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Abbreviations

ASI	Annual Survey of Industries
BIS	Bureau of Indian Standards
BMGF	Bill and Melinda Gates Foundation
BSUP	Basic Services for the Urban Poor
CAA	Constitution Amendment Act
CIPET	Central Institute of Plastic Engineering Technology
CMA	Commissionerate of Municipal Administration, Govt. of Tamil Nadu
CMA	Chennai Metropolitan Area
CMCDM	Chennai Mega City Development Mission
CMDA	Chennai Metropolitan Development Authority
CMWSSB	Chennai Metropolitan Water Supply and Sewerage Board
CoC	Corporation of Chennai
CPCB	Central Pollution Control Board
CSMC	Central Sanctioning and Monitoring Committee
CSO	Central Statistical Organisation
DMA	Directorate of Municipal Administration
DPR	Detailed Project Report
DTCP	Directorate of Town and Country Planning
DTP	Directorate of Town Panchayat, Govt. of Tamil Nadu
EPA	The Environment Protection Act
EPC	Engineering, Procurement, Construction
ER	Elephant Reserve
FSFC	Fourth State Finance Commission
FSM	Fecal Sludge Management
FY	Fiscal Year
GIS	Geographic Information Systems
GoI	Government of India
GoTN	Government of Tamil Nadu
GSDP	Gross State Domestic Product
HDF	High-density Fibreboard
HDFC	Housing Development Finance Corporation Limited
HUDD	Housing and Urban Development Department
IAS	Indian Administrative Service
IIHS	Indian Institute for Human Settlements
ILFS	Infrastructure Leasing and Financing Company
IMFL	Indian Made Foreign Liquor
IRMA	Independent Review and Monitoring Agency
ITIR	Information Technology Investment Region
IUDM	Integrated Urban Development Mission
JICA	Japan International Co-operation Agency
JNNURM	Jawaharlal Nehru National Urban Renewal Mission
KW	Kilo Watt
LDP	Low Density Polyethylene
LEA	Loss of Ecology Authority
LPCD	Litres Per Capita Daily
MAWS	Municipal Administration and Water Supply
MCM	Million Cubic Metres
MIDF	Metropolitan Infrastructure Development Fund

MLD	Million Litres Daily
MoC	Memorandum of Cooperation
MoUD	Ministry of Urban Development
MSW	Municipal Solid Waste
MUDF	Municipal Urban Development Fund
NDP	Net Domestic Product
NEM	North East Monsoon
NGO	Non-Governmental Organisation
NTADCL	New Tirupur Area Development Corporation Limited
NTR	Non-Tax Revenue
NUSP	National Urban Sanitation Policy
O&M	Operations and Maintenance
OG	Out-Growth
OGl	Operative Guidelines
PCPIR	Petroleum, Chemical and Petrochemical Investment Region
PIU	Project Implementation Units
PMU	Project Management Unit
SDP	State Domestic Product
SEC	State Election Commission
SFC	State Finance Commission
Sq.km	Square kilometre
SIPCOT	State Industries Promotion Corporation of Tamil Nadu
SLSC	State Level Sanction Committee
ST	Scheduled Tribe
STP	Sewage Treatment Plant
SWM	South West Monsoon
TADP	Tiruppur Area Development Program
TANGEDCO	Tamil Nadu Generation and Distribution Corporation
TMC	Thousand Million Cubic Feet
TN	Tamil Nadu
TNCHF	Tamil Nadu Co-operative Housing Federation
TNHB	Tamil Nadu Housing Board
TNPCB	Tamil Nadu Pollution Control Board
TNSCB	Tamil Nadu Slum Clearance Board
TNUDF	Tamil Nadu Urban Development Fund
TNUFIDCO	Tamil Nadu Urban Finance and Infrastructure Development Corporation Limited
TNUIDRF	Tamil Nadu Urban Infrastructure Development and Renewal Fund
TNUIFSL	Tamil Nadu Urban Infrastructure and Financial Services Limited
TNUITCL	Tamil Nadu Urban Infrastructure Trustee Company Limited
TNWIC	Tamil Nadu Water Investment Company
TP	Town Panchayat
TSU	Technical Support Unit
TURIF	Tamil Nadu Urban Road Infrastructure Fund
TWAD Board	Tamil Nadu Water Supply and Drainage Board
UIDSSMT	Urban Infrastructure Development Scheme for Small & Medium Towns
UIG	Urban Infrastructure and Governance
ULB	Urban Local Body
VAT	Value Added Tax
VLT	Vacant Land Tax
WSPF	Water and Sanitation Pooled Fund

Executive Summary

E1. Introduction

The secondary review of urban sanitation in Tamil Nadu provides a situational analysis of the water and sanitation situation in urban areas of the State, situated in the context of economic growth, demographic change, natural resource endowments and their historical utilisation character. This study draws mainly from available secondary literature and data from the government and other public sources.

E2. Physiography, Climate, Rainfall

Tamil Nadu, the eleventh largest state of India is situated at the south-western corner of the country and covers an area of 130,058 Square Kilometres (Sq.km). The main physiographic features in the State are the coastal plain on the eastern side, forming a major portion of the State; a central plateau region of slightly elevated plain ranging from 150 to 300 Metres (m) studded with hills making up the Eastern Ghats; and the hilly regions of the Western Ghats on the west.

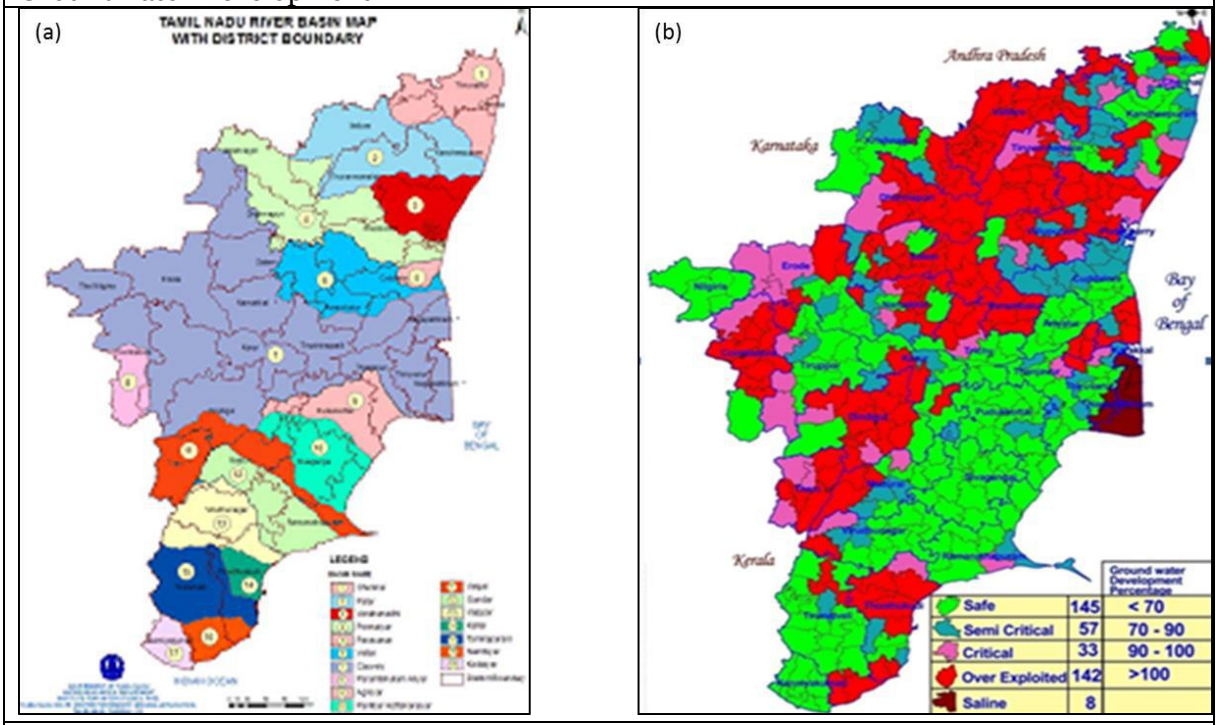
The proximity of the sea influences the climate of the eastern and southern parts of the state whereas hilly topography and the inland locations play important roles in modifying the climate over rest of the State. Temperatures tend to be moderate in the coastal areas, while inland it can go to extremes in some places. Generally, the average temperatures for most parts of the state stay between 28° C and 40° C in summer and between 18° C and 26° C in the short-duration winter season. The urban centres of Chennai, Nagapattinam and Madurai record some of the highest temperatures in summer.

The normal annual rainfall falling over the state is 958.4 mm. About 48 per cent of the total annual average rainfall is received during the North-East Monsoon (NEM), while about 35 per cent is received during South-West Monsoon (SWM) and the balance in the other seasons. Orographic impacts are believed to play an important role in the spatial distribution of rainfall. Rainfall over coastal areas is more and it decreases over inland. Also the rainfall over northern end is more than the southern locations. The coastal districts receive about 65–75 per cent of annual rainfall and interior districts get about 40–50 per cent in the NEM season.

E3. Water Resources

Of the annual water potential of 46,540 Million Cubic Metres (MCM), surface-flows account for about half of it. Most of the surface water has already been tapped, primarily for irrigation which is the largest user. At the end of the 11th plan (2007–2012), the irrigation potential had reached the ultimate irrigation potential estimated, and more than 99 per cent (99.6 per cent) of the potential created is being utilised. Surface water resources in the state are thus constrained by availability volumes and further constrained by the degradation of existing water resources by pollution from industries and households. There is also paucity of relevant usable information providing for linkages between water flows, return flows, end-use and pollution, as well as the impacts of these and climate events (floods, droughts) on households.

Figure (E.1): (a) River Basins with District Boundaries; (b) Blocks with Percentage of Groundwater Development



Source: (a) (GoTN, n.d.), Last accessed on Oct 03 2015 (b) (TWAD Board, n.d.) accessed Oct 08 2015

The utilisable groundwater recharge is estimated at 22,423 MCM. The current level of utilisation is about 60 per cent of the available recharge. Over the last five years, the percentage of safe blocks has declined from 35.6 per cent to 25.2 per cent while the semi-critical blocks have gone up by a similar percentage. Over-exploitation has already occurred in more than a third of the blocks (35.8 per cent) while eight blocks (2 per cent) have turned saline. The depth-to-groundwater also varies from district to district. Thirteen (42 per cent) of the thirty-one districts[1] have a minimum GW level deeper than the State average (green line), while 15 of the 31 (48 per cent) districts have maximum GW levels deeper than the State average. Groundwater contamination is an issue in most districts. The extent of contamination varies and is seemingly not very high for excess Iron or excess Fluoride. The issue of nitrates and fecal coliform contamination suggests higher risk, but does not exceed 25 per cent of samples.

The projections for 2044 (State Framework Water Resources Plan for Tamil Nadu) indicate significant increases in domestic and industrial consumption as well as in energy production. This is anticipated to stress further the already stressed water resource potential of the State.

E4. Tamil Nadu Economy and Social Development

Tamil Nadu has the second largest Gross Domestic Product (GDP) amongst the States, after Maharashtra. Economic growth has been following a cyclical trend with positive linear character every 4–5 years followed by a year of lower growth. Over the FY 2005–2015 period, the primary sector shows near-stagnation and even decline in some years; Manufacturing has grown steadily over the first half of the period, but has slowed down in year-on-year growth after FY 2011; and the services sector has witnessed the highest growth.

1 Excluding Chennai

While no sub-sector within the primary sector displays any prominence during this period, registered-manufacturing (formal), construction and allied sub-sector of transport, storage and communication display prominent shares in the state domestic product (SDP) from the Industry sector; the sub-sectors of trade, hotels and restaurants, real estate, building ownership and other services have prominent shares from the services sector. Within the secondary and tertiary sectors, land-related economic activities, connectivity and mobility aspects of industrial and tertiary growth and leisure seem to be enjoying continued growth (in the last three years) and suggest a very urban focus.

The scale and growth of economic activity in the districts is significantly different and ten of the thirty-two districts in the state account for more than half the SDP (Table E.1). The distribution of domestic product for 2011–2012 (taken as a typical year where data is available) is presented in Table (E.1). The category of districts with low Net Domestic Product (NDP), i.e. less than 1 per cent of SDP; are about ten years behind the category of districts with a share greater than 4 per cent of SDP, in terms of the scale of economy. The middle category of districts in terms of NDP are also the ones reported to have more persons employed in the primary sector and include some of the paddy-growing areas of the State.

Table (E.1): Classification of Districts and their share of Net Domestic Product 2011-2012

District(s)	Category (District NDP as Share of State)	Total Net District Domestic Product (In Lakh Rupees)	Share of State Total
Perambalur, Ariyalur, Thiruvarur, The Nilgiris, Theni, Ramanathapuram, Sivagangai, Nagapatinam. Pudukkotai, Karur, Dharmapuri	Less than 2 %	4,640,807	13 %
Thiruvannamalai, Villupuram, Thanjavur, Dindigul, Krishnagiri, Namakkal, Thoothukudi, Cuddalore, Virudhunagar, Kanniyakumari, Erode	2-4 %	11,875,389	33 %
Madurai, Tirunelveli, Tiruppur, Salem, Tiruchirappalli, Vellore, Coimbatore, Kancheepuram, Thiruvallur, Chennai	Greater than 4 %	19,479,853	54 %

Source: IIHS Analysis of CSO (2015)

E5. Urbanisation in Tamil Nadu

Tamil Nadu is the most urbanised state (amongst the large states[2]) in the country, with an urban population share of 49 per cent. The urban population is spatially dispersed and there are variations in urbanisation levels across districts and regions of the state. Unlike most other states where a significant proportion of the urban population is in and around two or three primate cities (e.g. Mumbai and Pune in Maharashtra, Bangalore and Mysore in

[2] Delhi, Goa and Mizoram have a higher proportion of urban population in their state.

Karnataka), urban centres are well dispersed in Tamil Nadu. There are corridors of urban concentrations (Sivaramakrishnan & Singh, 2005); namely Chennai-Krishnagiri-Hosur (estimated to account for 43 per cent of state's urban population by 2021), Coimbatore-Erode-Salem-Krishnagiri (estimated to account for 19 per cent of state's urban population by 2021), the corridor of Tiruchi-Madurai-Tirunelveli, the coastal corridor of Chennai-Puducherry-Cuddalore-Thanjavur-Karaikudi (anticipated 7 per cent of state's urban population by 2021), and in a lesser way the corridor of Tuticorin-Nagarcoil (anticipated to account for 4 per cent of state's urban population by 2021).

The state has 33 districts for administrative purposes. Of this, the district of Chennai is wholly urban. Apart from Chennai, there are six districts that have urbanisation share of more than 60 per cent. There are 14 districts that display urbanisation levels less than 30 per cent. The districts with lower urbanisation levels are mostly situated on the coast and the central parts of the state. The statutory urban units (ULBs and Cantonment Boards) exhibit a fair amount of dispersion, with significant numbers existing in about 60 per cent of districts of the state. This has been a demographic and development feature of the state and is evidenced in the census from 2001. The urban areas of Tamil Nadu are organised into 10 corporations, 148 municipalities, 561 town panchayats, two cantonment boards, and 376 census towns. The distribution of urban areas across size-class of settlements is presented in Table (E.2).

Table (E.2): Size-Class Distribution of Urban Areas in Tamil Nadu

Class	Type of Urban Area					
	Municipal Corporation	Municipality	Town Panchayat	Cantonment Board	Census Town	Total
Class I (Greater than 1,00,000)	10	21	-	-	1	32
Class II (50,001 – 100,000)	-	74	1	-	5	80
Class III (20,001-50,000)	-	52	138	1	57	248
Class IV (10,001 – 20,000)	-	1	287	1	117	406
Class V (5,001 – 10,000)	-	-	125	-	171	296
Class VI (Less than 5,000)	-	-	10	-	25	35
Total #	10	148	561	2	376	1097
Total*	12	124	528	-	-	-

Source: Census 2011, Operative Guidelines, GoTN, 2014;
*# according to Census 2011, *according to Operative Guidelines*

E6. Household Sanitation and Drinking Water Supply in Urban Tamil Nadu

80 per cent of the urban households in the State have access to tap water supply (within premises and out) with 66 per cent of these households accessing treated tap water and the remaining untreated tap water. Only 45 per cent of the urban households have access to piped water supply within premises, and 40 per cent of the urban households have access to treated water within premises. Households with access to piped water supply are higher in the municipal corporations at 63 per cent, followed by Municipalities (43 per cent) and then town panchayats (34 per cent); amongst statutory urban areas. In census towns too, 34 per cent of the households have access to piped water supply within premises. Access to treated piped water is highest in municipal corporations (60 per cent), municipalities (37 per cent) and then town panchayats (25 per cent) in that order. Tubewells are the next most prevalent source of drinking water in urban Tamil Nadu with about 6 per cent of households using it as the primary source. Amongst statutory urban areas, tubewells are reported to be higher in municipalities (7 per cent), than town panchayats (5 per cent) and the municipalities (4 per cent). Census towns and cantonment boards report the highest proportion of households with tubewells (9 per cent) as a primary source.

16 per cent of the urban households in Tamil Nadu reside in slums. 30 per cent of slum households access treated water through a piped water supply, while another 3 per cent access untreated water. 44 per cent of the urban slum households access water through piped supply, but not within the premises, while another 4 per cent access this away from premises. Hand pumps (8 per cent) and tube-wells (6 per cent) are the mostly commonly used sources for drinking water, after tap water.

In Urban Tamil Nadu, about 75 per cent of households have toilets within their premises, 9 per cent use public toilets, and 16 per cent resort to open defecation. About 66 per cent of the household toilets are reported to have water closets (Census of India, 2011a). About 27 per cent of the toilets (40 per cent of those with water closets) are connected to sewer system, and 38 per cent of the household toilets (40 per cent of those with water closets) are connected to septic tanks (Census of India, 2011a). In Class 1 Cites, the coverage of household toilets connected to sewers is as high as 50 per cent; smaller cities, hence, have a higher prevalence of septic tanks. Of the households not having a latrine within premises, a significant proportion (42 per cent) of these households, reside in town panchayats, 25 per cent in municipalities and about 16 per cent in municipal corporations. Census towns account for 17 per cent of the urban households without latrines. Amongst the districts, Salem (9 per cent), Coimbatore (7 per cent), Tirunelveli and Virudhunagar (7 per cent) and Erode have the larger share of households without latrines. 35 per cent of the households without latrines use public conveniences. The proportion of households using public conveniences is higher in municipalities and marginally lower in municipal corporations and town panchayats; they are lowest in census towns. Amongst the districts, Coimbatore, Salem and Virudhunagar have higher proportion of households reported accessing a public convenience; followed by Chennai, Erode, Namakkal and Theni.

E7. Wastewater Collection and Treatment in Urban Tamil Nadu

In urban Tamil Nadu, 1,129 Million Litres Daily (MLD) of sewage treatment capacity exists with another 151 MLD under construction; however current utilisation is reported to be lower at 394 MLD as per Central Pollution Control Board (CPCB) report of 2013. While on-site sanitation systems are the most predominant household arrangements across the State, there has hitherto been limited attention paid to safe collection and treatment of human excreta from septic tanks. Limited data is available on the number and coverage of these vehicles, as these are mostly operated by the informal sector. It is a largely unregulated activity that has started receiving attention only lately.

E8. Institutional Arrangements for Urban Sanitation and Water Supply

The legal framework for urban governance in Tamil Nadu evolved based on the legacy of law and administrative arrangements in Chennai (Madras Municipal Corporation Act, 1919) and other municipalities modelled thereon. The governance of town panchayats evolved within a legal framework shared with villages, i.e. the Tamil Nadu Panchayats Act, 1958. These Acts were amended to be in conformity with the 73rd and 74th Constitutional Amendment Acts (1993 and 1994). Amendments to the District Municipalities Act added a separate chapter on town panchayats.

