCAPE

Tiruppur's elite publics imagined urban-industrial futures and sought to influence water infrastructure plans to pursue economic growth in the face of water scarcity. However, the operationalization of these plans in the context of low bureaucratic and infrastructural capacity presented a different set of challenges. The historical geographies of the local state and water infrastructures in Tiruppur's municipal core and added peripheral areas combine to produce irregular, unpredictable, inadequate, and unequal piped water supply across the city.

This chapter investigates how Tiruppur's non-elite publics cope with inadequate, intermittent, and unequal piped water supply. Non-elite publics survive by procuring water from a *hybrid waterscape* that consists of multiple inter-operating sources, supplied through different infrastructures, each governed by a distinct assemblage of state, non-state, and market actors and relationships (Acey, 2019; Spencer, 2019) that have co-evolved to compensate for piped water scarcity.[214] Tiruppur's hybrid waterscape includes parallel water infrastructures (e.g., municipal borewells described in Chapter 4), market-based sources (bottled water, trucked water, resold piped or borewell water), and self-provided sources like private borewells, rainwater harvesting, and water conservation practices at the household level. I analyze how Tiruppur's non-elite

[214] My use of the term, hybrid waterscape, draws on a long genealogy of scholarship on urban water infrastructures in the Global South. This scholarship argues that waterscapes and urban water infrastructures in the Global South consist of 'heterogeneous infrastructure configurations' (Lawhon et al., 2018) or 'gray zones' (Truelove, 2019a) that do not conform to Northern notions of a universal, modern infrastructure ideal (Furlong & Kooy, 2017). Following these scholars, I use hybrid waterscape to refer to "socio-material configurations that involve many different kinds of technologies, relations, capacities, and operations, entailing different risks and power relationships. A configuration might be thought of as the range of infrastructural options potentially available to a person for everyday use […] that shifts over time for various reasons." (Lawhon et al., 2018: 726). Much like Truelove's (2019a) 'gray zones,' my conceptualization of hybrid systems also defies simple dualisms of legal-illegal, formal-informal, and public-private.

publics strategize everyday water access from a range of options available to them in the hybrid waterscape, the tradeoffs they make, and how they seek to improve their long-term water access in the face of water scarcity by demanding improvements to the municipal water supply.

I find that non-elite publics' water access strategies vary by their social identity and spatial location in the city and the relative costs of different water sources available to them. The combination of water sources that they choose also varies by time as these choices are made in relation to other available options and their costs of access at a given point in time (cf. Furlong and Kooy, 2017; Lawhon et al., 2018). The costs of water access are variable and dynamic as they include monetary costs and the time, effort (or labor), and emotional stress involved in fetching, storing, and using water (Jepson, 2014). They also involve the different relationships that a user has to leverage, navigate, and maintain to secure water access. Water access costs vary even among users who cohabit in the same locality or hydraulic zone in the city. Each water user, thus, has their unique *web of access* within this hybrid waterscape that draws them into a distinct set of material connections to the *local infrastructural state*. Non-elite publics are further differentiated by the water infrastructures they rely on and the corresponding web of access connecting them to the local infrastructural state. This chapter traces these different non-elite publics, their material connections to the state, and investigates how they organize, either individually or collectively, to demand improvements to municipal water provisioning and alleviate their unequal experiences of water scarcity in the city.

This chapter consists of four parts. The first part interrogates literatures on water access, political action, and organizing in hybrid waterscapes of the Global South to situate the contributions of the Tiruppur case. The second part describes the research design employed in this chapter to understand socio-spatial variations in non-elite publics' water access practices, material connections to the local infrastructural state, and organizing strategies. I describe a data collection tool, *the water and waste calendar*, which I developed in collaboration with a Tiruppur-based labor rights NGO called SAVE. The third part describes the non-elite publics' everyday water access practices and how they relate to demands (or lack thereof) for improving the waterscape. In conclusion, I summarize the contributions of this chapter and reflect on whether prevailing forms of organizing for water in Tiruppur can advance just alternatives to existing water infrastructure plans and the growth-oriented imaginations that underlie them.

5.1. The dynamics of water access, political action, and organizing in hybrid waterscapes

Hybridity of water sources, infrastructures, institutional forms, and modes of delivery characterizes urban waterscapes of the Global South even as the extant scholarship has overwhelmingly focused on the operations and failures of centralized pipe networks (Bakker et al., 2008). However, in the last decade or so, a growing body of work has advocated the worlding and provincializing of urban water (Furlong and Kooy, 2017). Scholars have urged researchers and practitioners to consider a range of water provisioning and access practices beyond formal, state-controlled, centralized pipe networks to address the lived realities of Southern cities (Lawhon et al., 2014; Furlong and Kooy, 2017).

5.1.1. Factors shaping water access in hybrid waterscapes

Many factors shape users' water access strategies in hybrid waterscapes. Users' water access is shaped by their socio-spatial identities. Additionally, access strategies are developed in relation to the provisioning practices associated with different water sources and the infrastructures and institutional forms through which they are delivered in a particular location. Users not only seek to reduce the monetary, time, or labor costs of water access but also consider a range of other factors when meeting their daily water needs from a combination of water sources in hybrid waterscapes. Hence, scholars contend that merely measuring the willingness-to-pay for piped water—a common approach adopted by many economists (cf. Whittington, 1990; Pattanayak et al., 2005) —is insufficient for developing plans for just and equitable water access in hybrid waterscapes (Spencer, 2008).

Users rely on multiple sources in a hybrid waterscape or choose to disconnect from piped networks for various reasons. In addition to monetary cost savings, these include the material properties of water from a particular source like its taste, smell, and color and how they relate to water's many uses in a particular sociocultural context (Spencer, 2008; Zérah, 2008), the pressure and reliability of piped water, the availability of storage infrastructure to store intermittent piped water supply (Furlong and Kooy, 2017), access to political intermediaries or 'mafias' who may enable (or block) access to piped water (Ranganathan, 2014b; Bjorkman, 2015; Anand, 2017; Acey, 2019), the desire to evade state surveillance and control as it occurs through infrastructures (Meehan, 2014), or a general distrust of particular water providers (Vandewalle and Jepson, 2015). Users' preferences are equally altered by infrastructure projects that foster or foreclose opportunities to (dis)connect from alternatives (Schindler et al., 2019).

Even as institutional factors and biophysical characteristics associated with particular water infrastructures influence users' access strategies, their structural positions, i.e., an intersection of their multiple social and spatial identities, also play a part and impose (or alleviate) costs of access. These intersecting socio-spatial identities include the user's gender, race, age, class, caste, citizenship, tenancy status, or residence in an untenured informal settlement. For example, several scholars of water in South Asian city regions have repeatedly emphasized the “sociocultural tax” (Sultana, 2020: 1418) or the unequal corporeal and emotional burdens that water access places on lower-caste and lower-class women (Sultana, 2009, 2011; Truelove, 2011). Structural positions like caste, class, and gender shape unequal water access in hybrid waterscapes too. Within hybrid waterscapes, structurally disadvantaged users tend to be more dependent on lower-quality water sources or those with higher access costs. In Tiruppur, some of these higher costs include the additional mental and emotional labor of navigating different governance systems daily and budgeting water of varying quality for different uses. These unequal costs prevent low-income women from partaking in leisure or other productive activities. In the long term, they also have negative health impacts (Geere et al., 2018).

Structural positions not only mediate everyday water access, but they also exclude certain users from plans and design considerations for piped water networks (as the preceding chapters showed for migrant workers) or impose unequal access burdens. Moreover, gender and caste positions also structure users’ relationships with the various agents and associational structures that mediate water access (Truelove, 2011; O’Reilly & Dhanju, 2014). Structural positions, thus, affect users’ water access strategies in hybrid waterscapes. Users’ *webs of access* to different sources and infrastructures, in turn, affect their ability to demand accountability from water providers, the kinds of changes they demand, if and how they seek redressal from the state when they experience issues and contest entrenched inequalities in the waterscape.

5.1.2. The dynamics of political organizing and demands for just water access in hybrid waterscapes

This section puts three distinct scholarly conversations in dialogue with each other to develop a framework for analyzing the dynamics of state-society relations and demands for equitable water provision in hybrid waterscapes such as Tiruppur's. First, discussions on the politics of collective consumption in cities argue that equitable and just distribution of essential services like water is the outcome of sustained collective struggles by the working-class making demands of the state (Castells, 1977; 1983; Cohen, 2016b). However, these studies do not elaborate how collective struggles emerge from and get shaped by the kinds of state-society relations and prevailing platforms for collective action in hybrid waterscapes, where users' webs of access and unique connections to the infrastructural state may (or may not) intersect with the webs and issues faced by other similarly affected users.

Second, a small body of work has examined the dynamics of political action in hybrid waterscapes and their relationship to urban politics and governance (Jepson and Brown, 2014; Vandewalle and Jepson, 2015; Acey, 2019). Acey (2019) uses Hirschman's (1970) exit, voice, and loyalty (EVL) framework to analyze state-society relations in hybrid waterscapes and understand how users demand accountability from the state and contest inequalities in access. Hirschman's framework shows that users threaten the state (or non-state provider) with exit to demand better services, and they use their voice to demand change when an exit is not possible (Pierce, 2017). Acey's empirical work in Lagos and Benin City, Nigeria, shows that users' expressions of voice and demands for change are shaped by their historical and emerging relations with street-level state and non-state actors, organizations, and the formal and informal rules that mediate access to water infrastructures (and the state) on a daily basis. Access to associational structures that organize water users also plays a part, as does the responsiveness of the provider/ state to demands for improvement (Acey, 2019). The exercise of voice is curtailed if there are no clear lines of authority or responsibility leading from the infrastructure to a provider (or the state), if the mediating factors and agents are ‘illegal’ (Acey, 2019; Chidambaram, 2020), or if popular discourses and governance practices devolve the responsibility for water access and quality control away from the state or provider to the individual user (Jepson and Brown, 2014).

Acey further notes that users’ expressions of voice can be individual or collective. It can take many forms like complaints, noisy protests, legal battles, refusal to pay, theft and pilferage, or concerted advocacy by pro-poor activists (Acey, 2019). Despite noting that the use of voice can be individual or collective, Acey and others (e.g., Pierce, 2017) largely focus on standalone political actions employed at the household level and their efficacy in improving water access in hybrid waterscapes. They do not tell us if and how hybridity or the availability of multiple options fosters (or fractures) collective action across divides among users who rely on different infrastructures and providers in ways that challenge entrenched inequalities in water access in the city. In the absence of collective action and struggles demanding just access, standalone individual actions might be inadequate to transform systemic inequalities.

Third, emerging scholarship on the anthropology of water infrastructures acknowledges that users’ socio-spatial identities affect their ability to access different water infrastructures and the infrastructural state. It also notes that socio-spatial identities impact users’ ability to organize and claim citizenship rights, including the right to equitable water access. However, anthropologists contend that the material properties of infrastructures also play a role in influencing the dynamics of collective action for equitable water access. They argue that the material properties of water infrastructures assemble distinct collectives or publics affected by them and influence how these publics then organize to improve their water access. They observe that social group or spatial location does not necessarily delimit the hydraulic publics that water infrastructure assembles; these publics come together based on their shared experiences of and grievances with water (Bjorkman, 2015; Von Schnitzler, 2016; Anand, 2017).

In hybrid waterscapes, each kind of water infrastructure produces its distinct publics and politics. The scale, coverage, and nature of water supply from each infrastructure produce the affected ‘publics.’ Each type of infrastructure also enrolls individual users into distinct relations with state institutions, depending on how the state is involved in the infrastructure’s governance. Similarly, the material properties of water supplied through the infrastructure, and its significance for users, determine the kinds of improvements that the publics will organize around, if and how they engage the state to transform their water access, and the kinds of political strategies that they will employ in the process. Thus, each water infrastructure in a hybrid waterscape assembles distinct infrastructural publics at a scale unique to that infrastructure, much like a club good (see Warner, 2011 for a helpful review of club goods). Hydraulic publics and ‘clubs’ that assemble around different water infrastructures may not always overlap with each other or other structures for collective action in the neighborhood or city (Appel et al., 2018; Lawhon et al., 2018; Chidambaram, 2020). Thus, water produces its distinct publics and politics. Whether and how these water politics seek to transform urban politics and governance in a certain context remains open for investigation.

The distinct hydraulic publics that assemble around different kinds of water infrastructures engage in unique forms of political action towards various ends. Much of the burgeoning scholarship on water infrastructures in South Asian megacities has focused on political action by hydraulic publics that assemble around municipal piped networks. Scholars contend that the politics of connecting to municipal piped water networks are insurgent citizenship and claim-making practices by marginalized residents (Ranganathan, 2014a; Anand, 2017). These studies have shown how connecting to municipal piped water supply remains an aspirational ideal and a pathway to tenure security and graduated citizenship for many residents of informal settlements. However, they do not discuss the publics that form around non-piped or decentralized sources or the political calculus underlying their practices of dis/connecting from/ to these non-piped water sources. Neither do they examine how piped water publics and their politics overlap with those of other non-piped hydraulic publics.

This chapter argues that understanding the publics that assemble around non-piped water sources, their politics of dis/connection, and their participation in urban governance through water are critical as planners seek to address inequalities in water access beyond pipe networks (Lawhon et al., 2014). I argue that paying attention to the publics and politics that form around non-piped, decentralized water infrastructures is equally important in small cities like Tiruppur, where piped network coverage is limited, and piped water forms just a small part of most users' webs of water access. Moreover, it allows us to see how disenfranchised migrant residents, who make up a substantial share of the urban population, seek to make claims to the city and the local state through water (cf. Chatterjee, 2004; von Schnitzler, 2016). Thus, following material connections to the state through webs of access, the publics that form through these connections and shared experiences, and their collective political actions together help explain the emergence and subsequent trajectories of struggles demanding just water distribution across the city. These insights can additionally help planners design infrastructures, service provision, and their everyday governance in ways that foster civic engagement and political action by the most marginalized in society.

5.2. Research design and methodology: Using water calendars to understand users' water access and organizing strategies across Tiruppur

To trace water users' everyday water access practices in Tiruppur's hybrid waterscape and their relationship to various publics' expression of demands for improved and equitable water provisioning, I adopted a multi-stage, mixed methods research design. First, I collaborated with a Tiruppur-based NGO in participatory action research (PAR) project to develop a water and waste calendar that measured variations in water access practices at the household level by users' identity, housing tenancy arrangement, and spatial location in the city over one month. This calendar tool took an embodied approach to identify each household's web of access and material connections to the local infrastructural state. Second, a survey of these households allowed me to gather data on their access issues, organizing strategies, and demands for improvements to the waterscape. Finally, analyzing the survey data in relation to access practices and (dis)connections to the infrastructural state helped me trace the different hydraulic publics in Tiruppur and their politics to examine how they shape water infrastructure planning at the city level. The rest of this section details this multi-stage, mixed methods research design.

5.2.1. Participatory action research to develop the water and waste calendar

Participatory action research with NGO SAVE

I collaborated with a Tiruppur-based NGO called Social Awareness and Voluntary Education (hereafter SAVE)[215] in participatory action research (PAR) project to understand everyday water-sanitation practices and issues through a grounded, embodied perspective. Many planning scholars advocate PAR approaches as they generate new forms of context-specific knowledge that foregrounds everyday practices and hardships within communities, which then allows researchers to apply this knowledge in ways that benefit the community partner and advance social justice in the research context (see Winkler, 2013 for a succinct review). Through collaborative, participatory research with SAVE, I hoped to understand the lived experiences of water infrastructure plans and everyday service provisioning practices to use research to give back, if only in a limited way, to improve water governance in Tiruppur. In the concluding chapter of the dissertation, I do so by discussing how plans and governance practices can be more inclusive of the needs and experiences of the city's marginalized working-class.[216]

My interactions with the leadership and staff of SAVE over two years of pre-dissertation fieldwork facilitated our collaboration.[217] SAVE was interested in collaborating to understand water-sanitation conditions in working-class localities across Tiruppur as part of their longstanding efforts to create pollution-free living and working environments for adults and children across the city. They were also seeking to engage with emerging urban planning

[215] SAVE is a Tiruppur-based NGO that undertakes various developmental programs to uplift socio-economically poor and marginalized communities. The organization continues to eliminate child labor, empowerment of women and youth, promotion of fair labor standards, and comprehensive development of both rural and urban poor communities in the Tiruppur region and neighboring districts. Unlike many labor unions in Tiruppur, SAVE aims to maintain political neutrality and non-alignment and works to change policies through a combination of advocacy and grassroots organizing.

[216] By marginalized working-class, I refer to the thousands of workers who work in precarious, unstable jobs in the textile (and ancillary) industries, often living from wage to wage.

[217] This collaboration was funded by a grant from the Office of Engagement Initiatives at Cornell University. This grant allowed me to compensate SAVE and the research participants for their contributions—time, effort, and knowledge—to the research project.

processes introduced by the national government in Tiruppur, such as *Clean India Mission* and the *Smart Cities Mission*. SAVE's leadership felt that a research report prepared by a researcher based at a foreign university would equip them with the context and evidence to engage in these processes and demand changes in urban policies and practices at various scales. On their part, SAVE and their team of community organizers mediated my entry to working-class localities and their residents in and around Tiruppur. We designed research questions and data collection tools together, unlike traditional PAR approaches, where research questions emerge directly from affected participants (cf. Winkler, 2013). Nonetheless, our collaboration sought to include a diversity of lived experiences and knowledge in the research design and data collection stages and centered on social justice and equity questions. Further, none of the participants disputed the salience of water-sanitation issues in their daily life, even if these issues ranked far lower in their list of daily concerns, which unsurprisingly centered around employment, income, debts, and their children's health and education.

