TAMIL NADU: AN OVERVIEW

The object of this research has been to do an overall examination of Tamil Nadu State –mainly in its demographic and socio-economic aspects– with a closer focus on water condition, in terms of rainfall, surface and ground water resources, domestic and industrial demand, and water pollution.

With this research we have been able to select some target areas for implementing a project on water filtration plants and water distribution and supply for BOP market, identifying a number of cities with a population range between 500,000 and 1,000,000 habitants, where our partner MFI Equitas is present with its branches offering financial and non-financial products.

Based on Census 2001, the cities that are responding to our requirements are Tiruchirapalli and Salem, with a population of 866,354 and 751,438 respectively; we decided also to consider other two towns, Erode and Vellore, because its populations (of 389,906 and 386,746 respectively) are growing swiftly. All of these cities lie in the north and central part of the southernmost State of India; Tiruchirapalli and Vellore are important administrative centres, whereas Salem is one of the major producers of textile, steel, automotive, poultry and sago industries and Erode main productions are handloom and power loom textile.

Because of main industrial complexes (as tanneries which are located in Vellore, Tiruchirapalli and Erode districts, a large number of textile bleaching and dyeing units in Erode and Salem, and other industries as chemical in Tiruchirapalli district and sugar mill in Erode) the major part of water body in these areas are contaminated and classified from slightly to highly polluted.

The research highlights, therefore, the poor condition of water resources in Tamil Nadu –both for natural condition and heavy industrial presence– and the need of safe drinking water for BOP population, who uses to collect water from polluted and without quality control basins and wells near to their settlements.
Tamil Nadu (Country of the Tamils) is one of the 28 states of India, laying in the southernmost part of the Indian Peninsula and is bordered by the States of Pondicherry, Kerala, Karnataka, and Andhra Pradesh. Its capital and largest city is Chennai (former known as Madras). Tamil Nadu is the eleventh largest state in India by area and the seventh most populous state. It is the fifth largest contributor to India's GDP and the most urbanised state in India. The state has the highest number (10.56%) of business enterprises in India, compared to the population share of about 6%. It is one of the foremost states in the country in terms of overall development.

The region has been the home of the Tamil civilization since at least 1500 BC, as attested by numerous archaeological sites in and around Adichanallur. Its classical language Tamil has been in use in inscriptions and literature for 2500 years. Tamil Nadu was born as a State of the Indian union on 1 November 1956; it was then called Madras State and later in 1969, was renamed as Tamil Nadu.

The state is home of many natural resources, Hindu temples of Dravidian architecture, hill stations, beach resorts, multi-religious pilgrimage sites and eight UNESCO World Heritage Sites.

1. Geography

Tamil Nadu covers an area of 130,058 square kilometres and it is the eleventh largest state in India. The bordering states are Kerala to the west, Karnataka to the northwest and Andhra Pradesh to the north, to the east is the Bay of Bengal and the union territory of Pondicherry. The town of Kanyakumari is the southernmost tip of the Indian Peninsula, where the Arabian Sea, the Bay of Bengal, and the Indian Ocean flow together.
The geographical territory is bound by the Eastern Ghats in the north, the Nilgiri, the Anamalai Hills, and Palakkad on the west, by the Bay of Bengal in the east, the Gulf of Mannar, the Palk Strait in the south east, and by the Indian Ocean in the south.

The western, southern and the north-western parts are hilly and rich in vegetation. Tamil Nadu is the only state in India which has both the Western Ghats and the Eastern Ghats and they both meet at the Nilgiri hills. The Western Ghats dominate the entire western border with Kerala, effectively blocking much of the rain bearing clouds of the South West Monsoon from entering the state. The 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.

Tamil Nadu has a coastline of about 910 kilometres, which is the country’s third longest coastline. Tamil Nadu 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.

2. **Climate**

Tamil Nadu, with a climate range from dry sub-humid to semi-arid, is heavily dependent on monsoon rains, and thereby is prone to droughts when the monsoons fail. The state has three distinct periods of rainfall: an advancing monsoon period, from June to September, with strong southwest winds; a North East monsoon from October to December; and a dry season, from January to May. The normal annual rainfall of the state is about 945 mm, of which 48% is through the North East monsoon, and 32% through the South West monsoon. Tamil Nadu is classified into seven agro-climatic zones: north-east, north-west, west, southern, high rainfall, high altitude hilly, and Cauvery Delta (the most fertile agricultural zone).
3. **Demography**

The population growth rate in Tamil Nadu had started declining in eighties itself. In 1991 the decadal growth rate was 15.4 percent for Tamil Nadu compared to the All-India rate of 25.8 per cent. This rate declined further to 11.2 percent for Tamil Nadu in 2001 while the All-India rate declined to 21.3 per cent. This decline was much faster than many other states mainly due to a significant decline in total fertility rate accompanied by a decline in birth rate and infant mortality rate.

- **Human Development Index**
  Tamil Nadu HDI (2001) is 0.657 as compared to 0.571 for India as a whole. Tamil Nadu is also placed well in the South Asian context. The State's per capita income is above the national average and it occupies fifth place in the ranking of 15 major states in India. Tamil Nadu has the second lowest fertility rate next only to Kerala. Life expectancy at birth for males and females is 64.85 and 65.20 respectively. The literacy rate has been increasing over the years reaching the level of 73.47 percent in 2001, next only to Kerala and Maharashtra.

  The National HDR prepared by the Planning Commission, Government of India, places Tamil Nadu at the third position with an HDI value of 0.531 among 15 major States. Specific data, on each of the indicators such as life expectancy at birth (LEB), literacy and income suggest, however, that while Tamil Nadu is placed well above the all India average it still lags behind some States for example, Kerala is well ahead of Tamil Nadu in literacy and LEB while Maharashtra is ahead in LEB and income. Therefore, Tamil Nadu focus in the next decade should be to reach the levels attained by Kerala in health and educational attainment, while aiming at increasing the levels of SDP to those of Punjab or Maharashtra in order to reduce poverty and inequality.

- **Demographic Transition in Tamil Nadu**
  Among the 15 major States in India, Tamil Nadu is the sixth most populous State and its population accounted for 6.0 percent share of the national population of 1027.02 million. The Census 2001 results show the population of Tamil Nadu at 62.1 million comprising of 31.3 million males and 30.8 million females. The rural and urban population is 34.9 million and 27.2 million, respectively.

  The density of population is placed at 478 per sq km. The annual growth rate of population in Tamil Nadu was 1.1 percent during nineties and 1.4 per cent during eighties and is lower than the growth rate registered at All-India level during nineties. One of the major changes that have come about in the demographic transition in Tamil Nadu is the fall in the total fertility rate and birth rate since the eighties and the replacement rate reaching nearly two by nineties. This is also accompanied by a decline in the death rate.