The other key legislations for urban governance include the Tamil Nadu Water and Drainage Act 1971, the Chennai Metropolitan Water Supply and Drainage Act, 1977, housing and slum improvement (e.g. the Tamil Nadu Housing Board Act 1961, and the Tamil Nadu Slum Clearance Act, 1971), and urban planning and land-use regulation (the Town and Country Planning Act, 1971). The Town and Country Planning Act, 1971A provides for the notification of areas, constitution of planning and development authorities like the Chennai Metropolitan Development Authority (CMDA), preparation and implementation of Master Plans and Detailed Development Plan and enforcement of Development Control Regulations.

The Municipal Administration and Water Supply (MAWS) Department and the Housing and Urban Development Department (HUDD), are the two key urban departments in the State Government.

The MAWS Department is responsible for coordinating the activities of various organisations and agencies in the planning, execution and maintenance of measures to provide improved infrastructure and services in the urban areas of the State, and the provision of drinking water supply in rural and urban areas of the state. In the administration of the MAWS Department, the Principal Secretary is assisted by a Special Secretary, a Joint Secretary and two Deputy Secretaries. The Commissionerate of Municipal Administration and the Directorate of Town Panchayats are sub-departments of this Department in achieving the objectives set forth by the Government.

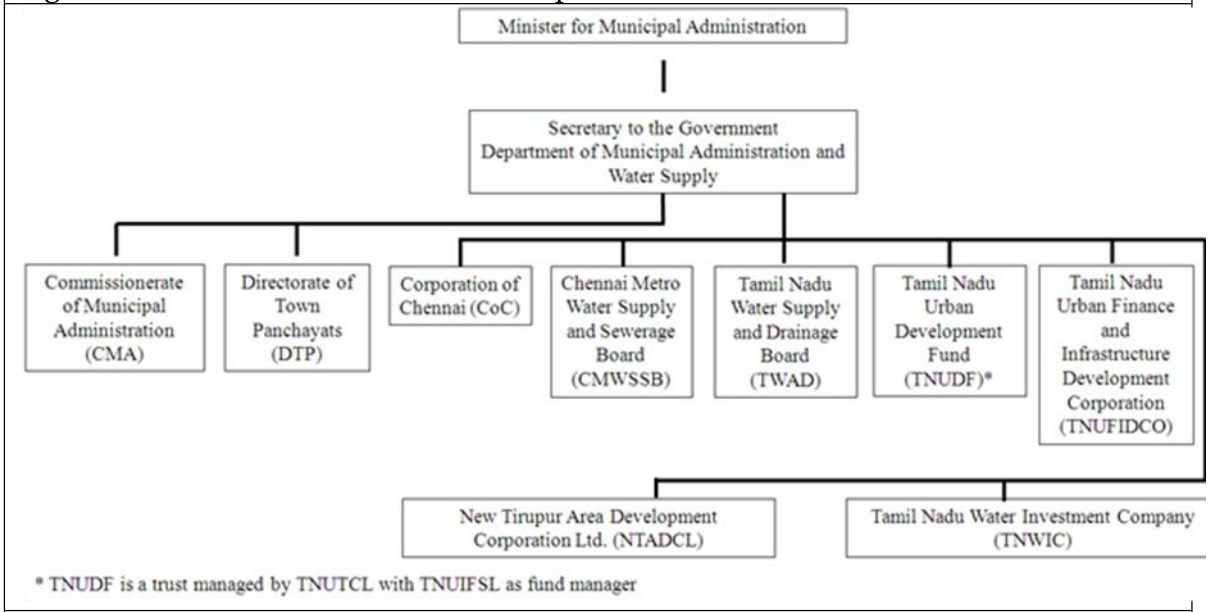
MAWS Department also has administrative control of undertakings/bodies such as the Corporation of Chennai (CoC), the Chennai Metropolitan Water Supply and Sewerage Board (CMWSSB) and the Tamil Nadu Water Supply and Drainage (TWAD) Board, the last being responsible for the provision of water supply and underground sewerage facilities in the state (other than Chennai). MAWS Department also administers the New Tiruppur Area Development Corporation Limited (NTADCL), which caters to the drinking water supply and industrial water needs of Tiruppur and nearby areas.

Apart from these, the Tamil Nadu Urban Development Fund (TNUDF) managed by the

Tamil Nadu Urban Infrastructure and Financial Services Limited (TNUIFSL), and the Tamil Nadu Urban Finance and Infrastructure Development Corporation Limited (TNUFIDCO) are the two urban financial intermediaries that guide the ULB in assessing the financial viability of projects and assist in the development of urban infrastructure. These agencies also coordinate in channelizing funds from Government of India, external agencies and financial markets for the development of urban infrastructure. The expertise of institutions like the TNUIFSL and the TNUFIDCO are utilised to provide necessary consultancy based support services to the ULB to improve their technical capability for implementing bigger and more complex projects. The Tamil Nadu Water Investment Company (TNWIC), a joint venture of the GoTN and the ILFS also falls under the MAWS Department administration.

The MAWS Department coordinates and manages the work of eight urban agencies:

Figure E.2: Institutions within MAWS Department



Source: Adapted from MAWS Department (2015)

E9. Key Issues in Sanitation and Water in Urban Tamil Nadu

- Access
- Full Cycle
- Water Stress
- Public Health Outcomes
- Behaviour change
- Knowledge generation
- Institutional Priority to urban sanitation
- Financing

1. Study Background

1.1. Urban Sanitation in Tamil Nadu: Scope of Study

Urban settlements in India are grappling with the challenge of severe deficits along the 'full sanitation chain'. While public systems in India have historically hailed sewerage as the sole solution for urban households, it is a fact that nearly two-thirds of urban households depend on on-site systems, i.e. septic tanks and pit latrines (Census of India, 2011a). Adequate attention needs to be paid to comprehensive management of human excreta, whether sewage or septage, if the deficits of urban sanitation in India are to be addressed. This has been highlighted in India's National Urban Sanitation Policy of 2008 by Ministry of Urban Development (MoUD), the draft advisory and policy on Septage Management issued by the MoUD, and in the Septage Management Operative Guidelines issued by the Government of Tamil Nadu (GoTN, 2014a).

Taking due cognisance of the predominance of on-site sanitation systems in the State, GoTN committed to improving urban sanitation in mission mode, and issued the Operative Guidelines for Septage Management across the State in September, 2014. These guidelines underlined the importance of standardising the design and construction of septic tanks, instituting standard operating procedures for collection and transportation of septage, and implementing possible co-treatment options at the existing under-utilised sewage treatment plants, apart from creating new infrastructure and systems for comprehensive septage management.

The Bill & Melinda Gates Foundation (BMGF) came forward to assist the GoTN in developing and implementing sustainable sanitation solutions for urban Tamil Nadu. The objectives of the Tamil Nadu Sanitation Mission include elimination of open defecation; safe containment, treatment, and disposal of human excreta, so that public health, hygiene and dignity can be achieved for urban households and urban areas in the state. The BMGF signed a Memorandum of Cooperation (MoC) with GoTN for the same, in August, 2015.

With a view to scope the tasks that need to be carried out under the TN Sanitation Mission, including identification of the institutional arrangements and capacities required, Indian Institute for Human Settlements (IIHS) was commissioned to carry out a scoping exercise. This scoping study comprises a secondary review supplemented with primary data collection in select urban areas, and the conduct of consultations with identified stakeholders; to understand better the situation of sanitation in the urban areas of the State. The State-level analyses are supplemented with primary studies and consultations in two urban locations in the State: a town panchayat cluster, and a municipality.

This is the report of the secondary review; providing a situational analysis of the water and sanitation situation in urban Tamil Nadu, situated in the context of economic growth, demographic change, natural resource endowments and their historical utilisation character. This study draws mainly from available secondary literature and data from the Government and other public sources.

1.2. Project Objectives and Scope of Work

The scope of the Study includes:

i. Carrying out a situational analysis of urban sanitation in Tamil Nadu.
ii. Conducting an analysis of the institutional, financial and legal frameworks operating in governance systems, for the examination of the operating frameworks within which sustainable urban sanitation solutions will need to be explored in Tamil Nadu State.
iii. Landscaping of key stakeholders, supporters, potential partners for the government's efforts and ongoing initiatives on urban sanitation in Tamil Nadu.
iv. Facilitating engagement with relevant stakeholders, including, but not restricted to, government officials and community groups, and providing learning therein.
v. Provide the basis for planning and organising exposure visits to successful examples of Fecal Sludge Management (FSM) in appropriately similar contexts.
vi. Developing recommendations for high level interventions by the Technical Support Unit (TSU) that is going to be established by the GoTN.

1.3. Scope and Structure of this Document

This secondary review starts with the description and analysis of the physical setting for the State of Tamil Nadu —Location, Physiography, Climate, Temperature and Rainfall— to move to the natural resource endowments and selected usufructs such as forests, minerals and water resources. After this contextual setting, it examines the trends in state economy to understand the shares of the primary, secondary and tertiary sectors and the dependence on livelihoods. The first half of the document closes with an analysis of the urbanisation trends in the State.

In the latter part of the document, the focus is on the legal and institutional framework and the administrative structure that provides governance to urban Tamil Nadu. This is followed by a brief but focused analysis of the state finances and the finances of the ULB.

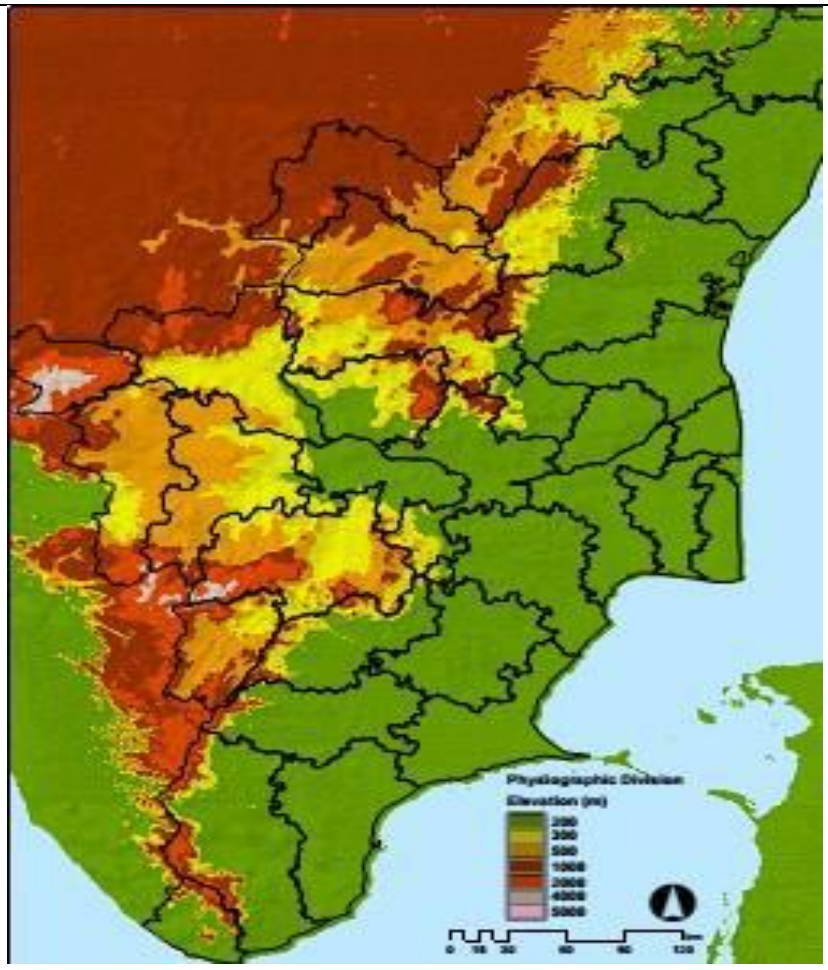
2. Physical Setting: Geography, Resources and Demography

This section explores the physiographic features of the State, the distribution of natural resources and the interplay between these as evidenced in the livelihoods of the resident population and the structure of the local economy.

2.1. Geography and Physiographic Features

The southernmost state of India, Tamil Nadu, covers an area of 130,058 Sq.km, and is the eleventh largest (in terms of area) in India. The bordering states are Kerala to the west, Karnataka to the north-west and Andhra Pradesh to the north. To the east is the Bay of Bengal and the state encircles the Union Territory of Puducherry. The southernmost tip of the Indian Peninsula is Kanyakumari which is the meeting point of the Arabian Sea, the Bay of Bengal, and the Indian Ocean.

Figure 2.1: Physiography of Tamil Nadu – Elevation



Source: IIHS illustration of USGS DEM data, 2015

The main physiographic features in the State are the coastal plain on the eastern side stretching from Pulicat lake (in the neighbouring State of Andhra Pradesh) to Kanyakumari to a length of 1076 km forming a major portion of the State, a central plateau region of slightly elevated plain (elevation ranging between 150 to 300 m) studded with Javadhu, Shevaroys, Kalrayan, Pachamalai and Kollimalai hills known as Eastern Ghats and the hilly regions of the Western Ghats are on the West.

The western, southern and the north western parts are hilly and rich in vegetation. The Western Ghats and the Eastern Ghats meet at the Nilgiri hills. The Western Ghats traverse the entire western border with Kerala, effectively blocking much of the rain bearing clouds of the south west monsoon from entering the state. The south eastern parts are fertile coastal plains and the northern parts are a mix of hills and plains. The central and the south central regions are arid plains and receive less rainfall than the other regions. The trend of drainage is from west to east into the Bay of Bengal. The river Cauvery rises from the Brahmagiri hill in Coorg district of Karnataka State and flows eastwards across the peninsula into the Bay of Bengal, entering Tamil Nadu at Meetur. The Ponnaiyar River rises from Kolar district of Karnataka State runs across Tamil Nadu and falls into the sea north of Cuddalore. The Vaigai River originates from the Western Ghats and passes across the State and finally falls into the Bay of Bengal, 16 km east of Ramanathapuram.

2.2. Climate, Temperature and Rainfall

The proximity of the sea influences the climate of the eastern and southern parts of the state whereas hilly topography and the inland locations play important roles in modifying the climate over rest of the State. The western portions of the State and the portions bordering with Kerala fall under the climate type: marine, mild winter, moist all seasons, warm summer and the remaining part of the State comes under the climate type: Tropical Savanna, Hot, seasonally dry. Temperatures tend to be moderate in the coastal areas, while inland it can go to extremes in some places. Generally, the average temperatures for most parts of the state stay between 28° C and 40° C in summer and between 18° C and 26° C in the short-duration winter season. The urban centres of Chennai, Nagapatinam and Madurai record some of the highest temperatures in summer.

Tamil Nadu has a coastline of about 910 km which accounts for 12 per cent of the country's coastline. The state coastline bore the brunt of the 2004 Indian Ocean Tsunami when it hit India, which caused 7,793 direct deaths in the state. Tamil Nadu falls mostly in a region of low seismic hazard with the exception of the western border areas that lie in a low to moderate hazard zone; as per the 2002 Bureau of Indian Standards (BIS) map, Tamil Nadu falls in Zones II & III. Historically, parts of this region have experienced seismic activity in the M 5.0 range.

The State mainly receives its rainfall in three seasons, viz. SWM, NEM and Pre-monsoon season. The normal annual rainfall falling over the state is 958.4 mm. About 48 per cent of the total annual average rainfall is received during NEM, while about 35 per cent is received during SWM and the balance in the other seasons. The spatial distribution of the rainfall received over Tamil Nadu is highly variable. Rainfall over coastal areas is more and decreases to inland areas since the rainfall causing systems are forming over the Bay of Bengal and moving towards the coast of Tamil Nadu. Also the rainfall over northern end is more than the southern locations. Orographic impacts are believed to play an important role in the spatial distribution of rainfall. The coastal districts receive about 65–75 per cent of annual rainfall and interior districts get about 40–50 per cent in the NEM season. The hilly regions in the west and hilly/plain lands in north western half of the region receive their major share from SWM.

The total surface water potential of the state is assessed as 24,160 Million cubic meters (MCM). There are 17 major river basins in the State with 79 reservoirs and about 39,000 tanks (TWAD Board). Of the annual water potential of 46,540 MCM, surface-flows account for about half. Most of the surface water has already been tapped, primarily for irrigation which is the largest user. About 15 lakh hectares are irrigated by surface water through major, medium and minor schemes. The utilisation of surface water for irrigation was about 99 per cent at the end of the eleventh plan period.

Out of 386 ground water blocks, 139 blocks (36 per cent of all GW blocks) are categorised as over-exploited, 33 blocks (9 per cent of all GW blocks) as critical, 67 blocks (17 per cent of all GW blocks) as semi-critical, 136 blocks (35 per cent of all GW blocks) as safe and 11 blocks (3 per cent of all GW blocks) as Saline/poor quality blocks. The NEM rainfall has increased from 34 per cent to 63 per cent and the SWM has decreased from 48 per cent to 24 per cent, during a span of 10 years. The heavy short-duration downpour (rainfall events) during the NEM, results in severe floods; especially in the coastal districts such as Cuddalore, Nagapattinam, Thanjavur and Thiruvarur. Urban flooding is another significant problem. The capital city Chennai and its suburban areas are worst affected by flood every year (various media reports) because of improper drainage and encroachment of water bodies and waterways.

Out of 13 million hectares of geographical area, about 7 million hectares of land is under cultivation. The farming situation covers irrigated (55 per cent) and rain fed/dry land (45 per cent). Among all States of India, ground water has been harnessed fully in the State of Tamil Nadu.

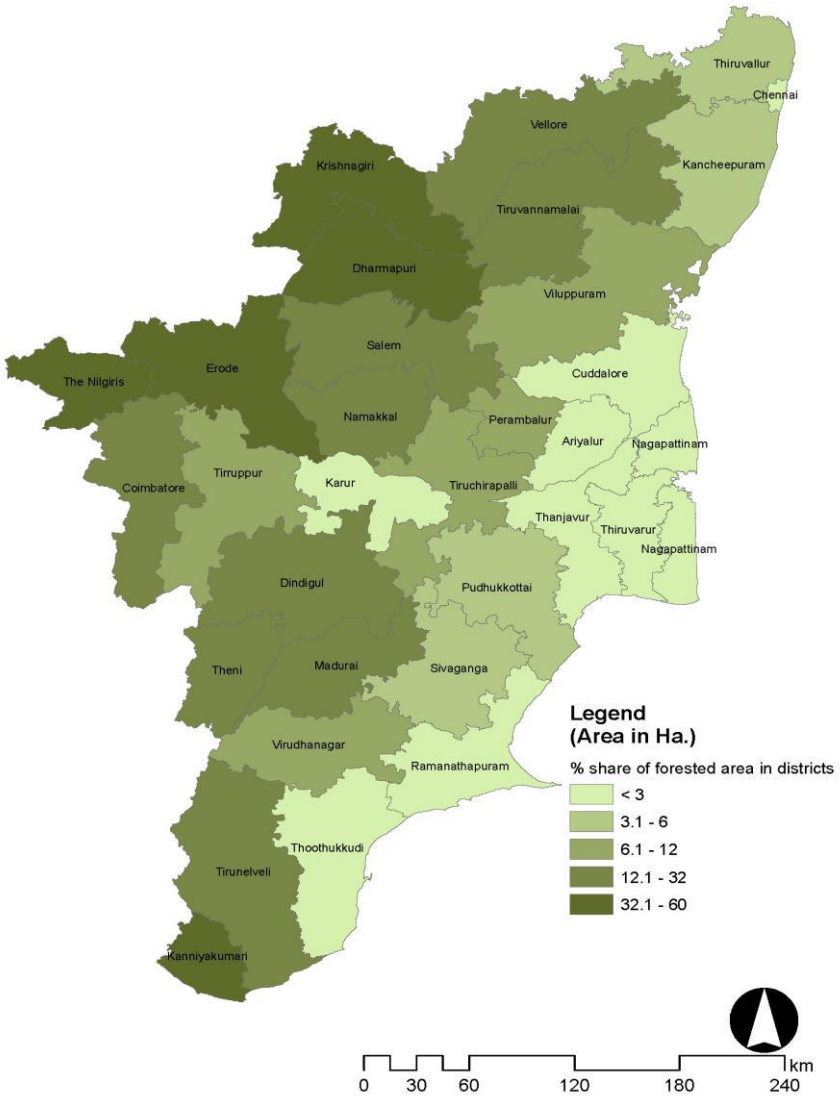
2.3. Forests

Tamil Nadu has an area of 27,634 Sq.km under forest cover and tree cover which constitutes 21 per cent of the geographical area of the State. The State harbours diverse vegetation in nine different forest types, viz., tropical wet evergreen forests, tropical semi-evergreen forests, tropical moist deciduous forests, littoral and swamp forests (Mangroves), Tropical Dry deciduous forests, tropical thorn forests, tropical dry evergreen forests, subtropical broad leaved hill forests and montane wet temperate forests. The share of forest cover in the districts decreases from west to east.