The PAR method additionally demands that researchers center values of empowerment through the community engagement process (Winkler, 2013). However, I did not naively seek to "share power" or "empower" anyone through the community engagement processes in this collaboration, even as I was committed to uncovering and valorizing local, embodied knowledge as it manifests in everyday practices. My position as an upper-class, upper-caste researcher with access to substantial resources and mobility[218] in the local context vested undue power and privilege in me. My privileged position shaped my interactions with all the community

[218] Across India, mobility for non-work or educational purposes (e.g., loitering as fieldwork often is) is highly restricted among women. The fact that I was married, childless in my 30s, and yet 'permitted' by my husband, in-laws, and parents to live and work unchaperoned in a new city, elicited mixed feelings of awe, envy, and disapproval among my research participants. It came to structure our interactions. It was a subject of so many screening encounters that I stopped noting them after a while.

organizers and participating households involved in the research. However, my ability to converse in Tamil, my honesty about my background and intentions, flexibility, and willingness to work with SAVE's community organizers and participants on their terms, listen and learn from them through the fieldwork process, made our working relationship collegial and mutually respectful. At the end of our data collection, a handful of female participants noted that they enjoyed maintaining the *water and waste calendar* and thanked me for the opportunity to "write with a pencil" after a prolonged period. They proudly told me, "We could not study, but we are very happy to contribute to your studies and degree" (fieldnotes, 10 October 2019).

Tracing embodied webs of access with a water and waste calendar

SAVE, and I initially developed *a water and waste diary* to capture the diversity of access practices in Tiruppur's hybrid waterscape. Although anthropologists of infrastructure advocate for following pipes or material infrastructures (Bjorkman, 2015; Anand, 2017), we decided to adopt an embodied approach drawing on feminist political ecology (Truelove, 2011; 2019b). Embodied approaches focus on individual experiences of water insecurity and draw attention to how intersecting social identities produce additional marginalization or inequalities between people located in the same place and/ or sharing the same infrastructure (Truelove, 2019b). We adopted this embodied approach as it allowed us to trace how users access water from multiple 'pipes' (or infrastructures) governed by different providers, how these webs of access structure their lived experiences of water scarcity and inequalities, and their responses to these inequalities. However, since direct observation of embodied practices across multiple localities would be intensive and difficult, I proposed a mixed-methods approach using *the water and waste diary*.[219]

A *water diary* is an intensive longitudinal research tool designed to gather fine-grained empirical evidence on users' water collection and use behavior in relation to changes in environmental, socio-economic, infrastructural, and institutional factors that influence their choices on a day-to-day basis (Bishop, 2015; Hoque and Hope, 2018). Diaries are rooted in feminist praxis; they allow respondents to generate topics through their entries and also help them become more aware of their consumption patterns. They foreground users', particularly women's practices and knowledge that otherwise gets suppressed in aggregate statistics (Lahiri-Dutt, 2015). They help researchers query practices and meanings associated with water, which might otherwise be hard to gather through direct observation.

Diaries also offer other advantages compared to cross-sectional surveys that are typically restricted to questions about the main sources of drinking water, the distance traveled/time required for water collection, availability of water at the source, and payments for water supply services. They allow researchers to capture temporal variations in water use behavior or the trade-offs that households make as water availability shifts by season, infrastructural breakdowns, economic/political instability, and intra-household changes (e.g., income fluctuations) (Hoque and Hope, 2018). Understanding temporal variations in water access is especially important for planning equitable water services in small cities like Tiruppur, where municipal drinking water supply is intermittent and unreliable, and a large proportion of the population relies on alternative water sources governed by their distinct arrangements,

[219] I use 'we' when referring to collaborative decisions and actions and 'I' when referring to my personal decisions that informed the research design and/ or data collection or analysis methods.

sometimes on a daily basis. Since temporal variability and reasons for switching between sources are hard to capture in a static, one-time survey due to retrospective recall issues (Wutich, 2009), I proposed the use of a diary so that participating households could self-record the sources from which they collected water by day and time, the relative costs (monetary, time, and labor) of water access from different sources, the uses to which they allocated water from the different sources, the issues, stress, or emotions that they experienced through the water collection or use process, and how they responded to these issues.

Despite their advantages, diaries are a challenging tool to deploy in low-literacy contexts like cities of the Global South, where multiple water providers and sources complement and compete with one another (Wutich, 2009; Bishop, 2015). Researchers must be creative in diary design to mitigate water user (and diarist) fatigue and invest significant time and resources in training and motivating users to complete diary entries regularly (Wutich, 2009). I designed a pilot water and waste diary based on data gathered through an initial round of field visits—observations of different water infrastructures, sources, and service levels, and informal informational interviews with households about their water collection and use practices. SAVE's community organizers (a group of working-class, middle-aged women) and I conducted these observations and interviews in localities in 11 wards across Tiruppur, which included wards in the old urban core as well as the merged towns and villages.[220] These initial visits also exposed me to various tenancy arrangements and the experience of socially constructed differences as they manifested in the local housing (and bundled water) markets across Tiruppur and informed

[220] In addition, we conducted observations and interviews in a Census Town (CT) called Mudalipalayam panchayat on the outskirts of Tiruppur, which concentrates an unusually high proportion of North and East Indian migrant workers. These workers work in the industrial estate developed by TEA in partnership with the GoTN in the early 1990s. These field visits were conducted in April-May 2019.

the diary design. They also revealed that the material properties of the different water sources (mainly their potability and taste), their accessibility (supply timings, distance from the house, costs, and the labor involved in hauling water), the assemblage of actors, and power relations governing a particular infrastructure shaped households' everyday water access and use practices. Additionally, their practices were shaped by water storage infrastructures at home and household-level demographic conditions that included class, caste, ethnicity (Tamil or non-Tamil, native or migrant), tenancy arrangement, and location in either the old municipal core or an added village.[221] The diary contained prompts and questions designed to capture this information.

We piloted the diaries over three days with 120 water users in 12 localities across Tiruppur.[222] Through this testing, we aimed to understand: (a) the appropriateness and comprehensibility of the water diary—format and questions—to gather the expected information; (b) its user-friendliness for users with low literacy levels; (c) the daily time commitment that diary completion entailed; (d) and the willingness of sampled users to participate in a month-long commitment and keep up with the demands of the study.

The pilot testing revealed that the diaries were intensive, and therefore, had to be redesigned.[223] First, the diary format had to change to include fewer and more closed questions so that participants could answer them by simply checking a few boxes instead of writing long responses comprising multiple sentences. We also had to include pictorial cues to make the questions easy for SAVE's community organizers to explain and for users to read, follow, and

[221] The pilot and final survey instruments also included questions about waste disposal and sanitation practices at the household scale. However, as waste disposal questions are outside the scope of this dissertation, I do not elaborate on them here.
[222] SAVE decided to distribute the diary to all users rather than a small select group to assess users' commitment and willingness to maintain the diary for a longer duration.
[223] Diarists were not compensated at this stage in cash or kind.

answer (cf. Wutich, 2009; Hoque and Hope, 2018). The community organizers noted that they could point to different pictures while explaining the questions and the kinds of expected responses (see Figure 5.1 for an example of this training process). Second, the community organizers also insisted that all the questions be accommodated on a single page, with each page corresponding to a single day to ease the daily commitment for each user.[224] They also insisted that the entire diary be formatted like a calendar so that women could hang it up on a wall and fill various boxes as and when they used water, with a hung-up calendar on display acting as a daily nudge for completion. They also pushed me to design the diary such that the daily time commitment for filling the various sections would be no more than 5-10 minutes per person. They believe that this would mitigate user fatigue, which had caused many users to quit at the testing stage. Accessing and valorizing local knowledge, thus, demanded that data be collected in a convenient and easy format for the knowledge providers.

Based on this feedback, I simplified the diary design and developed *a water and waste calendar*. This calendar only consisted of questions capturing temporal variability in water access and use by source and infrastructure and everyday intra-household division of labor for water-related tasks. I transferred all questions related to the governance of these water infrastructures and sources to a one-time survey that I administered with my research assistant (more on this later). Eliminating such questions allowed me to simplify the data collection tool.[225]

[224] The pilot diary had three sheets per day, which confused respondents.

[225] Other non-trivial considerations that informed the final design were the availability of paper sizes and printing facilities that could print multiple copies (nearly 125) at the designed size and at a cost that fit within our budget. Tiruppur is not a metropolitan city but has a large printing cluster thanks to the textile industry. I also had to ensure that the final product (i.e., the calendar itself) was user-friendly and wieldy. A community organizer recruiting and training nearly 9-10 participants was to carry 9-10 books (weighing about 4 kilograms in total) and pencil kits in public buses or walk around with them in the various localities where she worked.

Figure 5.1 - A community organizer explains how to fill the calendar to a group of participants

Source: Author's photograph, 4 September 2019.

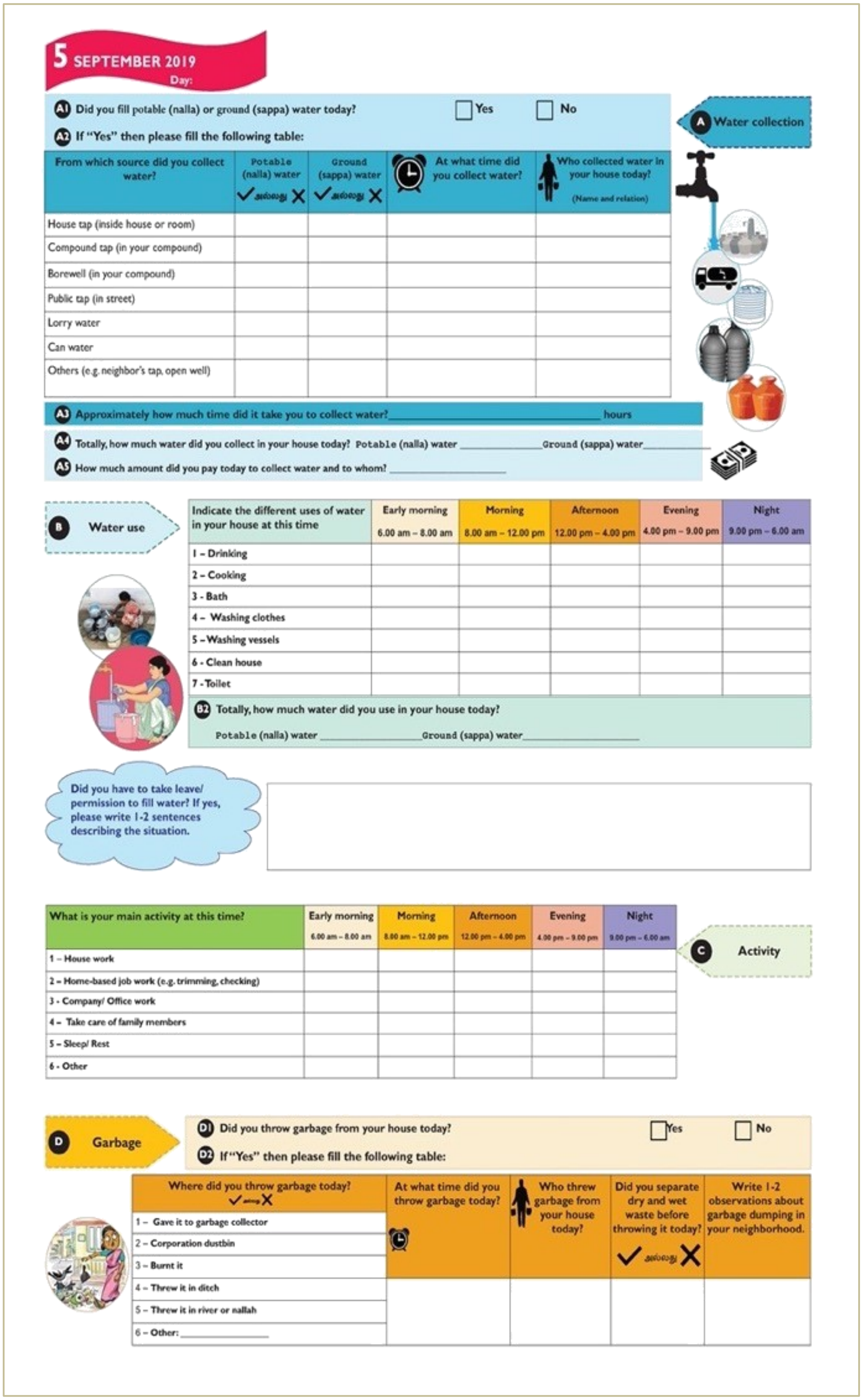
The final *water and waste calendar* consists of 30-pages, each page corresponding to one day for the measurement period (see figures 5.2 and 5.3 for an example of a blank and filled-out page).[226] As Figure 5.2 illustrates, the page for each day consists of four sections. The first section measures *water collection* practices. It queries how much water the respondent collected from each source, water quality (potable or not), time spent on collecting water, the person responsible for collecting water in the household, and the price of water by infrastructure or source. The second section measures total *water use* by potable and non-potable water at the respondent's household level. Whereas I originally intended to measure the volume of water used

[226] In retrospect, perhaps thirty days was too much, and I did observe that many respondents exhibited signs of fatigue. Ideally, we should have measured water collection and use practices between two consecutive municipal water supplies. As described in Chapter 4, the frequency of municipal water supply is highly variable across Tiruppur's wards and ranges from 3 days to 15 days. Perhaps, we could have restricted the survey period to twenty days.

by major activities (drinking, cooking, laundry, cleaning, and hygiene), we found that respondents found this too onerous to track and report. So, we measured the total water used within the household by potable and non-potable sources. Each week, the calendar also asked the respondent to report a 'water event' and asked if they had to miss work to collect water or due to a water-related task. These were open-ended questions where respondents had to write a response. The third section of the calendar measures *daily activities* by time. We included this section to document the incidence of home-based, informal work or employment in the textile industry among our respondents. However, this format did not reveal accurate insights; the survey dates were part of a lean economic period in Tiruppur (Goel, 2019) that also coincided with religious holidays. So, many women did not engage in home-based work. Many male respondents were also embarrassed to note periods of unemployment, so they would falsely indicate that they were at work. The final section of the calendar measures *waste disposal* practices. Respondents indicate if they disposed of household waste, where, at what times, and which household member was responsible. Once every few days, they had to write a short response noting issues related to waste disposal.

The calendars were printed and distributed in three languages: Tamil, Hindi, and English, with a staff member from SAVE and my research assistant providing Tamil translations and the Hindi translations completed by me.

Figure 5.2 - A page from the water and waste calendar



5 SEPTEMBER 2019
Day:

A Water collection

A1 Did you fill potable (nalla) or ground (sappa) water today? ☐ Yes ☐ No

A2 If "Yes" then please fill the following table:

From which source did you collect water?	Potable (nalla) water ✓ அல்லது ✗	Ground (sappa) water ✓ அல்லது ✗	At what time did you collect water?	Who collected water in your house today? (Name and relation)
House tap (inside house or room)				
Compound tap (in your compound)				
Borewell (in your compound)				
Public tap (in street)				
Lorry water				
Can water				
Others (e.g. neighbor's tap, open well)				

A3 Approximately how much time did it take you to collect water?__________ hours

A4 Totally, how much water did you collect in your house today? Potable (nalla) water __________ Ground (sappa) water__________

A5 How much amount did you pay today to collect water and to whom? __________

B Water use

Indicate the different uses of water in your house at this time	Early morning 6.00 am – 8.00 am	Morning 8.00 am – 12.00 pm	Afternoon 12.00 pm – 4.00 pm	Evening 4.00 pm – 9.00 pm	Night 9.00 pm – 6.00 am
1 – Drinking					
2 – Cooking					
3 - Bath					
4 – Washing clothes					
5 – Washing vessels					
6 - Clean house					
7 - Toilet					

B2 Totally, how much water did you use in your house today?
Potable (nalla) water __________ Ground (sappa) water__________

Did you have to take leave/ permission to fill water? If yes, please write 1-2 sentences describing the situation.

C Activity

What is your main activity at this time?	Early morning 6.00 am – 8.00 am	Morning 8.00 am – 12.00 pm	Afternoon 12.00 pm – 4.00 pm	Evening 4.00 pm – 9.00 pm	Night 9.00 pm – 6.00 am
1 – House work					
2 – Home-based job work (e.g. trimming, checking)					
3 - Company/ Office work					
4 – Take care of family members					
5 – Sleep/ Rest					
6 - Other					

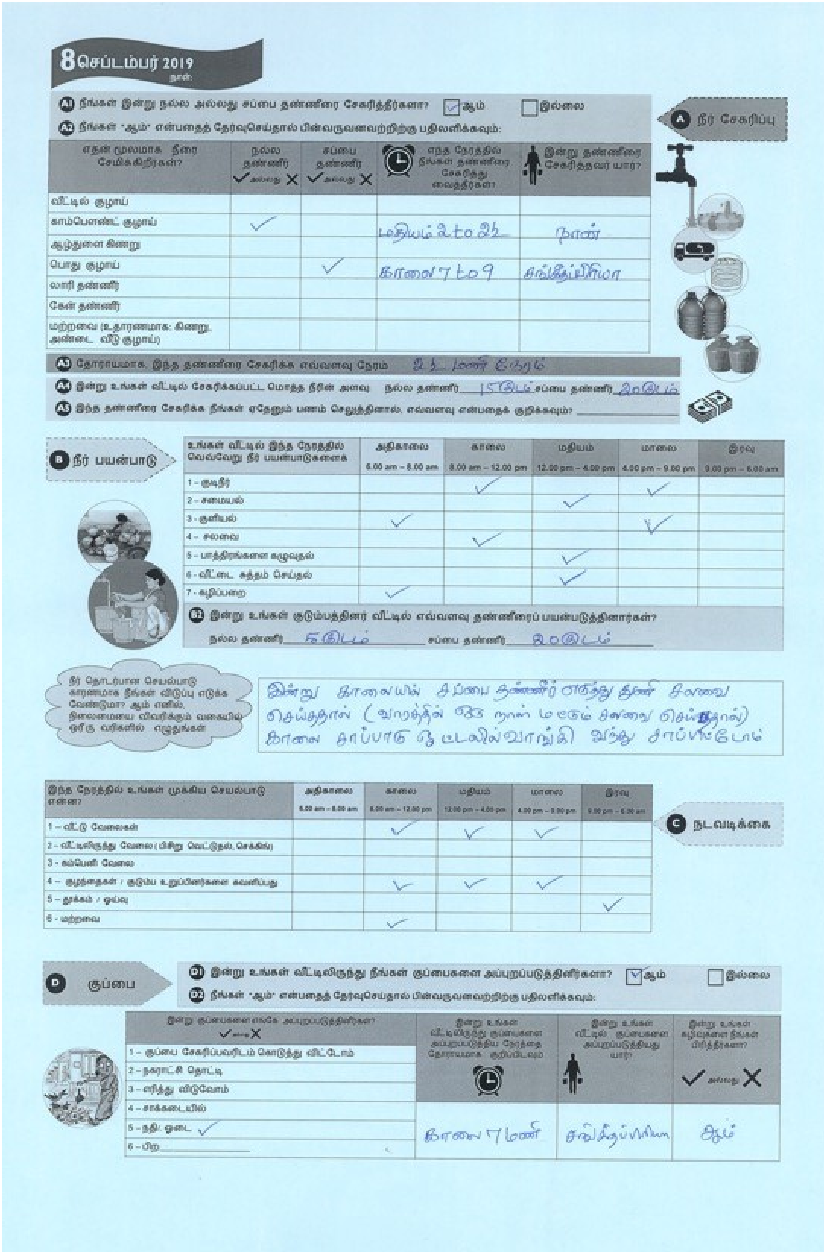
D Garbage

D1 Did you throw garbage from your house today? ☐ Yes ☐ No

D2 If "Yes" then please fill the following table:

Where did you throw garbage today? ✓ ⟶ ✗	At what time did you throw garbage today?	Who threw garbage from your house today?	Did you separate dry and wet waste before throwing it today? ✓ அல்லது ✗	Write 1-2 observations about garbage dumping in your neighborhood.
1 – Gave it to garbage collector				
2 – Corporation dustbin				
3 – Burnt it				
4 – Threw it in ditch				
5 – Threw it in river or nallah				
6 – Other: __________				

Figure 5.3 - An example of a filled-out page of the water and waste calendar (in Tamil)



<u>*Data collection with the water and waste calendar: Sampling and recruitment*</u>

We adopted a purposive sampling strategy to understand how users' social identities, tenancy situations, and locations in the city intersected to shape their water access practices. I also developed the following criteria to guide the research team in identifying participant households.