- **Total Fertility Rate (TFR)**
  The fertility rate in Tamil Nadu was lower than in many states and All-India average even in the early eighties. During nineties the State showed a significant improvement and by mid nineties (1995-97) Tamil Nadu had 3 TFR of 2.1, the lowest after Kerala (1.8). However the difference between Kerala and Tamil Nadu lies in the fact that it is uniform in Kerala across rural and urban sectors.

- **Birth Rate and Death Rate**
  According to the Tamil Nadu Human Development Report, the death rate in Tamil Nadu has declined by 40 percent in the last four decades whereas the birth rate has declined by about 30 percent. Further, the birth rate has been falling uniformly across the districts during the eighties and nineties with the exception of one or two districts and the rural urban differences have also narrowed down. The birth rate of 19.9 for rural sector and 17.0 for the urban sector in 1999 is among the lowest in India and so is the death rate of 7.8 and 5.1 for the rural and urban sectors.

- **Sex-ratio**
  The sex-ratio in Tamil Nadu has improved slowly in the last decade. The combined (rural and urban) sex ratio was 958 in 1991 and 986 in 2001. The overall sex-ratio has improved in all regions except coastal north in rural Tamil Nadu; the coastal and southern districts have attained the expected value of above 1000 by
2001; The sex-ratio for urban is worse than the rural with the exception of inland and coastal regions in 2001.

All the regions have sex-ratio for the 0-6 years group of below 1000, declined in both rural and urban areas in 2001 compared to 1991. Inter-district variation in sex-ratio has also increased between the two censuses for overall as well as 0-6 years: for example, districts like Salem (763), Dharmapuri (869), Theni (873) and Namakkal (882) have very low rates in 2001 compared to many other regions in India.

- **Literacy and Health**

The literacy rate in Tamil Nadu increased substantially from 62.7 to 73.5 percent between 1991 and 2001 with improvement across all segments. However, the rural-urban gap and gender gap are still to be bridged. Female literacy improved from 51.3 to 64.5 percent and male literacy rates improved from 73.7 to 82.3 percent. Rural literacy improved from 41.8 to 55.8 percent and urban literacy improved from 69.6 to 75.6 percent and this gap between the rural and urban sectors remained even with each region. These figures are among the highest compared to many large states in India.

The health status can be judged in various ways and the commonly used measures are infant mortality rates (IMR) which also reflects the overall well-being of the society. The IMR in Tamil Nadu showed a rapid decline between eighties and 2000. It was about 125 in 1970 decreasing to about 68 in 1990 and further declining to 44 in 1999. The regional level variation once again highlights rural urban contrast though it is homogenous across regions within a sub-sector except for the southern region in rural Tamil Nadu.

- **Unemployment**

The rural unemployment sector for Tamil Nadu (All-India) had about 13.5 percent (7.1) and is higher than most other states except Kerala and West Bengal whereas for the urban sector in Tamil Nadu it was 8.9 percent (7.7 percent) and is higher than most other south Indian states (except Kerala) and other industrialized states like Gujarat (4.2 percent). In 1999-2000 the urban unemployment rates are lower than rural rates across males and females. The female rates are higher than males in the urban sector but fluctuates for the rural sector. The unemployment rate has increased for all except females in urban sector.

- **Poverty and Employment**

Tamil Nadu has made significant progress in terms of poverty reduction over the last few decades. In the period 1973-74 to 1987-88 the percentage of people living below poverty line in Tamil Nadu was higher than the all-India average. However since then, there has been a dramatic decrease in poverty levels: in 1973-74 the poverty level was 54.94 percent, it declined to 43.39 per cent in 1987-88 and further to 21.12 per cent in 1999-2000. Moreover, the incidence of poverty was relatively higher in rural areas till 1987-88 where as it declined steadily during the nineties thanks effective implementation of various poverty alleviation programmes.

The structural changes in employment pattern are bound to have also affected the poverty rates among different occupation groups and employment status. The per capita consumption expenditure in Tamil Nadu grew at an annual rate of 1.9 percent for the rural sector and 5.5 percent for the urban sector between 1993-94 and 1999-2000. This has significantly reduced the overall poverty rate in Tamil Nadu (All-India) from about 35 per cent (36 per cent) in 1993-94 to 21 per cent (26 per cent) in 1999-2000. The urban poverty rate in Tamil Nadu declined by about 18 percentage points to about 22 percent whereas the rural poverty rate declined by about 23 percentage points to about 21 percent thus reducing the gap between rural and urban poverty rates. This has also reduced poverty rates across different occupations and employment status. The agricultural labour, which accounts for about 45 percent of the rural population having the largest number of poor (66 per cent) has halved the poverty rates by 1999-2000. The interesting feature however is that the poverty rates among the self-employed in agriculture has decreased to less than 15 percent with the proportion of poor among them also having decreased. The urban sector shows that the self-employed and the casual labour have reduced their share in 1999-2000 compared to 1993-94 but the poverty rates have increased marginally.

4. **Urbanization**
Tamil Nadu ranks first in urbanisation among the fifteen major States in the country. According to the 2001 Census, Tamil Nadu has emerged as the State with the highest level of urbanisation (43.86 per cent) in the country, increasing since 1961. 2.72 out of 6.21 crore of the total state population live in urban areas.

Tamil Nadu has a very dispersed pattern of urbanisation with municipalities in virtually every district (excluding Ariyalur and Perambalur). The boundaries of Chennai District are contiguous with the Chennai Municipal Corporation. However, the Chennai Metropolitan Area is a larger area which includes several municipalities and town panchayats in Tiruvallur and Kancheepuram Districts. The spatial distribution (by district) of the six corporations, 104 municipalities, and 611 town panchayats clearly illustrates that urbanization is not limited to anyone part of the State. However the urban population is concentrated along 3 to 4 major urban corridors, namely Chennai – Salem/Erode – Coimbatore; Tiruchi – Madurai – Tirunelveli; Chennai – Cuddalore – Thanjavur and to a lesser extent Tuticorin – Nagercoil.

- **Urbanisation Rate**

  The urbanisation rate marginally improved from about 33 percent in 1981 to 34.2 percent in 1991, but has significantly improved to about 44 percent in 2001. Though the rate of urbanisation has been fairly uniform across districts ranging between 40 percent and 50 percent for a large number of districts there are still wide variations. A large numbers of coastal districts have low rates of urbanisation (below 20 percent) with the exception of Tiruchirapalli (46 percent). Similarly among the southern districts Kanyakumari has a very high rate of 65 percent but Sivaganga and Ramanathapuram have rates 28 percent and 25 percent respectively. Among the inland districts Coimbatore has 66 percent whereas Dharmapuri has only 16 percent.

- **Urban Poverty**

  As of 1999-2000, the proportion of people living below the poverty line estimated for all India stood at 26.10 percent (27.09 in rural areas and 23.62 in urban areas). This proportion in urban Tamil Nadu had been steadily on the decrease from 42.40 in 1973-74 to 39.77 in 1993-94 and further to 22.11 per cent in 1999-2000. The number of poor persons during 1999-2000 is estimated at 49.97 lakh in the urban areas. The factors that have contributed to rapid decline in poverty in the State include effective implementation of several Poverty alleviation schemes. These schemes are providing wage employment or self-employment. The Public distribution system also provides a safety net for the poor. Since 1993-94, the percentage of people below poverty line was higher in urban areas than in rural areas: this increasing incidence is reflected in the accelerated growth of slums in cities and towns.