The State has set aside about 3,840 sq.km. under a network of protected areas in 8 sanctuaries, 5 national parks and 12 bird sanctuaries. The State is also home to 3 Biosphere Reserves viz. Nilgiris Biosphere Reserve, Gulf of Mannar Biosphere Reserve and Agasthyamalai Biosphere Reserve.

Most of the important species of mammals of India are found in the forests of the State. Among them the endangered are Slender loris, Lion tailed macaque, Indian Pangolin, Jackal, Indian Fox, Indian Wild dog, Sloth bear, Jungle cat, Leopard, Tiger, Mouse deer, Gaur, Blackbuck, Nilgiri Tahr, Grizzled squirrel, Common dolphin and Dugong. The State has three Tiger Reserves under 'Project Tiger'. They are Kalakad-Mundanthurai, Anamalai Wildlife Sanctuary Project Tiger and Mudumalai Tiger Reserve. In Tamil Nadu 'Project Elephant' is implemented in four Elephant Reserves (ER), namely Nilgiri ER, Coimbatore ER, Anamalai ER and Srivilliputtur ER.

Figure 2.2: Tamil Nadu Districts with proportion (per cent) of area under Forests



Source: GoTN (2014c)

Mangroves are spread over 35 sq.km in Chidambaram, Cuddalore, Nagapattinam, Ramanathapuram and Thanjavur (Muthupet). In Cuddalore mangroves are found in Pitchavaram, located about 225 km south of Chennai. Pitchavaram mangroves are bathed in the Vellar-Coleroon estuarine complex and spread to an area of 1,100 Ha. The Pitchavaram area consists of 51 islets (small and large), which are traversed by numerous creeks, gullies, channels and canals.

In Tamil Nadu coral reefs are found in Gulf of Mannar and Palk bay.

In Tamil Nadu, five species of sea turtles namely Olive Ridley, Loggerhead Turtle, Hawksbill Turtle, Green Turtle and Leatherback Turtle have been reported. Olive Ridley nests sporadically along northern Tamil Nadu coast and high nesting is observed along Nagapattinam and Chennai coasts. The other turtle nesting areas are the coasts between Tranquebar and Pazhayaru, Mamallapuram and Chennai and Point Calimere and Nagapattinam. Turtle nesting was reported during December to February and also during April to June.

The tribal population in the country was reported at 104.5 million in 2011, with about 10 per cent of the tribal population resident in urban areas. Tamil Nadu accounts for 0.76 per cent of the national population of notified tribes (0.79 million). In the State, 16.9 per cent of the tribal population is resident in urban areas. The key demographic indicators of the tribal population in the State are detailed in the Table (2.1) below. While the sex ratio is comparable between urban and the state, child ratio is higher in the urban for Scheduled Tribes. The literacy rate is higher amongst both male and female in urban areas. However, the work participation rate is lower amongst the tribal population in urban areas, suggesting marginalisation in employment.

TABLE (2.1): KEY DEMOGRAPHIC INDICATORS FOR SCHEDULED TRIBES IN TAMIL NADU

Particulars	Urban	State
Total Population of Schedule Tribes (ST)	134,417	794,697
Sex Ratio (ST)	980	981
Child ratio (ST)	940	918
Male Literacy (ST)	66 %	53 %
Female Literacy (ST)	55 %	41 %
Male Work Participation Rate (ST)	56 %	60 %
Female Work Participation Rate (ST)	31 %	49 %

Source: Census of India, 2011

A third of the Scheduled Tribes resident in urban areas of the State are resident in the districts of Kancheepuram, Thiruvallur, Chennai and the Nilgiris (the first two being near Chennai and the last in the Western Ghats region); about half the urban ST population concentrated in seven districts and about 75 per cent of the urban ST population resident in 12 of the 32 districts in the State.

2.4. Mineral Resources

Geologically, the hilly terrain and the central plain contain crystalline hard rocks such as charnockites, granite gneiss, khondalites, leptynites, metamorphic gneisses with detached occurrences of crystalline limestone, iron ore, quartzo-feldspathic veins and basic intrusives such as dolerites and anorthosites.

Coastal zones contain sedimentary limestones, clay, laterites, heavy mineral sands and silica sands. The hill ranges are sporadically capped with laterites and bauxites of residual nature. Gypsum and phosphatic nodules occur as sedimentary veins in rocks of the cretaceous age. Gypsum of secondary replacement occurs in some of the areas adjoining the foothills of the Western Ghats. Lignite occurs as sedimentary beds of tertiary age. Tamil Nadu is one of the leading States in the reserves of the following minerals viz., Lignite, Garnet, Magnesite, Quartz, Feldspar, Clay, Limestone, Bauxite, Graphite and Granite.

TABLE (2.2): DISTRIBUTION OF MINERAL RESOURCES IN TAMIL NADU

Sl. No.	Mineral Group	Districts with Significant Endowments	Industrial End-use	Estimates of Resource
1	Heavy Mineral Sands (Garnet, Ilmenite, Rutile, Leucoxene, Monazite and Zircon)	Kanyakumari, Tirunelveli, Thoothukkudi, Ramanathapuram and Nagapattinam	pigment, refractory, ceramic industries and nuclear industry	
2	Magnesite	Salem, Namakkal, Coimbatore and Erode	Refractory purposes and in chemical industries	73 M Tonnes
3	Graphite	Sivagangai, Ramanathapuram, Madurai and Tirunelveli	Export Quality	2 M Tonnes
4	Clay (refractory, stoneware and ceramic grades)	Cuddalore, Pudukkottai, Tirunelveli, Tiruvallur, Kancheepuram and Tiruvannamalai	Refractory, stoneware and ceramics	9 M Tonnes
5	Bauxite	Dindigul, Namakkal and Salem (Kodaikanal, Palani, Yercaud and Kolli Hill ranges)	Aluminium industry	26 M Tonnes
6	Lignite	Cuddalore (Neyveli), Perambalur and Thiruvarur	Thermal power plants, fertiliser, briquetting and carbonisation plants	3,0275 M Tonnes
7	Quartz and Feldspar	Tiruchirappalli, Salem, Coimbatore, Madurai, Tirunelveli, Erode and Dindigul	Export Quality	
8	Limestone	Perambalur, Tirunelveli, Thoothukkudi, Virudhunagar, Salem,	Cement and chemical industries	1,282 M Tonnes

TABLE (2.2): DISTRIBUTION OF MINERAL RESOURCES IN TAMIL NADU				
Sl. No.	**Mineral Group**	**Districts with Significant Endowments**	**Industrial End-use**	**Estimates of Resource**
		Karur, Namakkal, Dindigul, Coimbatore and Madurai		
9	Granite	Kancheepuram, Vellore, Villupuram, Dharmapuri, Salem, Erode, Pudukkottai, Madurai, and Namakkal districts.	Building facades, flooring, decorative/ornamental uses and in monuments	710 M cum.
10	Silica Sands	Nagapattinam, Cuddalore, Kancheepuram and Tiruvallur		115 M Tonnes
Source: http://www.tnmine.tn.nic.in/Mineral Reserves and Resources.htm, accessed 27/09/2015				

The State government earned about ₹594 Crore from the administration of the minerals sector in FY 2010–2011, growing from ₹366 Crore in FY 2003–2004.

2.5. Water Resources in Tamil Nadu

Tamil Nadu has an area of about 130,000 sq.km and a population of 72 million of which slightly more than half (52 per cent) are rural. The decadal population growth has increased over the 2001–2011 period to 15.61 per cent contrary to a decreasing trend over the decades starting from 1971 (The projections made by the Registrar of Census in 2006 had anticipated the Total Fertility Rate to reach near replacement levels by 2011). However, the decadal growth is still slower than the India average (15.61 per cent in Tamil Nadu compared with about 17.70 per cent nationally). Taken together with stable birth rates, the higher population growth rate could be as much an indicator of longevity courtesy of a better organised health delivery system, as the robust industrialisation that has triggered an influx of job-seekers from other states. However, the population density is higher at 555 persons/sq.km in Tamil Nadu compared with the national density of 368 persons/sq.km. Chennai with a density of about 26,900 persons/sq.km is reported to be the second densest district in the country after North-east Delhi. Tamil Nadu is both land and, in particular, water short; compared to the rest of India. It has 6 per cent of the country's population but only 4 per cent of the land area, 6 per cent of the country's estimated replenishable groundwater resources and 3 per cent of the country's surface water resources. Water constraints in Tamil Nadu vary by basin and are influenced by the present level of irrigation development and by urban needs.

The section examines the development of surface water and ground water resources in the state, the stage of development across the state and the quality of flows from available data and literature in the public domain. It then focuses on the urban sector to examine drinking water supply and household sanitation arrangements, the infrastructure set up for different parts of the value chain and its implications.

2.5.1 Surface Water Resources of Tamil Nadu

The average Run off (surplus flow) to the sea from the 17 Basins of Tamil Nadu State is computed as 177.12 TMC. The total surface water potential of the river basins of Tamil Nadu is assessed as 24,160 MCM (853 TMC). This potential comprises 17 major river basins, with 39,000 tanks (storage capacity of 347 TMC), 79 reservoirs (storage capacity of 243 TMC), contribution from other States (of 261 TMC) and other storage of two TMC.

Of the annual water potential of 46,540 MCM, surface flows, account for about half. Most of the surface water has already been tapped, primarily for irrigation the largest user. The gross irrigated area is 2.4 million hectares, by surface water through major, medium and minor schemes. At the end of the 11th plan (2007–2012), the potential of irrigation created was 1,528,000 Hectares, which is greater (105 per cent) than the ultimate irrigation potential estimated. More than 99 per cent (99.6 per cent) of the potential created is being utilised.

Figure 2.3: River Basins of Tamil Nadu with District Boundaries

Source: (GoTN, n.d.), Last accessed on Oct 03 2015

Rivers of Tamil Nadu: Among the several rivers flowing through the state, Kaveri River, with 760 Km of length, is the longest among all the rivers in Tamil Nadu. It is among the sacred rivers of the country; this river is popularly called the 'Ganga of the South' or the 'Dakshina Ganga'. Some of the other main rivers of Tamil Nadu can be sub-divided into the following types:

Following are the other major rivers which flow through this southernmost region of the Indian peninsula:

Bhavani River: Fed, mostly, by the southwestern monsoon, this is one of the main tributaries of the river Kaveri.

Cheyyar River: This tributary of River Palar is a major seasonal river that flows through the district of Tiruvannamalai.

Chittar River: The main river originates from the Courtallam Hills of the Shencottah Taluk and Tenkasi Taluk in the district of Tirunelveli. It flows through the state along with its five tributaries.

Ponniyar River: Flowing across the borders in between the taluks of Villupuram and Cuddalore, it finally drains into the Bay of Bengal.

Thamirabarani River: This River originates from the peaks named Agathimalai, Aduppukkal Mottai and Cherumunji Mottai in the Tirunelveli district.

Vaigai River: While flowing towards the Palk Strait, it changes its course towards the south-east near Sholavandan and passes through the town of Madurai.

Gundar River: It mainly flows through the districts of Tirunelveli and Virudhunagar in Tamil Nadu.

Noyil River: This tributary of Kaveri flows through Dharapuram taluk and Palladam taluk in Erode district and Coimbatore district respectively.

Suruli River: This originates from the Suruli Waterfall, which is among the major tourist attractions in the Theni district.

Vaipar River: With its origination in the bordering hills of the Kerala state, the river runs through the Virudhunagar district as well as the Theni district.

2.5.1.1 Quality Considerations in Select River Basins of Tamil Nadu[3]

The Palar River basin: The Palar originates in the Nandi Durg hills of the eastern part of Karnataka State. The river passes through hilly stretches of Andhra Pradesh before entering Tamil Nadu near Vaniyambadi town. The Palar river basin covers an area of about 18,300 Sq.km, of which approximately 11,000 Sq.km. falls within the Tamil Nadu border. The river joins the sea near Mahabalipuram. The average annual rainfall ranges from 800 to 1,200 mm.

Tanks have historically been the most important source of irrigation within this river basin. There are no storage reservoirs constructed across this river, but one finds a few anicuts (diversion weirs) that fill about 700 Tanks irrigating about 61,000 Hectares. These are called system tanks. Apart from the system tanks, there are numerous spring channels with their origin in the Palar or its tributaries, irrigating thousands of hectares in the villages along the river. There are reported to be about 606 spring channels (Institute of Water Studies, 2005). In many villages, the spring channels still exist, but in a degraded and silted condition. In many of these channels, river water stopped flowing long ago, and in some, untreated effluent is discharged by tanning industries. Paddy is the major crop followed by groundnut.

[3] [Most of the matter in this section has been sourced from 'Living rivers, dying rivers' (Iyer, 2015)]

The concentration of tanning industries in the Palar basin has a history of more than a century. Leather industries have been highly profitable as well as earners of substantial foreign exchange; and have also generated large employment opportunities for the local population. During the eighties two significant shifts happened. These were the ban on the export of semi- finished leather, leading to industry shift to export of finished leather; and the process of tanning changed from the conventional eco-friendly vegetable based process to chrome tanning and the number of tanneries multiplied rapidly. India's total value of leather exports was expected to surge to Euro 5.27 Billion by 2013-2014, of which 35 per cent was from Tamil Nadu and the Palar basin (Council for Leather Exports, 2009). In the nineties, the number of 'red' industries that discharged a huge quantity of untreated effluent in the Palar basin were: 460 tanneries, 63 chemical industries and 116 other industries (ADB, 1994). Since then, the number of tanneries has increased to a reported 800 within the basin. The Palar basin in Tamil Nadu characterised by a high degree of urbanisation, coupled with rapid expansion of leather tanneries; has increased the demand for water from urban populations and industry manifold. It is characterised as a 'closed basin' (Venot, Turral, Samad, & Molle, 2007).

A study carried out in the Vellore district (Mukherjee, 2010) indicate high chromium contamination and high presence of chromate-tolerant microbial population. Tests on groundwater indicate high concentration of total dissolved solids. Studies by TNPCB indicate a high level of chromium contamination in land, soil and groundwater, and that the chromium waste has spread over a large area in the Ranipet region. There are Common Effluent Treatment Plants set up, but local reports indicate that most of these do not work effectively. Not only is the soil and water polluted, but the air due to the spraying of chemicals is also affected. One of the major impacts of the environmental degradation has been the out-migration of households in the village that depended on farming.

The most vital response to the acute pollution problem came from the Vellore Citizens Welfare Forum, which filed a PIL against the tanners in 1991. The SC bench in their decision of 1996, upheld the precautionary principle and the polluter pays principle, and created an authority under section 3 (3) of the EPA, 1986 to compute compensation for reversal of ecological damage and for payment to individuals. However, the computations by the Loss of Ecology Authority (LEA) were challenged by the tanners and the compensation whittled down by about half. The status of the Palar basin in 2013 is reportedly much worse compared to what it was earlier. The judicial intervention was minimally successful in raising awareness, but not in ensuring sustainable development and reversal of ecological damage in the basin.

The Palar River has got the rare distinction of earning the third place among the ten most polluted rivers in the World identified by the Blacksmith Institute of New York in 1996. The criteria used for such identification were: (i) the size of the affected population (over 3.5 million), (ii) severity of the toxin(s) involved, (iii) impact of children's health and development, (iv) evidence of a clear pathway of contamination and (v) existing and reliable evidence of health impact.

The Cauvery river basin: The River Cauvery is an inter-State river which is the mainstay for both Tamil Nadu (lower riparian State) and Karnataka (Upper riparian State). The main tributaries of the river in Tamil Nadu are Bhavani, Amaravathi, Noyyal and Kodaganar. A large number of tanneries and dyeing, bleaching, chemical, sugar and paper industries are in

these basins. Most of these industries use the freshwater from the river flows and use the same rivers to dump their effluents. Also, the large number of small and medium-sized towns located all along these rivers dump their municipal sewage and other wastes in the rivers.

Noyyal: A tributary of Cauvery: The River originates in the Western Ghats, flows through the industrial town of Tiruppur, through a distance of 175 km., before joining the Cauvery. The region which constitutes this river basin is traditionally a dry tract, which depended entirely on groundwater for all purposes. Over the years, there has been a lowering of water table, resulting in groundwater depletion in many parts. The introduction of modern mechanised pumping technologies has fundamentally altered the dynamics of agricultural water supply and use. This is all occurring in an area with marked seasonal variations in precipitation and relatively low levels of groundwater storage.

Tiruppur town and its suburbs are known for its concentration of knit-wear industries. There are over 3,000 knitting mills and over 800 dyeing and bleaching industries in this region. These not only consume a huge quantity of fresh groundwater but also discharge them back into the Noyyal River. In 1997, the Orathapalayam dam constructed across the Noyyal River was overflowing with effluent endangering quite a number of villages around. Eventually, at the time when there was no appreciable flow in the Cauvery River, the Public Works Department opened the gates of the Orathapalayam dam to let the polluted water flow down without any prior warning to the public. The effect was devastating. Considerable damage occurred to crops, animals, soils and groundwater. Several hundred animals collapsed after drinking this water. The severity of the situation was such that Government was forced to release 20,000 cusecs of water from Mettur dam with a view to reduce the pollution load in the Cauvery even though it was a dry period.

Waterways of Chennai: The waterways of Chennai namely the Cooum and Adyar river and the Buckingham canal were historically clean water ways, but they now carry sewage and industrial effluents. Repeated attempts to clean the Chennai waterways have been a failure. There are reported to be about 750 sewage and effluent outfalls into these waterways carrying over 700 MLD of waste water (untreated) finally mixing with Bay of Bengal.

The Cooum, once a fresh water source is today a drainage course collecting surpluses of 75 small tanks of a minor basin. The length of the river is about 65 km, of which 18 km, fall within the Chennai city limits. This river once used for fishing and boat racing, has borne the adverse effects of the city's unplanned explosion.

The Buckingham canal is reportedly the most polluted of the three major waterways in the city with nearly 60 per cent of the estimated 700 million litres of untreated sewage from the city, being let into it daily, including by CMWSSB.

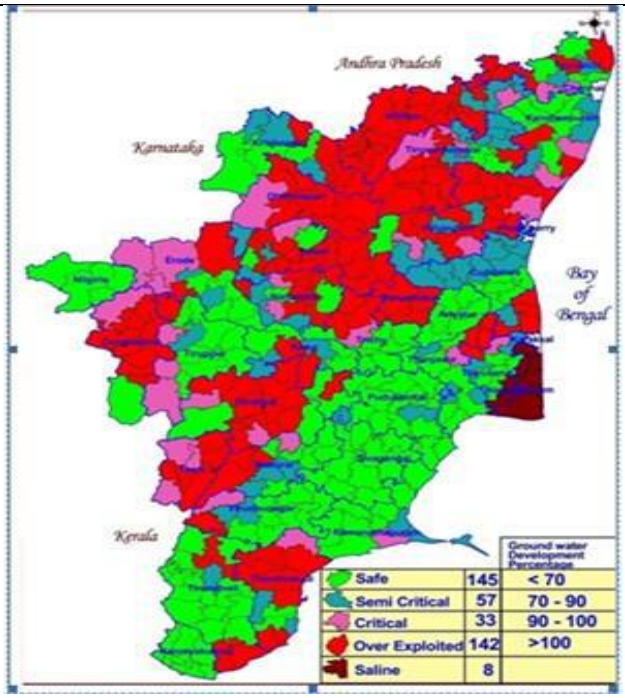
The Adyar River, a flood carrier of Chennai is full of municipal sewage and effluent discharged by industries. Estimated industrial pollutant loadings discharged into major rivers in Tamil Nadu was also presented. Thus, surface water resources in the State are constrained by availability volumes and further constrained by the degradation of existing water resources by pollution from industries and households. This phenomenon also highlights the paucity of available information for decision-making and planning. Data that is collected is very selective such as land details, rainfall, crop details, water (surface and groundwater), income and consumer expenditure, assets and liabilities, livestock, etc., and There is lot of data such as pollution data of river basins, pollution levels of surface and

groundwater, solid waste, bio-medical waste, urban sewage, e-waste generation, and losses from floods and droughts (socio-economic losses and expenses incurred by way of mitigation) which is not collected and made available in the public domain.