Each community organizer selected ten participants from each of the 12 localities[227] within Tiruppur, where SAVE had active operations and thick ties to residents. The ten or so participants that organizers sampled from each locality resided in the same hydraulic zone of the city. This allowed us to understand how users' water access strategies varied after controlling for municipal piped water supply conditions. These users were sampled such that they belonged to diverse caste backgrounds (*Dalits* and non-*Dalits*), represented different migration statuses (Tamil natives, Tamil migrants, and out-of-state migrants), and lived in a variety of tenancy arrangements, i.e., either an independent house, apartment, or housing compound—common housing types across Tiruppur that also entailed access to different water infrastructure arrangements on site. We also attempted to recruit one or two single male migrant respondents in each locality, but this was not always feasible given the language barrier[228] and the difficulty in tracking single men during the workday. Despite our best attempts to simplify the calendar design and reduce the daily commitment for each participating user, we could not always find an equal number of willing participants fulfilling all the sampling criteria in each locality. However, we took steps to ensure that no one demographic was systematically quitting the study by replacing them with a respondent sharing a similar class, caste, or tenancy background. Often, each respondent represented multiple intersecting social and spatial identities.

[227] Of these, 4 were in the old urban core, 3 were part of added towns, and 5 were parts of added villages. However, as the research progressed, we had to switch out some respondents and localities due to interference from local politicians, who felt that the research findings would expose their shortcomings, confirming that water is indeed constitutive of political power (fieldnotes, 15 September 2019; Bjorkman, 2015).

[228] Tamil-speaking community organizers did not speak Hindi, and many migrant men did not speak or understand Tamil. Gender and age differences between the organizers and young, male migrants also made it awkward for the former to recruit the latter.

Table 5.1 summarizes the key demographic characteristics of the surveyed sample of water users across Tiruppur.[229] As the table shows, 50% of the surveyed households lived in rental housing and spent about 20% of their monthly household income on average on housing-related expenses such as rent, electricity, water charges, and toilet user fees. Their houses usually consisted of a single, multipurpose room that was about 230 sq-ft in size. A quarter of the surveyed households mentioned that they had chosen to live in their current house to access better water infrastructures and services. Many out-of-state migrant households mentioned a welcoming environment and proximity to friends or relatives from their hometowns as other top considerations for their choice of housing location.

Table 5.1 - Demographic characteristics of the surveyed water users

Total number of respondents (n)	94
Locality (% of total)	
Old municipal core (City wards)	32.98
Added areas (Town wards)	25.53
Added areas (Village wards)	41.49
Homeownership (% of total)	
Homeowners	50
Tenants	50
Possess local citizenship (% of total)	81.91
Out of state migrant workers (% of total)	11.7
Years in Tiruppur (average)	21.78
Caste (% of total who are *Dalits*)	24.47
Respondent's education level (% of total)	
Illiterate	3.19

[229] At the end of the survey period, we received 108 complete water and waste calendars. Of these, four calendars had too many data entry errors, so we were forced to discard the data. A total of 94 calendars filled by residents living within the boundaries of TCMC inform the analysis presented in this chapter.

Primary school (till 4th grade)	14.89
Secondary school (till 8th grade)	40.43
High school graduate	22.34
Graduate or above	19.15
Respondent's employment status (% of total)	
Unemployed	26.6
Self-employed (including home-based work)	25.53
Part-time employment	20.21
Full-time employment	27.66
Household size (average)	4.02
Area of the dwelling (average, in square feet)	473.4
Monthly rent (average for tenants, in rupees)	3172.34
Number of water sources relied on in the survey period (average)	2.46
Monthly household income from all sources (average, in rupees)	25291.4

Source: 2019 Subramanyam and SAVE water and waste calendar survey.

The participants all filled out their calendars concurrently so that we could understand temporal variability in water access across households *and* locations within Tiruppur. A member of the research team trained a member of the participating household, usually the female head or another literate member, to fill the water and waste calendar as she was more likely to be aware of water consumption patterns for cooking and other domestic uses. SAVE's community organizers, my research assistant, or I also checked in with the participants during the survey period to ensure that they were filling the calendar regularly and accurately and provide clarifications. In a few cases, additional respondents (~7%) quit the study at this intermediate stage as they either encountered a scheduling conflict or because they feared their landlords.[230]

[230] They feared that their landlord would not like them revealing the rules and patterns of water access in their housing situation. A handful of people refused to participate in our study, citing intimidation by their landlord as the main reason. This refusal revealed the additional scales at which power operates in the waterscape and the strong role that some landlords play in mediating access to water, the state, and civil society organizations.

Low literacy levels among the surveyed users (see Table 5.1) did not deter calendar completion since we had simplified the design. However, it did affect their responses to many closed and open-ended questions. For example, many participants were not comfortable reporting water volume in liters. We encouraged them to note it in terms of "pitchers/ pots" (called *kudam* in Tamil), which is a locally intuitive measure or in terms of their overhead tank's volume. Our in-person companion survey (more on this later) helped us note the volumes of storage containers in participants' houses and clarify recorded volumes. In the case of open-ended questions on any memorable or noteworthy incident related to water, most participants either did not recall any incident or were simply uncomfortable (or disinterested) in recording it. Many calendars were returned with blank boxes or abbreviated responses for these open-ended questions (cf. Bishop, 2015). Each respondent received Rs. 500 (~USD 7) if they completed at least 80% of the calendar accurately.[231]

5.2.2. Companion surveys and interviews to understand users' access issues and organizing strategies in Tiruppur's hybrid waterscape

We paired the water and waste calendar with two one-time companion surveys administered by me or my research assistant. Water diaries are often combined with methods like interviews, observations, questionnaire surveys, and focus group discussions (FGD) to collect baseline data about water service levels and capture additional demographic data about the water user (Hoque

[231] Some scholars note that cash payments can alter water purchase behaviors (Hoque and Hope, 2020). However, we paid the honorarium at the end of the survey, so it was unlikely to alter water practices or the data. SAVE's community organizers who belonged to the same social background as many of our research participants found it ironical that participants got paid to share their "knowledge," whereas they did not as the organization's policies discouraged such conflicts of interest.

and Hope, 2018). In our study, we sought to understand the everyday issues that users faced in accessing water from the many sources, their coping strategies, and responses in the form of individual or collective demands for improved water provisioning by the local state.

Towards that end, the first survey captured demographic data on household members, data on migration and tenancy status, access to local social-political networks, and participation in urban governance. The second survey collected data on water services available to each household by water source, quality, and infrastructure of delivery; the governance structures and costs associated with each of these sources; water storage devices and practices accessed by the household; and the household's sanitation infrastructures and waste disposal practices. This survey also consisted of several open-ended questions that sought to understand each participant households' water needs, the experiences of scarcity and inadequacy, and response strategies to these. In many cases, these open-ended questions and discussions about users' recordings on the calendars became 'ethnographic windows' (Leonard, 2016) into broader governance and service provisioning practices in the respondent's compound, street, or neighborhood. It allowed me to probe respondents about the histories of service provision in the neighborhood, caste, political dynamics, and the everyday production of difference as it played out through service provisioning and access. See Appendix I (Sections 2 and 3) for copies of survey questionnaires, which took 55 minutes on average to administer.

In-depth, open-ended interviews with community leaders and older residents in the neighborhood also helped us understand the contest of water governance and political organizing in the localities. My research assistant and I entered the data from the water calendars in Microsoft Excel to understand each users' web of access. In analyzing these webs, I sought to understand which source a user relied on for a major portion of their everyday water needs and the source that they most frequently depended on through the study, and how these webs helped users forge material connections to the local infrastructural state. We entered data from the two companion surveys in QualtricsXM, a survey data entry and management platform. I coded the open-ended responses and analyzed them in relation to users' webs of access to trace the different kinds of hydraulic publics and their politics across Tiruppur.

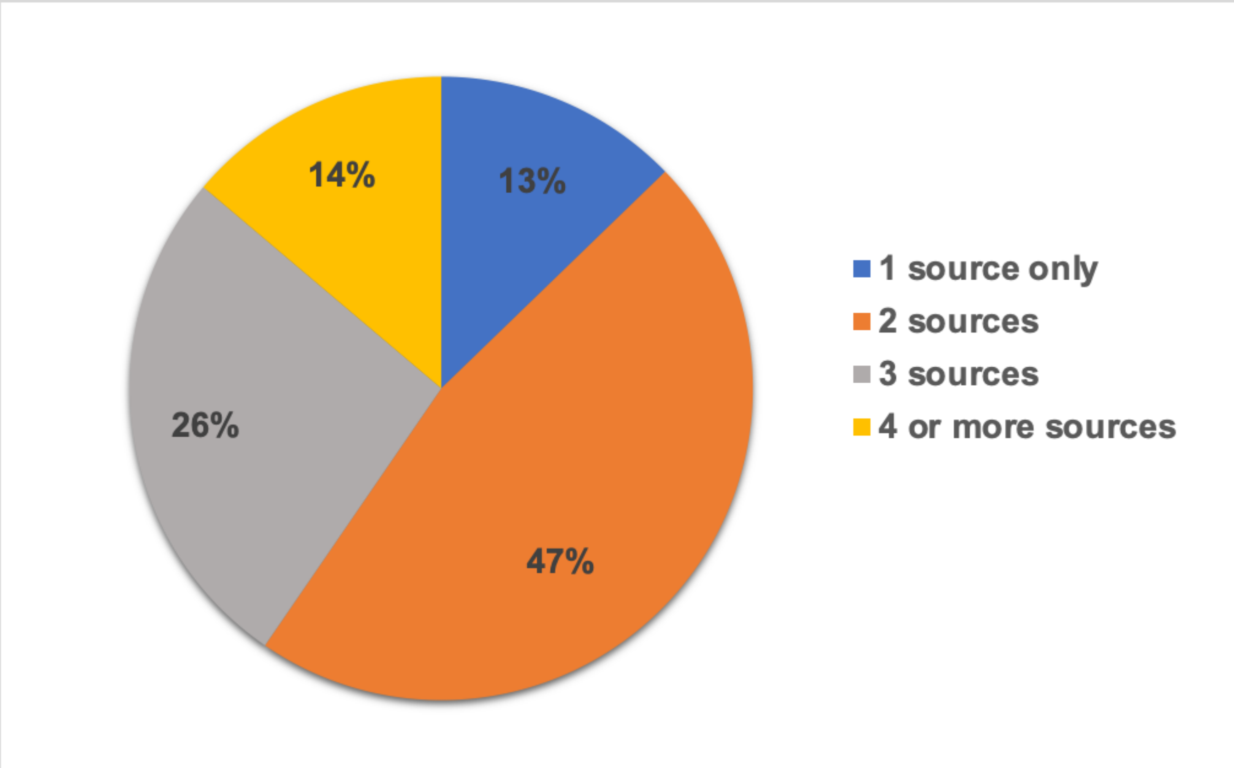
5.3. Embodied experiences of the waterscape

This section first describes water access practices among the surveyed users, followed by narratives of embodied access that illustrate diverse webs of access and material connections to the state, even among users inhabiting the same hydraulic zone and locality, i.e., Town Nagar in Tiruppur. Thereafter, I discuss the different kinds of hydraulic publics and their politics in Tiruppur, which vary based on these publics' dependence on particular water infrastructures and material connections to the state.

5.3.1. Water access practices among the surveyed users

In general, most Tiruppurians depend on more than one water source. 87% of the households within our sample (n=94) accessed water from more than one water source daily during the survey period to meet their daily water needs (see Figure 5.4). Three-fourths of the one dozen households who were able to manage with municipal piped supply alone were homeowners; they had access to a water storage tank and pumping infrastructure at home that they did not share with their tenants or neighbors.

Figure 5.4 - Number of water sources used by the surveyed households in the survey period (n=94)



Source: 2019 Subramanyam and SAVE water and waste calendar survey.

For those who relied on multiple sources of water, the most common other sources of water include borewells (privately-owned and available on-site or municipal borewells at the street-scale), followed by 24x7 public drinking water taps connected to the municipal piped network, trucked water, bottled water purchased by the can or water purchased from a neighbor, and rainwater collected in buckets and barrels. We observed that there was greater reliance on on-site, private borewells in the added villages. In contrast, in the old urban core, where there was slightly better access to public sources, people relied on municipal borewells or 24x7 drinking water taps. Residents in the old urban core also reported buying trucked water or drinking water from their neighbors in case of an emergency; this was less common in the added areas where people either had access to private borewells or had learned to cope with less water over time.

Although Tiruppurians rely on multiple water sources within the hybrid waterscape, the extent to which each household relies on different sources varies considerably both by spatial location in the city and by users' identity and housing (tenancy) situation within the same locality. Table 5.2 shows no discernable differences in the average number of sources that a single household depends on by homeownership or location, although homeowners depend on fewer sources in the added villages. But the critical question remains if homeowners and tenants depend on different types of sources and infrastructures, even as they rely on multiple sources since different sources impose additional monetary, corporeal, or emotional burdens on the user. More importantly, they shape their connections to the state and their ability to make water-related demands from the state.

Table 5.2 – Average number of sources used by the surveyed households by tenancy arrangement and location (n=94)

Location	Homeowners	Tenants
City	3.17	2.68
Town	2.31	2.45
Village	1.91	2.59

Source: 2019 Subramanyam and SAVE water and waste calendar survey.

5.3.2. Webs of access and material connections to the infrastructural state

Data from the water diaries allowed me to track a household's *web of access* during the survey period. I traced the combination of sources from which a household obtained water during the survey period (one month) and analyzed the extent to which a household depended on a particular water source in the span of one month, both in terms of the *quantity of water* obtained from a source and the *frequency* at which a source was accessed in one month. This analysis helped me understand how each household perceived and valued the various water sources available in their locality, how they chose from among these sources, the considerations underlying their choices, how these sources helped them establish material connections to and make demands of the local infrastructural state. The data showed that even within a single locality, households' webs of access varied by their social class and caste and their tenancy arrangement, affecting the dynamics of political organizing for water at the locality scale. A description of the webs of access of four users from a single hydraulic zone in Town Nagar will illustrate these differences: (i) Bhagya, a native *Dalit* homeowner, (ii) Maha, a lower-caste, Tamil migrant tenant (iii) Kavitha, a native Gounder homeowner, and (iv) Salim, an inter-state (non-Tamil) migrant tenant.

Bhagya was one of Town Nagar's residents who maintained the water and waste calendar. Bhagya is a *Dalit*, middle-aged woman who did domestic work for my landlady and other upper caste (and upper class) Gounder and Kamma Naidu women in the neighborhood. Bhagya was keen to participate in the study. However, as she could not read or write, she invited me to her house to explain the process of recording data in the calendar to her twenty-year-old daughter, a college graduate who worked in a knitwear company. Since Town Nagar has urbanized in the last decade or so, its morphology bears traces of its rural past, where housing used to be (and continues to be) segregated by caste. Bhagya's house is located in one such traditional, segregated *Dalit* colony of the village, which is ironically called "New Colony," just as *Dalit* colonies are referred to in other parts of Tiruppur where villages have urbanized into towns and cities.[232] I had to cross the main road, walk past the village (now town) school, many butcher shops, and waste recyclers to go to Bhagya's house. I went to her house late in the

[232] Recent empirical research in the Indian context shows that caste-based residential segregation in villages remains largely unchanged with urbanization. This pattern holds even in some of the country's largest and fastest-growing metropolises (Bharathi et al., 2021).

evening after her daughter returned from work. Bhagya picked me up from the main road so that I would not get chased by a stray dog or harassed by young men in the colony. Bhagya had lived in this colony all her life. Her parents and in-laws were agricultural laborers who had initially toiled in the village Gounders' farms. Later, they started doing housekeeping for the same Gounders when they built factories and knitwear companies in their fields. Her husband once drove a garbage truck for the municipality but had since quit work. Bhagya had been the sole breadwinner, taking on domestic work, until her daughter started working at the company. Tamil Nadu has a strong history of affirmative action towards *Dalits* in many State policies, even if desegregation was slow to materialize in everyday practice. So, Bhagya's family had managed to secure the title (*patta*) to the land on which they had built their house. They had access to a free electricity connection and a free household municipal piped water connection, for which they paid an annual water tax of Rs. 1500. However, they did not have a private indoor toilet and used a community toilet in their colony.