- **Growth of slum**

  A rapid increase in urban population results in the problems of straining or breaking-down of sanitary facilities and other infrastructure in cities and towns. The local bodies are faced with the responsibility of providing amenities with limited or often scant resources. The net result of this incongruity between the resources and responsibilities not only leads to formation of new slums but also gives new dimensions to the problem of slums.

  Slums are a formidable problem merely because the gap between resources and demand for shelter tends to exist perpetually. The urban poor by themselves can neither afford to build pucca house or spare the hard earned money for stay in rented houses with basic amenities. Such people encroach Government and private lands kept vacant. Many slums are situated in vulnerable locations like river margins, water logged areas, road margins, etc.

  Slum population accounts for 20 percent of the total population in the State. It is well known that the slum huts lack proper basic amenities such as living space, drainage, toilet and other facilities. Ultimately this aggregates the degree of morbidity and mortality among slum population. It is now widely recognized that the Government should only play a role of ‘facilitator’ and creator of ‘enabling’ climate for housing activities instead of being a direct provider of housing units. The Government of Tamil Nadu evolved its Housing Policy (1988) on the lines of the National Housing Policy.

The Tamil Nadu Slum Clearance Board (TNSCB) was constituted during 1970 for the clearance and improvement of slum areas in Tamil Nadu. The activities of the board were initially confined to Chennai city but, subsequently, the activity expanded to other municipalities and town panchayats and currently, TNSCB
almost covers all urban centres of the State. It is estimated that more than 35 percent of the population of Chennai and more than 25 percent of the urban population of the State live in slums. The Tamil Nadu Slum Clearance Board and Public Works Department have jointly identified 33,313 families living on river margins and 8164 slum families squatting on the river beds in Chennai.

- **Water supply**
  An increasing urban population has been creating a huge gap between demand and supply of water every year. The last Census estimated that approximately only 70 percent of urban towns have access to safe drinking water. The minimum per capita supply of water required in urban areas vary from 70 lit/day to 130 lit/day, and this requirement of water supply varies according to the land use classification of the towns. In Tamil Nadu, out of 744 towns (including corporations and municipalities), 145 towns are not fully provided with water supply. The problem of drinking water is more acute in rural and urban town panchayats. 45 out of 370 urban town panchayats and 97 of the 241 rural town panchayats are not fully provided with water supply. About 15 percent of the urban population is yet to be provided access to drinking water, highlighting the fact that the urban water supply in Tamil Nadu is far below the national average. For instance, 86 out of 104 municipalities, all corporations, and 412 out of 611 town panchayats have water supply below the national average of 90 lpcd.

- **Drainage**
  In Tamil Nadu underground drainage system has been provided only in major urban centres, like Salem, the municipal corporations of Chennai, Coimbatore, Tiruchirapalli, Tirunelveli and Madurai. In addition, underground drainage systems have also been constructed in 12 municipalities accounting only for 10 percent of the total municipalities of the State.

- **Sewerage**
  In Tamil Nadu out of the 151 Municipalities and 5 Corporations, only 15 Municipalities and 4 Corporations have partial underground sewerage system. Sewage schemes are under implementation in the municipal towns of Erode, Pallilayam, Bhavani and Komarapalayam and Tiruchirappalli corporation located along river Cauvery under the National River Action Plan. Further, new sewage schemes under the National River Conservation Programme (NRCP) have been taken up in Tiruchirappalli, Madurai, Tirunelveli Corporations and Karur and Inam Karur, Kumbakonam, Thanjavur and Mayiladuthurai Municipalities. During the year 2004-05 a policy decision was taken to provide underground sewerage scheme in the remaining 22 district head quarters towns. Apart from this, underground sewage schemes will also be taken up for the municipal towns in the Chennai metropolitan area. With a view to help people of all categories, especially economically weaker sections and low income groups, a new system called low cost sanitation scheme has been introduced in urban areas. So far 1,57,336 latrines all over the State have been taken up for conversion of dry latrine to flush latrines. Surface drainage is another aspect generally neglected in urban areas.

- **Solid Waste Disposal**
  Solid waste is generated in almost all parts of the urban areas and solid waste management becomes complicated in bigger cities: collection, transportation and disposal are the major operations involved in solid waste management. In most cities and towns, the refuse is dumped in an unsatisfactory and haphazard manner without sanitary land fill. The present generation of garbage in Urban local bodies ranges between 9000-10000 M.T. per day. Collection and segregation of garbage at source is practiced in 70 percent of wards in municipalities in the State. The goal is to achieve 100 percent source segregation, disposal of garbage in a safe manner and thereby making the habitation areas garbage free and also avoid contamination of natural resources. Privatization of Solid Waste Management has been encouraged in all municipalities and corporations. Self Help Groups are also being involved in Solid Waste Management.

- **Urban Industrial Pollution**
In urban areas of Tamil Nadu there are five main industrial complexes, they are Manali/Ennore, RaniPET, Cuddalore, Mettur and Tuticorin which have chemical, petrochemical and other industries. These complexes have also become environmental hotspots. The high influx of population to urban areas, increase in consumption patterns and unplanned urban and industrial development have led to the problem of air pollution. The larger industries have a very high aggregate pollution potential. Also, in many urban centres, industrial units are located in densely populated areas, thereby affecting a large number of people.

5. **Economy**

- **Agriculture**
  Agriculture is the prime mover of the state economy supporting 62 percent of the population and contributing 13 percent of the state income. The Government is aiming to achieve 100% food security in the State and also to create avenue for export of agricultural produce for economic enlistment of the farming community. During the tenth plan period, the State is aiming an annual growth rate of 4% in agriculture and 8% in horticulture crops for sustainable agricultural development, employment generation and poverty alleviation. The Government is focusing its policies towards overall development of agriculture sector in terms of increasing the cropping intensity by bringing every piece of land under cultivation, productivity increase, maximizing natural resources with parallel efforts to conserve them. The agricultural sector relies on improved crop varieties, fertilizers and pesticides to increase production. Indiscriminate use of chemical fertilizers has not only affected the soil structure but has also polluted the surface and ground water.

Tamil Nadu has historically been an agricultural state and is a leading producer of agricultural products in India. In 2008, Tamil Nadu was India's fifth biggest producer of Rice. In terms of production, Tamil Nadu accounts for 10% in fruits (mango and banana are accounting for over 87% of the total fruit production) and 6% in vegetables, in India. The main vegetables grown are tapioca, tomato, onion, brinjal and drumstick. Tamil Nadu is also a leading state in the production of flowers with the total production of horticultural crops standing at Rs. 99.47 Lakhs during 2003-04. The state has 17,000 hectares of land under oil palm cultivation, the second highest in India.