2.5.2 Ground Water Resources of Tamil Nadu

The utilisable groundwater recharge is 22,423 MCM. The current level of utilisation expressed as net ground water draft of 13.558 MCM is about 60 per cent of the available recharge, while 8875 MCM (40 per cent) is the balance available for use. Over the last five years, the percentage of safe blocks has declined from 35.6 per cent to 25.2 per cent while the semi-critical blocks have gone up by a similar percentage. Over-exploitation has already occurred in more than a third of the blocks (35.8 per cent) while eight blocks (2 per cent) have turned saline.

Figure 2.4: Stage of Groundwater Development in Blocks, Tamil Nadu



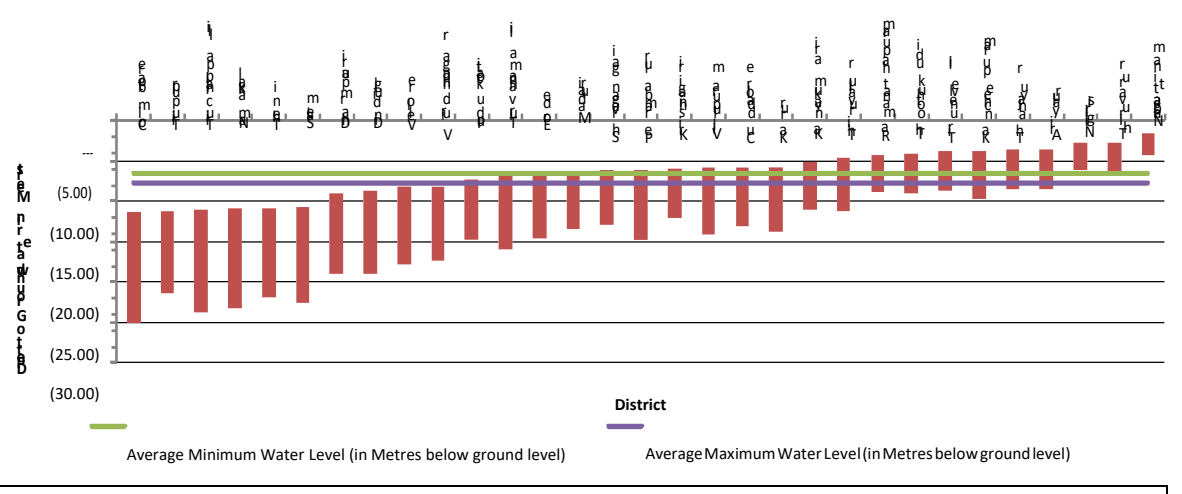
Source: (TWAD Board, n.d.) accessed Oct 08 2015

2.5.2.1 Change in Groundwater Level

Tamil Nadu is one of the states in the country with groundwater at an advanced stage of development. This is characterised by a significant proportion of over-exploited, critical and semi-critical blocks (62 per cent of total number of blocks). The depth to groundwater also varies from district to district. Figure 2.6 represents the average depth to groundwater in the districts and the range of fluctuation (minimum to maximum) over the year. Thirteen (42 per cent) of the thirty-one districts[4] have a minimum GW level deeper than the State average (green line), while 15 of the 31 (48 per cent) districts have maximum GW levels deeper than the State average.

4 Excluding Chennai

Figure 2.5: Change in Depth to Groundwater: Post-Monsoon (Jan 2015) to Pre-Monsoon (May 2015)



Source: (PWD, 2015a, 2015b, n.d.)

2.5.2.2 Quality of Groundwater

The testing of groundwater sources is carried out under the National Rural Drinking Water Program. Except for Villupuram and Virudhnagar, most districts report some sources (up to 5 per cent) with excess Iron, while a larger extent of contamination is reported in Dindigul and Kanniyakumari and in Nagapattinam.

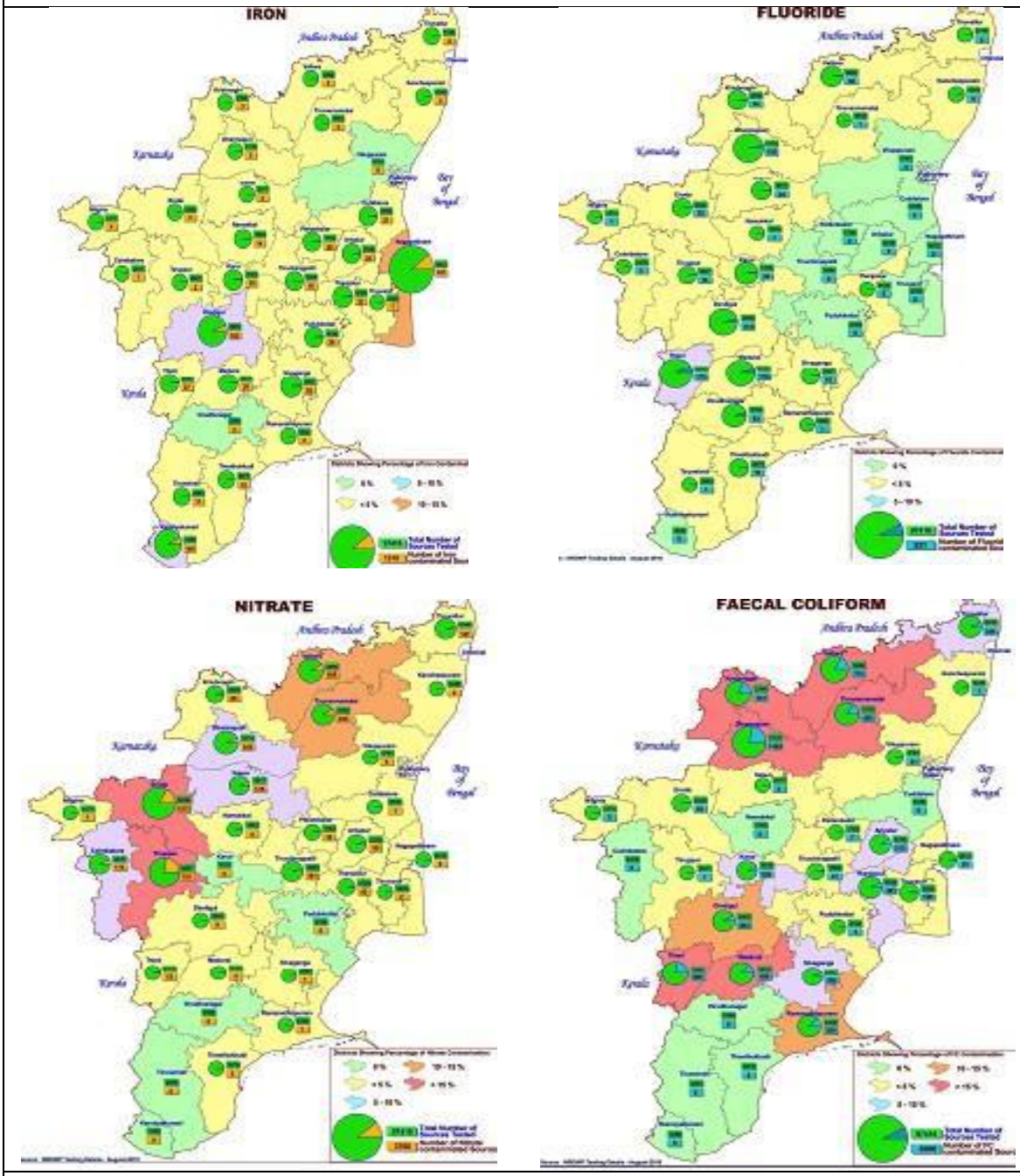
Fluoride as a contaminant is reported most in Theni district. The districts of Kanniyakumari, Pudukkotai, Tiruchirappalli, Perambalur, Ariyarur, Tiruvarur, Cuddalore, Villupuram and Nagapatinam do not report any excess Fluoride.

Nitrate contamination is reported highest in Tiruppur, Erode (these have significant number of 'red' category industries), Tiruvannamalai and Vellore and there is no reportage of Nitrates in Kanniyakumari, Karur, Pudukkotai, Tirunelveli and Virudhnagar.

Theni, Dharmapuri and Krishnagiri report the highest incidence of fecal coliform in groundwater samples, followed by Vellore, Tiruvannamalai, Madurai, Ramanathapuram and Dindigul.

Groundwater contamination is an issue in most districts. The extent of contamination varies and is seemingly not very high for excess Iron or excess Fluoride. The issue of nitrates and fecal coliform contamination suggests higher risk, but does not exceed 25 per cent of samples.

Figure 2.6: Presence of Iron, Fluoride, Nitrate and Fecal Coliform in Groundwater



Source: GoTN (2014b)

2.5.3 Water Resources: Demand-Supply Estimates

Water availability is becoming a critical commodity in the State. Sectors like industries, hydro-power, domestic, livestock and increasing environment needs are competing for the available share of water. The demand from the various sectors as assessed by the Institute of Water Studies (IWS), GoTN is presented in the table below. The challenge is to bridge this gap by reducing the demand or by efficient water management.

Table (2.3): Current Demand-Supply Situation for Water Resources in Tamil Nadu

Description	Supply/Demand in Thousand Million Cubic Feet (TMC)
Total Assessed water Resources	1,587.00
Drinking water demand	51.40
Corporations	13.80
Municipalities	9.60
Town Panchayats	10.00
Rural	18.00
Irrigation demand	1,766.00
Industries	54.90
Power	4.20
Livestock	18.30
Total Demand	1,894.80
Gap (Demand–Availability)	**(307.80)**

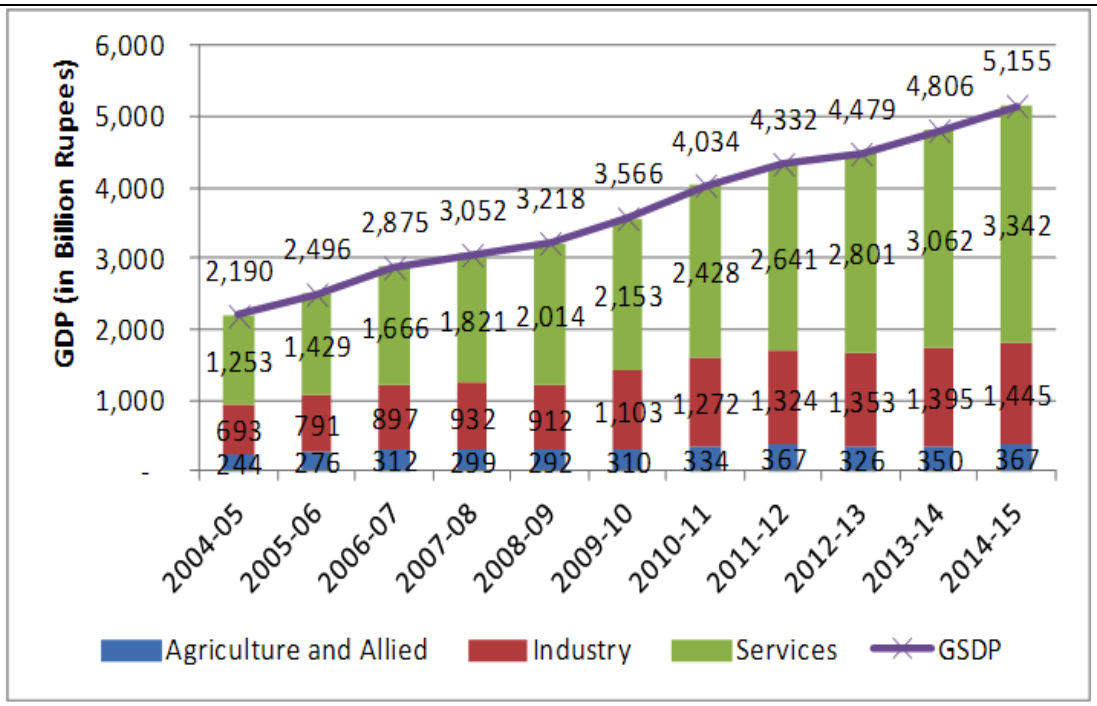
Source: http://www.twadboard.gov.in/twad/tamilnadu.aspx accessed October 8, *2015*

The Water Resources Organisation prepared a State Framework Water Resource Plan of Tamil Nadu. The projections for 2044 indicate significant increases in domestic and industrial consumption as well as in energy production. This is anticipated to stress further the already stressed water resource potential of the State.

3. Economy of Tamil Nadu

Tamil Nadu has the second largest GDP amongst the States, after Maharashtra. Economic growth has been following a cyclical trend with positive linear character every 4–5 year followed by a year of lower growth. The trend in economic growth over the last ten years is shown in Figure 3.1 below. The primary sector shows near-stagnation and even decline in some years, and reports a growth of 50 per cent (or half) over the 2005–2015 period. Manufacturing has grown steadily over the first half of the period, but has slowed down in year-on-year growth after FY 2011, and reported a growth of 207 per cent over the 2005–2015 period. The services sector has witnessed the highest growth during this period, and reported a growth of 235 per cent over the ten-year period.

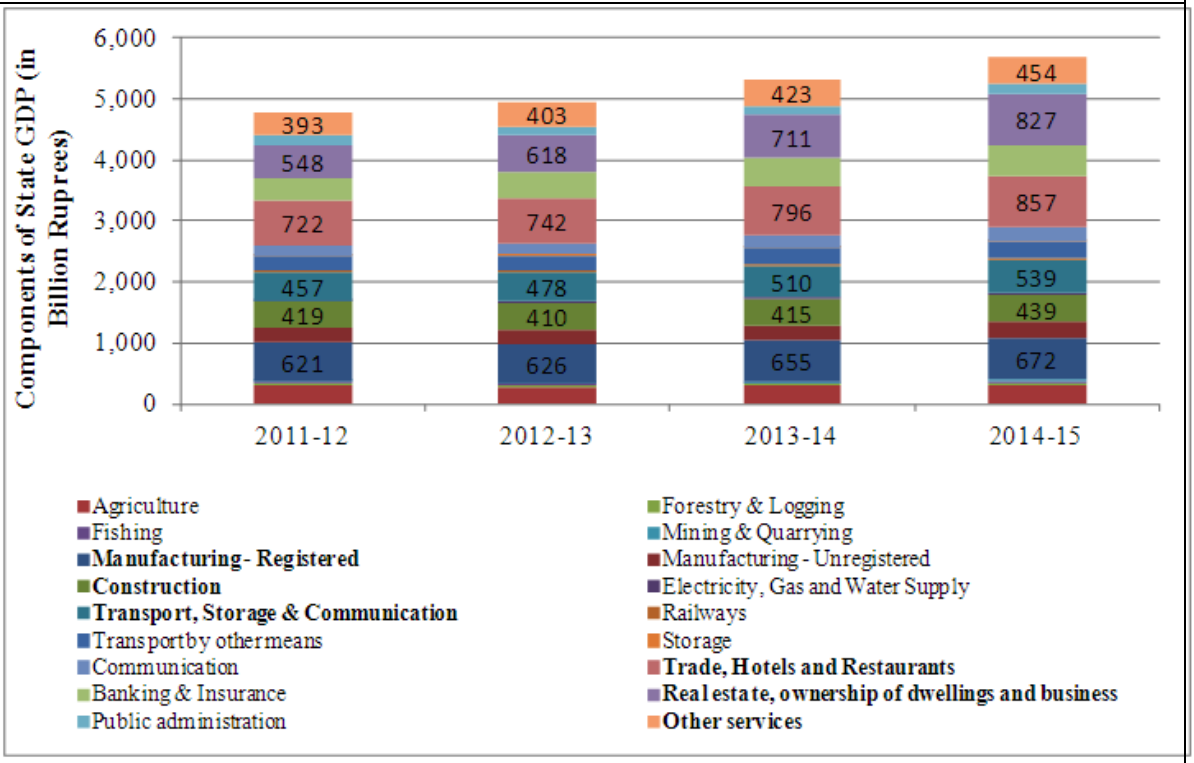
Figure 3.1: Trend in State GDP over 2005 to 2015 by Primary, Secondary and Tertiary Sectors



Source: IIHS Analysis of CSO (2015)

The sectoral composition of the state economy for the 2012-2015 period is detailed in Figure 3.2 below. While no sub-sector within the primary sector displays any prominence during this period, registered-manufacturing (formal), construction and allied sub-sector of transport, storage and communication display prominent shares in the state domestic product from the Industry sector; the sub-sectors of trade, hotels and restaurants, real estate, building ownership and other services have prominent shares from the services sector. Thus, the state economy is typified by a nearly stagnating primary sector (agriculture, livestock and fisheries), an Industries sector that is growing at a slow pace and a more rapidly growing services sector. Within these, land-related economic activities, connectivity and mobility aspects of industrial and tertiary growth and leisure seem to be enjoying continued growth (in the last three years) and suggest a very strong urban growth focus.

Figure 3.2: Trend of Composition of State GDP over 2012 to 2015 by Constituent sub-sectors



Source: IIHS Analysis of CSO (2015)

The scale and growth of economic activity in the districts is significantly different and ten of the thirty-two districts in the state account for more than half the SDP (see 3.1). The distribution of domestic product for 2011–2012 (taken as a typical year where data is available) is presented in Table (3.1). The category of districts with low NDP, i.e. less than 1 per cent of SDP; are about ten years behind the category of districts with a share greater than 4 per cent of SDP, in terms of the scale of economy. The middle category of districts in terms of NDP are also the ones reported to have more persons employed in the primary sector and include some of the paddy-growing areas of the State.

Table (3.1): Classification of Districts and their share of Net Domestic Product 2011-2012

District(s)	Category (District NDP as Share of State)	Total Net District Domestic Product (In Lakh Rupees)	Share of State Total
Perambalur, Ariyalur, Thiruvarur, The Nilgiris, Theni, Ramanathapuram, Sivagangai, Nagapatinam. Pudukkotai, Karur, Dharmapuri	Less than 2 %	4,640,807	13 %
Thiruvannamalai, Villupuram, Thanjavur, Dindigul, Krishnagiri, Namakkal, Thoothukudi,	2-4 %	11,875,389	33 %

Table (3.1): Classification of Districts and their share of Net Domestic Product 2011–2012			
District(s)	**Category (District NDP as Share of State)**	**Total Net District Domestic Product (In Lakh Rupees)**	**Share of State Total**
Cuddalore, Virudhunagar, Kanniyakumari, Erode			
Madurai, Tirunelveli, Tiruppur, Salem, Tiruchirappalli, Vellore, Coimbatore, Kancheepuram, Thiruvallur, Chennai	Greater than 4 %	19,479,853	54 %
Source: IIHS Analysis of CSO (2015)			

The share of the primary sector (agricultural sector) is significant in Ariyalur district at 33.87 per cent during 2010–11, followed by Perambalur district (30.70 per cent), Nagapattinam district (24.09 per cent) and Theni district (23.19 per cent). The share of secondary sector to total district income was found to be the highest in Virudhunagar district (51.76 per cent) followed by Kanniyakumari district (49.28 per cent), Tiruppur district (42.22 per cent), Coimbatore district (41.83 per cent).