Bhagya did not have many complaints about her water situation, except that she desired a daily piped water supply. She had a large, overground plastic "Sintex" water tank in her house, in which she collected and stored about 1000-liters potable water for an entire week whenever municipal piped (drinking) water was supplied, which was about once a week. For laundry, washing vessels, and (public) toilet use, her family collected water almost every day from a municipal borewell on the street.[233] Bhagya did not spend money to obtain borewell water, even if she had to invest time and labor to collect and haul water. Bhagya, thus, had strong

[233] A village elder and local activist recalled that *Dalits* filled at the common village well and experienced overt discrimination a few decades ago. Over time, each caste-segregated neighborhood got its own well/ borewell, following which incidences of caste-based discrimination reduced, even if these 'separate but equal' water infrastructures did not trouble entrenched caste hierarchies (interview TIRPOL08, 9 December 2019).

connections to the local state through her continued dependence on municipal piped and borewell water supply. The watermen who operated both these sources in Bhagya's colony were her *Dalit* kin members and helped her address any issues with municipal water supply as and when they arose. Overall, the combination of in-house water storage infrastructure with daily municipal borewell supply helped alleviate Bhagya's everyday experiences of water scarcity and prevented her from taking any steps to demand improvements to the water supply in her colony.

Maha, another water user, lived in a housing compound developed in a 'layout'[234] in what was earlier farmland in another part of Town Nagar. Although not located in the *Dalit* part of Town Nagar, this housing compound, owned by a Gounder caste native of Town Nagar, mainly housed *Dalit* households from the southern parts of Tamil Nadu and Muslim migrants from Bengal, Bihar, and Uttar Pradesh.[235] Thus, segregation prevailed at multiple scales--that of the neighborhood and the micro-scale of a single housing compound to create different experiences of the city and its services even among the working-class. Although Maha was not a *Dalit*, she cohabited this compound with other residents from the southern, drought-affected districts of Tamil Nadu. Like Bhagya, she, too, engaged in housekeeping work in a few knitwear companies to make ends meet while her husband sporadically engaged in their traditional caste occupation of laundering and ironing clothes. She preferred Tiruppur to her native village, where there was little water available for agriculture, and she could not find stable non-farm employment.

[234] A 'layout' is a property sub-division created in farmlands, where developers demarcate and sell plots for residential and commercial purposes. My interviews with former farmers across Tiruppur revealed that they had sold their lands to developers in increments over the last two decades to cash in on industrial growth and cope with the growing shortage of agricultural labor that had shifted to wage work in Tiruppur's knitwear industry. In Tiruppur, old layouts bear farmer family names and function as informal neighborhoods; newer ones tend to be enclaved.

[235] Industrialization and growing demand for worker housing meant a steady source of income for upper-caste natives who had invested in the housing market. These landlords'/ladies' land value also continued to multiply with time. Thus, they, too, had a vested interest in maintaining Tiruppur's export-oriented growth machine.

The entrance to Maha's compound had two municipal piped water connections that were shared between 9 families.[236] Except for individual water storage drums, pots, and pitchers, there was no collective water storage infrastructure. This lack of storage helped to keep the rent affordable. Whenever municipal piped water is supplied for 1.5 to 2 hours each week, Maha and women from the nine other families get organized, coordinate, and collect about one drum of water or 300-liters of water each to last them till the next supply, which is usually after 6 or 7 days. They have devised a system—they each use a hose to fill their individual drums for about half an hour each, and if water continues to flow, they fill a few additional pots each. All the women gathered around me when I interviewed Maha and chimed in to confirm that their rules ensured that every family in the compound got an equitable amount of water. However, the onus for equitable distribution was theirs, and it was complicated by the inconsistency of municipal piped water supply timings.[237] If Maha is away at work, one of her neighbors calls her on her cellphone whenever water arrives. So, occasionally, Maha has to take "permission" from her boss to return home and collect water for the week. If she cannot make it home on time or runs out of her stored quota of municipal piped water, she goes to the 24x7 free municipal (First Scheme) drinking water tap near Town Nagar bus stop to fetch drinking water. This tap is located about a ten-minute walk away from her house.

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[236] There are no regulations mandating the minimum number of connections that a landlord/lady must buy for a given number of occupants.

[237] Throughout my fieldwork, I remained amazed about how the residents of this neighborhood, and others across Tiruppur, coped with inconsistent municipal water supply timings and unreliable water supply duration. I discovered that over time, residents had developed various informal coping mechanisms. On the sixth or seventh day, when they expected supply, they called the watermen, their friends, and relatives on the neighboring street that usually received water two hours before their street and then proceeded to inform each other. Most tenants would not go out or engage in a recreational activity on the day they expected municipal water supply and stayed at home to collect water for the week. If they happened to go out, they would request a neighbor to fill water on their behalf or promptly return to collect their quota of water. If they were not at home, they would be forced to spend money on trucked water or buy water from a water-rich neighbor.

Since municipal piped water supply is limited, Maha only uses her stored water quota (or drinking water from the public tap) for drinking, laundry, and cooking. She plans every other non-drinking, water-consuming activity like bathing, toilet use, housekeeping, and laundry with untreated municipal borewell water from the borewell that she operates on behalf of the "official" borewell manager in the locality. For turning the borewell pump on (or off) each morning and night--promptly at 6 a.m. and 8 p.m. respectively, Maha collects a token fee or "tea money" of Rs. 10 per household per month from every household that fills water at the borewell. Each day, she also keeps an eye on the borewell water tank so that it does not overflow and water does not get wasted. Maha is conscious enough to delay supply timings on Sundays and holidays so that people can sleep in. She also arranges to get leaky taps and pipes repaired by coordinating with the "official" borewell manager and the tap inspector for the ward. Although municipal borewell water costs just Rs. 10 a month, lower caste, working-class women like Maha living on this street (and elsewhere in Tiruppur) pay for it in terms of time (about half an hour each morning at least) and corporeal effort as each pitcher of water weighs at least 18-20 kilograms. Luckily, they do not travel a great distance to haul water from borewell taps.[238] Current informal but operational rules for municipal borewell water across Tiruppur prevent residents from using a hose to transfer borewell water to their homes.

Like Bhagya, Maha, too, does not rank water issues high on her list of problems; stable employment, wages, her children's education, and other domestic issues worry her more. Maha wishes that water was supplied once every five days rather than once every seven days. Whenever Maha and her neighbors experience any piped water-related problems, they do not complain to the "waterman" or another state actor. Instead, because the landlady owns the water

[238] On average, borewell taps were located no more than 50 to 100-meters away from respondents' houses.

connection, they complain to her, and she gets the problem rectified. "Since we have borewell water, we do not realize how inadequate piped water supply is, but it is insufficient," Maha told me frankly. Maha's Hindi-speaking neighbors prefer to buy bottled water since they perceive bottled water to be of higher quality. So, they do not experience the same kinds of piped water scarcity that Maha or the Tamil *Dalit* families in the compound do, even if they must spend an additional Rs. 280 per month. Overall, neither Maha nor her neighbors take any collective action at the neighborhood (or higher) scale to improve the piped water supply situation but take individual steps to cope by getting water from a hybrid waterscape.

Kavitha, an upper-caste Gounder woman, lives across the street from Maha's house in a large, two-story house owned by her husband's family. Kavitha has sub-divided her property on paper and has managed to obtain two household municipal piped water connections, each corresponding to her property sub-divisions, because she can afford to pay double the property and water taxes each year for the two connections. This allows her to get twice the amount of water each time the Corporation supplies water, which she stores in a large underground tank on her property. Every two days, she pumps water to an overhead tank so that her family can use water through an in-house plumbing system. Unlike Bhagya or Maha, Kavitha hardly spends time or energy waiting for or collecting water. Because she gets water from two connections and often has excess water, she also sells drinking water (at the rate of 1 rupee per pitcher) to women in Maha's compound when they run out of water—a fact that she did not admit to me, but Maha's neighbors made sure to note when we were mapping the waterscape. Although Kavitha is the "official" borewell manager for the locality, she neither fills water at the borewell nor operates it. About seven years ago, she was appointed by the ward councilor as the borewell manager, but she handed down the operations to Maha because it was a lot of work.

About 300-meters away from this 'layout' is another large property—part of an old farmland—that has been developed as a low-income migrant housing complex. Salim, a 32-year-old Muslim migrant from the North Indian state of Uttar Pradesh, lives in a two-room house in this compound with his wife and 8-year-old daughter. Housing for migrant workers from North and East Indian states, especially single-male migrant workers, tends to be highly segregated in Tiruppur due to the prevalence of migrant xenophobia. Some large landlords like Salim's specialize in catering to this niche within Tiruppur's housing market. As one such landlord admitted to me, "Tamil families require more facilities for the same rent, which increases property maintenance costs for me. So, I prefer Hindi bachelors. I can charge them per head." Another landlord told me, "Hindi bachelors will adjust with anything."[239]

Salim has worked in larger cities like Mumbai and Bangalore but prefers the slow and comfortable pace of life in Tiruppur. He runs a small grocery store from the front portion of his house, where he also stocks and sells 20-liter drinking water cans for Rs. 35 each. These cans are in high demand since the landlord has provided just two municipal piped water connections for the nearly hundred single-male migrant workers who live in this compound. Most of these bachelors are not at home when the Municipal Corporation supplies water. They either buy water cans or go to the 24x7 drinking water tap near the bus stop and fill water. As a result, families like Salim's, who have women at home for water work, can fill as much water as they like.[240] "But there is 24x7 [private] borewell water in the compound for everything else […] There are no restrictions on borewell water use. Hence, all the rooms are full in this compound," reasoned

[239] Interviews TIRRE20, 17 December 2019, and TIRRE19, 7 December 2019. In many cases, export companies lease entire compounds for their migrant workers and convert them into 'hostels.' These hostels tend to have on-site borewell facilities that provide water 24x7. However, because workers living in these hostels tend to be socially and infrastructurally segregated from the rest of the city, they do not participate in everyday place maintenance, governance, or planning.

[240] Interview with Salim, 2 December 2019.

Salim. He pointed to the little pipe extension that he had installed through a hole in the wall so that his physically impaired wife would not have to haul pots of water from the communal tap to their kitchen each day. Salim and his family, too, consume water cans to meet drinking and cooking water needs. Because Salim and the other tenants rely on private water sources, which fulfill their water needs, neither Salim nor the other tenants in the compound make individual or collective water-related demands to the infrastructural state.

Hybridity in Tiruppur's waterscape, thus, helps extend water coverage to water-poor households like Bhagya's, Maha's, or Salim's so that they can cope with drinking water scarcity. However, it also distributes the burdens and costs of access unequally and maintains older socio-spatial inequalities. As the cases of Bhagya, Maha, Kavitha, and Salim showed, households living on the same street and served by the same municipal hydraulic zone can have very different individual webs of access and highly personalized connections to the local infrastructural state in Tiruppur's hybrid waterscape. These differences exist because of variations in household-level water affordability and access to piped and parallel infrastructures and long-term water storage infrastructures within the house or compound. The next section describes the kinds of hydraulic publics that we observed based on their webs of access and connections to the state.

5.3.3. Organizing for water: Tiruppur's multiple hydraulic publics and their politics

<u>*Tiruppur's hydraulic publics*</u>

As the above narratives showed, individual water users have unique webs of access in Tiruppur. These users can be grouped into three major kinds of publics based on their webs of access, i.e., the water sources and infrastructures that they largely rely on in terms of the amount of water they consume from a source, how often they depend on the source, and whether they depend on a source for critical needs like drinking. I classify users based on their dependence on Corporation-supplied water sources as (i) piped water publics, (ii) municipal borewell publics, and (iii) non-publics (see Table 5.3). Table 5.3 also confirms what the embodied narratives revealed, i.e., a user's dependence on and access to particular water infrastructures is correlated with their class, caste, migration, and tenancy status.

Table 5.2 - Major water sources reported by demographic category during the survey period

	n	Personal municipal pipe connection	Shared municipal pipe connection	On-site private borewell	Municipal borewell	24x7 public tap	Bottled water	Trucked water	Water purchased / borrowed from a neighbor
TOTAL	**94**	**32 (34.04%)**	**14 (14.89%)**	**11 (11.70%)**	**29 (30.85%)**	**4 (4.26%)**	**0 (0.00)**	**3 (3.19%)**	**1 (1.06%)**
Homeowners	47	27 (57.45%)	3 (6.38%)	0 (0.00)	13 (27.66%)	2 (4.26%)	0 (0.00)	2 (4.26%)	0 (0.00)
Tenants	47	5 (10.64%)	11 (23.40%)	11 (23.40%)	16 (34.04%)	2 (4.26%)	0 (0.00)	1 (2.13%)	1 (2.13%)
In-state	36	4 (11.11%)	10 (27.78%)	9 (25.00%)	12 (33.33%)	0 (0.00)	0 (0.00)	1 (2.78%)	0 (0.00)
Out-of-state migrants	11	1 (9.09%)	1 (9.09%)	2 (18.18%)	4 (36.36%)	2 (18.18%)	0 (0.00)	0 (0.00)	1 (9.09%)

Source: 2019 Subramanyam and SAVE water and waste calendar survey.
(*Note:* Figures in parentheses indicate the proportion of the demographic category that reported a particular water source as its major water source in the water and waste calendar. A major water source is one from which a household obtained its largest share of water by volume during the survey period)

(i) *Piped water publics* - Nearly half the surveyed users reported piped water as their major water source. A third of the water users, most homeowners, had access to a personal municipal piped water connection and control over their pipes. Since municipal piped water supply is intermittent, about two-thirds of these homeowners also occasionally fetched borewell water, but they were not heavily dependent on borewell water. These homeowning piped water publics had stable and consistent connections to watermen (and their supervisors) in the local infrastructural state, which affected their ability to voice issues and demand changes.

(ii) *Municipal borewell publics* – Another third of the sample listed municipal borewells as their major water source. Unsurprisingly, tenants were more reliant on municipal borewells for their water needs; most of these tenants fetched borewell water every day.[241] These tenants, including Maha, lived in compounds without on-site borewells or adequate water storage infrastructure. They also shared their piped water connections with neighbors, making piped water a small (and replaceable) part of their total water consumption. These water-poor households used less valuable but easily available (untreated) borewell water for water-intensive, non-drinking purposes and conserved scarce, higher quality piped water or water from 24x7 public taps for drinking and cooking purposes, just like Spencer (2008) and Lele et al. (2018) have observed in other contexts.

These publics' access to the local state controlling piped water was mediated by their landlords, who owned the water connections. The local state's implication in maintaining 24x7

[241] Reliance on municipal borewells or public infrastructures was not strongly fractured along caste lines within our sample.

public taps or bottled water was also unclear to these users.[242] These municipal borewell publics formed material connections to the local councilor who sponsored the borewell infrastructure or appointed a local resident for overseeing its everyday operations. However, tenants who did not vote locally often did not interface directly with the councilor on local water issues. In this way, material connections to piped and borewell infrastructures, and the state actors governing them, affected tenants' abilities to voice demands.

(iii) *Non-publics* – A small proportion of the surveyed users did not possess any material connections to the local infrastructural state. These included Salim, who lived in segregated migrant housing, and residents in newer housing stock in the added peripheries who relied on private, on-site borewells and bottled water. As such, these individual users did not coalesce into 'publics' who interfaced with the state or made demands of it. In many cases, the 'public' was at the scale of a single-tenant compound or individual user. Further, their structurally disadvantaged positions, as in the case of many intra- and most interstate migrants, also affect their ability to organize, exercise their voice, and make demands for improvements to the waterscape.

Generally speaking, households who relied on more than one water source, including the municipal piped network, obtained just 18% to 26% of their monthly water quota from the municipal piped supply (either through individual or shared connections). They, thus, had tenuous and weak connections to the Corporation's water bureaucracy. In the case of tenants, this connection, too, was mediated by the landlord, further weakening the tenants' ability to make demands of the state. Tiruppur's multiple hydraulic publics, thus, form different material

[242] For example, in surveys, users could not answer who controlled or regulated the 24x7 drinking water taps or bottled water.

connections to the local state. Similarly, their perceptions of the state's implications in the production of water scarcity and the governance of a particular water source (or infrastructure) are also influenced by the ways in which they interface with the state in water access. These connections, perceptions, and the lived experiences of scarcity affect their ability to organize and demand improvements to water supply in their locality, as the next section will show.

The multiple publics' politics of organizing for improved water access

87% of the surveyed households relied on more than one water source and experienced some of the unequal burdens of water scarcity. However, only about half reported having taken any step towards improving their water situation. On average, homeowners were more vocal in making demands and complaining about the water situation than tenants, even if tenants formed a greater share of the surveyed users who experienced some form of water scarcity and incurred additional costs for water access. Two-thirds of the surveyed homeowners and only about a third of tenants had taken any step, either individually or collectively, to address water scarcity by demanding improvements to municipal water supply (see Table 5.3). Among the tenants who reported taking action, all except one were Tamil-speaking tenants with local voting rights. Compared to tenants who did not organize for water improvements, these in-state tenants were more dependent on Corporation-supplied water for most of their daily water needs. Differences in homeowners' and tenants' material connections to the infrastructural state, combined with the absence of ongoing social struggles that can mobilize affected publics, help explain these variations in their organizing strategies or the issues around which they organized.

Table 5.4 - Proportion of the surveyed residents who took action to address water scarcity and improve water access

	n	Number who voiced demands for water	Proportion who voiced demands for water
Total	94	48	51.06%
Homeowners	47	32	68.09%
Tenants	47	16	34.04%
In-state migrants	36	15	41.67%
Out-of-state migrants	11	1	9.09%

Source: 2019 Subramanyam and SAVE water and waste calendar survey.

Piped water publics and their politics

A majority of those (nearly 60%) who took any action towards improving water access, homeowners and tenants included, were part of the piped water publics that I described earlier, i.e., they relied on piped water as their major water source. Most of these took individual steps to demand redressal for piped water scarcity. In interviews, these publics repeatedly stressed that the frequency and duration of piped water supply were unsatisfactory or that they disliked the taste of water that was now being supplied through the Third Scheme. These publics either showed up at their local water tank or called their street-level bureaucrats, i.e., the waterman and tap inspector, and in a few cases, the ward councilor, asking them to improve the timings, frequency, and duration of piped water supply to their locality. In some cases, the local state would address these issues, whereas in other cases, the publics got tired and stopped complaining when there was no redressal.