- **Livestock, poultry, and fisheries production**
  Among states in India, Tamil Nadu is one of the leaders in livestock, poultry and fisheries production, having the second largest number of poultry amongst all the states and accounted for 17.7% of the total poultry population in India. In 2003 - 2004, Tamil Nadu had produced 37,836 lakhs of eggs, which was the second highest in India representing 9.37% of the total egg production in the country. With the third longest coastline in India, Tamil Nadu represented 27.54% of the total value of fish and fishery products exported by India in 2006.

- **Industrialization**
  Industrial policy initiatives in the State are designed in the backdrop of the increasing multifaceted globalization of production systems, especially, in terms of technology transfers and development of physical infrastructure for higher growth. Recognising the importance of industry, Tamil Nadu formulated the dynamic New Industrial Policy 2003 and evolved strategies to make the State a leading industrial destination in India. The New Industrial Policy has its focus on optimal use of resources, up-gradation of managerial skills and administrative, technical improvement and modernisation in the fields of manufacturing and infrastructure sectors for higher growth in Tenth Five Year Plan Period. In the Information Technology sector, the State is a leader. Chennai has become a hub of software industry. Besides Information Technology, the State has made strides in automobile sector and is poised to record significant growth in the Textile Sector in view of the abolition of the Textile Quota regime.

Tamil Nadu is at the top in terms of number of factories. It ranked second in providing employment and third in fixed and productive capital, gross value of output and net value added by contributing towards National Income. In terms of number of factories, the percentage share of Tamil Nadu to all India was 15.28 percent, 11.25 percent of employment, 9.56 percent of gross value of output and 8.76 percent of net value added during 2002-03. The industrial growth as measured by the Index of Industrial Production was
encouraging in the State during 2004-05. The performance of industry during the review year showed a spectacular rebound and registered a growth rate of 8.2 percent. The positive growth in all the three subsectors was contributing to a higher industrial growth though electricity clocked at 3.0 percent only. The manufacturing sector having the highest weight in IIP witnessed a growth of 8.7 percent. Since there is a close linkage between agriculture and industry, the growth is mutually reinforcing in each sector. Industrial production at the National level was also at 8.2 percent during 2004-05.

- **Industrial Production**

During the year 2004-05, a disaggregated analysis of manufacturing group of industrial sector at two-digit level shows that as many as 13 sub-groups with a total weight of 69.02 percent had registered a positive growth against eight sub-groups in the previous year of 2003-04. Among them, robust growth rate was exhibited by machinery and equipment other than transport equipment (41.3%). The robust growth rate was displayed by other eight sub groups viz. rubber, plastic, petroleum and coal products (27.3%), basic metals and alloys (17.0%), wool, synthetic and fibre textiles (15.3%), leather products (14.3%), metal products and parts except electrical machinery (12.3%), chemical and chemical products (12.8%), transport equipment and parts (11.9%), beverages, tobacco and tobacco products (11.0%), and moderate growth by four sub-groups viz. non-metallic mineral products (7.6%) paper and paper products (6.5%), other manufacturing industries (4.7%) and food products (4.3%) . However, cotton textiles (-5.2%) and textile products other than mills (-37.4%) witnessed deceleration during the review year.

There are five main industrial complexes in Tamil Nadu: Manali/Ennore, Ranipet. Cuddalore, Mettur and Tuticorin which have chemical, petro-chemical and other industries. There are cement units, distilleries, sugar, sago, paper, dairying, electroplating, chemical and fertilisers (agro-chemicals), mining industries, ores/mineral processing industries and a variety of other industries which are water consuming and also generate large quantities of effluent. Some of the industries have also provided the treated effluent for irrigation with some degree of success. However, other industries, particularly a pulp plant faced serious problems when the effluent used for irrigation contaminates the surrounding wells.

6. **Governance and administration**

The Governor is the Constitutional head of the state while the Chief Minister is the head of the government and the head of the council of ministers. The Chief Justice of the Madras High Court is the head of the judiciary. The present Governor, Chief Minister and the Chief Justice are Surjit Singh Barnala, M. Karunanidhi and Hemant Laxman Gokhale (Transferred to Supreme court) respectively.

The major administrative units of the state constitutes 39 Lok Sabha constituencies, 234 Assembly constituencies, 32 districts, 10 city corporations, 152 municipalities, 611 town panchayats and 12,618 village panchayats.

Tamil Nadu had a bicameral legislature until 1986, when it was replaced with a unicameral legislature, like most other states in India. The term length of the government is 5 years, as is elsewhere in India. The present government run by the DMK led alliance came to power in 2006 and comprises a council of 29 ministers, chaired by the Chief Minister Dr.M.Karunanidhi. Tamil Nadu legislative assembly is chaired by the speaker Mr. R Avudaiappan and is housed at the historical Fort St. George in Chennai. The state had come under the President's rule on four occasions: first from 1976 to 1977, next for a short period in 1980, then from 1988 to 1989 and the latest in 1991.

Tamil Nadu has 10 City Corporations: Chennai, Coimbatore, Madurai, Tiruchirapalli, Salem, Tirunelveli, Erode, Tirupur, Vellore and Thoothukudi. There is a plan to upgrade Tambaram, Nagercoil and Ambattur as City Corporations. The Corporation of Chennai, established in 1688, is the oldest Municipal Corporation not only in India but also in any Commonwealth nations outside United Kingdom.

Tamil Nadu has been a pioneering state of e-Governance initiatives in India. A large part of the government records like land ownership records are digitised and all major offices of the state government like Urban Local Bodies (all the Corporations and Municipal Office activities) revenue collection, land registration offices,
and transport offices have been computerised. Tamil Nadu is one of the states where law and order has been maintained largely successfully.

7. **Districts of Tamil Nadu**

1. Ariviyalur District
2. Chennai District
3. Coimbatore District
4. Cuddalore District
5. Dharmapuri District
6. Dindigul
7. Erode
8. Kanchipuram
9. Kanyakumari
10. Karur
11. Krishnagiri
12. Madurai
13. Nagapattinam
14. Namakkal
15. Nilgiris
16. Perambalur
17. Pudukkottai
18. Ramanathapuram

[Map of Tamil Nadu showing districts]
26. Tirupur
27. Tiruvallur
28. Tiruvannamalai
29. Tiruvarur
30. Vellore
31. Viluppuram
32. Virudhunagar

