CHAPTER 2
THE CONTEXT, DATA SOURCES, METHODS AND LIMITATIONS

2.0 INTRODUCTION

The purpose of this chapter is to set the context of the thesis, discuss the data sources used (both secondary and primary), methodology used in primary data collection and the limitations of the data and the thesis.

Map 2.1 Case Study Area

2.1 AN OVERVIEW OF URBANISATION IN TAMIL NADU

The State of Tamil Nadu stands as the most urbanised state in India with 48.5\% of the population remaining urbanised based on the present 2011 Census, which is above the national average of 31.16\% (Venkataramanan, 2011). This is a sharp increase from a level of 44.04\%\(^1\) in the 2001 census and 34\%\(^2\) in 1991, which means a 10\% increase in the urban component of the population in a decade. The decadal growth of population is 15.60\%. With a population density of 555 per sq. km, Tamil Nadu is the seventh largest state in India, in terms of population. The current population of the state is 72 million (7, 21, 38, 958), out of which 37 million (3.71 crore) people live in rural areas (51.55\%) and 34 million (3.49 crore) in urban areas\(^3\). There has only been a 6.49\% growth in the rural population since 2001, whereas the urban population has gone up by 27.16\%, indicating the high level of urbanisation going on in the State. **It ranks first in urbanisation among the 15 major states in India.** Urbanisation in the state has been on the increasing trend since 1961. The urban population of Tamil Nadu is projected to grow at the rate of 67\% by the year 2030, which will be the highest in the country\(^4\). However, the population growth of other metropolitan cities has shown a considerable slowdown\(^5\). For instance, the population of Greater Mumbai (18.4 million) has reduced from a rate of growth of 30.47\% (1991-2001) to 12.05\% (2001-2011). Similarly, the population of Delhi is 16.3 million (reduced rate of growth from 52.24\% in 1991-2001 to 26.69\% in 2001-2011). The population of Kolkata is 14.1 million (reduced rate of growth from 19.60\% in 1991-2001 to 6.87\% in 2001-2011). Three-quarters of the population of Tamil Nadu will be urban in another two decades – much more rapid change than the average for the whole country” (Janakarajan et al., 2007, p.51).

Another distinguishing feature of the urbanisation of Tamil Nadu is that it is highly dispersed. The three metropolitan centres of Chennai, Madurai and Coimbatore together accounted for 33.3\% of the total urban population of the state

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1 Venkataramanan, 2011  
2 Vedachalam, 2012  
3 Vedachalam, 2012  
4 Municipal Administration and Water Supply Department Policy Note - 2012-2013  
5 www.censusindia.gov.in2011
in 2001. Of these cities, the Chennai urban agglomeration (7.4 million inhabitants) accounted for 23.6% of the total urban population of the state. Going by the latest census figures, Chennai obviously is 100% urban among the 33 districts of Tamil Nadu. Moreover, the population of Chennai is projected to increase to above 10 million (to be listed as the top ten million plus cities of India in 2031). This means that cities like Chennai will continue to add people, with little corresponding increase in natural resources (Vedachalam 2012).

2.2 CHENNAI CITY

Chennai, the capital of Tamil Nadu, is a major city of southern India, with the fourth largest metropolitan area in India. Chennai Metropolis lies in the latitude between 12°50’49” and 13°17’24” and longitude between 79°59’53” and 80°20’12”. The land is a flat coastal plain. In its formative years, Chennai served as the capital of the Madras Presidency and was its main administrative and commercial center. Post-independence, it became the capital of the State of Tamil Nadu. The city has a diversified economic base with well-developed industrial and tertiary sectors. Chennai is the main automobile production and assembly center in India, and it is gaining momentum as a back-office and IT center. Chennai is located on the southeastern coast of India off the Bay of Bengal. The topography of Chennai city is extremely flat with an average slope of less than 0.7 m per km. The Chennai Metropolitan Area (CMA), comprising of Chennai city and its surrounding contiguous area was notified in 1974. The Metropolitan Area is comprised of Chennai City Corporation, 16 municipalities, 20 special-grade village panchayats and 214 villages. The total land area is 1,189 square kilometers. The urbanized area extends approximately 50 kilometers north to south and 30 kilometers east to west. The City Corporation area is much smaller, extending about 20 kilometers north to south and about 12 kilometers east to west (Map 1). The city development authority recently extended the city area from 174 sq km to 426 sq km and enclosed the metropolitan area, adding two more city corporations (G.O.256, 2009). According