Less than a fifth of these piped publics, homeowners, and tenants combined, reported that they had engaged in collective action in the form of a protest or combined petition to demand improvements in the piped water supply. In three instances, people had participated in a protest organized by the ward councilor asking that the Corporation improve the frequency and duration of water supply to their neighborhood. In two other cases, they had submitted a petition to the councilor demanding similar changes. Collective action usually involved showing up as a group at the water tank or Corporation office to complain and demand action from Watermen, Tap Inspectors, or Assistant Engineers (AEs). On two occasions, my meetings with Tap Inspectors and AEs were interrupted by angry groups of middle-aged, Tamil-speaking women demanding immediate attention to their neighborhood's water problems.[243]

A greater share of such combined complaints or protests tended to originate in the added villages. The area councilor or a ward-level leader of a leading political party would usually organize such a protest. With the formation of Tiruppur Corporation and the merger of the peripheral villages with the city, the demand for better services in the added areas, especially better drinking water supply (greater frequency or duration of supply or both), has animated municipal politics. Councilors from the CPI(M) and its political allies, the DMK and the MDMK, have frequently staged walkouts from or sit-ins in Corporation council meetings citing an 'apathy' or 'stepmotherly' treatment by the administration towards their constituents (e.g., Staff Reporter, 2010; 2011b; 2012b; 2013b; 2016).[244] Residents, too, have taken to the streets whenever water supply was delayed beyond ten days or a borewell broke down, obstructing

[243] In one incident, a group of women demanded immediate attention to water-logging in their street that a leaking municipal water pipe had caused. They did not budge until the engineer left to examine the problem (fieldnotes, 21 November 2019).

[244] Several party workers and leaders would proudly narrate stories of the many protests they led when I would ask them about the water situation in their area. Others would describe the many rounds they made each morning to ensure that water was being supplied on time and per the rules.

traffic till an engineer or administrator arrived on the spot and assured them that appropriate action would be taken (e.g., Staff Reporter, 2011a; 2012a; 2012c; 2013a) (see figure 5.5).

Figure 5.5 - Women blocking road traffic in protest after not receiving drinking water supply for 20 days in 2011

Source: Staff Reporter, 2011a.

On their part, Tap Inspectors and engineers would take immediate, stop-gap action to display their responsiveness and to diffuse a protest even if they did not develop a long-term planning solution to address water scarcity. A former councilor who had staged many protests explained why these demonstrations could not be sustained long enough to impact planning by saying,

> "Suppose we gather a crowd and go and demand water once every 4 days from the administration, then the next 2-3 supplies will be once every 4 days. After that, they will revert to their 'once in 8 days' schedule. The administration tires us out…change is not long-lasting. That is why, public have also stopped demanding. For six days, they are at home and on the seventh day, they rest at home or return to their villages. People only care about work, wages, and rest. They are willing to

pay Rs. 100 and buy water instead of protesting for lasting change."245

Demonstrations and protests sought to draw attention to collective issues at a street, neighborhood, or ward level related to the timings, frequency, and duration of piped water supply. They relied on the performative power of a spectacle to elicit (and equally demonstrate) accountability (cf. Coelho, 2004; Ranganathan, 2010; also see Von Schnitzler, 2016). However, even tenant-led complaints or protests did not seek to reform inherent biases in piped water supply which privileged property ownership. Neither did they question the gradual closure of free or subsidized public water taps that largely served low-income, working-class residents. In a few cases, these sporadic councilor-led protests resulted in the allocation of funds for a municipal borewell in the ward from which the protest originated. Installing a borewell was easier for the local state compared to addressing inequalities in piped water distribution.

I encountered no cases of long-term collective consumption struggles proposing alternatives to the existing piped water provisioning system or demanding a reform of the existing system. Instead of organizing to demand equitable distribution of water and better living conditions from their employers or the state or question existing water governance practices, the working class accepted broader discourses of scarcity. They tried to cope with water scarcity by adjusting their everyday consumption practices and absorbing the costs of obtaining water from multiple sources. In part, this was because workers' unions did not politicize housing or water scarcity issues (Vijayabaskar, 2011); they occasionally made demands and submitted petitions for the construction of affordable public housing or workers' hostels but did not try to challenge prevailing models of economic development predicated on voracious and unequal industrial growth. Everyone in Tiruppur, including the unions, usually championed the export-oriented

[245] Interview TIRPOL04, 28 July 2017.

growth machine, even if it brought impending socio-environmental harms in its wake. Chari (2004: 177-179) classifies the union culture in Tiruppur as 'conservative' because it works to secure entitlements in the workplace but never willfully threatens the conditions of accumulation in Tiruppur. At public events, capitalists and union leaders stress their cooperative relations. In one such event, Raja Shanmugam, the President of TEA, proudly proclaimed, "In other cities, industries and unions will be like cat and mouse. But in Tiruppur's knitwear industry, we are knitted together."[246] The absence of city-wide struggles for collective consumption further deterred scattered and sporadic individual actions from coalescing into a broader social movement that actively questioned water infrastructure plans and policies to transform an unequal status quo.

Ironically, a water ATM installed by the local MLA was the only example of an 'alternative' pro-poor intervention in Tiruppur's waterscape. This ATM facility used Reverse Osmosis (RO) technology to convert groundwater into drinking water. It dispensed one pot (or 20-liters) of free drinking water per household per day for households possessing a smart ration card registered in that locality.[247] This intervention, an act of political patronage, was pro-poor but not truly progressive. It excluded Tiruppur's most marginalized--migrant families and the disenfranchised who did not possess a local ration card.

[246] Speech at a public event, 27 June 2019.

[247] A *ration card* is a document that allows a family to obtain subsidized food grains, household commodities, and other benefits through the Public Distribution System in India. A smart ration card has a digital chip and is linked to other identities and benefits.

Borewell publics and their politics

A fourth of the users who organized for improving their water access, homeowners and landowners included, were part of the borewell publics, who depended on municipal borewells for their daily water needs. Homeowners and tenants within these borewell publics organized in two ways. Homeowners usually demanded improvements to the piped water supply to reduce their dependency on borewells. Tenants demanded changes to the existing borewell infrastructure, such as the extension of borewell pipes and taps to their streets or changes to borewells supply timings. They usually organized at the street- or neighborhood-level and approached the ward councilor with petitions to demand these changes.

Even in cases where homeowners did not depend on municipal borewells, they maintained access to these borewells. They saw these borewells as ‘free’ handouts from the state--a crucial component of the bundle of local citizenship rights that they were entitled to and one they had to continue to claim to safeguard it as a right. As one informant noted, “Although everyone in our street has a private borewell, we continue to use the *sappa tanni* (municipal borewell water) so that the *panchayat* will not close the borewell on our street.”[248] Anand (2017) and Ranganathan (2014a) have shown how marginalized residents of Indian cities claim citizenship rights through payments for and struggles over access to piped networks. However, these stories from Tiruppur suggest that decentralized, public water infrastructures (or clubbed water goods), too, form an integral part of the political terrain on which citizenship claims are made. However, the claims and struggles for improving borewell infrastructure at the scale of local borewell ‘clubs’ are sporadic, localized, and isolated. They do not join similar other

[248] Interview, 22 November 2019.

struggles across the city. Neither do they add up to challenge city-wide water infrastructure plans or policies, which allows an unregulated dependence on groundwater to continue.

Silent publics

More than half the surveyed households (a third of the homeowners and over two-thirds of the tenants) had never organized to demand water improvements. The homeowners who did not organize were water-secure; they did not experience any inconvenience or severe cost burdens due to piped water scarcity. They had access to long-term water storage infrastructure such as underground and overhead storage tanks at home. They also had private borewells on-site as a backup measure in case municipal water supply fell short.

Similarly, most of the tenants who did not organize belonged to the group I categorized as *non-publics*. A third of these obtained most of their water from on-site borewells operated by their landlords. These borewells usually provided a round-the-clock water supply. These tenants only relied on the piped network (either through individual or shared connections) for drinking water, if they did so at all. Some landlords, like Salim's, who catered to out-of-state migrant tenants, made it a point to advertise the availability of 24x7 on-site borewell water to attract tenants and charge them higher rents (see figure 5.6). As these tenants were not critically dependent (and in many cases not at all dependent) on potable piped water infrastructures or municipal borewells, they had a weak relationship to the local infrastructural state assemblage that managed these infrastructures. Even in cases where tenants did not have access to private borewells and depended on the municipal piped network, as in Maha's case, their relation to the local infrastructural state was often mediated by the landlord. The landlord, who 'owned' the water connection, addressed most repairs or maintenance issues, even if they charged the tenants an additional fee for undertaking such repairs. One Tamil Muslim tenant explained why it was important to mobilize the state through her landlord for any changes to piped water supply by saying, “No one will listen to us as we are tenants. They [local infrastructural state] treat us like garbage. They will only listen to house owners.”[249]

Other tenants who were heavily reliant on municipal borewells did not organize to complain or demand changes. They had access to round-the-clock 24x7 public water taps in their vicinity from where they could bring water in case of scarcity. They also felt more at ease buying trucked water or water from a water-selling neighbor (like Kavitha) in the rare event when their municipal borewells failed or broke down, rather than make an effort to organize or make demands of the local state. These switches were highly individualized decisions and imposed variable costs on individuals. Bringing ‘free’ water from another locality or a 24x7 public tap was not arduous for a household with access to a motorbike or a bicycle. However, it meant spending additional money to get bottled or trucked water for a household without access to a personal vehicle. Thus, as other sources in the hybrid waterscape helped mitigate inadequacies or issues with public sources (albeit temporarily or even unsatisfactorily), tenants rarely organized to seek broader improvements to public water services. In the case of out-of-state tenants, their (in)action was further influenced by their inability to organize with Tamil-speaking tenants and access the local political state or civil society organizations.[250] In some compounds, tenants who paid a higher rent were allowed to fill more water at shared taps, further fracturing any intra-class solidarities that could form around shared water problems. Several out-of-state migrant

[249] Interview, 4 October 2019.

[250] A long history of anti-Hindi mobilization by the Dravidian parties and everyday discourses rejecting Hindi imposition that was widespread, including at the time of my fieldwork, created feelings of mistrust towards out-of-state workers. This xenophobia caused many out-of-state migrant workers like Salim to live in segregated housing compounds, cut off from other Tamil workers. When migrants lived with Tamil-speaking neighbors, they could often not communicate in Tamil (just as Tamilians could not speak Hindi) to organize shared concerns.

tenants would pause in the middle of the survey and ask rhetorically, “Whom will we complain to? Who will listen to us?”[251]

In this way, hybridity in Tiruppur’s waterscape helps the state increase water coverage. It alleviates users’ experiences of water scarcity and increases their resilience. However, this hybrid waterscape devolves the responsibility for coping with water insecurity down to each individual. The personalized ways in which users cope prevent them from collectively articulating water-related grievances or making demands for change. Since water distribution is built on social differences rooted in class, caste, and migration status, cross-class or cross-ethnic collective action is hindered.

Figure 5.6 - A hand-painted signage advertising the availability of rooms in a migrant housing compound. The sign, which is unusually in Hindi (to attract a particular clientele) and strategically placed above the shared drinking water connections that serve this compound, claims, "Water facility available. Water is available for 24 hours. For details, call …"

Source: Author’s photograph, August 2019.

[251] Interviews, September-October 2019.

5.4. Conclusion

This chapter showed that Tiruppur's hybrid waterscape, a by-product of exclusionary planning, allows the local state to compensate for piped water scarcity. It provides more-or-less universal water coverage, albeit with waters of differing qualities, to the city's residents. Because water from many sources is delivered through multiple infrastructures governed by unique relations and arrangements to the individual user, the individual costs of water access are highly variable. For each user, these costs are contingent on their social (class, caste, and migrant) identity, their tenancy situation, and spatial location in the city. These socio-spatial factors affect their ability to purchase water from the market, haul water from borewells or public taps in their locality, and access long-term water storage infrastructure. Each user, thus, develops a unique web of access as they meet their water needs from a combination of sources to procure water at costs acceptable to them. Each user's varying degrees of reliance on municipal water infrastructures and the ability to weather its shortcomings within their webs shape their material connections to the local infrastructural state, the issues they articulate, whom they approach for redressal, and how they organize. Thus, different webs of access in Tiruppur's hybrid waterscape help explain the absence of sustained collective struggles, or a city-wide politics of collective consumption, that demand just municipal water services.

Differentiated coverage through multiple infrastructures and water sources fragments Tiruppur's hydraulic publics and their politics. These fragmented publics are materially connected to different parts of the local state and participate in water governance at different scales. They largely make individual political demands of the different state actors (and organizations) to whom they are weakly connected, if they make any demands at all. Collective action, rare as it is, tends to be restricted to the scale of hydraulic club goods, i.e., municipal borewells in this case. Collective protests that make demands for better piped water supply from higher decision-making tiers of the local state only occur when a local councilor or politician organizes them.

In many cases, hydraulic publics only exist at the scale of an individual user who sources water from market-based vendors of bottled or trucked water or her private, unregulated borewell or rainwater harvesting tank. Since these non-publics do not interact with the hydraulic state or perceive its imbrications in their experiences of water scarcity or their ability to mitigate it, they do not mobilize the state to demand improvements to the municipal water supply. Another group of non-publics—Tiruppur's working-class, out-of-state migrant workers are politically silenced in these infrastructural politics as they have no voting rights in Tiruppur, and therefore little recourse to redressal of grievances through political society or local state structures (cf. Chatterjee, 2004; Harriss, 2007; Benjamin, 2008). Across Tiruppur, they are also cut off from the everyday, informal means of accessing the state through water infrastructures; this relationship, too, is mediated by the landlord, employer, or labor contractor (cf. Bjorkman, 2017). As a result, they end up assuming individual responsibility (and costs) for accessing better quality or more reliable water supply from the market. Unlike Tiruppur's elite publics who access the highest tiers of the state in an organized manner to address their water needs, its non-elite publics access diverse actors at the lowest tiers of the state bureaucracy in a fragmented manner.

Fragmented hydraulic publics and politics do not add up to challenge or inform the city government's water infrastructure or service delivery plans. A lack of local state capacity or efforts to engage multiple publics in water governance processes and coordinate demands across scales, infrastructures, and providers further complicates collective action across differences within the city. Moreover, the engagement of labor unions and civil society organizations in the politics of collective consumption is also limited across Tiruppur. Consequently, differences and inequalities in water access persist and gradually become the norm around which the user plans her daily access. Unfortunately, the costs of this collective acquiescence to water scarcity, and the elite-centric plans that produce or maintain them, are unequally borne by the most marginalized within Tiruppur's working class. This chapter's findings, thus, provoke a deeper question on the role that material environments play in fostering civic engagement and collective action across social, political, and infrastructural differences and infrastructure planning's role in fostering such material environments. This question is especially pertinent in small cities like Tiruppur that do not have a diverse mix of strong state institutions or civil society organizations with a history of addressing short-term or long-term environmental challenges.

Tiruppur's new water infrastructure plans only attend to piped water networks. They do not regulate, coordinate, or plan the interactions between piped water and other decentralized sources (e.g., borewell water). A majority of Tiruppur's water users plan their water needs (and lives) around these interactions between piped water and other decentralized sources.[252] Understanding their biophysical and social interactions is important for planning just and water-secure urban futures. Groundwater can compensate for piped water scarcity, but when a large section of the city relies on untreated groundwater for coping, it externalizes the costs of individual water security to the environment. The short-term costs of such externalization are disproportionately borne by low-income, and lower-caste female bodies, whose individual water webs of access largely comprise untreated and contaminated groundwater. The possible long-

[252] A similar question has been raised by Jim Spencer (2019), who notes "scalar hybridity" in water infrastructures in peri-urban regions of the global South, where large, networked water infrastructures inter-operate with small, decentralized infrastructures to meet water needs. Spencer, too, does not offer concrete planning solutions.

term costs of these hybrid coping strategies include the irreparable depletion of groundwater sources that future generations will have to bear. This dissertation's concluding chapter discusses some of the planning and policy implications of these findings.

CHAPTER 6 - CONCLUSION

This brief concluding chapter first reviews the main arguments of this study. Then, it discusses this study's contributions to the scholarship and outlines some unanswered questions for future research. Finally, it reflects on the implications of these findings for just water infrastructure planning in Tiruppur and other water-scarce, small cities with hybrid waterscapes across South Asia.

6.1. Summary of arguments

This dissertation developed an analytical approach that followed the flows of water through the stages of producing, operating, and using water infrastructures to investigate how the state and multiple publics interact at these stages to produce and address the differentiated experiences of water scarcity in the small city of Tiruppur, India. It also interrogated how Tiruppur's small scale and the materiality of water infrastructures shape these state-society interactions and planning outcomes. Additionally, it traced the histories of state-society relations in urban water governance and Tiruppur's material waterscape to understand how they co-evolved through time.

The dissertation showed how a group of elite publics in Tiruppur—knitwear capitalists from the Gounder caste—are consistently able to organize through business and caste networks like SIHMA or TEA and partner with the state to produce water infrastructures that serve their visions of Tiruppur's future. These partnerships allow them to mitigate water scarcity at different points in the city's history, simultaneously legitimating their role and power in shaping the city's future. The local state, which is obliged to cater to a wide range of publics, takes a multi-pronged approach to alleviate water scarcity. On the one hand, city-level bureaucrats, engineers, and planners seek to expand piped water networks incrementally across the city as and when State or national funding becomes available to small cities like Tiruppur. They collaborate with and rely on elite publics' networks and support to secure this funding. Whereas incremental approaches to municipal water infrastructure planning are the norm across Indian cities, their adoption in a small city context like Tiruppur's that experiences water resource and institutional scarcity merely expands piped infrastructures without addressing older, entrenched inequalities in water access. Moreover, because investments in expanding Tiruppur's piped water networks are sporadic, the mismatch between when infrastructures are planned and when they come operational renders them inadequate and obsolete as soon as they are commissioned.

Incremental approaches to producing municipal piped water networks cause older infrastructures as well as governance arrangements and organizational practices that assemble around them to persist even after network expansion. These materially introduced path dependencies endure (cf. Meilinger & Monstadt, 2021) and influence operations long after networks expand with urban growth, municipal recategorization, and investments in city-wide retrofits as the everyday practices of watermen and tap inspectors in *Chapter 4, Government categories and the state(s) of water provision*, revealed. These incremental path-dependent approaches also foreclose alternative visions that lie outside piped network imaginaries.