- **Largest agglomerations of Tamil Nadu (2001 Census)**

<table>
<thead>
<tr>
<th>Metropolitan area</th>
<th>District</th>
<th>Population</th>
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<tbody>
<tr>
<td>1. Chennai</td>
<td>Chennai</td>
<td>6,560,242</td>
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<tr>
<td>2. Coimbatore</td>
<td>Coimbatore</td>
<td>1,461,139</td>
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<tr>
<td>3. Madurai</td>
<td>Madurai</td>
<td>1,203,095</td>
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<td>4. Tiruchirapalli</td>
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<td>866,354</td>
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<td>5. Salem</td>
<td>Salem</td>
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<td>6. Tirupur</td>
<td>Tirupur</td>
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<td>7. Tirunelveli</td>
<td>Tirunelveli</td>
<td>433,352</td>
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<td>8. Erode</td>
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<td>9. Vellore</td>
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<td>386,746</td>
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<td>10. Tuticorin</td>
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<td>11. Thanjavur</td>
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<td>17. Neyveli</td>
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<td>Coimbatore</td>
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<tr>
<td>20. Karaikudi</td>
<td>Sivaganga</td>
<td>125,717</td>
</tr>
</tbody>
</table>

8. **Equitas presence in Tamil Nadu**

- **Chennai**
  
  Chennai, formerly known as Madras, is the capital city of the Indian state of Tamil Nadu, located on the Coromandel Coast of the Bay of Bengal. Chennai is the fourth most populous metropolitan area and the fifth most populous city in India with a population of 4.34 million in the 2001 census within the area administered by the Corporation of Chennai and an extended Metropolitan Population of 6.5 million. The urban agglomeration of metropolitan Chennai has an estimated population over 8.2 million people. Chennai's economy has a broad industrial base in the car, technology, hardware manufacturing, and healthcare industries. The city is India's second largest exporter of software, information technology (IT) and information-technology-enabled services (ITES). A major chunk of India's car manufacturing industry is based in and around the city. Chennai Zone contributes 39 percent of the State's GDP. Chennai accounts for 60 percent of the country's automotive exports.

- **Coimbatore**
  
  Coimbatore is the second largest city next only to Chennai. It is the administrative headquarters of the Coimbatore District and a major textile and engineering hub of South India. It forms a part of the ancient Kongu Nadu region of South India, where its people were the first to establish territorial state. Coimbatore city including its suburban areas has a population of 2.4 million people.
Coimbatore houses a large number of small and medium textile mills. It also has central Textile research institutes. The neighbouring town of Tirupur is home to some of Asia's largest garment manufacturing companies, exporting hosiery clothes worth more than Rs. 50,000 million. The city is the second largest software producer in Tamil Nadu. The software development is set to take an upswing with the launch of TIDEL park and other planned IT parks around the city. The IT industry in Coimbatore is nascent compared to its textile and manufacturing industries. Coimbatore is also emerging as an BPO (Business Process Outsourcing) city, ranked at 17th place among the global outsourcing cities.

- **Erode**
  Erode is a city, an urban agglomeration, a municipal corporation and headquarters of the Erode district in Tamil Nadu. It is situated at the centre of the South Indian Peninsula, on the banks of the rivers Cauvery and Bhavani. It is located on the Western Bank of the river Cauvery, while its Twin City, Pallipalayam, is on the Eastern Bank of the river. Erode is the fastest growing urban region in South India, well known for handloom, power loom textile products and readymade garments and hence it is called Loom City of India. Products such as cotton sarees, bed spreads, carpets, lungies, printed fabrics, towels, dhotis are marketed here in bulk.

- **Kumbakonam**
  Kumbakonam is a town and a special grade municipality in the Thanjavur district in Tamil Nadu. It is located 40 kilometres from Thanjavur and 273 kilometres from Chennai and is the headquarters of the Kumbakonam taluk of Thanjavur district. The town is bounded by two rivers, the Kaveri River to the north and Arasalar River to the south. According to the 2001 census, Kumbakonam has a population of 140,021 and has a strong Hindu majority; but it also has sizeable Muslim and Christian populations. Kumbakonam dates back to the Sangam period and was ruled by the Early Cholas, Pallavas, Medieval Cholas, Later Cholas, Pandyas, the Vijayanagar Empire, Madurai Nayaks, Thanjavur Nayaks and the Thanjavur Marathas. It rose to be a prominent city between the 7th and 9th centuries AD, when it served as a capital of the Medieval Cholas. The town reached the zenith of its prosperity during the British Raj when it was a prominent centre of European education and Hindu culture. In 1866, Kumbakonam was officially constituted as a municipality, which today comprises 45 wards, making it the second largest municipality in Thanjavur district.
  Kumbakonam is known as the "temple town" due to the prevalence of a number of temples here and is noted for its Mahamaham festival which attracts people from all over the globe. The main products are brass, bronze, copper and lead vessels, silk and cotton cloths, pottery, sugar, indigo and rice.

- **Madurai**
  Madurai is the oldest continuously inhabited city in the Indian peninsula. It is an ancient and prestigious city, situated on the banks of the River Vaigai in Madurai district. Madurai is widely known as the Temple City and It is the third largest (was second largest from it's origin till 2001) city in Tamil Nadu. Madurai was the capital city of ancient Southern civilization. Madurai’s cultural heritage goes back 2,500 years, and the city has been an important commercial centre and has conducted trade as far as Rome and Greece since as early as 550 B.C.E. Madurai district houses reputed organizations in the private sector which are engaged in the production of variety of goods such as tyres, industrial rubber products, machinery, textiles, conveyor belts, chemicals etc.

- **Dindigul**
  Dindigul is the 13th largest town in Tamil Nadu. Dindigul is known for its leather tanning Industry. Besides tanning, the city is home to a major textile spinning industry, which ranks second only to Coimbatore in spindle capacity. Another famous manufacturing item from Dindigul is handloom sarees. Particularly in Nagal Nagar area hundreds of Sourashtra community people are doing hand loom sarees manufacturing. Dindigul city is an important wholesale market for onions and groundnuts (peanuts). Panneer Grapes which is a speciality type of black grapes which is specific to Dindigul. Dindigul is primarily an agro-based town of Tamil Nadu. About 70% of the total population earns their livelihood directly or indirectly through agriculture. There are about 165 Rice mills in and around Dindigul.
• Salem
Salem is a city and a corporation in Salem district, located in the north central part of the southernmost state of India.
Salem is a part of the Kongu Nadu, an ancient division of Tamilakam comprising the western Tamil Nadu. Almost completely surrounded by hills, Salem is at the base of the renowned tourist destination of Yercaud hills, which offers breathtaking views both along the ride up the hill and from the peak. There are also remote sites of beauty such as Kiliyur Falls and Kavery peak. Yercaud is at an altitude of 1600 m above mean sea level. The city is surrounded by a natural amphitheater of hills formed by the Nagaramalai to the north, the Jarugumalai to the south, the Kanjamalai to the west, and Godumalai to the east. It is divided by the river Thirumanimuthar in the main division.
Salem is one of the major producers of traditional silver anklets, which are popular among women. It boasts large textile, steel, automotive, poultry and sago industries. Salem also has one of the largest magnetite deposits in India.