3.1. Manufacturing and Industries

The State occupies a leadership position in manufacturing of diverse range of products like Automobiles and parts, textiles, Electronic hardware, Leather products, Light and heavy Engineering & Fabrication, etc., apart from Software development IT enabled Services (DoI, 2015). According to the Annual Survey of Industries (ASI) for 2012-13 by Central Statistical Organisation (CSO), Government of India, Tamil Nadu has 36,869 factories employing 1.96 million persons including 1.60 million workers with invested capital of ₹0.29 million Crore.

The Strategic Plan for infrastructure development in Tamil Nadu in the Vision 2023 envisages development of industrial and commercial infrastructure in two broad areas as follows:

- Industrial infrastructure covering industrial estates, SEZs Investment of ₹150,000 crore
- Tourism projects covering entertainment complexes hotels/resorts amounting to ₹10,000 crore of investment

In the strategic plan, industrial infrastructure comprises of land required for industrial activity and the cost of development of land to make it suitable for industrial use. It also includes the facilities required within the industrial area. The development projects under consideration are:

a. Acquisition of 6,826 acres of land by SIPCOT (State Industries Promotion Corporation of Tamil Nadu) for new and extension of existing industrial estates across the state;

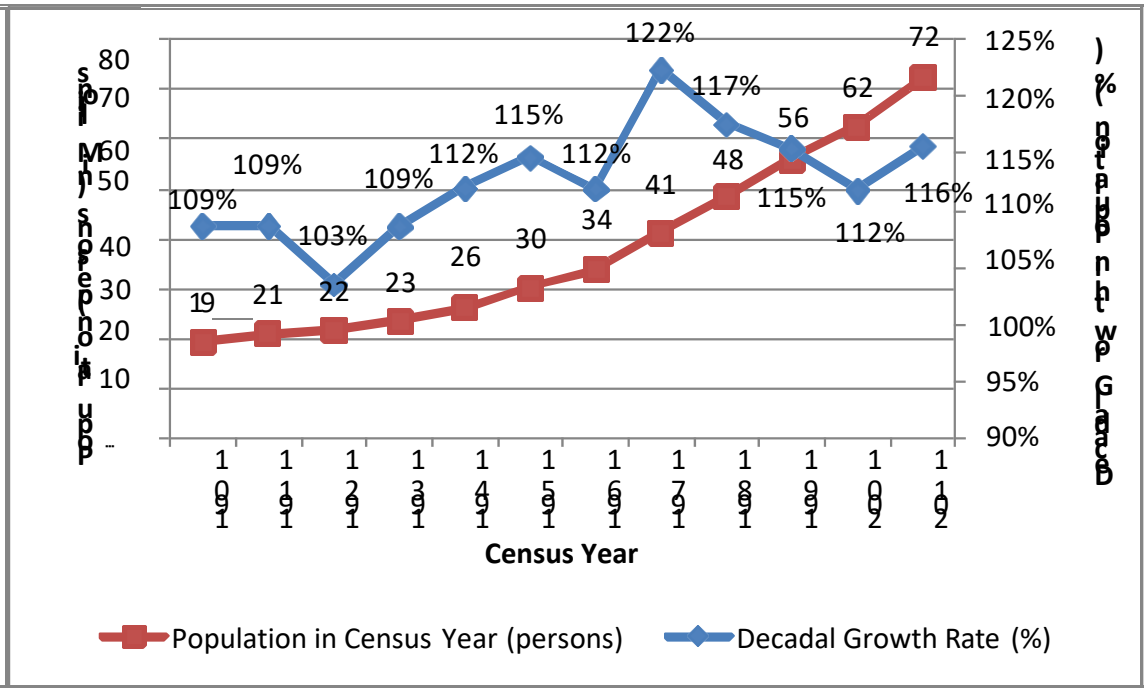
b. Acquisition of land by SIDCO (Small Industries Development Corporation Limited) for industrial estates across 25 locations in Tamil Nadu. The extent of land estimated to be acquired is 2,256 acres;
c. Area development of Sriperumbudur industrial area;
d. Development of the following industrial corridors:
    1) Chennai–Ranipet
    2) Ranipet–Hosur
    3) Madurai–Thoothukudi
    4) Coimbatore–Salem
    5) Chennai–Trichy
    6) Coimbatore–Madurai
e. Establishment of a Petroleum, Chemical and Petrochemical Investment Region (PCPIR);
f. Establishment of an Information Technology Investment Region (ITIR);
g. Establishment of three large industrial townships; and
h. Aerospace and logistics park near the green field airport

4. People of Tamil Nadu and Urbanisation

The results of the Census of 2011 indicate a rapidly urbanising Tamil Nadu. The ratio of rural to urban population had nearly reached parity and stands, in percentage terms, at 51.6 in villages and 48.4 in cities. Tamil Nadu's population at the stroke of midnight of March 1, 2011, stood at 7.21 crore, including 3.61 crore men and 3.60 crore women. The population distribution in rural areas stood at 3.72 crore, while urban population was 3.49 crore. Of the total increase of 9.7 million people in the last decade (2001–2011), the contribution of rural areas was 2.3 million, whereas the contribution of urban areas was 7.4 million.

Considering that population projections had indicated a movement towards near replacement levels over the last decade (Total Fertility Rate = 2.1), the State surprised many by being the only State (apart from Chattisgarh) to experience an increase in decadal population growth rate, from 11.7 per cent in 1991–2001 to 15.6 per cent in 2001–11. The category of child population within the age of zero to six years constitutes 9.5 per cent of the state's population, a decline from the 11 per cent in 2001. Thus, the growth in population is due to a sharp rise in numbers, aged seven years and above, and study of district-level data reveals that the most likely explanation for this population increase is in-migration of labour, especially in districts with high industrial activity (Singh, 2011).

Figure 4.1: Total Population Growth Trend in Tamil Nadu-1901-2011



Source: Analysis from various Census years

The district level population data and growth trends are interesting. The district of Kancheepuram experienced an increase in its decadal population growth rate from 19 per cent in 1991–2001 to 39 per cent 2001–11. Thiruvallur's decadal growth rate increased from 23 per cent in 1991-01 to 35 per cent in the last census. These districts are next to Chennai. Coimbatore increased from 17 per cent to 19 per cent over the inter-census periods, while Tiruppur increased from 25 per cent in 1991–2001 to 29 per cent in 2001–11. These districts being major hubs of economic activity, specifically information technologies and

manufacturing, the data suggests the influx of non-Tamil persons from around the region and even other states.

4.1.Urbanisation in Tamil Nadu

Tamil Nadu stands out as well urbanised; this has been so for a long time. A relatively high proportion of the total population is urban and the towns are well dispersed; arguably due to three factors[5]:

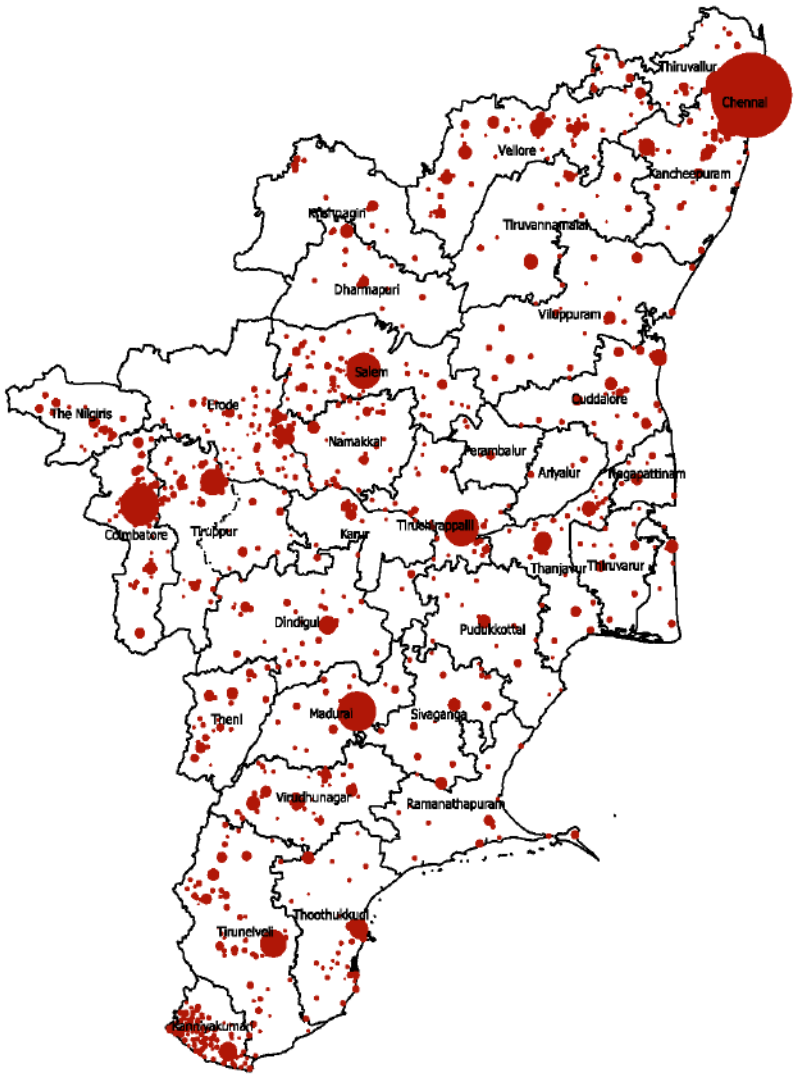
1. The even regional spread of irrigation infrastructure (canals, wells and tanks), giving rise to mixes of wet and dry crops based on water availability and management, and generating a significant marketed surplus;
2. The relative absence of large-scale industry (except possibly the suburbs of Chennai) , which means that industry has a workshop and home-based character throughout the region; and
3. The decentralised and dispersed physical infrastructure (roads, railways and marketplaces).

While some economic activity —retailing, agricultural wholesaling and processing, Gold-Smithy and Pawn-broking, for instance— is common to settlements throughout India, a remarkable feature of these dispersed market towns is the degree to which their economic bases are specialised. Taking Tamil Nadu again, for instance, the Palar Valley specialises in leather, Cheyyar in mats, Arni and Kancheepuram in silk, Vellore and Salem in construction, Tiruchengode in drilling equipment and lorry bodies, Salem and Bhavani in textiles, Tiruchirappalli in gems, Coimbatore in textiles and engineering, Tiruppur in knitted cotton, Sivakasi in matches, Palladam in chewing tobacco, Annur in cooking oil and Kangeyam in cattle.

Tamil Nadu is the most urbanised state (amongst the large states[6]) in the country, with an urban population share of 49 per cent. The urban population is spatially dispersed and there are variations in urbanisation levels across districts and regions of the state. Unlike most other states where a significant proportion of the urban population is in and around two or three primate cities (e.g. Mumbai and Pune in Maharashtra, Bangalore and Mysore in Karnataka), urban centres are well dispersed in Tamil Nadu. There are corridors of urban concentrations; namely Chennai-Krishnagiri-Hosur (anticipated to account for 43 per cent of state's urban population by 2021), Coimbatore-Erode-Salem-Krishnagiri (anticipated to account for 19 per cent of state's urban population by 2021), the corridor of Tiruchi-Madurai-Tirunelveli, the coastal corridor of Chennai-Puducherry[7]-Cuddalore-Tanjavur-Karaikudi (7 per cent of state's urban population by 2021), and in a lesser way the corridor of Tuticorin-Nagarcoil (estimate to account for 4 per cent of state's urban population by 2021) (Sivaramakrishnan & Singh, 2005).

[5] (Rukmani, 1996) as cited in India Working: Essays on Society and Economy. Barbara Harriss White (Ed.)
[6] Delhi, Goa and Mizoram have higher proportion of urban population in their state.
[7] Puducherry is a separate Union Territory adjoining Tamil Nadu. The corridor characterisation includes this owing to the connectivity infrastructure.

Figure 4.2: Settlement Map of Tamil Nadu



Source: IIHS Analysis of (Census of India, 2011b)

The state has 33 districts for administrative purposes. Of this the district of Chennai is wholly urban. Apart from Chennai, there are six districts that have urbanisation share of more than 60 per cent. There are 14 districts that display urbanisation levels less than 30 per cent. The districts with lower urbanisation levels are mostly situated on the coast and the central parts of the state. The statutory urban units (ULBs and Cantonment Boards) exhibit a fair amount of dispersion, with significant numbers existing in about 60 per cent of districts of the state. This has been a demographic and development feature of the state and is evidenced in the census from 2001.

The urban areas of Tamil Nadu are organised into 10 corporations, 148 municipalities, 561 town panchayats, two cantonment boards, and 376 census towns. The distribution of urban areas across size-class of settlements is presented in Table 4.1.

TABLE (4.1): SIZE-CLASS DISTRIBUTION OF URBAN AREAS IN TAMIL NADU						
Class	**Type of Urban Area**					
	Municipal Corporation	**Municipality**	**Town Panchayat**	**Cantonment Board**	**Census Town**	**Total**
Class I (Greater than 100,000)	10	21	-	-	1	32
Class II (50,001 - 100,000)	-	74	1	-	5	80
Class III (20,001-50,000)	-	52	138	1	57	248
Class IV (10,001 - 20,000)	-	1	287	1	117	406
Class V (5,001 - 10,000)	-	-	125	-	171	296
Class VI (Less than 5,000)	-	-	10	-	25	35
Total	10	148	561	2	376	1097
Total*	12	124	528	-	-	-

Source: Census of India (2011b), (GoTN, 2014a)

**according to Operative Guidelines*

5. Urban Watsan and Environmental Services in Tamil Nadu

5.1. Drinking Water Supply

The major source of water to urban households in Tamil Nadu is through piped network (66 per cent) (Census of India, 2011a), another 14 per cent depend on untreated tap water, and nearly 16 per cent depend on ground water (through hand-pumps, tube-wells or wells). However, only 40 per cent of households have access to piped water supply within their premises.

Table 5.1 presents the per capita water supplied in different types of urban areas. The table below illustrates that a majority of urban areas receive water supply below the Service Level Benchmarking norm of 135 lpcd (litres per capita daily).

Table (5.1): Per Capita Water Supply in Urban Tamil Nadu

ULB	Good	Comfortable	Poor	Acute	Total
Corporations (Good >=110 lpcd, Comfortable >=70-<110 lpcd, Poor- <70 lpcd)	5	3	3	0	11
Municipalities (Good >=90 lpcd, Comfortable >=40-<90 lpcd, Poor->=20 -< 40 lpcd, Acute <20)	44	77	1	2	124
Town Panchayats (Good > 70 lpcd, Comfortable >=40-<70lpcd, Poor- <40 lpcd)	431	91	6	0	528
Total	480	171	10	2	663

Source: http://www.twaddboard.gov.in/twad/urban_water.aspx, Last accessed on 9th June, 2015.

In earlier years, the city of Chennai suffered from an acute water scarcity, in particular during low rainfall years. In early 2000, the CMWSSB supplied less than 50 per cent of the requirement of the city population, that too in an irregular fashion (Ruet, Saravanan, & Zerah, 2002). Groundwater played a crucial role in filling the gap. However, the city's groundwater level had reached an alarming low and in many places intrusion of seawater was reported because of over-exploitation of ground water. This has affected the potability of groundwater in many places as indicated by a battery of indicators (Janakarajan 2013). The CMWSSB depended heavily on transport of water from public wells and agricultural wells located in peri-urban villages. These measures impacted the groundwater table and socio economic life of people but also resulted in conflicts because of imbalance in the water equity between the city and peri-urban areas.

The Metro Water Board supplied water through 10000, 12000 and 20000 litres capacity tanker-trucks numbering around 6000 every day throughout the city till October 2004, in addition to the supply through the pipeline network. The water was pumped from the well fields at Minjur, Panchetti and other places and the board hired about 125 field wells around Poondi to pump 30 million litres of water per day into Red Hills water treatment plant. This recourse to ground water for shoring up supply was a strategy employed from the early seventies. By the middle of the last decade, the GoTN and the city authorities had changed strategy and initiated desalinisation projects (200 MLD completed, 200 MLD under construction) to satisfy Chennai's water requirements. Owing to the cost of desalinisation

and the impact on revenues of the CMWSSB, the GoTN provides finances to plug the revenue gap to the tune of about ₹200 Crore annually. The dependence of towns in the state on groundwater sources is very high with a majority of them using groundwater sources or a combination for primary drinking water supply.

5.2. Household Access to Drinking Water Supply in Urban Tamil Nadu

The access of urban households to drinking water sources (Census of India, 2011a) is provided in Table (5.2) below. 80 per cent of the urban households have access to tap water supply (within premises and out) with 66 per cent of these households accessing treated tap water and the remaining untreated tap water. Within premises, the coverage is significantly lower. Only 45 per cent of the urban households have access to piped water supply within premises, and 40 per cent of the urban households have access to treated water, while the remaining have access to untreated water. Households with access to piped water supply are higher in the municipal corporations at 63 per cent, followed by municipalities (43 per cent) and then town panchayats (34 per cent); amongst statutory urban areas. In census towns too, 34 per cent of the households have access to piped water supply within premises.
However, access to treated piped water is highest in municipal corporations (60 per cent), municipalities (37 per cent) and then town panchayats (25 per cent) in that order. Tubewells are the next most prevalent source of drinking water in urban Tamil Nadu with about 6 per cent of households using this as the primary source. Amongst statutory urban areas, tubewells are reported to be higher in municipalities (7 per cent), then town panchayats (5 per cent) and municipalities (4 per cent). census towns and cantonment boards report the highest proportion of households with tubewells (9 per cent) as a primary source.

Table(5.2): Access To Drinking Water By Urban Households In Tamil Nadu In Different Types Of ULBs – 2011

Type of Access to Drinking Water	Proportion of Households Resident in					
	Cantonment Board	Census Town	Municipal Corporation	Municipality	Town Panchayat	Total
Treated Tap Water	68.35 %	53.61 %	80.56 %	61.60 %	58.57 %	66.29 %
Un-treated Tap Water	9.94 %	21.65 %	5.93 %	15.14 %	19.94 %	14.03 %
Covered Well	1.82 %	2.53 %	0.48 %	1.97 %	2.24 %	1.60 %
Uncovered Well	2.05 %	3.43 %	0.53 %	3.24 %	4.97 %	2.74 %
Handpump	4.44 %	2.26 %	5.50 %	3.24 %	3.55 %	3.96 %
Tubewell	10.75 %	13.58 %	4.97 %	10.82 %	8.51 %	8.65 %
Spring	0.82 %	0.16 %	0.08 %	0.25 %	0.30 %	0.19 %
River/Canal	0.01 %	0.07 %	0.08 %	0.21 %	0.34 %	0.17 %
Tank/Pond	0.02 %	0.06 %	0.04 %	0.06 %	0.18 %	0.08 %

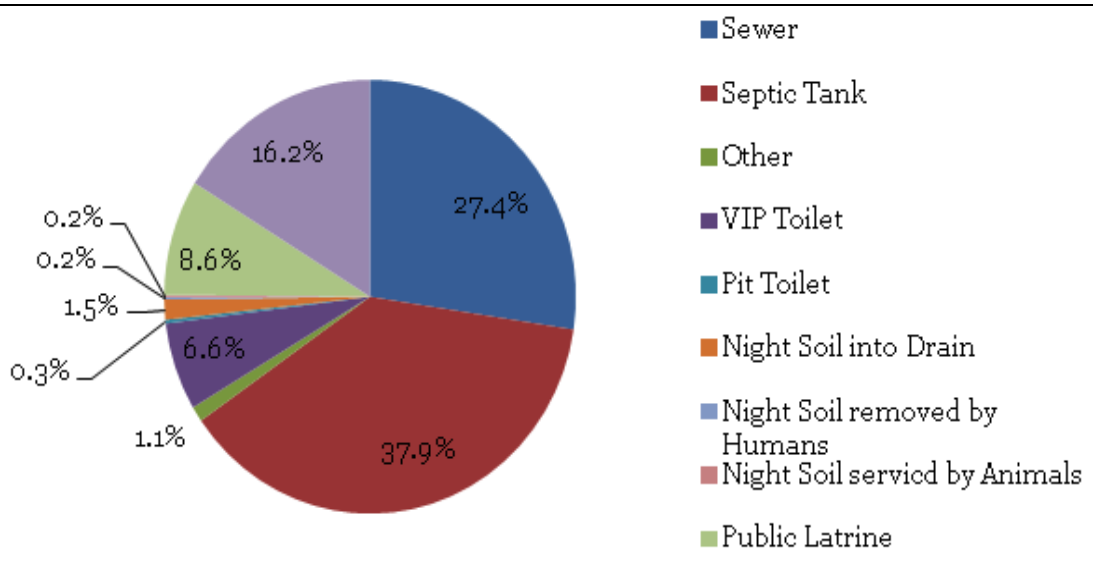
Table(5.2): Access To Drinking Water By Urban Households In Tamil Nadu In Different Types Of ULBs – 2011						
Type of Access to Drinking Water	Proportion of Households Resident in					
	Cantonment Board	Census Town	Municipal Corporation	Municipality	Town Panchayat	Total
Other sources	1.81 %	2.65 %	1.83 %	3.47 %	1.40 %	2.29 %
Total Urban Households	13,275	1,296,545	3,086,749	2,418,467	2,114,068	8,929,104
Source: Census of India (2011a)						

16 per cent of the urban households in Tamil Nadu reside in slums. 30 per cent of slum households access treated water through a piped water supply, while another 3 per cent access untreated water. 44 per cent of the urban slum households access water through piped supply, but not within the premises, while another 4 per cent access this away from premises. Handpumps (8 per cent) and Tubewells (6 per cent) are the mostly commonly used sources for drinking water, after tap water.