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6 Venkataramanan, 2011
7 www.iihs.co.in and Census 2011
8 (G.O.(Ms)No.256, MA&WS (Election) Department, dated 26.12.2009, on expansion of the boundaries of Corporation of Chennai.
to a government order issued in December 2009, the Corporation of Chennai was expanded to include 42 surrounding ULBs: 9 municipalities, 8 town panchayats, and 25 village panchayats. This means the corporation will grow from 174 to 426 square kilometres, from a population of 5.5 million to 6.8 million, and from a 155-member council to a 200-member council. As per the 2011 census, the provisional population of the expanded Chennai city is 67.27 lakh. The provisional urban agglomeration is 8,696,010. Growth rates have been the highest in the largely unplanned peri-urban and village Panchayat areas, while the city itself experiences significant out-migration. The CMA population is projected to increase to 12.5 million. Chennai presently has the highest demographic density (26,903), next only to North East.

The problem of coping up with the increasing urban infrastructure and access to basic civic services is more pronounced in the light of two factors:

1) **The increasing population of CMA:** The urban population of Chennai city was half a million at the turn of the century and has now grown to more than four million within the city and to nearly six million in the metropolitan area. After the expansion, the city’s population increased from a population of 5.5 million to 6.8 million. The population of the CMA increased from 7.3 million to 8.7 million (G.O. (Ms) No.256, 2009; Srivathsan, 2012).

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9 Municipal Administration and Water Supply Department Policy Note - 2012-2013
10 Chennai City Development Plan (2009)
11 CMDA Master Plan(2008)
12 Density of population is defined as the number of persons per sq.km
13 Census2011_tn.pdf
Table 2.1: Decadal Growth rate of Population in CMA

<table>
<thead>
<tr>
<th>SL. No.</th>
<th>Area</th>
<th>Population (in lakhs)</th>
<th>Annual Rate of growth (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Chennai city</td>
<td>26.42</td>
<td>32.85</td>
</tr>
<tr>
<td>2</td>
<td>Municipalities</td>
<td>4.84</td>
<td>8.14</td>
</tr>
<tr>
<td>3</td>
<td>Town Panchayats</td>
<td>1.11</td>
<td>1.64</td>
</tr>
<tr>
<td>4</td>
<td>Village Panchayats</td>
<td>2.67</td>
<td>3.38</td>
</tr>
<tr>
<td>5</td>
<td>CMA</td>
<td>35.04</td>
<td>46.01</td>
</tr>
</tbody>
</table>

Source: Census of India and CMDA (2001) and Census 2011

A review of the CMDA reports relating to the population of CMA shows that it had increased from 3.54 million in 1971 to 4.61 million in 1981. The population further increased to 5.81 million in 1991. As per the latest census in 2001, the population was 7.41 million. The data given in the above table (2.1), showing the decadal growth rate of population for CMA, reveals a mixed pattern of growth. The municipalities and town panchayats have experienced a higher growth rate compared to the city. However, for the entire area of the CMA, the annual growth rate of population fell from 2.76% during 1971-81 to 2.37% during 1981-91, which again fell to 1.93% during 1991-2001. The population growth has, however, shown a rise of 2.6% (2001-2011). An analysis of the demographic profile of CMA reveals the fact that a mass exodus of in-migration into CMA has been taking place.

Migration stands out to be the main factor contributing towards urban growth in Chennai (Madras) (Sivaramakrishnan, 1978), which was 31% in the decades preceding 1901, 40% (1931-51), and 37% in (1951-1961). The very cosmopolitan nature of Chennai City attracts migrant groups from all over India. Around 74.5% of the migrants to Chennai City come from other parts of Tamil Nadu; 23.8% come from other parts of India and the remaining 1.71% from other countries (Census, 2001). The city has been experiencing a downward trend in migration. For example,
the migrated population to the total CMA population was 37.24% in 1961 and it declined to 21.57% in 2001. Although there has been a decline, the migrated population still constitutes a significant proportion of the city’s total population, which has led to increased demand for basic amenities. It should be noted that both the ‘push’ factors and the ‘pull’ factors are responsible for the considerable amount of migration to the city. Stagnated agriculture and water scarcity contributed by and large to the out-migration. Migration into the city has larger implications on the demand for environmental amenities such as water supply and sanitation.

Due to the rapid demographic growth over the years since 1951, the urban growth of Chennai has been haphazard (Paul Appaswamy, 1999). Although the population has been increasing in a geometric progression, the increment in the supply of services has grown in a linear progression. Thus the demand for urban services exceeded its supply resulting in the problem of mismatch in the provision of urban services like water supply and sanitation, housing for the urban poor, a pollution-free environment and better waste disposal mechanisms. An understanding of the problems confronting the urban water sector in Chennai city thus assumes significance, not to mention the over one million (10,79,414) slum population constituting 25.60% of the total population - the highest among all other major cities in Tamil Nadu. Scant attention is paid to the development of facilities like drinking water and sanitation for the low-income population and the poor (M.G.Devasahayam 2011).