• Tiruchirappalli
Tiruchirappalli, also called Tiruchi or Trichy, is the administrative headquarters of Tiruchirapalli District and it is considered as the second capital of Tamil Nadu as the fourth largest Municipal corporation and also the fourth largest urban agglomeration in the state. Trichy is the one of the best sanitized city in India, ranked sixth in the national rating of cities under the National Urban Sanitation Policy. Trichy is the only city from Tamil Nadu to have figured in the top Ten. Situated at a distance of 319 kilometres south of Chennai and 402 kilometres north of Kanyakumari, it is located almost at the geographic centre of the state.

Tiruchirappalli is a prominent industrial and educational hub of central Tamil Nadu.

• Vellore
142 years old municipality of Vellore was crowned as a City Corporation in Tamil Nadu on August 1, 2008 by the present Chief Minister Kalaignar Karunanidhi. It is considered to be one of the oldest surviving cities in South India. The city lies on the banks of the Palar river on the site of Vellore Fort. The city lies between Chennai and Bangalore and the Temple towns of Thiruvannamalai and Tirupati. The city houses one of the best hospitals, colleges, and ancient temples that India has to offer, thus there by gaining the status of an important transit point for travellers, a hub for medical tourism and a major upcoming tourism hot spot. Vellore, an administrative centre is predominantly a market place for its own district and neighbouring districts such as Chittoor District (Andhra Pradesh) and Thiruvannamalai District.
The city, along with its nearby industrial towns has witnessed a consistent industrial growth, followed by the implementation of South Asia's second railway track between Chennai, Royapuram and Walajah, improving the region's industrial activities.

Vellore lies between the IT majors (Chennai & Bangalore) and major pilgrim centres (Tirupathi and Thiruvannamalai). Thousands of men and women from here travel to Chennai and nearby industrial towns everyday for work.
TAMIL NADU WATER RESOURCES

Tamil Nadu accounts for 4 percent of the land area and 6 percent of the population, but only 3 percent of the water resources of the country. Most of Tamil Nadu is located in the rain shadow region of the Western Ghats and hence receives limited rainfall from the south-west monsoon.
Rainfall

The State gets relatively more rainfall during north-east monsoon, especially, in the coastal regions. The normal rainfall in south-west and north-east monsoon is around 322 mm and 470 mm which is lower than the National normal rainfall of 1250 mm. Similarly, the per capita water availability of the State is 800 cubic meters which is lower than the National average of 2300 cubic meters.
• **Surface water resources of Tamil Nadu**

The total surface water potential of the state is 36 km³ or 24864 M cum. There are 17 major river basins in the State with 61 reservoirs and about 41,948 tanks. Of the annual water potential of 46540 million cubic metres (MCM), surface flows account for about half. Most of the surface water has already been tapped, primarily for irrigation which is the largest user. There are about 24 lakh hectares are irrigated by surface water through major, medium and minor schemes. The utilisation of surface water for irrigation is about 90 percent.

• **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 percent of the available recharge, while 8875 MCM (40 percent) 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 percent 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 percent) while eight blocks (2 percent) have turned saline. The water level data reveals that the depth of the wells range from an average of 0.93 metres in Pudukottai district to 43.43 metres in Erode.

According to the Central Groundwater Board, there has been a general decline in groundwater level in 2003 due to the complete de-saturation of shallow aquifers. There has been considerable failure of irrigation wells in Coimbatore District.

**Surface and Ground Water:**

<table>
<thead>
<tr>
<th>SI n°</th>
<th>Major River Basin</th>
<th>Minor River Basin</th>
<th>Water resource potential of the basin (Mcum)</th>
<th>Surface Water</th>
<th>Ground Water</th>
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<tbody>
<tr>
<td>1</td>
<td>Chennai</td>
<td>1. Araniyar</td>
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<td></td>
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<tr>
<td></td>
<td></td>
<td>2. Kosalthalaiyar</td>
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<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>3. Cooum</td>
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<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>4. Adyar</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Palar</td>
<td>5. Palar</td>
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<td>3416</td>
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<tr>
<td>3</td>
<td>Varahanadhi</td>
<td>6. Ongur</td>
<td>545</td>
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<tr>
<td>4</td>
<td>Ponnaiyar</td>
<td>7. Varahanadhi</td>
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<td></td>
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</tr>
<tr>
<td></td>
<td></td>
<td>8. Malattar</td>
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<td></td>
<td>1499</td>
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<td>9. Ponnaiyar</td>
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<tr>
<td></td>
<td></td>
<td>10. Gadilam</td>
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</tr>
<tr>
<td>5</td>
<td>Vellar(n)</td>
<td>11. Vellar(n)</td>
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<td></td>
<td>1021</td>
</tr>
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<td>14. Ambuliyar</td>
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</tr>
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<td></td>
<td></td>
<td>15. Vellar (S)</td>
<td></td>
<td></td>
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</tr>
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<td>8</td>
<td>PAP</td>
<td>16. Parambikulam Basin Complex</td>
<td>866</td>
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<tr>
<td>9</td>
<td>Pambar</td>
<td>17. Koluvanar</td>
<td>551</td>
<td></td>
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<tr>
<td></td>
<td></td>
<td>18. Pambar</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>19. Manimuthar</td>
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<td></td>
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<td>10</td>
<td>Kottakaraiar</td>
<td>20. Kottakaraiar</td>
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<td>398</td>
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<td>11</td>
<td>Vaigai</td>
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<td></td>
<td>760</td>
</tr>
<tr>
<td>12</td>
<td>Gundar</td>
<td>22. Uttarakosaamangai</td>
<td>451</td>
<td>866</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>23. Gundar</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>24. Vembar</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>Vaippar</td>
<td>25. Vaippar</td>
<td>310</td>
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<td>669</td>
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<tr>
<td>14</td>
<td>Kallar</td>
<td>26. Kallar</td>
<td>203</td>
<td></td>
<td>37</td>
</tr>
<tr>
<td></td>
<td></td>
<td>27. Korampallamar</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>15</td>
<td>Tambaraparani</td>
<td>28. Tambaraparani</td>
<td>1706</td>
<td></td>
<td>827</td>
</tr>
</tbody>
</table>
**Water balance**

The annual water potential of the State including surface and groundwater is assessed as 46,540 MCM (1643 TMC) while the estimated demand is 54,395 MCM (1921 TMC) in 2001 which is likely to go up to 57,725 MCM in 2050. The various sectors are: Domestic use (urban and rural) is projected to go up from 4 per cent to 6 per cent due to increase in population and due to urbanisation. The domestic requirement would increase by 55.72 percent; agriculture use will remain stagnant or may even decrease due to progressive urbanisation; the share of industry may not change much, but in absolute terms the increase will be about 27.7 per cent. The provision of 1600 MCM in 2050 would be made for minimum flow in rivers for ecological purpose, which is a new category for water resource planning.

**Irrigation**

Out of a net sown area of 56 lakh hectares, about 30 lakh hectares (54 percent) of arable land are irrigated. Since irrigation may take place more than once, the gross irrigated area is of the order of 36 lakh hectares or an irrigation intensity of 120 percent. Canals account for about 29.2 percent, tanks for 21.3 percent and wells for 48.9 percent of net irrigated area.