5.3. Household Arrangements for Sanitation in Urban Tamil Nadu

In Urban Tamil Nadu, about 75 per cent of households have toilets within their premises, 9 per cent use public toilets, and 16 per cent resort to open defecation. About 66 per cent of the household toilets are reported to have water closets (Census of India, 2011a). About 27 per cent of the toilets (40 per cent of those with water closets) are connected to sewer system, and 38 per cent of the household toilets (40 per cent of those with water closets) are connected to septic tanks (Census of India, 2011a). In Class 1 Cites, the coverage of household toilets connected to sewers is as high as 50 per cent; smaller cities, hence, have a higher prevalence of septic tanks. About 7 per cent of the State's urban households report having improved pit latrines.

Figure 5.1: Household arrangements for urban sanitation in Tamil Nadu



Source: Census of India (2011a)

While Tamil Nadu has made substantial investments in sewerage and sewage treatment plants, especially in larger cities, the record of treatment and safe disposal is unimpressive. In respect of sewage treatment in cities that have sewerage systems, 1,129 MLD of sewage treatment capacity exists with another 151 MLD under construction; however current utilisation is reported to be lower at 394 MLD (CPCB, 2013).

While on-site systems are the most predominant household arrangements across the State, there has hitherto been limited attention paid to safe collection and treatment of human excreta from septic tanks. Septage/fecal sludge from these on-site structures is generally emptied using vehicle mounted vacuum tanks (cess-pool vehicle). However, limited data is available on the number and coverage of these vehicles, as these are mostly operated by the informal sector. This is also a largely unregulated activity that has started receiving attention only lately. The sludge collected from septic tanks is commonly disposed into either natural storm water drainage system or a nearby surface water body in the absence of any treatment systems. ULBs on the other hand, have not recognised the full cycle of sanitation, especially on-site installations, as something that needs their attention.

Of the households not having a latrine within premises, a significant proportion (42 per cent) of these households, reside in town panchayats, 25 per cent in municipalities and about 16 per cent in municipal corporations. Census towns account for 17 per cent of the urban households without latrines. Amongst the districts, Salem (7 per cent), Coimbatore (7 per cent), Tirunelveli and Virudhnagar (7 per cent) and Erode have the larger share of households without latrines.

35 per cent of the households without latrines use public conveniences. The proportion of households using public conveniences are higher in Municipalities and marginally lower in Municipal corporations and town panchayats; they are lowest in census towns. Amongst the districts, Coimbatore, Salem and Virudhnagar have higher proportion of households reported accessing a public convenience; followed by Chennai, Erode, Namakkal and Theni.

39 per cent of the slum households do not have access to a latrine within premises. 16 per cent of urban slum households use public conveniences, while the remaining defecates in the open. Of the slum households with latrines, 31 per cent are connected to the sewer, 24 per cent are connected to Septic Tanks, 3 per cent to pit latrines, 1.7 per cent have their night soil removed and 1.2 per cent have latrines connected to other disposal systems.

The household arrangements in urban Tamil Nadu, a relatively urbanised State, are similar to national averages (16 per cent open defecation in Tamil Nadu, compared to 13 per cent national average, and almost one-third of households with sewerage connections). In addition, there are considerable deficits in the full-cycle of sanitation like in rest of urban India. In addition to nearly 16 per cent of households having to resort to open defecation, limited treatment of human excreta from urban areas, poses a considerable public health hazard. The poor priority accorded to sanitation historically by urban institutions at the State and city levels, is manifested in limited capacities, resources and incentives for urban sanitation, and an inflexion point may have presented itself with the launch of the Operative Septage Management Guidelines in 2014.

5.4. Wastewater Treatment Infrastructure

Sewage treatment facilities exist in three of the 12 municipal corporations and in 19 of the 124 municipalities. There is an STP under construction in one more municipal corporation, in 14 Municipalities and three Town Panchayats adjacent to a municipality. Urban Tamil Nadu has 1,129 MLD of sewage treatment capacity with another 151 MLD under construction. The details of existing and proposed sewage infrastructure is presented in Table (5.3) below.

Table (5.3): Existing And Proposed Infrastructure For Network-Based Wastewater Systems In ULBs Of Tamil Nadu

Particular	Municipal Corporation	Municipality	Town Panchayat
Number of ULBs with STP	3	19	0
Existing Sewage Treatment Capacity (MLD)	777.00	351.73	
Number of ULBs with proposed STP	1	14	3
Proposed Sewage Treatment Capacity (MLD)	23.85	119.33	7.74
Number of ULBs with proposed UGSS	1	15	2
Proposed Underground Sewerage System (in km)	113.77	1,092.07	28.48
Total Number of ULBs	12	124	528

Source: GoTN (2014a) and various Government Orders

5.5. Solid Waste Management

Urban Tamil Nadu generates about 12,504 Tonnes (T) of Municipal Solid Waste (MSW) daily, of which 11,626 T/d is collected and 603 T/d is treated (CPCB, 2012). The unsegregated municipal solid wastes generated are collected and are either disposed in low-lying areas or water bodies or disposed along the roadside and are set on fire. Kodungaiyur and Pallikaranai in Chennai are the standing example for municipal solid waste dumping sites.

Table (5.4): Scenario of SWM in Municipal Corporations (2010)

Sl. No.	Urban Local Body	Population 2010 (in Lakhs)	Waste generation (MT/day)	Waste collected (MT/day)	Percentage (%)	Number of Vehicles in activities -		
						Primary	Secondary & Transportation	Disposal
1	Coimbatore	9.28	650	630	96.92	4845	130	
2	Madurai	9.31	450	450	100	2035	87	
3	Trichy	7.52	432	415	96.06	2608	70	
4	Salem	6.96	335	315	94.02	397	26	

Table (5.4): Scenario of SWM in Municipal Corporations (2010)								
Sl. No.	Urban Local Body	Population 2010 (in Lakhs)	Waste generation (MT/day)	Waste collected (MT/day)	Percentage (%)	Number of Vehicles in activities -		
						Primary	Secondary & Transportation	Disposal
5	Tirunelveli	4.11	145	120	82.75	1484	22	
6	Tiruppur	3.44	406	390	96.06	660	47	
7	Erode	1.5	110	110	100	624	17	
8	Vellore	1.77	85	83	97.65	299	14	
9	Thoothukkudi	2.16	137	130	94.9	174	12	
	TOTAL	46.05	2750	2643	96.11	13126	425	
Source: Banu, S.S and Kanagasabai, S. (2012)								

46 per cent of the urban local bodies are reported to have adequate land for treatment and disposal of solid waste. The details of ULBs and adequacy of land available for treatment of solid waste is detailed in Table (5.5) below.

Table (5.5): Details of availability of land for disposal (2013)			
Sl.No	Details	Municipality	Municipal Corporation
1	ULBs having adequate land for compost yard	57	4
2	ULBs having above 75% but below 100% requirement of land	8	0
3	ULBs having above 50% but below 75% requirement of land	8	1
4	ULBs having below 50% requirement of land	19	1
5	ULBs without having any land	5	0
6	ULBs reporting 'NA'	28	3
Total		**125**	**9**
Source: IIHS Analysis; CMA, 2013			

The GoTN established a solid waste management fund for all local bodies in 2013, by pooling an amount of ₹50 crores. Of this, ₹150 Crore is earmarked for rural local bodies and ₹100 Crore for urban local bodies. This annual allocation to the fund is for the use of urban local bodies, based on need. A project sanctioning committee was also constituted for approving the projects under the Solid Waste Management Fund under the chairmanship of Secretary of MAWS Department. The establishment of State Level Solid Waste Management Cell has been proposed in the CMA/DMA for implementing different schemes for waste management.

Success stories of SWM

Nammakkal Town

Namakkal has the distinction of becoming the only zero garbage town in the country. In order to achieve this, they have practiced door to door collection, introduced night sweeping, beautified parks and burial grounds, removed encroachments on all roads and streets, prevented garbage disposal by roadside hotels and shops, green belt development on highways, levy charges for hotels, marriage halls, commercial complexes and garbage generating industries, and manufacturing of vermi-compost from organic waste. This experiment has been successful due to a holistic approach with all agencies cooperating together under the leadership of the District Collector.

Pammal Municipality

Pammal is a third grade municipality with 21 wards and a population of approximately 100,000, located 17km from Chennai. In 1994, a local resident Ms. Mangalam Balasubramanian and a group of women formed a Mahalir Mandram (women's association) to address the challenge of waste Management in Pammal. This waste was deposited in the neighborhood bins. Awareness–raising street plays were held to educate residents about pollution and the benefits of waste management. At that point, the Mandram began segregating the waste and making vermin compost from the biodegradable material. The successful production of compost inspired the Sankara Eye Hospital to allocate space on a portion of their land in Sankara Dhyana Mandapam for the Mandram's vermi compost production. In 1995, the Mandram registered itself as a self-help group and obtained a loan, which was used to construct a vermi composting shed. The impact of their work attracted the attention of many officials and impressed Pammal municipality's executive officer.

In 2004, representatives of PepsiCo visited the project and subsequently suggested that the activities be expanded to cover a larger area. In 2005, using PepsiCo's support, a larger shed with 108, one–two tone capacity vermi compost tanks was constructed on 1.1 acres provided by the municipality. The Municipality then invited Ms. Balasubramanian to expand the service to cover all 21 wards in Pammal. The Mandram registered itself as an NGO named Exnora Green Pammal and signed a contract with Pammal municipality.

The activities taken up included door-to-door collection of garbage from households by Green Ambassadors (Pasumai Thuduvargal name in Tamil illustrating the dignity of Labour) segregated at source as organic and inorganic. Following this, there is a conversion of organic waste into vermin compost with brand name 'Excellent organic compost' (Exorco). The inorganic waste is separated into different categories such as pet bottles, HDF, LDP, Laminates, Cardboard, Pet bottles are crushed into pellets. Thin carry bags are crushed and sent to CIPET (Central Institute of Plastic Engineering Technology), where Students use it for their project work. Some of the water pouches and thin carry bags are recycled in a weaving centre established by the NGO near Thirukazhukundram.

Dry leaves such as coconut leaves, garden dry leaves are converted into briquette. There is also conversion of food waste, canteen waste and meat waste into energy. At present a demonstration unit of waste to energy is set up producing biogas and producing 5 KW of electricity lighting street lights. In all such above activities, the total waste

materials are converted into usable materials and they provide employment opportunities to many women from downtrodden families.

Learning: Raising awareness to achieve widespread public cooperation in terms of segregation of waste requires continuous effort and is likely to take several years. Changing people's habits is a gradual process. Solid waste management requires money for start-up and for operation. Services cannot be sustained from one-time grants.
The revenue earned by the sale of compost and recyclable materials and the collection of a user fee covers less than 10 per cent of the operating costs. The municipalities/local bodies by imposing a Green Tax on all residents could assist in getting segregated materials. Collecting a user fee is not an ideal way to generate revenue for solid waste management because payment is irregular, and collecting the fee is a considerable burden for the service provider. Although collection of a user fee strengthens rapport between the service provider and residents, such collection becomes a very costly task because collecting the fee consumes an enormous amount of the service provider's time.

The Pammal SWM experience demonstrates that successful implementation of the Government's rules depends upon determined local leadership, public awareness, involvement and cooperation of residents, qualified staff, attentive human resource management, proper and ongoing financial support and physical facilities. Together such elements can achieve major improvements in the cleanliness of neighborhoods as well as a significant reduction of waste.

Source: Managing Trustee, Exnora Green Pammal, Chennai & Director, Sam Foundation for Eco Friendly Neighbourhood, http://www.tnenvis.nic.in/Database/SolidWaste_1169.aspx accessed October 8, 2015

6. Legal Framework for Urban Water Supply and Sanitation

The legal framework for urban governance prior to the 74th CAA comprised multiple legislations and the administrative thinking on urban governance, influenced by the distinct histories of the city of Madras, other municipalities and the large number of smaller towns. The Corporation of Chennai (CoC) was governed from 1919 by the Madras Municipal Corporation Act, 1919, now known as the Chennai City Municipal Corporation Act.

Municipal corporations formed in the 1970s and 1980s had legislations closely modelled on the Madras Municipal Corporation Act, namely Madurai (The Madurai City Municipal Corporation Act 1971) and Coimbatore (The Coimbatore City Municipal Corporation Act, 1981). Aside from the Municipal Corporations, larger towns and cities in Tamil Nadu were under the jurisdiction of the District Municipalities Act 1920.

The governance of smaller towns —Town Panchayats— evolved within a legal framework shared with villages, i.e. the Tamil Nadu Panchayats Act, 1958. The state amended existing laws in 1994 and carried out a re-assignment of the rural-urban for enacting conformity to the 73rd and 74th CAA at the national level. The Tamil Nadu Panchayats Act of 1958 was amended in 1994 to constitute the conformity legislation for the 73rd Amendment, dealing only with rural areas, while Town Panchayats were re-designated as transitional areas from rural to urban and hence ULBs, and brought under the purview of the Tamil Nadu District Municipalities Act, 1920.

Amendments were made to the District Municipalities Act to bring it into conformity with the 74th Amendment, with a separate chapter on Town Panchayats inserted into the Act, and the administrative section, Directorate of Town Panchayats, brought under the administrative control of the MAWS Department at the Secretariat.

Subsequently, 561 town panchayats were reclassified as special village panchayats in 2004 and brought under the purview of the Rural Development Department. Then in 2006, the special village panchayats were reconstituted as town panchayats and brought under the administrative ambit of the MAWS Department. All sections of the Tamil Nadu District Municipalities Act except sections[8] 5, 7 12-c, 13-b, 43, 68, 77-aa and 77-b, were made applicable to the town panchayats by a government order in 2014.

The various Municipal Corporation Acts (by this time numbering six) were amended suitably to provide for the various provisions of the 74th CAA, essentially pertaining to ULB structure, as was the Tamil Nadu District Municipalities Act, 1920, and also for defining the roles of the state election commission (SEC) and state finance commission (SFC). The SEC and the SFC were created in 1994. Elections to Local Bodies were held after a long break in October 1996 and subsequently in 2001, 2006 and 2011 (TNSEC, n.d.). The First SFC submitted its report for the period FY 1998–2002, the Second SFC constituted in 2001 submitted its report for the period FY 2003–2007, the Third SFC constituted in 2006 for the period FY 2008–2012 and the Fourth SFC for FY 2013–2017(GoTN, 2011).

[8] These section pertain to term of elected body, constitution of council, election procedures for council heads, delegation of authority to contract, and terms for government officers and teachers lent to institutions managed by the elected body.

In addition to the two Acts governing ULBs in the state, there are a number of legislations that govern specific functions of urban governance. Many of these, enacted mostly in the seventies provided for the creation of parastatal bodies at the state level to deliver services and/or take responsibility for municipal functions such as water and sanitation (e.g. the Tamil Nadu Water and Drainage Act 1971 and the Chennai Metropolitan Water Supply and Drainage Act, 1977), housing and slum improvement (e.g. the Tamil Nadu Housing Board Act 1961, and the Tamil Nadu Slum Clearance Act, 1971), and urban planning and land-use regulation (the Town and Country Planning Act, 1971).

The Town and Country Planning Act, 1971, replaced the Madras Town Planning (MTP) Act, 1920, which had applied only to urban areas. The new act covered an extended jurisdiction of rural as well as urban areas across the state. It provides for the notification of areas, constitution of planning and development authorities like the Chennai Metropolitan Development Authority (CMDA), preparation and implementation of Master Plans and Detailed Development Plan and enforcement of Development Control Regulations.

6.1 State Administration Arrangements for Urban Areas

The State administration in Tamil Nadu manages the urban governance, infrastructure and development domain through two key departments, namely MAWS Department and HUDD. The MAWS Department is headed by an officer of the rank of Principal Secretary, while the HUDD is headed by an officer of the rank of Secretary. Both these key departments have a number of departments within, with clear delineation of roles. Each of these departments is part of different ministerial portfolios and hence ministers. While these departments function independently, it is reported that the HUDD delegates its powers of building approval (Ground plus one level) to ULBs, which are in turn administered by MAWS Department.

6.1.1 The Department of Municipal Administration and Water Supply (MAWS)

The MAWS Department was formed in 1984, after bifurcation from the Rural Development and Local Administration Department of the Secretariat. The Department of Municipal Administration and Water Supply is responsible for coordinating the activities of various organisations and agencies in the planning, execution and maintenance of measures to provide improved infrastructure and services in the urban areas of the State, and the provision of drinking water supply in rural and urban areas of the state. The Commissionerate of Municipal Administration and the Directorate of Town Panchayats are sub-departments of this Department in achieving the objectives set forth by the Government. MAWS Department also has administrative control of undertakings/bodies such as the Corporation of Chennai (CoC), the Chennai Metropolitan Water Supply and Sewerage Board (CMWSSB) and the Tamil Nadu Water Supply and Drainage (TWAD) Board, the last being responsible for the provision of water supply and underground sewerage facilities in the state apart from Chennai. MAWS Department also administers the New Tiruppur Area Development Corporation Limited (NTADCL), which caters to the drinking water supply and industrial water needs of Tiruppur and nearby areas.

Apart from these, the Tamil Nadu Urban Development Fund (TNUDF) managed by the Tamil Nadu Urban Infrastructure and Financial Services Limited (TNUIFSL), and the Tamil

Nadu Urban Finance and Infrastructure Development Corporation Limited (TNUFIDCO) are the two urban financial intermediaries—reported pioneers and trendsetters in the field of urban finance in India—that guide the Urban Local Bodies in assessing the financial viability of projects and assist in the development of urban infrastructure. These agencies also coordinate in channelising funds from Government of India, external agencies and financial markets for the development of urban infrastructure. The expertise of institutions like the TNUIFSL and the TNUFIDCO are utilised to provide necessary consultancy based support services to the urban local bodies to improve their technical capability for implementing bigger and more complex projects. The Tamil Nadu Water Investment Company (TNWIC), a joint venture of the GoTN and the ILFS also falls under the MAWS Department administration.