Currently the population growth of inner Chennai is decreasing, but it is increasing rapidly in the suburban areas resulting in a growing water demand (Appasamy, 1995). The problem would be more pronounced in light of the current expansion of the city and CMA limit.

2) The expansion of Chennai city from 174 Sq. km to 426 Sq. km and the expansion of CMA from 1189 sq km to 4400 sq.km/8800 sq.km from a population of 7.3 million to 8.7 million: According to a government order issued in December 2009, the Corporation of Chennai has been expanded to

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include 42 surrounding Urban Local Bodies (ULBs): 9 municipalities, 8 town panchayats, and 25 village panchayats. This means that the corporation will grow from 174 to 426 square kilometres (from a population of 5.5 million to 6.8 million and from a 155-member council to a 200-member council. Also, the zones have been redefined and the number of zones has increased from 10 to 15. The newly added areas are comprised in the 8 new zones, viz., Thiruvottiyur, Manali, Madhavaram, Ambattur, Valasaravakkam, Alandur, Perungudi and Sholinganallur (Figure 2.2).

Map 2.2 Showing the expanded Chennai city corporational zones

Source: The Hindu, 15th June, 2012
After studying cities such as Mumbai, Hyderabad and Bangalore, the government of Tamil Nadu is currently reviewing two options to decide on the final size of the greater Chennai region\(^\text{15}\).

The first option has Gummidipoondi and Uthukottai taluks in the north, Sriperumbudur in the west and Chengalpattu in the south. This covers an area of 4,400 sq km. In the second option, the north and western boundaries remain the same while the western boundary extends to include Kancheepuram and Uttaramerur taluks. Cheyyar makes the southern boundary. This covers an area of 8,800 sq km (map 2.3).

**Map2.3 Showing the Options for the expansion of CMA**

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\(^{15}\) A.Srivathsan, 2012
Map 2.3 indicates that instead of developing a Chennai-centric single region, a polycentric model with separate Kancheepuram, Chengalpattu and Chennai urban regions is possible. This alternative can also help network smaller towns such as Sriperumbudur, Tiruvallur and Madurantakam.

An important characteristic of the pattern of urbanisation in Chennai is its rate of spatial expansion. Muthiah notes (2003, p.24) that in 1939, the only major change in its extent from the earlier 1798 limit (comprising 27 square miles) was the municipal inclusion of Mambalam. In 1978, almost 16 square miles were added to increase the area to a manageable 67 square miles, an expansion of 2.5 times in eight decades. Moreover, the metropolitan area has remained around 450 square miles since at least 1964.

Chennai Metropolitan Area (CMA), comprising of Chennai city and the surrounding contiguous area was notified in 1974. The Metropolitan Area is comprised of Chennai City Corporation, 16 municipalities, 20 special-grade village panchayats and 214 villages. The total land area is 1,189 square kilometers. The urbanized area extends approximately 50 kilometers north to south and 30 kilometers east to west. The City Corporation area is much smaller, about 20 kilometers north to south and about 12 kilometers east to west (Map 2.2). Presently the city development authority extended to the city area from 174 sq km to 426 sq km and enclosed the metropolitan area, adding two more city corporations (G.O.256, 2009).

The Chennai urban agglomeration extends over three districts of Thiruvalluvar, Chennai and Kancheepuram. Census 2001 shows that the number of constituent units in the urban agglomeration is 53. Among these units, 13 units were constituted in the 2001 census. The density of population at present is estimated to be 26,903 per sq km (Census, 2011) and this has larger implications with respect to the problem of infrastructural deficiency in the region.

The boundaries of Chennai district are identified with the Chennai Municipal Corporation. However, the Chennai Metropolitan Area is much larger comprising of several municipalities and town panchayats in Thiruvalluvar and
Kancheepuram Districts. The spatial distribution of the six corporations (104 municipalities and 611 town panchayats) illustrates that urbanisation is not limited to any one part of the state. Another noted feature of urbanization in the state is the concentration of population along certain urban corridors.

A large-scale neighbourhood has been developed within Chennai city and its suburbs. The South Madras Neighbourhood scheme comprises of Indra Nagar, Shastri Nagar and Besant Nagar. Industrial developments have taken place in Madhavaram, Vysarpadi, Kodungaiyur, Ambattur, Noombal, and the adjoining areas of Pammal and Perungudi. Industrial estates have also been started at Villivakkam, Thirumazhisai and Morai near Avadi. The lands along Poonamallee Bypass road near Poonamallee Town in the west and Old Mamallapuram Road (from city limit to Sholinganallur) in the south were reclassified for industrial use, where a number of medium-scale and small-scale industries have come up.