Surface irrigation potential has largely been exhausted. Area under canal irrigation has remained almost stagnant since the sixties at about 8.5 lakh hectares. Modernisation of several of the canal system has been taken up under the National Water Management Project and the World Bank funded Water Resources Consolidation Project.

The efficiency of many of the canal systems has declined due to seepage and silting. Irrigation efficiency can be improved through command area development, participatory irrigation management, conjunctive use of surface water and groundwater, introduction of advanced methods of irrigation such as drip and sprinkler systems, and reduction in the wastage of water due to over irrigation.

The area under tank irrigation has fallen by a third from 9 lakh hectares in sixties to 6.3 lakh hectares in 1999-2000. The average net area irrigated by a tank has decreased from 19.2 ha in 1981-82 to 15.1 ha in 1999-2000. The proportion of area irrigated by tanks has fallen from 36.8 percent in the sixties to only 21.3 percent in 1999-2000.

Modernisation of tanks with assistance from the European Economic Commission has been taken up since 1984. Nongovernmental organisations are also involved in implementing the scheme through active participation of water user associations. Wells have become the predominant source of irrigation accounting for nearly half of the irrigated area. The total number of wells has increased from 5.39 lakh in 1970-71 to 16.79 lakh in 1999-2000. During this period, the area irrigated by wells has increased from 9.18 lakh hectares to 14.53 lakh hectares. The number of open wells and dry wells energised was only 42.4 per cent in 1970-71 but increased to 91.1 per cent in 1999-2000, due to the free supply of electricity to farmers. 16,000 wells could not be used due to well failure. The fact that there is well failure is an indicator of the over-extraction of groundwater in certain parts of the State. As mentioned earlier, the groundwater in 138 out of 385 blocks is over-exploited.

**Watershed Management**

Given that 45 percent of the net sown area is not irrigated, it is essential to take up watershed management and in situ water harvesting. There are 19,330 micro-watersheds in the State where watershed development can be taken up. Check dams, percolation ponds, contour banding and other soil and water conservation measures can be implemented. It may also be necessary to take up catchment protection works. Recharge of groundwater is particularly important given the heavy dependence on wells. There are a number of
programmes such as the Drought Prone Area Programme (DPAP), Integrated Watershed Development Programme (IWDP) and the National Watershed Development Programme for Rain-fed Areas (NWDGRA) which provide funding for watershed management.

- **Domestic Sector**
  Although population growth has slowed down, Tamil Nadu is urbanising rapidly. Consequently, the domestic water requirements are projected to increase by more than 50 per cent from 2,222 MCM in 2001 to 3,460 MCM in 2050. Water quality is also becoming a serious concern due to pollution by industrial effluents, sewage, etc. and also due to naturally occurring phenomena. The Government of Tamil Nadu has indicated that water security, i.e. provision of drinking water to the people will be the highest priority of the Government.

- **Rural Water Supply**
  The latest survey in April 2002 indicates that there are 80,421 rural habitations in the State. A habitation is smaller than a village and includes hamlets/clusters of households which have a common water source. A fully covered habitation means that the entire population has access to safe assured drinking water at the level of 40 litres per capita per day (lpcd). The source should be within a distance of 1.6 kilometres of the habitation for plain areas and within an elevation of 100 metres in the case of hilly areas. Partially covered habitations provide potable water but at levels less than 40 lpcd. Non-covered habitations have no potable supply accessible to the habitation. Under this classification of coverage, 28,623 habitations were fully covered, 51,294 partially covered, and 504 habitations had no reliable source.
  The Tamil Nadu Water Supply and Drainage Board (TWADB) has been taking up the no source and partially covered habitations to make them fully covered, paying particular attention to SC/ST habitations.

- **Rural Sanitation**
  The level of sanitation is poor in Tamil Nadu. Less than 15 percent of households have access to toilets. Only 27 percent have drainage facilities, of which only 4 percent have covered drainage. Solid waste collection and disposal is virtually non-existent. The Department of Rural Development has been implementing the 'Restructured Central Rural Sanitation Programme' since 1999. The components include the construction of individual toilets, sanitary complexes for women, school sanitation and rural sanitary marts. They have also initiated the 'Total Sanitation Campaign' in phases in many of the districts of Tamil Nadu. TSC emphasises Information, Education and Communication, Human Resource Development and Capacity Development activities to increase awareness.

- **Industrial Water Use**
  Industrial water demand is projected to increase by 27 percent from 1,555 MCM in 2001 to 1,985 MCM by 2050. Thermal power plants account for the highest proportion of water use. Other industries include chemicals, distilleries, oil refinery, textile dyeing, steel, fertilisers, pharmaceuticals, petrochemicals, paper and pulp, sugar, electroplating etc. Most industries pay a user charge to the Government if they draw water from rivers and lakes. Industries which receive municipal supply pay a water tariff to the concerned local body. Since the availability of water is limited, many industries have themselves adopted conservation and recycling measures. Two industries in Chennai, CPCL and MFL purchase and treat sewage from Metrowater to meet their water requirements.

- **Pressures**
  Water resource is a vulnerable resource and its quality changes because of the following factors:
  1. Deforestation and poor land use practices in the catchment area, which disturb topsoil and vegetative cover resulting in decreased infiltration rates, increased runoff, sediment transport and deposition in rivers and storage reservoirs.
  2. Over abstraction of surface water sources at the upstream reduces the minimum flow required in the downstream sections for the sustenance of ecosystems and mangroves.
  3. Over pumping of groundwater induces saline water intrusion into fresh water aquifer resulting changes in groundwater quality with increased TDS.
4. Water pollution due to discharge of untreated/partially treated industrial and municipal wastewater into water sources depletes dissolved oxygen and affects fish and other aquatic life.
5. Agricultural drainage, which is carrying residues of chemical fertilizers and pesticides, affects the water quality, promoted weed growth and renders the water resources unfit for other uses.
6. Encroachment of agricultural land and water sheds for urbanization and industrial development has impact on wetlands and important watershed areas and affects recharging areas and reservoir capacities.

- Environmental Concerns

As environmental issues are complex in nature, coordinated, interdisciplinary and holistic approach is required for addressing the environmental issues. Key environmental issues that are to be addressed in the water resources project planning as well as in evaluation of the river basins include:

- **Industrial effluent discharge**

There are more than 3,000 industrial units in Tamil Nadu which have been classified under the highly polluting or "red" category. The total effluent generated is about 6 lakh litres per day of which more than 5 lakh litre (85 percent) is generated by large industries. About 400 units discharge directly into rivers. Of particular concern are the nearly 1,000 tanneries which are located in Vellore, Kancheepuram, Dindigul and Erode districts. The effluents have caused serious problems in the Palar basin. Similarly, there are a large number of textile bleaching and dyeing units in Tiruppur, Erode, and Karur, which have contaminated the Noyyal, Amaravathy and other water bodies.