Despite these infrastructural and institutional path dependencies, street-level actors, the watermen, improvise to distribute scarce piped water using the existing infrastructures, and ward councilors install parallel water infrastructures like borewells to alleviate non-elite publics' experiences of water scarcity. These innovations in operations planning, which develop through embodied practices of social learning and everyday state-society interactions, keep an incomplete and inadequate system functioning. They allow non-elite, marginalized publics to meet their water needs from a combination of water sources and infrastructures. However, these forms of incremental improvisation do not inform infrastructure production at the city level. They, too, fall short of destabilizing deep-seated socio-spatial inequalities that underlie water infrastructure planning and everyday water access. The result is a hybrid waterscape with highly differentiated access that inflicts unequal burdens on the city's most marginalized publics.

Tiruppur's incrementally developed hybrid waterscape intersects with a finely differentiated socio-spatial structure to fragment everyday water access by users' social identity, tenancy arrangements, and spatial location in the city. Chapter 2, *The origins of a thirsty growth machine*, described how this finely differentiated socio-spatial structure resulted from the global-scale restructuring of the textile industry in the mid-to-late-20th century that manifested in distinct ways in Tiruppur to boost export-oriented production but complicate labor organizing (see pp. 76-82). Chapter 5, *Non-elite publics and their water access politics*, carefully traced how fragmented water access creates diverse hydraulic publics, each with their unique set of water issues, varying degrees of material connections to the local infrastructural state, and distinct forms of mobilizing the state to make water demands. When combined with the near absence of cross-class or cross-ethnic mobilizing structures, including the unions' inability to organize workers outside the workplace, such fragmented publics and their politics fail to galvanize a politics of collective consumption that could possibly have demanded equitable water provision and a just rescripting of Tiruppur's urban futures.

Tiruppur, thus, finds itself in a Catch-22 situation. Despite rapid urbanization and robust economic growth, radical and just alternatives do not take shape in the urban present, laying a pattern for the foreseeable future. Things do not change because elite publics, the capitalists, are able to insert themselves into planning processes and steer plans to suit their visions. In contrast, the ignored and marginalized non-elite publics continue to self-provide and assume additional access costs rather than demand improvements from the state. The absence of unified, collective demands from affected publics retains an unjust status quo. Inherited material legacies and the relations and practices they nurture are also difficult to undo without violent dispossessions. Therefore, what are the implications of these findings for planning just, water-secure, urban futures in Tiruppur and the many cities and towns like it across India, and more broadly, the Global South? The political and environmental stakes are high as Tiruppur and other small cities across the Global South attempt to meet the UN Sustainable Development Goals of extending universal and equitable water coverage to all. Before I turn to the implications for planning and development praxis, I first discuss some of the contributions of this study to debates in planning and urban governance.

6.2. Contributions to the scholarship

Following the flows of water through various governance configurations, spatialities, and stages of infrastructure production, operations, and water consumption in the small city of Tiruppur also allows me to make contributions to different scholarly conversations on urban governance. I briefly note these contributions and sketch out some unanswered questions for future research.

1. State-business partnerships in the pursuit of sustainability

Studies on Indian capitalism distinguish between provincial capital of agrarian origins and corporate capital (Harriss-White, 2003; Chari, 2004; Basile, 2009). The scholarship on urban governance in India's metropolitan cities has largely followed corporate capital's (and capitalists') participation in planning and effecting spatial transformations, either independently or in partnership with the state. As urbanization occurs in provincial small cities, small towns, and villages, we need to interrogate provincial capitalists' involvement in the governance of these rural-urban transitions. Doing so will allow us to understand how capitalists reproduce historical caste privileges and forms of exclusions rooted in rural pasts in urban presents and futures, the mechanisms through which they gain the legitimacy to do so, and how emerging kinds of planning afford them such opportunities. This dissertation's insights on local capitalists' participation in Tiruppur's water governance significantly expand emerging scholarship on this topic (e.g., Balakrishnan, 2019).

Chapter 3, *Tiruppur's elite publics and planning the growth machine's futures*, traced the caste and business networks through which provincial capitalists organize, the strategies through which they embed themselves in the state, and participate in the rituals and practices of governance that envision Tiruppur's futures. Chapters 2 and 3 also described how these networks have become stratified, affecting the capitalist elites' strategies and practices to orchestrate spatial transformations along with changes in the urban political economy. I sketched these changes over time by constructing a historical perspective from archival materials and through a detailed study of two spatial projects devised by the capitalist elites in the post-liberalization period. These spatial projects illustrated how these elites utilize their growing global reach to bypass an incapable local state, overcome the disadvantages of Tiruppur's secondary position in administrative hierarchies, and tap into different nodes of the State and national governments to realize their visions. With their consistent contributions to governance and infrastructure production over time, Tiruppur's capitalist elites constitute a legible civil society in the public realm that is regularly invited to participate in neoliberal 'participatory' planning processes and privileged ‘stakeholder’ consultations where Tiruppur’s futures are decided.

The capitalist elites’ involvement in planning and governance compensates for the local state’s many incapacities. However, it entrenches older forms of caste power in governance. It prevents others from scrutinizing the capitalists’ many visions for growth that produce water scarcity and socio-environmental inequalities in the first place. Non-elite publics are also prevented from proposing alternative future visions. Consequently, solutions for water scarcity only partially address the problem as seen through the lens of elite publics who are engaged in planning. As the concluding section of Chapter 3, *Tiruppur’s elite publics and planning the growth machine’s futures* showed (pp. 145-147), capitalists’ involvement in governance also entails a performative dimension (cf. Prudham, 2009). As capitalists continue to contribute resources, ideas, pledges, or mere presence to water infrastructure development in Tiruppur, it legitimates their involvement as central figures in discussions on Tiruppur’s urban environmental futures. Ironically, their continued participation and patronage sustain and enhances their elite status in the economy and society (Prudham, 2009). This status allows them to actively use infrastructure or sustainability fixes to pursue their visions for industrial-economic growth, which benefits their business and caste “community” (both being tightly intertwined), and sideline equity in visions for Tiruppur’s futures.

The Tiruppur case spotlights questions for planners and development practitioners seeking to harness private initiatives, capital investments, and entrepreneurial innovation for meeting planning challenges. For instance, under what conditions do formal and informal partnerships with capitalists allow for the pursuit of just sustainabilities (or environmentalism)? In what ways does capitalists’ social embeddedness influence the visions and goals that emerge through these partnerships? What tools are available to planners and activists to ensure that equity does not get sidelined in the pursuit of sustainability through private initiatives? These are questions with significant impacts on how we currently plan that I intend to pursue in future research.

2. Decentralization and bureaucratic practice in small cities and their urbanizing peripheries

Following decentralization across India, the responsibility for planning water infrastructures and expanding water service coverage has gradually been rescaled to the local government level. However, local-level institutions for governance and administration have historically been weak in Indian cities (Shatkin, 2013). Small cities and towns, in particular, have struggled with implementing growing service delivery mandates.

The literature has advanced two explanations for the local state's failure to operate large, networked water infrastructures and provide services equitably in small cities. One reason, which centers on 'politics,' argues that small size engenders proximity,[253] allowing some elite publics to capture the local state (Harriss-White, 2003; De Bercegol, 2017; Zérah, 2017). The other reason documents the influence of 'administrative' factors like a lack of fiscal and technical capacities within the small-sized bureaucracies (De Bercegol, 2017; Lele et al., 2018; Kovács et al., 2019). This dissertation concurs with both these findings but pushes the arguments further. This dissertation showed how Tiruppur's diverse publics experience and use proximity to influence planning processes and outcomes. Elite publics, including the Gounder capitalists,

[253] Other theorists view this proximity as advantageous for democratization as it allows local groups to access the state and make demands of it (see Misra and Kudva, 2008 for a review).

capture a weak local state and influence planning and infrastructure production processes at the city level to serve their goals. On the other hand, organized non-elite publics establish material connections to locality-specific and infrastructure-specific street-level bureaucrats, the watermen, and ward councilors to inform everyday infrastructure operations at the locality level, not infrastructure production at the city level. Silent publics, and non-publics who lack any material connections to the local state or citizenship rights in Tiruppur, are unable to utilize proximity to influence governance and planning in any manner.

The dissertation also shows how the bureaucracy's administrative capacity is not just shaped by institutional factors that others have noted. But Tiruppur's secondary position is also associated with infrastructure norms that create material limits to social learning and improvisation by the street-level bureaucracy. Therefore, solutions like municipal recategorization and mergers, which are increasingly being adopted in Tamil Nadu (and other States across India), improve a city's position in administrative hierarchies and help it gain access to additional funds for expanding water infrastructure networks. But they do not address persistent material legacies and their influences on infrastructure operations and differentiated planning outcomes in the hybrid waterscapes of small cities. They allow entrenched inequalities linked to these materially influenced practices to endure.

These insights from Tiruppur on bureaucratic practices in infrastructure operations draw attention to another set of questions for planning just and sustainable futures in small cities. In what ways do norms and benchmarks imposed by higher levels of the state, particularly new ones for climate-readiness or smart cities, guide planning practices in small cities and towns? How do they impact the framing of city-level sustainability goals and inform local bureaucratic practices to attain these same goals? How do they allow learning and improvisation at different levels to inform city-level plans and goal formation? In what ways do they redress deep-seated inequalities in the city as local governments recalibrate their practices to achieve these norms and benchmarks?

3. The material politics of collective consumption in a small city

In following governance configurations at the water access and consumption stage in Chapter 5, *Non-elite publics and their water access politics*, this dissertation staged a dialogue between the scholarship on the material politics of water and infrastructure provision with work on the politics of collective consumption. This dialogue helps me contribute to a growing literature on the micropolitics of everyday water access, the formation and fragmentation of infrastructure publics, and their organizing strategies in hybrid waterscapes of the Global South.

In Tiruppur, institutional scarcity characterizes not only the local state but also local publics, including non-elite groups. Broad-based struggles for collective consumption, and by extension, movements that fiercely debate urban environmental futures, are largely absent. Existing struggles or contestations tend to be highly localized and restricted to a few goods and services or specific material dimensions of those goods and services, as anthropologists of infrastructures have repeatedly noted (Bjorkman, 2015; Anand, 2017). The publics who organize have specific complaints on the duration, timing, frequency, or lack of municipal piped (drinking) water or the non-availability of borewell water. However, no one questioned a differentiated approach to water provisioning that overwhelmingly displaced burdens and costs onto the working class.

Hybridity increases water security, even as it localizes and individualizes water problems, further dampening the emergence of collective demands for just water distribution in Tiruppur.

Tiruppur's smallness also plays a part in preventing these individualized, localized demands from scaling up and gaining sufficient mass or traction to coalesce into a broader, visible struggle, as the earlier section on the politics of decentralization illustrated. The absence of coordinating organizations, unions, and existing movements that can extend questions about workers' well-being to spheres of social reproduction also contributes to the de-politicization of collective consumption. Consequently, questions of human and environmental well-being continue to be decoupled from urban economic trajectories. Thus, differentiated environments with their fragmented publics and politics underlie Tiruppur's voracious industrial-economic growth model, which thrives on an unorganized, precarious, divided, and disposable workforce.

These findings prompt me to ask: What must community organizers and activists do to recenter questions of equity and justice in Tiruppur? What role do community learning and environmental education have to play in such organizing? Under what conditions will the micro-scale publics and politics that form around specific material aspects of infrastructure access scale up to coalesce into a broader struggle for collective consumption? Moreover, if water—so essential to life—is not the material basis for an ecologically sensitive, just politics of collective consumption in Tiruppur, what is? Moreover, how can it shape mobilizations demanding democratic ecologies?

6.3. Implications for praxis

This dissertation used a multi-scalar, multi-stage analytical framework to define and explain the wicked problem of water scarcities and inequalities in Tiruppur. My proposals to resolve this problem flow out of this analytical strategy (Rittel & Webber, 1973). I find it disingenuous to propose simplistic policy recommendations to address extremely complex and deeply intertwined issues. Therefore, instead of policy recommendations, I reflect on some implications for planning research, education, and practice that arise from the Tiruppur case.

1. Provincializing planning research and pedagogy for an inclusive praxis

The design and implementation of Tiruppur's multiple water supply schemes reveal that inequalities intensify when distant planning professionals plan in smaller places to compensate for local incapacities and incompetence. Here, by professionals' ***distance,*** I refer to their physical location in Chennai, Mumbai, Delhi, or elsewhere and their cognitive and sociocultural detachment from the places and communities they plan for. The former is not an issue as much as the latter, which impacts plans and outcomes when distant professionals apply off-the-shelf infrastructure planning solutions. These solutions, which tend to be based on the experiences of exceptional metropolises or ideal prototypes, do not respond to local conditions: demographics, access, and use practices, spatial morphologies, or operation and maintenance capacities. Hence, they fail to serve the most marginalized publics in smaller places equitably.

A paucity of knowledge on smaller places like Tiruppur that planners can draw their references from causes them to use prototypical designs that are not context-responsive or learn from existing practices in these places. In disciplines like economics or public administration, where such knowledge exists, small cities and towns feature as aggregate statistics in large-n studies. These aggregate statistics aid policies, guiding the disbursement of funds or technical support. However, it prevents practitioners from understanding the power relationships, politics, and conditions, critical for tailoring policies or infrastructure models to local contexts.

If planning is to address inequalities and marginalization in a wide range of settlements, and not just in global cities, then planners will need additional knowledge on small city-regions to guide their actions (Friedmann, 1987). For the most part, however, urban studies and planning research tends to reproduce urban hierarchies in planning scholarship, which drops most small city-regions "off-the-map" (Robinson, 2002). Jennifer Robinson goes on to add that, "The dearth of alternative vocabularies and approaches currently severely limits imaginations of possible futures for cities. The particular form of this limitation makes it particularly hard to mobilize creative ways to address the situation of poor and marginalized people in cities around the world" (Robinson, 2002: 533).

'Metrocentricity' is, thus, a problem of epistemology with implications for practice (Bunnell & Maringanti, 2010). These scholars add that this epistemic problem stems from a systematic devaluing of culturally attentive 'local' work that does not seem to have immediate, wider consequence or application, or that which is not of value to global funders or globetrotting communities-of-[planning]-practice (Bunnell & Maringanti, 2010: 417). Studying "off-the-map" places is difficult as it demands cultural competencies associated with area studies training, conceptual flexibility, and a willingness to engage with a plurality of knowledge and experiences (Bunnell & Maringanti, 2010: 418). I would add that it also requires the dexterity to translate and communicate this knowledge to metrocentric academic, policy, and practitioner audiences in a language they understand and can subsequently operationalize.

This dissertation exemplifies an attempt towards provincializing planning knowledge on urban water governance in the Global South through the case study of a small city's waterscape. It has adopted an interdisciplinary, culturally informed, situated, and pluralistic approach that Tim Bunnell and Anant Maringanti advocate for. By engaging in collaborative research with a local NGO, it has also endeavored to contribute to the knowledge base on the place and local-level planning. Finally, it sought to build the capacity of local community-based labor organizers to widen the ambit of their struggles to include the politics of collective consumption. In conclusion, I argue that we need more engaged, collaborative, and pluralistic research on urbanization and planning practices in small cities and towns to equip future generations of planners to learn from and across multiple cases to intervene thoughtfully in these places.

2. Thinking outside the network in off-the-map places

This dissertation showed that a hybrid waterscape helps the local infrastructural state meet its water coverage and service delivery obligations. It also helps marginalized non-elite publics to obtain the minimum amount of water needed for their daily survival in a context with piped water scarcity, intermittency, and inadequacy. Hybridity, thus, increases resilience in Tiruppur. However, as Chapter 5 showed, this form of state-sanctioned hybridity creates differentiated hydraulic citizenship (Anand, 2017), with low-income, unpropertied publics being forced to consume untreated borewell water of lower quality and bear additional costs and health burdens in the process (also see Jepson & Brown, 2014).

However, the antidote for an unequal hybrid waterscape is not its obverse, viz., universal piped water coverage. This dissertation has shown that extending universal piped water coverage in Tiruppur in an equitable manner is highly unlikely, if not impossible, for want of funds, State-level permissions, technical and social expertise, and locally available water sources. Further, the incremental approach to constructing municipal water supply schemes has produced many of the observed durable inequalities in water access. Although there are no clear or verified projections, the impacts of climate change on rainfall patterns and surface water availability in the River Bhavani sub-basin on which Tiruppur depends (Apoorva et al., 2019) will also hinder the indefinite expansion of piped water supply schemes. For all these reasons, hybridity will persist in Tiruppur's waterscape. Instead of allowing an unregulated, unplanned, and unequal form of hybridity to continue, the multi-tiered state can use planning to conceive just access in hybrid waterscapes and conserve water for future generations.

Moving forward, the city and State governments should weigh the costs of installing treatment technologies for decentralized municipal borewell networks against those of building large, piped networks that draw water from and displace costs onto distant watersheds. State-level policymakers should enact strong laws, regulations, and enforcement mechanisms for sustainable groundwater management to ensure that groundwater extraction occurs within ecosystem limits.[254] The local state must take concerted efforts to document, monitor, and regulate groundwater withdrawals, take active steps to recharge the aquifer,[255] and gradually adopt circular water management approaches that recycle and reuse greywater.[256]

The national government and multilateral donors can encourage, incentivize, and actively support these "outside the network" approaches through infrastructure funding and urban renewal programs. They can use service-level benchmarks, service delivery norms, and 'smartness' indicators and metrics to enable water supply through multiple sources and infrastructures and ensure that access to these sources of varying costs and qualities is not

[254] Groundwater regulation is under the purview of States in India's federalist state structure. At present, there is no groundwater management law in Tamil Nadu. The State only regulates groundwater withdrawals by industrial and commercial consumers using discretionary Government Orders or court rulings. Irrigation for agriculture is the main reason for groundwater withdrawal and aquifer exploitation across the State. However, the State does not regulate borewell irrigation or domestic borewell use (Apoorva et al., 2019).

[255] The Central Groundwater Board notes that the groundwater stress in the Noyyal river sub-basin is much higher relative to other parts of the State (Apoorva et al., 2019).