The business of MAWS Department includes:

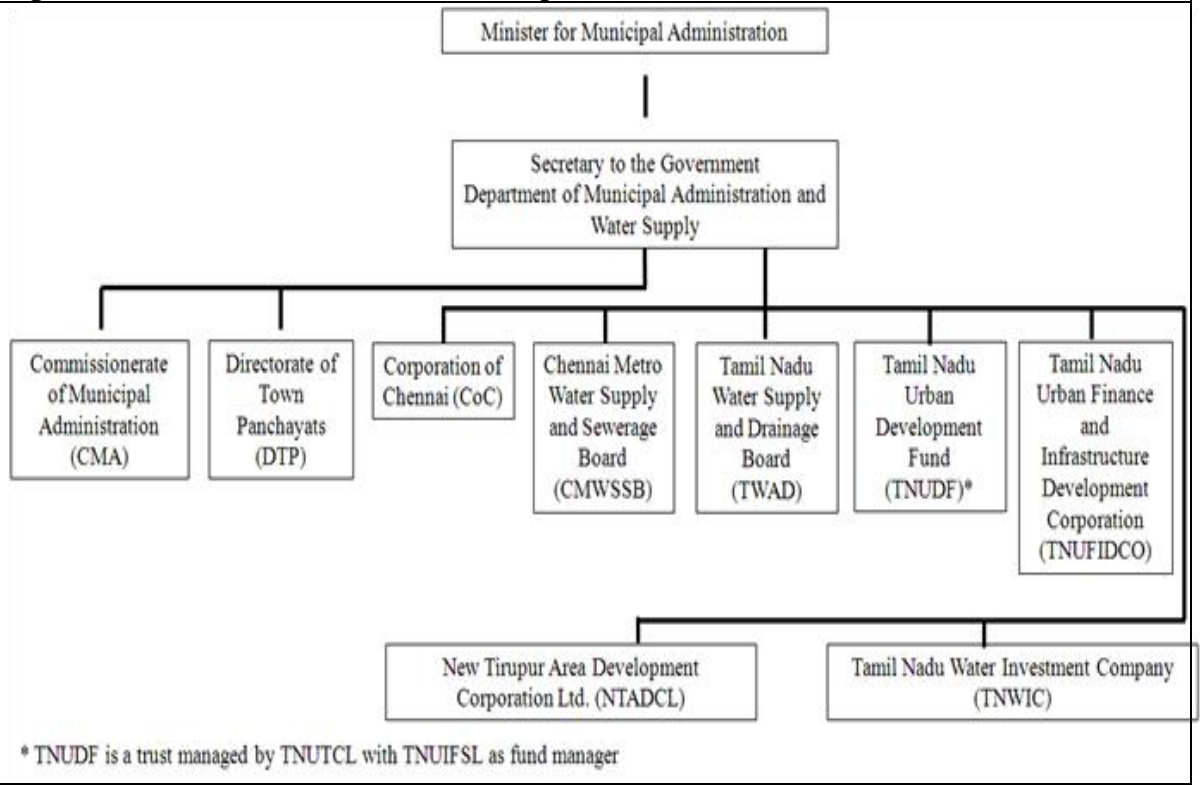
- Administrative support to elections relating to municipal corporations and municipalities; Fixing and regulating Fees (Licence fees levied by municipalities and municipal corporations in respect of Public Health matters);
- General Administration and all matters relating to local Boards not specifically assigned to other Departments;
- Directing the presentment of audit reports for municipal councils and municipal corporations;
- Providing permissions for development works in municipalities and municipal corporations under Five Year Plans;
- Administrative initiatives for local self-government in urban bodies;
- Regulation of markets;
- Constitution, abolition and dissolution and general administration and all matters relating to urban local bodies not specifically assigned to other departments;
- Framing the statutory rules of the public services with which this department is concerned, their revision and amendments;
- Sanction of prosecution of Government servants;
- Works and buildings under the administrative control of this department;
- Administration of various taxes including on advertisements levied by municipalities and municipal corporations, animals, lands and buildings, professions, trades, employment;
- Administration of pilgrim tax;
- Administration of tolls;
- Administration of license fee levied on public health matters by ULBs;
- Administration the Places of Public Resort Act;
- Administration of undertakings like TWAD Board, CMWSSB and administration of zoological gardens.

In the administration of the MAWS Department, the Secretary in-charge is assisted by a Special Secretary, a Joint Secretary and two Deputy Secretaries exercising control over 26 sections dealing with specific subjects and each headed by Under Secretaries overseeing the section staff.

6.1.1.1 Institutions Administered by MAWS Department

The MAWS Department coordinates and manages the work of eight urban agencies with the following core responsibilities:

Figure 6.1 : Institutions within MAWS Department



Source: Adapted from MAWS Department (2015)

Commissionerate/Directorate of Municipal Administration (CMA/DMA): The overall administration of the nine municipal corporations (except Chennai) and 125 municipalities under the administrative control of the Commissioner of Municipal Administration is the responsibility of this Department. This Department has multifarious functions in terms of providing basic infrastructure in these ULBs, conduct of elections to these local bodies and administering the staff in the 108 ULBs and in directing the discharge of 15 obligatory functions by the local bodies.

Directorate of Town Panchayats (DTP): Tamil Nadu is reported to be the first State to introduce a (transitional) classification in the status of ULBs, viz. town panchayat, for those transitional local bodies between Rural and Urban Local Bodies. The town panchayats normally are places of importance such as Division/Taluk headquarters, tourist spots, pilgrim centres and Commercial/Industrial towns. This has necessitated special attention to the civic needs of the town panchayats. These town panchayats were conferred with individual administrative powers and an enhanced staff pattern.

Town Panchayats (TPs) in Tamil Nadu were categorised as rural entities until 1996, and thus under the administrative control of Directorate of Rural Development. In 1981, the Government constituted a separate Directorate of Town Panchayats (DTP), which remained under the Rural Development Department as TPs were still governed, along with Village Panchayats, by the Tamil Nadu Panchayats Act 1958.

Following the re-designation of TPs as ULBs after the state legislation in conformity with the 74th Amendment and the transfer of TPs to the legal jurisdiction of the District Municipalities Act 1920, the Directorate of Town Panchayats was brought under the Department of MAWS in 1996. The DTP is headed by a Director, who is also the Inspector of TPs, and is assisted by 16 Assistant Directors of Town Panchayats based in 16 zonal offices all over the state. However, in Tamil Nadu, District Collectors of the respective districts are 'entrusted with the responsibility of supervising the affairs of these local bodies' (Vijayabaskar et al., 2011).

Corporation of Chennai (CoC): Under the Chennai City Municipal Corporation Act, 1919, the CoC is administered directly by the MAWS Department of the Government of Tamil Nadu. The city stretches along the Coromandel Coast and extends inland. The CoC covers an area of about 175 sq.km. The estimated present population (Census of India, 2011b) of this administrative unit is 4.65 Million. The CoC is headed by the Mayor with an executive headed by the Municipal Commissioner (usually from the Indian Administrative Service).

Chennai Metropolitan Water Supply and Sewerage Board (CMWSSB): The CMWSSB was constituted in 1978 for exclusively attending to the growing needs of and for planned development and appropriate regulation of water supply and sewerage services in the Chennai Metropolitan Area with particular reference to the protection of public health and for all matters connected therewith or incidental thereto. The service limits were confined to Chennai City limits initially, but have progressively expanded to cover the whole metropolitan area (Chennai Metropolitan Area). The Minister in charge of MAWS Department is the Chairperson of the CMWSSB and an administrative officer (usually from the IAS) is the Managing Director.

Tamil Nadu Water Supply and Drainage (TWAD) Board: The TWAD Board is the main implementing agency for all water supply and sewerage schemes outside the Chennai metropolitan area. TWAD Board works in coordination with the district and State Level Government Departments of the state, and the national ministries—the Government of India's Ministry of Rural Development, Drinking Water Supply, Urban Development, Housing and Urban Poverty Alleviation, Ministry of Water Resources, National River Conservation Directorate, Central Ground Water Board—Non-Government Organisations (NGOs), and significant academic institutions like, Anna University, Gandhigram Rural Institute, etc., within the state, to implement the water supply and sewerage schemes effectively in the districts of Tamil Nadu. The administrative head of the MAWS Department is the chairperson of the TWAD Board, while an administrative officer (usually from the IAS) is the Managing Director.

TNUDF and TNUFIDCO: The Tamil Nadu Urban Development Fund (TNUDF) was established in 1996, as a trust under The Indian Trust Act 1882, for the development of urban infrastructure in the state of Tamil Nadu. TNUDF was formed by conversion of the Municipal Urban Development Fund (MUDF), with contribution from Government of Tamil Nadu along with all India financial institutions viz., ICICI Bank Limited (formerly ICICI Ltd), Housing Development Finance Corporation Limited (HDFC) and Infrastructure Leasing and Financial Services Limited (ILFS). The TNUDF is the first public-private partnership providing long term debt for civic infrastructure on a non-guarantee mode. The TNUDF is managed by a Corporate Trustee viz., Tamil Nadu Urban Infrastructure Trustee Company Limited (TNUITCL) that periodically reviews the goals, lending policies and

procedures. The Tamil Nadu Urban Infrastructure Financial Services Limited (TNUIFSL) is the Fund Manager of TNUDF. The TNUIFSL is a Public Limited Company registered under the provisions of the Companies Act, 1956 in 1996, to carry on the business activities in respect of management of trust funds and other funds and to act as managers, consultants, advisors, administrators, attorneys, agents, or representatives of or for any funds and to provide consultancy, financial and investment advisory services. TNUIFSL has an authorised share capital of ₹2.00 Crore, and a paid-up share capital of ₹1.00 Crore. The TNUIFSL, a Public-Private Partnership in the urban sector, is promoted by Government of Tamil Nadu (49 per cent of equity) with equity participation from banks and financial institutions (51 per cent of equity) that are partners in the management of TNUDF.

The TNUIFSL manages a number of grants under the TNUDF with the total available fund size of ₹1714.15 Crore. It also manages other funds set up by GoTN targeted at infrastructure development in urban areas. As part of the Tamil Nadu Urban Infrastructure Project (TNUIP) assisted by Japan International Co-operation Agency (JICA), a grant fund (JBIC GF-I) with an allocation of ₹130.97 Crore was initiated in 2008 and is managed by TNUIFSL. This fund can be accessed by ULBs as capital grants for infrastructure projects that benefit the low-income population. Till March 2014, ₹125.40 Crore has been released by GoTN to the JBIC Grant Fund-I. The funds have been committed for seven water supply projects amounting to ₹173.34 crores (including exchange rate variation) under JBIC Grand Fund-I. A sum of ₹98.54 crores has been disbursed to ULBs as capital grant up to March 2014.

TNUIFSL also manages a non-lapsable fund in the name of Tamil Nadu Urban Road Infrastructure Fund (TURIF) created in 2008. The TURIF aims to develop the urban road infrastructure in ULBs in a phased manner with due care to maintain these.

The **Water and Sanitation Pooled Fund (WSPF)**, is a Trust wholly owned by Government, created in the year 2002 to mobilise resources from the capital market and to finance urban infrastructure projects. This Fund has been functioning on no-profit no-loss basis. The GoTN has designated WSPF as the State Pooled Finance Entity under Pooled Finance Development Fund Scheme and authorised it to operate according to the guidelines issued by the Government of India. The WSPF is governed by a committee with members from GoTN and operated by TNUIFSL. Till March 2014, WSPF had raised a sum of ₹222.30 Crore.

The **Chennai Mega City Development Mission (CMCDM)** was launched in January 2012 with TNUIFSL as the nodal agency and the Chennai Mega City Development Fund (CMCDF) created in March 2012, to assist CoC and CMWSSB in the implementation of various urban infrastructure and basic services project like roads, storm water drainage, lighting, water supply and sanitation in Chennai and its Suburban areas. The CMCDF is managed by TNUIFSL based on the guidelines and procedures prescribed by the GoTN. The Corpus for the fund is provided through budgetary provision annually by GoTN. Till, March 2014, the GoTN has released ₹1,000 Crore to CMCDF and a sum of ₹648.77 crores has been disbursed to CoC and CMWSSB.

The Tamil Nadu Urban Finance and Infrastructure Development Corporation Ltd. (TNUFIDCO) was incorporated under the Companies Act, 1956 in 1990 with equity stakes from GoTN (97 per cent), local bodies (2.6 per cent) and HUDCO (0.6 per cent). The main object of the corporation is provision of financial assistance and guidance to Local Bodies, Corporations, Boards, Authorities and parastatal agencies for their development schemes. It is also a Nodal Agency to implement Government programs/schemes in the State. In addition to this, the TUFIDCO extends financial assistance from its own source to the local bodies and parastatal agencies for various infrastructure development schemes. The Chairperson and Managing Director of TNUFIDCO is an officer of the administrative service from MAWS Department, on special duty. As on March 31st 2014, the TUFIDCO has authorised capital of ₹50 Crore, paid-up equity of ₹32 Crore, reserves of ₹125.96 Crore, and borrowings of ₹620.96 Crore. Over the 2011–2014 period, the TUFIDCO expended ₹32.27 Crore annually and earned an annual income of ₹48.91 Crore.

TUFIDCO functioned in earlier years as a nodal agency for urban schemes sponsored by the Government of India, such as the low-cost sanitation scheme, the Nehru Rozgar Yojana, the Mega Cities Project and the IDSMT. It became the nodal agency for the JNNURM, and subsequently for state schemes focused on urban infrastructure.

Tamil Nadu Urban Infrastructure Development and Renewal Fund (TNUIDRF): The Government of Tamil Nadu created the Tamil Nadu Urban Infrastructure Development and Renewal Fund in 2006, operated by the Chairman and Managing Director, TUFIDCO. The Fund consists of funds garnered from various centrally sponsored schemes for urban areas. TUFIDCO is also the Fund Manager in respect of the Metropolitan Infrastructure Development Fund (MIDF), and the funds under the Integrated Urban Development Mission (IUDM), a state government initiative. TUFIDCO had formulated an infrastructure funding scheme namely, TUFIDCO's Infrastructure Funding Scheme (TIFS). This fund has been raised from share capital, reserves and surplus of TUFIDCO, loan from Banks and deposits from the public. Financial assistance has been extended to implement various infrastructure projects such as roads, storm water drains, water supply, underground sewerage, bus stands, shopping complexes, etc., by ULBs, Boards, statutory authorities and other government agencies.

Jawaharlal Nehru National Urban Renewal Mission Implementation Arrangements

Arrangements for JNNURM/UIDSSMT: The main role of TUFIDCO as a nodal agency for the JNNURM was to route funds from the central and governments to ULBs. The State Level Sanction Committee (SLSC) meetings are convened by TUFIDCO and chaired by the Minister in-charge. The committee comprises all relevant department heads (MAWS Department, DMA, CMWSSB, CMA, TNSCB, TNHB, TWAD, CMDA, etc.). TUFIDCO provided oversight and coordinated all measures needed to obtain sanction for projects and secured and channelised the funds to ULBs. It also managed the loan component, maintained a revolving fund derived from it, and distributed this among ULBs. A Project Management Unit was established within TUFIDCO with six functional specialists as approved by the Government of India for the UIG. The same PMU functions for UIDSSMT.

For projects involving solid waste management, and for construction of roads and (storm water) drains —activities that municipalities managed themselves for some time— ULBs prepared the DPRs themselves in consultation with the DMA. For water and sanitation schemes, the CMWSSB prepared the DPRs for Chennai and the ULBs in its metropolitan area. The TWAD Board prepared DPRs for water schemes in some municipalities and towns in the state, and also for some sewerage schemes, but several towns and municipalities that had acquired capacity opted to independently prepare DPRs for water and underground drainage, sometimes with the assistance of consultants. These DPRs were then routed via the DMA to TUFIDCO, which conducted a preliminary appraisal based on the JNNURM/UIDSSMT rules. TUFIDCO carried out the technical appraisal for the UIDSSMT projects. It is reported that TUFIDCO constituted its own in-house appraisal committee, comprising experts in the field, to prepare a preliminary report to place before the SLSC in some of the JNNURM cases.

UIDSSMT projects were sanctioned directly by the SLSC after technical review, while JNNURM projects were forwarded to the GOI's Central Sanctioning and Monitoring Committee (CSMC). Technical appraisal of projects under the UIG component of the JNNURM, and the UIDSSMT, was done by the Central Public Health and Environmental Engineering Organisation (CPHEEO).

Arrangements for Basic Services for Urban Poor (BSUP): The DMA set up a Project Management Unit (PMU) and five Project Implementation Units (PIU), one in the TN Slum Clearance Board, and one each in the JNNURM cities - Chennai, Madurai and Coimbatore - to assist the ULBs in implementing the BSUP. Another PIU was set up in the DTP. Each PIU comprised five members each with expertise in technical, financial, information system, social work as well as research and training. The PIUs were set up through calls for open tender, to provide technical support to develop plans, reports, improve accounting practices, and in the implementation of projects. PIUs were also tasked with conducting surveys when needed.

Monitoring: Apart from the in-house monitoring conducted by TUFIDCO, a third party Independent Review and Monitoring Agency (IRMA) was set up as recommended by the GOI for the UIG and UIDSSMT. The contract for the IRMA in Tamil Nadu was awarded to M/s Mahendra Consulting Engineers, Ltd., from a list of agencies compiled by the GoI.

Source: Vijayabaskar et al. (2011)

Tamil Nadu Water Investment Company Limited (TNWIC): Tamil Nadu Water Investment Company Limited was formed as a Special Purpose Vehicle in 2000 under the Companies Act, 1956 by IL&FS Ltd and the GoTN as an investment Company to implement an Integrated Water Supply and Sewage Project and to promote infrastructure development projects jointly with government institutions and local bodies. TWIC's expertise is reported to cover the range of services in urban water and sewerage systems, desalination, industrial effluent management and recycling. TWIC offers Project Implementation and Consultancy services, O&M inputs during EPC and O&M services. The Principal Secretary, MAWS Department, GoTN is the Chairperson.

New Tiruppur Area Development Corporation Limited (NTADCL): The NTADCL was promoted by the Government of Tamil Nadu (GoTN) and Infrastructure Leasing and

Financial Services Ltd (IL&FS) as an SPV to implement the Tiruppur Area Development Program (TADP), in 1995.

As part of the TADP, NTADCL has been mandated, through a concession by GoTN, to develop, construct, operate and maintain a 185 million litres per day capacity water supply project and sewerage facility for about 60 per cent population in Tiruppur Municipality at a total cost of about ₹1023 Crore. The project also involves providing low cost sanitation facilities for slum areas in Tiruppur.

6.1.1.2 Finances Managed by the Department

Table (6.1) provides a summary of the state budget voted on account for the MAWS Department demand. The Commissionerate of Municipal Administration accounts for about two-third of the demand, followed by the DTP accounting for 16 per cent. This also indicates that the state finances were not anticipated for the TNUDF.

Table (6.1): Budget of the Department of Municipal Administration and Water Supply for 2014-15 (in Million)

Head of Account - Department/Agency	Revenue	Capital	Loan	Total
Secretariat	78	-	5	83
Commissionerate of Municipal Administration	44,925	19,175	1,258	65,358
Directorate of Town Panchayats	14,758	1,421	-	16,180
Tamil Nadu Water Supply and Drainage Board	5	9,830	227	10,062
Chennai Metropolitan Water Supply and Sewerage Board	2,153	2,756	-	4,909
Tamil Nadu Urban Finance & Infrastructure Development Corporation Ltd	5,186	-	-	5,186
Total	67,105	33,182	1,490	101,777

Source: Policy Note, MAWS Department 2015-16

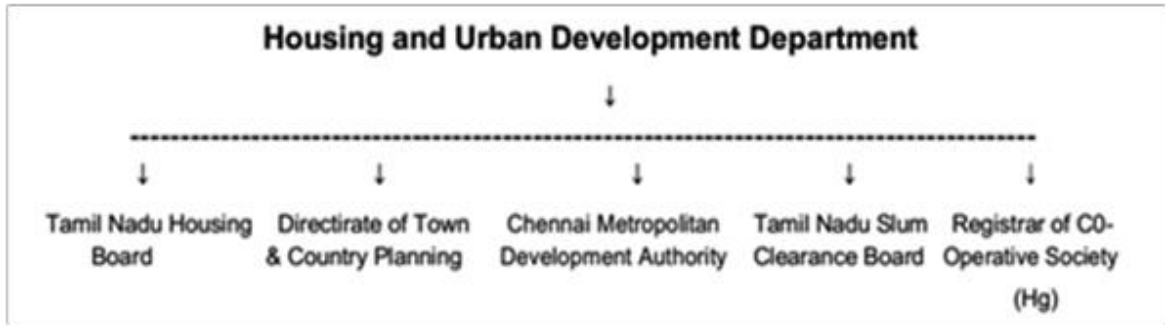
6.1.2 Housing and Urban Development Department (HUDD)

Taking cognisance of the priority for housing among the basic needs of the population, the GoTN has set for itself the goal, of providing 'a house for each family' and taken effective steps framing policies and programs for the development of housing sector both in the urban and rural areas of Tamil Nadu. The sizeable share of urban population (49 per cent) and the rapid pace of urbanisation over the past two decades put a significant onus of delivering this goal, on the urban sector. The Housing and Urban Development Department is the nodal department taking this forward, coordinating the efforts of agencies like the Tamil Nadu Housing Board, the Tamil Nadu Co-operative Housing Federation and the urban-focused Tamil Nadu Slum Clearance Board. Apart from these developmental efforts, the HUDD also administers the Directorate of Town and Country Planning (DTCP) and the Chennai Metropolitan Development Authority, two urban planning and regulatory institutions.