There are five main industrial complexes in Tamil Nadu: Manali/Ennore, Ranipet, Cuddalore, Mettur and Tuticorin which have chemical, petro-chemical and other industries. These complexes have also become environmental hotspots. There are cement units, distilleries, sugar, sago, paper, dairying, electroplating, chemical and fertilisers (agro-chemicals), mining industries, ores/mineral processing industries and a variety of other industries which are water consuming and also generate large quantities of effluent. Some of the industries have also provided the treated effluent for irrigation with some degree of success. However, other industries, particularly a pulp plant faced serious problems when the effluent used for irrigation contaminated the surrounding wells.

All the industries discharging effluents are regulated by the Tamil Nadu Pollution Control Board. They have to meet the effluent standards fixed by the Board. Industries pay a cess based on their water consumption to the Tamil Nadu Pollution Control Board. Most of the industries have constructed effluent treatment plants. In small industrial clusters, although the units are connected to common effluent treatment plants, the level of treatment is often not satisfactory.

- **Surface Water pollution**

Industries cannot be set up within 1 km of a river or water body. However, the effluents often flow through nallahs or open drains and reach the rivers, lakes, etc. Since the river water is used downstream for irrigation or drinking by people and livestock, contamination of the river has increasingly become a serious problem in many of the river basins of the State. River basins like Palar, Tamiraparani, Cauvery, Noyyal, Bhavani and Amaravathy face serious pollution problems due to industrial effluents. Sewage from municipalities and settlements has also increased tremendously due to piped water supply and is contaminating rivers, lakes, tanks, and ground water.

- **Ground Water Pollution**

With greater utilisation of water for industrial and domestic use and also due to the increased use of agricultural chemicals, ground water quality is deteriorating rapidly in the State. Diminished water quality also means that the quantum of fresh water available for particular uses is reduced, or that the water can be used only after treatment. Problems of water quality can be due to natural causes like geological formations or due to sea water intrusion. In the black cotton soil areas of the State, dissolved salts are high and in the coastal areas such as backwaters, estuaries etc. salinity levels are elevated.

Effluents from the leather industry have contaminated the groundwater in the Palar basin and effluents from the textile industry have affected the groundwater in the Noyyal basin. Seawater intrusion has taken place in some coastal areas due to over extraction of groundwater. Excess application of fertilisers and pesticides has
affected groundwater quality in certain pockets and high levels of nitrates are observed in the Western districts.

**Ground water pollution due to various industries:**

<table>
<thead>
<tr>
<th>Sl. n°</th>
<th>District</th>
<th>Study Area</th>
<th>Type of Industry</th>
<th>Intensity of Pollution</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Kancheepuram</td>
<td>Kancheepuram to Irumbulicheri</td>
<td>Tannery and Dyeing</td>
<td>Moderately polluted</td>
</tr>
<tr>
<td>2</td>
<td>Vellore</td>
<td>Ranipet Pernampet Ambut</td>
<td>Tanneries</td>
<td>Highly polluted</td>
</tr>
<tr>
<td>3</td>
<td>Cuddalore</td>
<td>Nellikuppam Moongilthuraipattu Periasevalai</td>
<td>Distillery, Sugar mill</td>
<td>Slightly polluted</td>
</tr>
<tr>
<td>4</td>
<td>Trichy</td>
<td>Senthannerupuram Thiruvalarchipatti</td>
<td>Distillery Tanneries</td>
<td>Moderately polluted highly polluted</td>
</tr>
<tr>
<td>5</td>
<td>Karur</td>
<td>Punjaipugalur</td>
<td>Distillery</td>
<td>Moderately polluted</td>
</tr>
<tr>
<td>6</td>
<td>Salem</td>
<td>Mettur</td>
<td>Chemicals</td>
<td>Slightly polluted</td>
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<td>7</td>
<td>Coimbatore</td>
<td>Sirumugai</td>
<td>Viscose factory</td>
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<td>8</td>
<td>Erode</td>
<td>Appakudal</td>
<td>Sugar mill</td>
<td>Highly polluted</td>
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<td>9</td>
<td>Dharmapuri</td>
<td>Palacode Marikkampalli Moornampalli Belathur</td>
<td>Sugarmill Chemicals Chemicals Cotton mills</td>
<td>Moderately Polluted</td>
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<td>Madurai</td>
<td>Pettai Irumbadi Avanipuram</td>
<td>Chemicals Chemicals Sewage</td>
<td>Not affected Slightly affected</td>
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<td>Ariyanayagipuram Vikramasingapuram</td>
<td>Paper mill Cotton mill</td>
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</table>

- **Catchment degradation**
  In a catchment without trees, 80 to 95% of the rainwater flows as run off and erodes surface soil. In the catchment area of most of river basin intensive farming activities are taking place. Such farming operations and deforestation have exposed the topsoil, and resulted change in runoff pattern and soil erosion affecting the reservoirs with heavy siltation. Naturally occurring fluoride is a serious problem particularly in the Western districts of the State. Uncontrolled grazing and movement of thousands of cattle is the most damaging activity in the catchment area, which disturbs the stability of the topsoil and leads to accelerated soil erosion.

- **Siltation in Rivers and Reservoirs**
  The problem of siltation in reservoirs has become alarming, since the silt deposited in the reservoirs or tanks decreases the capacity of the reservoirs thereby reduces the utility of them for various purposes. The studies on the sedimentation problems carried out in 33 reservoirs in Tamil Nadu reveal that there is a loss in capacity of more than 50% in two reservoirs (Kundha and Glenmorgan), and more than 30% capacity loss in 8 reservoirs. Further, the rates of sedimentation per annum in 33 reservoirs in terms of percentage of the capacity of reservoir and are as follows:
  - <0.5% of the capacity per annum in 22 reservoirs
  - 0.5 to 1% of the capacity per annum in 4 reservoirs
  - to 2% of the capacity per annum in 4 reservoirs
  - 2.0% of the capacity per annum in 3 reservoirs
• **Excessive surface and ground water abstraction**

Excess abstraction of water for domestic and industrial supply and agricultural uses without proper planning and priorities will adversely affect the surface water. The ground water table is being depleted year after year due to the failure of monsoon, inadequate recharge of the aquifers and excessive pumping of water from the wells over and above the annual recharge into the aquifers. In coastal aquifers the excessive pumping also causes saline water intrusion towards fresh water aquifer, and mixing of saline water with fresh water. This process of saline water intrusion is irreversible and causes the degradation of the quality of ground water with high concentration of TDS and mineral like chlorides and renders the ground water unsuitable for the purposes for which they were serving.¹

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### Key environmental issues in different river basins:

<table>
<thead>
<tr>
<th>Name of river basin</th>
<th>Catchment degradation</th>
<th>Siltation in river</th>
<th>Excessive surface water extraction</th>
<th>Sea water intrusion due to excess extraction</th>
<th>Municipal sewage pollution</th>
<th>Industrial effluent pollution</th>
<th>Weed Growth</th>
<th>Water logging &amp; salinity</th>
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- Severe + Moderate ○ Insignificant

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