[256] These circular approaches exist in Tiruppur's knitwear industry in 'Zero Liquid Discharge' technologies used by the dyeing units. Similarly, many large middle-class residential enclaves in Bangalore and Chennai also have decentralized wastewater treatment technologies that recover treated greywater for non-drinking uses. How these circular approaches can be adopted and governed in contexts like Tiruppur, the technopolitics of governing these decentralized reuse and recharge approaches (like the rainwater harvesting and Noyyal river restoration projects I alluded to in Chapter 3), their impacts on environmental health, and advancing water justice, and reconfigurations of governance relations remain to be studied. I intend to extend out to some of these questions in future work.

stratified along identity lines. Similarly, they should work with State governments to restructure municipal bureaucracies to include social planners who will center equity and access questions in rational, technocratic approaches to infrastructure design and execution. Simultaneously, they should encourage street-level learning to feed planning at the city level. Building the capacity for foregrounding equity in all "technical" infrastructure plans for small cities and incorporating lessons from street-level social learning should form an integral part of the provincializing planning pedagogy strategy mentioned in the previous section.

Planning with/ for hybridity can contribute to water justice in other ways too. It provokes planners to rethink configurations for water governance that aim to decenter the authority of elites in urban planning and build civic capacities among the non-elite publics, i.e., the working class. For example, the local state can experiment with community-managed forms of governance that have shown promise elsewhere (e.g., Das, 2016) for decentralized municipal infrastructures. These governance configurations' composition and operational dynamics will have to be worked out carefully to include the voices and needs of tenants, out-of-state migrant workers, and lower caste women, and not just the propertied minority forming the ward councilor or MLA's vote bank. The local state can relax the property-ownership requirement, experiment with graduated tariff structures, and allow payments in installments to facilitate the ownership of piped water connections by low-income residents. It should devise these tariff structures in ways that help subsidize the operations of 24x7 public water taps.

3. Re-humanizing water infrastructure planning for just water infrastructures

Just water infrastructure planning is not just about nonhuman water infrastructures or material agencies. It is also about recognizing environmental injustices that stem from the repeated, careless omission of some publics— hundreds of thousands in Tiruppur's case—from calculations for water demand that inform infrastructure designs for water supply schemes. Most of those omitted from plans are socially marginalized and actively discriminated against out-of-state migrant workers. In Tiruppur, they are cut off from familial and social networks and spheres of social reproduction in distant States. They also lack access to welfare like subsidized food and occasional cash payments that the Tamil State gives its native citizens. They live in segregated housing, separated from Tamil-speaking coworkers. Migrant workers only matter as labor, not as humans worthy of needs or desires.

Similarly, many circular migrants from other parts of Tamil Nadu are also not counted in estimates for Tiruppur's water demand. The systems that result from these miscalculations are inherently insufficient. They exacerbate the experiences of scarcity and distribute its costs unequally within the city.

Building just water infrastructures from the perspective of these marginalized residents demands a multi-scalar, multi-agency coordinated approach. The State (TN in this case) must coordinate with migrant-sending States and regions to survey and enumerate migrant workers and their needs in destination cities. Inter-State collaboration is required so that migrant workers can move their welfare benefits with them across State lines. Such enumeration data will also aid infrastructure planners in estimating water demand for infrastructure designs or service delivery. At the local level, too, the city government should undertake surveys to document localities and housing typologies that migrants inhabit. They should ensure that these housing arrangements are serviced with essential levels of basic infrastructure. They can do so by developing regulations for land and building use that mandate the minimum facilities and services that a landlord should provide their tenants (e.g., water connection-to-occupancy ratios, provision of on-site water storage infrastructure, etc.). Developing and enforcing these regulations is important for water justice since migrant workers do not have recourse to politicians and the power of their vote in destination States or cities.

6.4. Final thoughts: On transformative urban futures in the underbellies

> "We need food, clothing, and shelter to live. Health concerns place dietary restrictions on the food we eat. Doctors these days ask us to eat 2 *idlis* (a South Indian rice cake) instead of 3. The demand for food is reducing. On the other hand, the demand for clothing has exploded. 30-40 years ago, working-class people would wear just one garment all day. Middle-class people would wear two garments perhaps. But these days, even middle-class people change their clothes four times every day: one 'dress' for jogging in the morning, one for office, one for a formal meeting or an evening function, and one for bed. The demand for clothing is ever-growing, in my opinion."[257]

Professor Padmini Swaminathan, a Madras High Court-appointed Expert Committee member who studied the impacts of Tiruppur's dyeing industry on the River Noyyal and water resources in the region, writes, "The question of how much we are consuming (that is, growth), is rarely challenged. We are only changing what we are consuming […]. A policy focus on consumption is almost always the easy path: It generally absolves industry and the state of responsibility for a host of problems. It leaves production largely undisturbed. It fails to challenge the fundamental structure of the industry in question. It often blames poor populations for not engaging in responsible behavior" (Swaminathan, 2014: 243). Swaminathan's sobering reflections and this dissertation's findings provoke me to ask if there is any hope for just and democratic ecologies to emerge in Tiruppur or in similar "off-the-map" small places that

[257] Concluding remarks by TEA's President, Raja Shanmugam, at a public event organized by NGO SAVE, 27 June 2019.

comprise the world's manufacturing underbellies. Where might we locate such hope? Does it lie in the spaces and practices brushed aside by narratives on growth and water conservation—the domestic spheres and the invisible care infrastructures that power the growth machine? Will progressive ripples in global consumers' practices, enforced through global standards, build into a large wave that washes away entrenched inequalities? Perhaps, decolonizing our gaze to see distant small places like Tiruppur and recognizing our culpability in the environmental conditions over "there" is the first step towards building democratic ecologies and just infrastructures in a fast-urbanizing, interdependent world.

APPENDIX I: QUESTIONNAIRES

<u>I. Questionnaire to survey the role of business associations in urban governance</u>

I. General questions

1) Name of the organization/ association:

2) Address/ contact information:

3) Year established:

4) Is your organization registered? Yes/ No.

   If yes, year registered:

5) Does your organization/ association have other branches/ chapters? Yes/ No.

   If yes, which is the main office?

6) Is your organization a non-profit organization? Yes/ No.

II. <u>Membership-related questions</u>

7) Are your members individual persons/ firms?

8) Number of members at present:

9) Criteria for membership (Select all that apply)

In case of firms	**In case of individuals**		
Trade type	Gender	Caste	Education
Firm size	Profession	Regional identity	Income
Annual turnover	Religion	Spatial (particular neighborhood)	Other

10) Any other criteria:

11) Are all members belonging to [above mentioned criteria] members of your organization? In other words, is membership open to all meeting the above criteria? Yes/ No

12) Is the government/ a government agency a stakeholder in your organization/ association? [Clarify that this question does not cover individual government employees who may be members of the association]

13) Which are some other organizations similar to yours in aims and membership that are based in Tiruppur?

III. <u>Aims and activities</u>

14) What are the main aims of your organization/ association?

15) What are the main activities of your organization/ association?

16) Has your organization been involved in any activities for the broader community/ public in Tiruppur? If yes, can you please describe these activities?

    Follow up and ask if they partnered with any other organization/ community group in their various activities, especially the publicly oriented ones.

17) How do you fund these various activities (intra-organizational and broader community activities)? [Probe to find out if these community-focused activities have been funded through the association/ members' CSR activities]

18) What would you describe as the main achievements of your organization?

IV. <u>Relationship to the state</u>

19) Does your organization approach the government to resolve your concerns or issues?

20) What are some of the main concerns of your members that you present to the government? [Probe the channels through which they engage the government and make sure to understand which tiers of the government/ departments/ agency they work with, if applicable].

21) Follow up and ask specifically about their relationship to the Municipal Corporation. What are some of the reasons for which your organization approaches them?
[Probe if they have made any demands related to local public services like water, sanitation, roads, or streetlighting, and ask for details].

22) How would you describe your relationship to these government agencies (the ones they work with)?
[Probe to find out if it is cordial, collaborative, oppositional, single-issue focused, etc.]

23) Has your organization or its leadership been consulted in or invited in any city planning/ development process? If yes, which ones and in what capacity?
[Probe specifically regarding the Third Water Supply Scheme, the municipal merger process, City Development Plan process, Smart City Plan, or the Fourth Water Supply Scheme. Also, ask if they are consulted in day-to-day operations of public services by corporation officials and/ or elected representatives]

24) In your opinion, what are some urban improvements that would benefit your organization's members specifically?

V. Political affiliations

25) Does your organization align with any political party and/ or social movement? If yes, which one(s)?

VI. Published materials

26) Do you have a publication (e.g. annual report or special issue) documenting your organization's profile and achievements? If yes, can you please share a copy with me?

VII. Wrap up

I have reached the end of our survey and have no more questions to ask. Do you have any questions for me?

Thank you for making the time to answer my questions patiently. If you are interested, I can send you the main findings of the survey once I finish collecting and analyzing information from various organizations/ associations in Tiruppur.

II. Survey questionnaire used in the *Water & Waste Calendar* survey to understand household demographics, housing conditions, and social-political networks

GENERAL INSTRUCTIONS

- Please fill out the workbook as accurately as possible according to the instructions given during the training.
- If you have any doubts or do not understand any question, please contact the following persons:
  1) __________________, Field coordinator, SAVE -
  2) Nidhi, Main researcher - __________________
- For some questions, you have to provide pictures. These are indicated by the following symbol: Please WhatsApp the pictures with the question number to the following phone number: ________________
- For some questions, you have to provide a description. These are indicated by the following symbol: . You can either write your response or you can record your response and send it via WhatsApp with the question number to the following phone number: _________________
- In your first WhatsApp message, please include your name and area name for reference.

SECTION A: Personal details

(A1) **Name and Contact Number:**

____

(A2) **Street/ Layout Name:**

____

(A3) **Area and Ward Number:**

____

(A4) **Age**

____

(A5) **Sex**

☐ Male ☐ Female ☐ Third Gender

(A6) **Caste**

☐ Forward Caste ☐ SC/ ST ☐ Other (specify)

☐ Backward Caste (BC) ☐ Unknown/ No caste

(A7) ***Jati:***

____

(A8) **Religion:**

____

(A9) **Education level:**

☐ Illiterate ☐ High school (Class 12 or less but completed Class 10) ☐ Graduate

☐ Primary school (or less) ☐ Vocational diploma ☐ Post-graduate

☐ Secondary school (Class 10 or less) ☐ College graduation incomplete ☐ Other:_______

(A10) What is your current employment status?

- [ ] Unemployed **[Go to Q (A 17)]**
- [ ] Employed part-time
- [ ] Self-employed
- [ ] Employed full-time

(A11) If employed, then are you employed in the garment industry?

- [ ] Yes
- [ ] No **[Go to Q (A 13)]**

(A12) If you work in the garment industry, please select the type of employment?

- [ ] Work from home
- [ ] Work in a domestic company
- [ ] Work in a home-based unit
- [ ] Work in an export company
- [ ] Other: _______________

(A13) If you don't work in the garment industry, what is your occupation?
In case you have multiple jobs, list all

____

(A14) Where is your workplace located?

- [ ] At home
- [ ] 5 km to 10 km
- [ ] Within 1 km
- [ ] 10 km to 20 km
- [ ] I km to 5 km
- [ ] More than 20 km

(A15) How do you usually commute to your workplace?

- [ ] By walk
- [ ] Public transport (bus, share auto)
- [ ] Personal/ family vehicle (car, bike)
- [ ] Other: ___________________
- [ ] Company transport

(A16) What is your approximate monthly income from all jobs?

____

(A17) **Are you currently attending school/ college/ any vocational training course either on a full-time or part-time basis?**

☐ Yes ☐ No

(A18) **How long have you lived in Tiruppur?**

____

(A19) **What was the main reason for shifting to Tiruppur?**

☐ Not applicable - hometown is Tiruppur ☐ Marriage

☐ Job (for self) ☐ Personal/ family problems

☐ Job (for family member) ☐ Other:____________

(A20) **Is Tiruppur your family's (your husband's) hometown?**

☐ Yes **[Go to Q (A 25)]** ☐ No

(A21) **Which is your hometown?**

______________district____________________state

(A22) **How often do you go to your/ your husband's hometown each year?**

____

(A23) **Do you send money to your relatives in your/ your husband's hometown each year?**

☐ Yes ☐ No

(A24) **Have you/ your family settled in Tiruppur?**
If you plan to stay in Tiruppur for many more years or till you retire, it means that you are settled in Tiruppur

☐ Yes ☐ No

(A25) **Do you/ your family have a local ration card in Tiruppur?**

- [ ] Yes
- [ ] No
- [ ] Not sure

(A26) **Is your name on the voters' list in Tiruppur?**

- [ ] Yes
- [ ] No

(A27) **What is your mother tongue?**

____

(A28) **Can you speak Tamil?**

- [ ] Yes
- [ ] No

SECTION B: Family details

Please provide the following details about your family members/ those you live in the household with you as accurately as possible. If you do not know the answer to a question, put (?). If the question is not applicable, put NA.

(B1) **Total number of members who live in your household** ______________________
Ensure that details of all the members are noted in the table below

(B2) **Indicate who is the head of your household by putting a (*) next to their name in the table below:**

No.	**Name of family member**	**Relationship to you** (e.g. husband, son, daughter, cousin, etc.)	**Age**	**Sex** (M/F/T)	**Education** 0 - Illiterate 1 - Primary school (or less) 2 - Class 10 3 - Class 12 4 - Diploma 5 - Graduation incomplete 6 - College graduate 7 - Post-graduate 8 - Other	**Employment status** 0 - Unemployed 1 – Employed part-time 2 – Employed full-time 3 – Self-employed	**Occupation**	**Monthly income**
1.								
2.								
3.								
4.								
5.								
6.								
7.								
8.								
9.								

SECTION C: House details

(C1) **Does your family own the house that you live in?**

☐ Yes ☐ No **[Go to Q (C4)]**

(C2) **Does your family have legal documents of ownership (*patta*) for the house?**

☐ Yes ☐ No

(C3) **What is approximate market price of your house?**

____

(C4) **What is your total monthly rent?**

____

(C5) **Do you pay any additional fees/ charges for the following house-related services?**

Service	**Yes/ No** (Circle appropriate choice)	**Amount per month**
Water	Yes/ No	
Electricity	Yes/ No	
Cleanliness/ maintenance	Yes/ No	
Toilet use	Yes/ No	
Garbage removal	Yes/ No	
Parking	Yes/ No	
Any other:	Yes/ No	

(C6) **In case of any repairs or complaints about the house, whom do you typically approach?**

☐ Landlord/ Houseowner ☐ Do nothing

☐ Agent/ Contractor ☐ Other:__________________

☐ Solve the problem ourselves

(C7) **How many rooms are there in your house? (Excluding toilets and bathrooms)**

____

(C8) **What is the approximate area of your house?**

____**SQ. FT.**

(C9) **How would you categorize your house?**

- ☐ Individual house
- ☐ Line house
- ☐ Portion in an individual house
- ☐ Compound house
- ☐ Apartment
- ☐ Other:__________________

(C10) **Do you use a part of your house for any of the following? Select all that apply.**

- ☐ Rented out to someone
- ☐ Home-based business
- ☐ Shop
- ☐ Other uses:______________
- ☐ Office

(C11) **How long has your family lived in this house?**

____**years/ months**

(C12) **What are the two main reasons to decide to live in this neighborhood?**

____

____

____

(C13) **Does your family own any other property/ land?**

- ☐ Yes
- ☐ No
- ☐ Not sure

(C14) **Please take a picture of your house from outside and WhatsApp it to us. Try to get entire house in one picture as far as possible.**

Include your name, area name, and question number (C14) with your message.

SECTION D: Household income and expenses

(D1) **Total amount available for household expenses per month from all sources**

____

(D2) **Approximately, what percentage of your total monthly household income do you spend for the following each month? Include expenses by/ for all family members who live in your house in Tiruppur.**

Category	Percentage of income spent for this category						
	Less than 5%	5 - 10%	10 - 20%	20 - 30%	30 - 40%	40 - 50%	More than 50%
Food							
Medicines/ healthcare							
Rent and housing-related							
Education							
Transportation							
Loans							
Send money to relatives							

(D3) **Who takes most of the decisions about household expenses in your family?**

- ☐ I (Self)
- ☐ Head of the family
- ☐ Wife/ husband of the head
- ☐ Mother/ father of the head
- ☐ Other:____________________

(D4) **Are you included in the decision-making process about household expenses in your family?**

- ☐ Always
- ☐ Sometimes
- ☐ Most of the time
- ☐ Never

(D5) **Who goes to pay most of the bills (e.g. tax, water, electricity, phone) in your family?**

- ☐ I (Self)
- ☐ Don't know
- ☐ Head of the family
- ☐ Other member:____________
- ☐ Online payment

SECTION E: Community details

(E1) **Are you part of any community-based organization, committee, or group?**

- ☐ Yes
- ☐ No

(E2) **Do any of the groups that you participate in (E1) address water-sanitation or housing issues?**

- ☐ Yes
- ☐ No **[Go to Q (E4)]**

(E3) **If yes, describe their two main contributions towards improving water & sanitation.**

____

____

____

____

(E4) **Are you a member of a political party?**

☐ Yes. Which one:______________ ☐ No

(E5) **If you experience an emergency, whom would you go to for help in Tiruppur? Rank the following in order of preference:**

Relative______________
Neighbor_____________
Friend________________
Colleague_____________
Boss_________________
No one _______________
Other ________________

(E6) **In the last year, has the government taken up improvements in any of the following categories in your neighborhood?**

Category	**Yes/ No** **Circle the appropriate option**
Road	Yes/ No
Gutter/ ditch	Yes/ No
Water supply	Yes/ No
Garbage disposal	Yes/ No
Cleanliness	Yes/ No
Park/ tree plantation	Yes/ No
Streetlight	Yes/ No
Bus stop	Yes/ No
Footpath	Yes/ No

(E7) **When the government takes up any improvement in road, water, garbage disposal, streetlight, etc., are you consulted?**

☐ Always ☐ Sometimes

☐ Most of the time ☐ Never

(E8) **In the last one year, have members of your neighborhood taken any steps to go and demand improvements in any of the categories mentioned in (E 6)?**

☐ Yes ☐ No **[Go to Q (E12)]**

☐ Not sure **[Go to Q (E12)]**

(E9) **If so, were you included in the process?**

- ☐ Always
- ☐ Sometimes
- ☐ Most of the time
- ☐ Never

(E10) **If so, which of the following persons/ organizations did you approach to demand improvements in your neighborhood? Select all that apply.**

- ☐ Councilor
- ☐ Other govt employee
- ☐ MLA/ MP
- ☐ NGO/ Committee/ Social worker
- ☐ Other local politician
- ☐ Other :____________________
- ☐ Corporation employee
- ☐ None of these **[Go to Q(E 12)]**

(E11) **What were some of the reasons for choosing these persons/ organizations? Select all that apply.**

- ☐ One of us knows them personally
- ☐ They are responsive and helpful
- ☐ They are related to one of us
- ☐ We don't know anyone else
- ☐ They are from the same neighborhood
- ☐ They have improved our community in the past

(E12) **We have reached the end of the workbook. Thank you for patiently answering all the questions** ☺

SECTION F: Concluding details

(F1) **Total time taken to complete this workbook:** ________________________ **minutes**

(F2) **Date when you completed the workbook:** __________________________________

(F3) **Name of person who helped to fill/ complete the workbook:** __________________

III. Survey questionnaire used in the *Water & Waste Calendar* survey to understand water, sanitation, and garbage disposal details at the household level

SECTION A.1: Water sources

List the sources of water that your family uses and provide some details about them. If a source does not apply to you, put a X and skip questions for that source.