In the administration of HUDD, the Secretary in-charge is assisted by four Deputy Secretaries exercising control over 23 sections dealing with specific subjects and each headed by Under Secretaries overseeing the section staff.

The HUDD coordinates and manages the work of five agencies (urban and rural) with the following core responsibilities:

Figure 6.23: Institutions within HUDD



Source: Manual under RTI, HUDD, GoTN (n.d)

Planning and Development Regulatory Agencies: The land planning and development regulatory bodies in Tamil Nadu are the DTCP and CMDA. The area covered under the DTCP is 1,28,869 Sq.km. and the area under CMDA is 1,189 Sq.km. Both the regulatory bodies work towards the harmonious development of the State as per planning norms and parameters, by land use regulations through the preparation and implementation of Master Plans and Detailed Development Plans. The Plans take into consideration the need for the provision of effective road network fixing alignments of bye pass roads, ring roads, etc. The regulatory bodies also take up several initiatives to improve traffic and transportation by creation and upgradation of infrastructural facilities.

The **Directorate of Town and Country Planning (DTCP)** is functioning under Town and Country Planning Act, 1971. This Act provides for the preparation of Regional Plan, Master Plan, Detailed Development Plan and constitution of Regional Planning Authorities, Local Planning Authorities and New Town Development Authorities. This department has its head office at Chennai and 12 Regional offices, 27 Composite Local Planning Authorities and 8 New Town Development authorities are functioning under its control.
Regional Offices, Local Planning authorities, New town development authorities prepare the Regional Plan, Master Plan, Detailed Development Plan and extend grant to local bodies under various programmes. The department also gives technical advice to local bodies in the preparation of layouts and building plans, and functions as an appellate authority in case of appeal preferred by local bodies against refusal of Planning Permission.

The **Chennai Metropolitan Development Authority (CMDA)** has planning and regulatory jurisdiction over the CMA covering 1,189 Sq.km. which includes CoC, 7 municipalities, 12 town panchayats and 179 Villages in 10 panchayat unions. As per the Census 2011, the population of CMA is about nine Million.

Tamil Nadu Co-operative Housing Federation (TNCHF): The Tamil Nadu Co-operative Housing Federation was registered in 1959 as an apex body, with the area of operation of entire State. Out of 860 Cooperative Housing Societies functioning in the State, 816 cooperative housing societies including 619 urban societies are affiliated to the federation. The resources for housing finance for the Tamil Nadu Cooperative Housing Federation flow from state government, LIC, Housing and Urban Development Corporation (HUDCO), National Housing Bank (NHB), Housing Development Finance Corporation (HDFC), Commercial and Cooperative Banks against government guarantee.

Tamil Nadu Slum Clearance Board (TNSCB): The Tamil Nadu Slum Clearance Board has been implementing various housing, slum development and rehabilitation and resettlement programs to improve the living conditions of the urban slum families in Tamil Nadu. TNSCB area of work was in Chennai initially and after 1984 has been extended to other urban areas of Tamil Nadu. Till February 2013, the TNSCB has benefited 1.31 lakh families in 504 slums, expending ₹2,315.73 crores for various capital works.

Tamil Nadu Housing Board (TNHB): The Tamil Nadu Housing Board was established in 1961 with an objective of providing 'Housing for all' under Tamil Nadu Housing Board Act, 1961 to cater to the housing needs of the growing population of Chennai city and to mitigate the hardship in getting houses or house sites, owing to urbanisation. During 1961–2011, TNHB had completed 402,231 units (houses/flats/plots).

6.1.2.1Finances Managed by the Department

The Table (6.2) provides a summary of the state budget voted on account for the HUDD demand. The Commissionerate of TCP demands make up more than half the department budget, while the Tamil Nadu Slum Clearance Board accounts for 25 per cent.

Table (6.2): Budget of the Department of Housing and Urban Development 2014-15 (in Million)

Head of Account-Department/Agency	Revenue	Capital	Loan	Total
Secretariat	68	-	1,700	1,768
Commissionerate of Town and Country Planning	8,894	5	-	8,899
Cooperative Housing Societies	176	-	0	176
Chennai Metropolitan Development Authority	0	238	-	238
Tamil Nadu Housing Board	155	0	-	155
Tamil Nadu Slum Clearance Board	1,377	2,380	-	3,757
Total	10,670	2,623	1,700	14,994

Source: HUDD (2015)

6.1.3 The Hindu Religious and Charitable Endowments Department

There are 38,481 temples, 56 Mutts, 57 endowments, 41 educational institutions, 34 social welfare institutions and 8 health centres in the state under the control of Hindu Religious and Charitable Endowments Department. The major festivals in the temples give rise to large numbers of floating population and requiring services like shelter, food, water and sanitation. Currently, the arrangement for the major festivals are coordinated with the temple authorities, the HRCE department officers and local representatives by the district administration.

6.2 Devolution of Functions, Functionaries and Funds

The devolution of the 3Fs in urban Tamil Nadu exhibits a correlation with the different categories of ULBs in the state. Seventeen (barring fire services) of the eighteen functions listed in the twelfth schedule (of the constitution) have been devolved to the Municipal Councils and Municipal Corporations. As of March 2010, functionaries are yet to be transferred to ULBs for carrying out the devolved functions. Also, in the CoC, only thirteen functions have been devolved with the functions of water supply and sewerage being managed by the CMWSSB. In the case of town panchayats, twelve of the eighteen functions have been reportedly devolved to the ULB.

The creation and operation of different trust funds and fund-management agencies (like TNUIFSL and TNUFIDCO) in the domain of urban infrastructure services and development, have also meant that some of the fund flows (viz. compensation for entertainment tax, Education Fund (EF), funds earmarked for operation and maintenance) arising from devolution initiatives have tended to aggregate within these trust/program funds and been channelled to ULB on the advice and technical advisories provided by fund-management agencies. In a way, this seeks to optimise the requirements of functionaries in ULBs for carrying out the functions, by addressing capital expenditure planning and management requirements through services offered by fund-management agencies and operational expenditure planning and management through fund-manager advisory and delegated management or out-sourcing.

6.3 Financing of Urban Sector Investments

There are primarily four sources of capital (investment) related flows to the urban sector in Tamil Nadu:

1) State urban development schemes;
2) Central urban programs (as noted earlier);
3) Multilateral/bilateral funded programs; and
4) Investment by ULBs from surpluses generated.

Since its recent introduction by GoTN, the Integrated Urban Development Mission (IUDM) has been the most significant source of capital financing for ULBs in TN, followed by GoI and multilateral funded urban development programs. Overall, capital expenditure in the urban sector has ramped up at a compound annual growth rate of 20 per cent. Nevertheless, capital financing in the urban sector in TN, which is in the region of US$500–US$700 million per annum (World Bank, 2015), remains a small fraction of the investment needs and needs to be scaled up. The aggregate revenue surplus of ULBs in TN was more than ₹500 Crore during the last two years (World Bank, 2015). There is substantial capacity to access the market for infrastructure investments by leveraging the revenue surplus. As per the debt position and performance analysis of ULBs in Tamil Nadu, the outstanding debt of the 10 municipal corporations and 125 municipalities is ₹945 crores. Based on existing norms and based on financial projections, TN ULBs can absorb loans estimated at ₹8,968 crores in the next ten years (MCs borrowing capacity is estimated at ₹5,802 crores, and that of municipalities is estimated at ₹3,166 crores) if they deploy about 50 per cent of the revenue surplus year on year.

Table (6.3): Overall financial scenarios of ULBs in Tamil Nadu 10 MCs and Municipalities (Rupees in Crore)					
Description	2009-10	2010-11	2011-12	2012-13	CAGR
Opening balance	333	1,400	2,032		
Revenue Income	2,648	3,207	3,712	4,370	18 per cent
Revenue Expenditure	2,306	2,924	2,910	3,806	18 per cent
Revenue surplus	343	282	802	563	
Capital Income	1,510	2,650	1,481	2,137	12 per cent
Capital Expenditure	1,520	1,400	2,032	2710	21 per cent
Closing balance	333	1,400	2,032	2,023	
Source: World Bank (2015)					

6.4 State Budgets: A Review

Tamil Nadu presents a study in contrasts. On overall social development indicators, particularly relating to primary education and health, it is one of the best performing states in the country, which would tend to support the subsidies and social spending approach of the government.

At a gross level, too, the fiscal numbers are not bad. The fiscal deficit is estimated to be 2.89 per cent of Gross State Domestic Product (GSDP) as against the norm of 3 per cent and the Debt–GSDP ratio 19.23 per cent, which is well below the 25 per cent cap recommended by the Finance Commission. But these numbers, given the slowdown in tax revenues and the sharp deceleration in investments, are likely to be unsustainable in the long term.

The budgetary allocations and disbursements are examined for the period FY 2011 to FY 2014, based on available data. The Consolidated Fund, Contingency Fund and the Public Account together indicated a deficit during FY 2011 and FY 2013, whereas these resulted in a surplus during FY 2012 and FY 2014. The economic survey indicated that budgetary transactions have turned the corner during this period and the fiscal consolidation is largely revenue-led.

The revenue account displayed a sizable deficit (₹2,728.70 Crore) in FY 2011, however subsequent years have seen revenue surplus, signalling a fiscal correction during the period. The revenue receipts have increased over the FY 2011–2014 period, and gradually also as a share of GSDP (11.6 per cent in FY 2011 to 13.7 per cent by FY 2014). The increase has been primarily due to the growth in tax revenue. More than four-fifths of the State's revenue receipts are from tax revenue. The share of central taxes and grants-in-aid are dependent on GoI performance and the directions of the Thirteenth Finance Commission (during this period) and reportedly decreased over the period. The State's share in central taxes was on the decline from 18.6 per cent in FY 2011 to 16.5 per cent by FY 2014, and the Grants-in-aid also showed a decrease from FY 2011 to FY 2014.

Of the State's own-tax revenue, a significant portion of the revenue was generated through Taxes on sales, trade, etc. (State VAT, General Sales Tax on Petroleum goods, IMFL and Beer being the major revenue items) and state excise (mostly Indian and Foreign Liquors and other intoxicants), which accounted for 76–77 per cent. Other revenue earners were taxes on vehicles, stamp duty and registration fees, and taxes on goods and passengers, which showed an increasing trend over the period. However, the rate of growth of State's own tax revenue started showing a decrease, and does not augur well for the future.

The key issues in the State budgets over the period under consideration (FY 2011–2014) can be summarised as follows:

a. The estimates made in the budget —higher receipts and lower expenditure— have necessitated revision in later years.
    a) Tamil Nadu's Own Tax Revenue —what it raises by way of taxes locally— was scaled down from ₹101,557 Crore to ₹85,772.71 crores as per the revised estimates for 2014–2015.
b. Announcements (and schemes) made under Rule 110 have been funded through revised estimates or the contingency fund.
c. In an almost ₹11 lakh crore economy, the allocated expenditure of about ₹300 Crore towards distribution of colour televisions, laptops and kitchen appliances were to fulfil the ruling party's election promises.
d. The State budget has started to move into deficit on the revenue side, compared to the situation of a revenue surplus budget as late as FY 2011–12.
e. The State government planned to spend 56 per cent of its own revenues —and over 41 per cent of its total revenues, which include Central transfers and grants— on subsidies and benefits promised in the election manifesto.
f. At ₹59,185 crores, the outlay on such items dwarfs the ₹27,213 Crore capital outlay budgeted for the FY 2015–16 fiscal. This capital outlay too is optimistic, as in the past. Actual capital expense in 2014–15 at ₹23,809 Crore, was almost 10 per cent shy of the projection made in the medium-term fiscal plan.
g. The first tariff hike after seven years was effected in 2012–13, after the State-owned power generation and distribution utility TANGEDCO had accumulated losses of a staggering ₹59,000 crore. Despite a State-led support plan leading to TANGEDCO's restructuring, and the State government absorbing most of the losses and half its restructured loans; financial support of ₹13,586 crores was provided for the power sector in the FY 2015–16 budget, of which TANGEDCO alone will get ₹11,748 crores. The bite of the power sector on State finances is thus a continuing phenomenon. Over the past three years, the Tamil Nadu government has spent a significant amount on power subsidy and its generation/distribution utility. Although the huge demand–supply mismatch which existed two years ago has been more or less bridged, this has come at a cost. Continued financial support to TANGEDCO is necessitated as well as subsidy support for the lowest consumption slabs in the domestic consumption sector.

6.5 Financial Situation of ULBs in Tamil Nadu

This section is based on the analysis of the Fourth State Finance Commission, which submitted its report 2011. The Fourth SFC recommendations are for the period FY 2012–2017. The section focuses on the financial situation of the ULBs in Tamil Nadu. The own income for ULBs in Tamil Nadu comprises of:

1. Property Tax
2. Vacant Land Tax
3. Advertisement Tax, and
4. Non-Tax revenue

Property Tax: Over the period FY 2006 to FY 2010, Property Tax makes up about 50–54 per cent of the own income of Municipal Corporations. The collection performance of Municipal Corporations reported improvement over the same period in both current demand and arrear demand with municipal corporations collecting about 80 per cent of current demand and 55 per cent of the arrears by FY 2010. Over the years, current demand shows annual increases, while arrear demand has decreased. However, the levels of arrear demand were still very high and pointed to the need for attention on the collection effort. In municipalities, Property tax made up about 37–44 per cent of the own income. Collection performance was lower than in the municipal corporations, going up to 74 per cent for the current demand and 35 per cent of the arrears by FY 2010. The trend of increased current demand over the period and decreasing arrear demand was also reported. In town panchayats, property tax makes up about 23–31 per cent of the own income. Collection performance was good going up to 81 per cent for the current demand and 41 per cent of the arrear demand by FY 2010.

While Property tax revision is scheduled every five years and is required to be 25 per cent; the aggregate increase in Municipal corporations was lower in FY 2009, on account of the non-revision in the CoC. The non-revision in the CoC also led to income foregone by CMWSSB, as the sewerage tax (a part of the property tax) is supposed to be passed to the utility by the CoC. The self-assessment method was implemented in CoC in 1993 and in other Municipalities by 1998. However, the FSFC reported that existence of under-assessments and non-assessments in most of the ULBs. The FSFC highlighted the absence of a system for the enumeration of property tax assesses annually; and the dependence of ULBs solely on monthly revision lists from the bill collectors without effective maintenance of check registers by the wings of the revenue department and the TCP Department, absence of field visits by bill collectors and lack of inspection of bill collector submissions by the executive authorities. There is no system adopted in ULBs to furnish a report about the cases of unauthorised construction, additional construction made from the Town Planning Wing to Taxation Wing. This coordination is now sought to be effected through a centralised web-based application under development. The guidelines issued by the state government for the last revision in 2008, also prescribed a ceiling on the revision fixing this at 25 per cent for residential buildings, 100 per cent for industrial buildings, 150 per cent for commercial buildings, thus effectively reducing the opportunity for ULBs to enhance their revenue.

Despite the issue of instructions, there has been no progress on the levy and collection of service charges on Central Government properties, by the ULBs. The buildings used for educational purpose including hostels are exempt from property tax. Thus, even self-financing educational institutions that collect large fee and donations (compared to government institutions) do not come in the property tax net.

The FSFC reported that the introduction of GIS for property level mapping and applications on a pilot basis in cities of Coimbatore, Madurai and Tiruchirappalli Corporations, and the municipalities of Rajapalayam and Gobichettypalayam.

Profession Tax: This provides about 11–14 per cent of the own income of municipal corporations over the FY 2006–2010 period. The collection performance in municipal Corporations has increased marginally for current demand to 97 per cent in FY 2010, while arrear collections have improved from 21 per cent in FY 2006 to about 40 per cent in FY 2010. Profession tax makes up about 7–8 per cent of the own income of municipalities. In Municipalities, current demand collection has increased from 85 per cent in FY 2006 to 89 per cent in FY 2010, while collection of arrears is lagging at 19–22 per cent over the same period. In town panchayats, 94 per cent of current demand is collected, on average over the past five years. The percentage of arrear demand increased from 32 per cent to 60 per cent over the period of five years. Profession tax makes up about 9–11 per cent of the own income of town panchayats.

Vacant Land Tax (VLT): The VLT is levied on plinth area basis with a minimum and maximum value per unit area (square feet). This change was effected in 2009 from the earlier percentage of capital value method. Since there is no systemic protocol followed by ULBs for listing out vacant lands within the ULBs limit and assessing the tax promptly, the collection performance in this regard is moderate. ULBs do not track the registration details of land parcels on a regular basis with data from the registration department for levying VLT. Instead, when an owner approaches the ULB for building permission, the VLT gets levied. This affects the predictability of this source of income.

VLT accounts for about 2 per cent of the own income of municipal corporations and about 3 per cent of the own income for municipalities. In municipal corporations, current demand collection decreased from 54 per cent in FY 2006 to 45 per cent in FY 2010, while collection of arrears followed a similar trend decreasing from 52 to 42 per cent over the same period. Municipalities have a poorer record with collection of current demand trending between 6 and 10 per cent and collection of arrears trending between 1 and 3 per cent over FY 2006–2010.

Advertisement Tax: In 2011, the District Collector was responsible for the issue of license to erect hoardings taking into account the size of the hoardings, the road width and consent from the land owners as per the Advertisement Tax Act/Rules. These powers were transferred to the District Collectors in 2003, as per Section.285-B of the Tamil Nadu District Municipalities Act 1920, and the District administration was ordered to transfer 75 per cent tax proceeds to the ULBs. The hoarding rules were further amended during 2008 to give effect to the transfer of 100 per cent tax proceeds of ULBs. The income receipts reported by the ULBs were nil or meagre.

Non-Tax Revenue (NTR): The non-tax revenue income of ULBs comprise of fees from trade licenses, building permissions, parking spaces, bus stops, development charges, road-cutting restoration charges, and tolls; library cess; income from properties and investments; revenue earned from water supply, sewerage services and other items.

The NTR makes up about 30–36 per cent of the own income of municipal corporations and has an increasing trend over the FY 2006–2010 period averaging an annual growth (simple) of 9 per cent. Fee from building permissions (10 per cent), income from properties (11 per cent), revenue collection from water supply (20 per cent) and others (41 per cent) formed the major portion of NTR for Municipal Corporations in FY 2010.

In the case of municipalities, the NTR made up 46–54 per cent of the own income over FY 2006–2010, and had a decreasing trend from FY 2008. Library cess (9 per cent), income from properties (21 per cent), revenue collection from water supply (25 per cent) and others (24 per cent) formed the major portion of NTR for Municipalities in FY 2010.

For town panchayats, the NTR made up 57–67 per cent of the own income over the FY 2006–2010 period, with a decreasing trend from FY 2007. Building License fee (18 per cent), income from properties (19 per cent), revenue collection from water supply (33 per cent) and others (18 per cent) formed the major portion of NTR for town panchayats in FY 2010.

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