Chennai has become the IT hub of Tamil Nadu. Most of the IT developments are along the Rajiv Gandhi Salai (OMR), an area popularly known as the IT Corridor. A self-contained IT park (Tidal Park) has been developed at Taramani, housing all the major players in the IT sector. The IT corridor in Chennai stretches from Taramani to Semmancheri, where a number of IT developments are coming up because of the locational advantages for the industry. Bio-tech parks have been developed in Taramani and Sirucheri. These employment-generating developments have resulted in fast development of the areas in the west of the corridor as residential areas.

As cities grow, managing them becomes challenging. The speed and scale of urban transformation of the developing countries presents significant problems, mainly the impact on the capacity of the cities to provide adequate basic services for their citizens. An important challenge due to increased rate of urbanisation has been the strain on basic infrastructural services like water supply, sanitation, transport, environmental degradation, housing shortages and the resultant growth of slums. Of these, water assumes significance for its importance as the basic necessity of life.
Hence a study of the urban water sector in Chennai city, which is highly complicated and challenging in the context of rapid urbanization, was felt necessary.

2.3 METHODOLOGY AND LIMITATIONS

The present study has made use of both the primary and secondary sources of information.

2.3.1 Secondary Data

Records from the urban water supply providers form an important source of secondary data for the study. Details have been collected from the CMWSSB, Tamil Nadu Water Supply and Drainage Board (hereinafter referred to as TWAD Board) and the Central Ground Water Board.

Apart from this, a review of the literature pertaining to the urban water sector in developing countries like India (Chennai city in particular) forms an important source of information for the study.

An equally important source of data for this study is the records of the city development authority. Chennai Metropolitan Development Authority’s Master Plan I and II furnishes data relating to urbanisation, demography, migration and urban water supply augmentation undertaken by the water board.

Limitations

It must be noted that secondary data have its own limitations in providing a clear understanding of the objectives of the study. The objectives of the study, with respect to demand for and supply of water in Chennai city, have been dealt in by the CMWSSB records. The data collected from the TWAD Boards supplement this information. Details of the quantity and quality of ground water across different areas in Chennai city are well furnished by the Central Ground Water Board records. Thus a part of the objectives of the study, as to the responses of the government to water scarcity in Chennai, has been dealt in by these records along with the Chennai Master Plan. The review of literature has helped in understanding the market response to water scarcity in Chennai city. However, an understanding of the
growing urban stress due to unplanned and haphazard urbanisation in Chennai city entailed risks, which could not be analysed with just the aid of secondary data. Thus there exists a knowledge gap, which needs to be filled by conducting a primary survey of the households belonging to various sections of the population living in Chennai city. The primary survey also provides an understanding of the consumer’s response to water scarcity.

2.3.2 Primary Data

The technique of shared learning dialogue and semi-structured interviews was used to elicit information on various coping strategies adopted by the consumers to overcome water shortages (in quantitative and qualitative terms).

- The sample households were drawn using a multi-stage cluster sampling method. With the objective of understanding the responses of the consumer to water scarcity in Chennai city, a field survey comprising of 173 households was designed. The target sample was distributed to the two different parts of the metropolitan area (north and south Chennai). In each part, spatial clusters, belonging to different sections of the population, were identified: the slum dwellers, the rich and the middle class.

- As far as slum households were concerned, the units for the study (households) were identified using random sampling. This involved the use of random number tables to serialize the universe from 1 to the size of the population of the slum and then choosing the units for the survey. A quick listing of the households was carried out to confirm the size of the universe and thereby select the households for the survey. This was followed by the survey of households using a structured questionnaire (Appendix I). The questionnaire was structured to elicit information pertaining to the sources of water availability, consumption pattern of water according to different usage, quantity and quality of water available, price paid for water and expenditure on health, extent of drainage facilities available and the price paid for sanitation.
Sample households belonging to the rich and middle class were selected from the apartments (clusters). Ten such clusters belonging to different streets of the study area (Vysarpadi and Adyar) were selected for the study. Three sample households from each apartment, comprising a sample size of 30 each from Adyar and Vysarpadi, were studied pertaining to the above mentioned source of information.

Sixty households from Adyar slum, 53 households from Vysarpadi slum, 30 households from apartments in Adyar and 30 households from apartments in Vysarpadi, comprising a sample size of 173 were interviewed.

The primary data thus provided an understanding of the risk and vulnerability situation of the slum inhabitants when compared to people residing in apartments, which helped in mapping the growing urban stress in Chennai city due to unplanned and haphazard urbanisation.