Q. NO.	QUESTION	HOUSE TAP (inside house or room)	COMPOUND TAP (shared with neighbors)	BOREWELL (inside same compound)	PUBLIC TAP Nalla tanni (in street)	PUBLIC TAP Sappa tanni (in street)	LORRY WATER	CAN/ BOTTLED WATER	OTHER WATER (Please specify) e.g. well, buy from neighbors ______
(A1)	**Have you used this source for your family in the last three months? (✓ / X)**								
	If you selected X then skip the remaining questions for that water source in the column								
(A2)	**Typically, how often do you collect water from this source?** 1 - Every day 2 - Once in every 2-3 days 3 - Once in a week 4 – Once in a while 5 - Whenever there is water scarcity 6 - Other: ______								
(A3)	**Location of the source** 1 – Within the house/ delivery 2 - In the same compound/ plot 3 - Within 1-minute walk 4 - 1 to 5 minutes' walk 5 - 5 to 10 minutes' walk 6 - More than 10 minutes' walk				Street name/ area	Street name/ area			
(A4)	**What are the main purposes for which you use water from this source?** 0 – All 1 - Drinking 2 - Cooking 3 - Bathing 4 - Laundry 5 – Washing vessels 6 – Cleaning house 7 - Toilet 8 – Business (e.g. home-based shop)								

1

SECTION A.1: Water sources (Continued)

Q. NO.	QUESTION	HOUSE TAP (inside house or room)	COMPOUND TAP Nalla tanni (shared with neighbors)	BOREWELL Sappa tanni (inside same compound)	PUBLIC TAP Nalla tanni (in street)	PUBLIC TAP Sappa tanni (in street)	LORRY WATER	CAN/ BOTTLED WATER	OTHER WATER (Please specify) e.g. well, buy from neighbors ___
(A5)	**Approximately, how many other persons share this source of water with your family?** *For example:* *2 taps are shared by 10 families; OR* *1 lorry load is shared by 5 families*								
(A6)	**Who manages or operates this source of water?** *Mention the name of the person if you know it* 1 - My family 2 – Neighbor 3 – Houseowner 4 - Municipal Corporation 5 - Self-help group 6 - Community member 7 - Waterman 8 - Nobody 9 - Don't know 10 – Other:___						Mention the name and phone number of main lorry supplier		
(A7)	**How often do you interact with the water supplier/ manager? Select all that apply** 1 – Every time I collect water here 2 - They are present most of the time 3 - Whenever there is an issue/ repair 4 - To make payments 5 - Never								
(A8)	**In case of any repair or problem with this source, whom do you complain to?** 1 – Water manager/ operator (A6) 2 – Corporation 3 – Councilor 4 - Houseowner 5 - Solve it ourselves 6 – Do nothing								

SECTION A.1: Water sources (Continued)

Q. NO.	QUESTION	HOUSE TAP (inside house or room)	COMPOUND TAP Nalla tanni (shared with neighbors)	BOREWELL Sappa tanni (inside same compound)	PUBLIC TAP Nalla tanni (in street)	PUBLIC TAP Sappa tanni (in street)	LORRY WATER	CAN/ BOTTLED WATER	OTHER WATER (Please specify) e.g. well, buy from neighbors ________
(A9)	**How would you classify the taste of this water source?** 1 - Nalla tanni (Tasty/ sweet water) 2 - Sappa tanni (Bitter/ salty water) 3 – Both alternate								
(A10)	**How would you rate the cleanliness of this water source?** 1 - Usually clean 2 - Occasionally dirty 3 - Usually dirty								
(A11)	**Is it safe for women and children to go and collect water from this source?** 1 - Always safe 2 - Occasionally unsafe 3 - Always unsafe								
(A12)	**Do you treat water from this source before using it? If yes, what treatment do you use?** 1 - No treatment 2 - Boil water 3 - Add chemicals (e.g. alum) 4 - Use a cloth filter 5 - Other:__________								
(A13)	**What is the price of water from this source? To whom do you pay this money?** *Specify cost per unit and frequency of payment as applicable.* *Example: Rs 400 per 1000 litre of lorry water*								

SECTION A.1: Water sources (Continued)

Q. NO.	QUESTION	HOUSE TAP (inside house or room)	COMPOUND TAP Nalla tanni (shared with neighbors)	BOREWELL Sappa tanni (inside same compound)	PUBLIC TAP Nalla tanni (in street)	PUBLIC TAP Sappa tanni (in street)	LORRY WATER	CAN/ BOTTLED WATER	OTHER WATER (Please specify) e.g. well, buy from neighbors ________
(A14)	**What is your main concern with this water source?** If you have no concerns, indicate "NA"								
(A15)	**What are the rules for collecting water from this source?** *For example: At a time, only 5 pots are allowed per family* *If there are no rules, write "NA"*								
(A16)	**Is the water from this source sufficient for all the people who depend on it?** **If not, what do you do?**								
(A17)	**Overall how satisfied are you with this source of water?** 1 - Very satisfied 2 - Satisfied 3 - Not satisfied								
(A18)	**Wherever possible, please share pictures of these water sources with us**								

SECTION A.2: Water storage

List the different ways in which your family stores water and provide some details about these storage methods. If a storage method does not apply to you, put X and skip the questions for that section.

Q. NO.	QUESTION	UNDERGROUND TANK	OVERHEAD TANK	DRUM	BUCKETS	POTS	CANS	VESSELS	OTHER (Please specify) ______
(A19)	**Does your family use this method to store water? (✓/X)**								
(A20)	**Besides your family, approximately how many other persons do you share this water storage device with?** *For example:* *1 underground tank is shared by 20 persons*								
(A21)	**What is the approximate storage capacity in litres?**								
(A22)	**How many such storage devices do you have in your house?**								
(A23)	**Typically, how often do you refill this storage?** 1 - Twice per day 2 - Once per day 3 - Alternate days 4 - Twice in a week 5 - Once in a week 6 - Once in two weeks 7 - Once in a month 8 - Don't know/ Not regular 9 - Never 10 - Other: ______								
(A24)	**List one convenient thing about this method of storage**								

SECTION A.2: Water storage (Continued)

Q. NO.	QUESTION	UNDERGROUND TANK	OVERHEAD TANK	DRUM	BUCKETS	POTS	CANS	VESSELS	OTHER (Please specify) ________
(A25)	List one inconvenient thing about this method of storage								
(A26)	Are there any special steps that you/ your neighbors take to ensure that water in this storage does not get contaminated? Please describe them.								
(A27)	Please share pictures of the place where you store water in your house with us.								
(A28)	Answer the following question only if you have an underground and overhead tank system with a pump/ motor: (a) What is the approximately monthly electricity cost to operate the pump/ motor? ________ (b) Is the electricity cost paid by the houseowner or equally shared by all tenants? ________								

SECTION A.3: Water practices

Q. NO.	QUESTION	YOUR RESPONSE
(A29)	If you experience water scarcity or shortage at home, what do you do? Describe in 1-2 sentences.	
(A30)	In the last six months, have you/ your family complained about water problems to anyone? Can you describe the incident in 2-3 sentences saying what was the problem, whom you approached, and what was the outcome of your complaint.	
(A31)	Describe 1-2 innovative steps that you (or your neighbors) have taken to conserve water in your house (or compound)	
(A32)	What is the maximum amount that you are willing to pay per month to get regular, daily supply of drinking water (nalla tanni)?	
(A33)	Tell us about 1 or 2 changes that you would like to see in terms of water supply in your neighborhood	

SECTION A.3: Water practices

Q.NO.	QUESTION	YOUR RESPONSE
(A34)	Compared to other areas in Tiruppur, how would you rate the overall water availability in your area?	
	1 – Much better	
	2 - Same	
	3 – Much worse	
	4 – No idea	

SECTION A.4: Water practices at the workplace

This section should only be completed by you if you go for work outside your home!

(A35) What are the sources of drinking water in your company? Select all that apply.

☐ Can water ☐ They don't provide water

☐ Purified tap water ☐ Other:______________

(A36) Are any of the workers in your company responsible for going and filling water for drinking?

☐ Yes ☐ No

If yes, then name the persons responsible for filling drinking water:

____

(A37) Is there a toilet facility where you work?

☐ Yes ☐ No

(A38) Is there sufficient water in the toilet for everyone?

☐ Always ☐ Rarely

☐ Mostly ☐ Never

SECTION B: Toilet details

(B1) Do you have a private toilet in your house?

- [ ] Yes. How many? ___________
- [ ] No **[Go to Q (B3)]**

(B2) Where is the toilet waste (sewage) disposed?

- [ ] Pit
- [ ] Corporation's underground sewer
- [ ] Septic tank
- [ ] Open ditch
- [ ] Closed ditch
- [ ] River/ Odai
- [ ] Don't know
- [ ] Other:___________________

(B3) Why is there no toilet in your house?

- [ ] No space
- [ ] Houseowner didn't provide
- [ ] We cannot afford a toilet
- [ ] We are happy with shared toilets
- [ ] We defecate in the open
- [ ] Other:______________________

(B4) List the different toilets that members of your household use on a daily basis and provide information about them:

No.	**Toilet type** (e.g. shared toilet, community toilet, public toilet, open defecation, etc.)	**Which family members use this toilet?**	**Sewage outlet** 1 - Pit 2 - UG Sewer 3 - Septic tank 4 - Open ditch 5 - Closed ditch 6 – River/odai 7 - Don't know 8 - Other	**Who manages this toilet?** 1 - Corporation 2 - Self-help group 3 - Contractor 4 - Community member 5 - Nobody 6 - Don't know 7 - Other	**Toilet fees/ charges**	**Location** 1 - In the same compound 2 - Within 1-minute walk 3 - 1 to 5 minutes' walk 4 - 5 to 10 minutes' walk 5 - More than 10 minutes' walk	**Cleanliness** 1 - Very clean 2 - Clean 3 - Slightly dirty 4 - Very dirty	**How safe is this toilet for women and children?** 1 - Usually safe 2 - Occasionally unsafe 3 - Usually unsafe **If you think it is unsafe, what are some factors that make it unsafe?**	**Picture**
A.									
B									
C									

SECTION B: Toilet details (Continued)

(B5) **What are your top two issues/ concerns about the above-mentioned toilets? If you have no issues/ concerns, write "Not applicable."**

____

____

____

(B6) **Do you have a private bathroom in your house?**

- ☐ Yes. How many? __________
- ☐ No **[Go to Q (B8)]**

(B7) **What is the outlet for wastewater from your bathroom and kitchen?**

- ☐ Open drain. <u>Circle the material:</u> (a)Mud (b)Cement concrete (c)Brick (d)Stone (e) Other
- ☐ Closed drain. <u>Circle the material:</u> (a)Mud (b)Cement concrete (c)Brick (d)Stone (e) Other
- ☐ Corporation's underground sewer
- ☐ River/ odai
- ☐ Road/ yard
- ☐ Don't know
- ☐ Other:________________

(B8) **Where do you and your family members bathe?**

Males:____________________________________

Females:__________________________________

(B9) **Is there a ditch/ drain outside your compound?**

- ☐ Yes. Attach picture:
- ☐ No **[Go to Q (B15)]**

(B10) **How often is it cleaned?**

- ☐ Once in a week
- ☐ Once in two weeks
- ☐ Once in a month
- ☐ Other:________________
- ☐ When we call/ complain
- ☐ Don't know
- ☐ Never

(B11) **Who cleans it?**

- ☐ Corporation sweeper
- ☐ Private sweeper
- ☐ Other:________________
- ☐ No one
- ☐ One of our community members
- ☐ Don't know

(B12) **Do you pay any fees/ amount to the person who cleans it?**

- ☐ Yes. How much? __________
- ☐ Other:________________
- ☐ No
- ☐ Don't know

(B13) **Whenever it rains, how often does the ditch/ drain outside your compound overflow?**

- ☐ Always
- ☐ Sometimes
- ☐ Rarely
- ☐ Never

SECTION B: Toilet details (Continued)

(B14) If the ditch gets blocked/ or if it overflows, what do you do?

- ☐ All neighbors get together and complain to the Corporation
- ☐ All neighbors get together and get it cleaned ourselves
- ☐ One of us calls the Corporation
- ☐ One of us calls the councilor
- ☐ One of us calls a sweeper and gets it cleaned
- ☐ We do nothing
- ☐ Don't know
- ☐ Other: ___________________

(B15) If you were to get a connection to the Corporation's underground sewerage scheme for disposing your sewage and wastewater, how much would you be willing to pay as one-time connection fees? Tick the appropriate box.

Rs 0	Rs 1000 - 5000	Rs 5000 – 10,000	Rs 10,000 – Rs 15,000	Any amount up to Rs 20,000

(B16) If you were to get a connection to the Corporation's underground sewerage scheme for disposing your sewage and wastewater, how much would you be willing to pay as monthly fees? Tick the appropriate box.

Rs 0	Rs 25	Rs 50	Rs 100	Rs 150	Rs 200	Rs 250	Rs 300	Rs 500	Any amount up to Rs 1000	Amount as per a meter which measures the quantity of wastewater that we generate

SECTION C: Garbage disposal details

(C1) Do you keep a dustbin in your house?

- ☐ Yes. Attach picture:
- ☐ No

(C2) Approximately how much garbage do you generate per day?

- ☐ Less than half a bin
- ☐ Half a bin
- ☐ One bin
- ☐ Two bins
- ☐ More than two bins
- ☐ Other:___________________

(C3) Does a garbage collector come to collect garbage from your house?

- ☐ Yes.
- ☐ No **[Go to (C8)]**

(C4) Whom does the garbage collector work for?

- ☐ Corporation
- ☐ Other:___________________
- ☐ Community has arranged a sweeper
- ☐ Don't know

(C5) How often do they come?

- ☐ Once per day
- ☐ Once in two days
- ☐ Twice in a week
- ☐ No clear schedule
- ☐ Don't know
- ☐ Other:___________________

(C6) Usually, what time do they come?

- ☐ Before 9 am
- ☐ 9 a.m. to 11 a.m.
- ☐ Afternoon
- ☐ Evening
- ☐ No clear timings
- ☐ Don't know

SECTION C: Garbage disposal details (Continued)

(C7) **How much do you pay the garbage collector?**

________________________________ **[Go to (C10)]**

(C8) **Where do you throw this garbage? Select all that apply and attach pictures of the place where you dispose the garbage:**

- ☐ Corporation dumpster
- ☐ Burn it
- ☐ Open plot/ ground near the house
- ☐ Don't know
- ☐ Ditch/ river/ odai near the house
- ☐ Other:________________

(C9) **If you are provided with a daily, regular garbage collection service, what is the maximum amount that you are willing to pay per month? Tick the appropriate box.**

Rs 0	Rs 10	Rs 20	Rs 50	Rs 75	Rs 100	Rs 200

(C10) **What are your top two issues/ concerns about garbage disposal? If you have no issues/ concerns, write "Not applicable."**

____

____

(C11) **Do you segregate your garbage into wet waste/ dry waste before disposing it?**

- ☐ Always **[Go to (C13)]**
- ☐ Rarely
- ☐ Other:________________
- ☐ Never

SECTION C: Garbage disposal details (Continued)

(C12) **Why don't you segregate your garbage always?**

- ☐ We don't know how to
- ☐ It is inconvenient
- ☐ There's no use as there are no separate dumpsters
- ☐ There's no use as the garbage collector does not collect them separately
- ☐ Other:________________

(C13) **Do you sell or give away recyclable items (e.g. paper, cardboard, metals, glass, etc.)?**

- ☐ Always
- ☐ Rarely
- ☐ Sometimes
- ☐ Never

(C14) **Whom do you sell or give away these recyclable items to?**

____

____

(C15) **We have reached the end of the workbook. Thank you for patiently answering all the questions** ☺

SECTION D: Concluding details

(D1) **Total time taken to complete this workbook:** ________________ **minutes**

(D2) **Date when you completed the workbook:** ________________

(D3) **Name of person who helped to fill/ complete the workbook:** ________________

GLOSSARY

24x7	Round-the-clock
Banian	Men’s undershirt, but also a local term for t-shirts in general in Tiruppur
Chettiar	“Forward” caste whose traditional occupations are trade, moneylending, or weaving in Kongunad (Chari, 2004)
crore	1 crore = 10,000,000
Dalit	Literally “the oppressed;” it is an affirmative term for people belonging to “untouchable” castes, which traditionally formed the lowest rung of the caste hierarchy (Chari, 2004)
District	An administrative territory that is equivalent to a county in the US government system
Gounder	“Forward” caste group whose traditional occupation is agriculture in Kongunad. Gounders formed the demographic majority when the caste census was last conducted.
Iyer	“Forward” Tamil Brahmin caste
lakh	1 lakh = 100,000
Mudaliar	“Forward” caste whose traditional occupations are trade or weaving in Kongunad (Chari, 2004)
Naidu	Telugu-speaking “forward” caste group whose traditional occupation is agriculture
Nalla tanni	Potable (drinkable) water usually obtained from municipal piped water supply
Panchayat	Village or town council in India
Sappa tanni	Non-potable water usually obtained from a groundwater so
Ward	The smallest political-administrative sub-division of an urban or rural local government in India. Typically, each ward is represented by one elected representative called a ‘councilor’ in village or city council.

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