

Environment Profile for Tiruvarur District

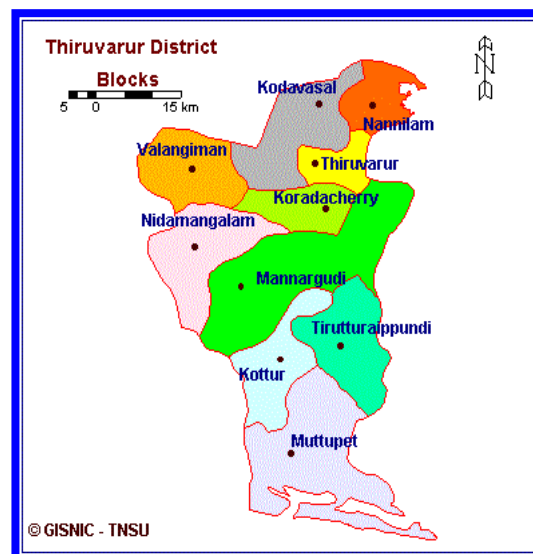
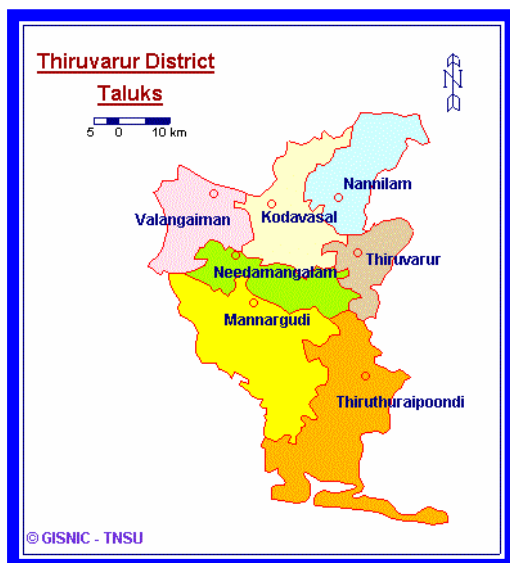
AIMS Research, Chennai – 600 018.

Directorate of Environment, GTN.

CONTENTS

Chapter No.	Particulars	Page No.
1.0	The Context	01
2.0	Background	02
2.1	Geographical Location of the District	02
2.2	Administrative Arrangement in the District	03
2.3	Meteorological Information	03
2.4	Demographic Details	03
2.4.1	Population	03
2.4.2	Trend in Birth/Death Rate and Infant Mortality Rate	04
2.4.3	Literacy level among the population	05
3.0	Resources-Availability, Use and Environmental Status	06
3.1	Land Resources	06
3.1.1	Agriculture and Horticulture	06
3.1.2	Forest Resources	08
3.1.3	Mineral Resources	10
3.2	Water Resources	10
3.2.1	Rivers, Canals and Waterways	10
3.2.2	River Basins and their Catchment Areas	10
3.2.3	Fisheries Production	11
3.3	Heritage Resources	11
3.4	Energy Resources	12
4.0	Infrastructure	14
4.1	Urbanisation	14
4.1.1	Urbanisation Pattern	14
4.1.2	Density of Population	14
4.1.3	Decadal Growth rate in urban centres	15
4.1.4	Urban Slum Population	15
4.1.5	Trend in Urbanisation and Slums	15
4.2	Infrastructure Services and Environmental Status	16
4.2.1	Occupied Housing units	16
4.2.2	Urban Services	16

Chapter No.	Particulars	Page No.
	4.2.3 Domestic waste water generation and treatment	16
	4.2.4 Municipal Solid Waste Generation	16
	4.2.5 Composition of Solid Waste	16
	4.2.6 Coverage of Problem Villages	16
	4.2.7 Reported cases of water borne diseases	16
	4.2.8 Facilities under Indian system of Medicines	17
	4.2.9 Population below poverty line	17
4.3	Transportation	17
	4.3.1 Development of Roads, Bridges	17
	4.3.2 Growth of Vehicle population	17
4.4	Industrial Development and Environmental Status	17
	4.4.1 Number of Industries	17
	4.4.2 Emission Inventory of Major Industries	18
	4.4.3 Air pollution stressed area	18
	4.4.4 Ambient Air Quality Status	18
	4.4.5 Water quality	18
	4.4.6 Discharge of Industrial effluents	18
	4.4.7 Noise levels	18
4.5	Environmental Status of Coastal Eco-system	18
	4.5.1 Industrial Sewage discharge in the coastal waters	18
	4.5.2 Aqua Culture activities	18
	4.5.3 Wetland Habitats, their use and problems	19
	4.5.4 Potential Hot Spots along the East Coast	19
	4.5.5 Trade, Commerce and Export	19
5.0	Environmental Institutions	20
	5.1 Environmental Education and Research Institutions	20
	5.2 Environmental NGOs	20
6.0	Summary of Observations	21



Chapter

1

1.0 The Context

The **Department of Environment (DoE)** is the nodal department for dealing with environmental management of the State. The State has been endowed with multitude of natural resources, judicious management of, which is essential for sustainable development in all sectors. Effective resources management calls for an in-depth assessment of their existing conditions and trends. A cursory evaluation of the present status of our environment and natural resources including land, soil, water, air and the life support systems like forests, rivers, coastal areas indicate that the health of such systems are threatened by serious levels of degradation. Though different Government Departments / Agencies are responsible for management of resources under their jurisdiction, information relating to the individual sector lie fragmented.

To manage the environment in a holistic manner and to develop an environment friendly sustainable development perspective, it becomes necessary to identify the gaps in the present management of resource bases. Such intervention would be realistic only if there is a strong database with data collected from the primary/secondary sources, compiled and presented in the form of district environment profiles. Thus the **AIMS Research (A Joint Venture of TCW/ICICI, IDBI and ICICI)** - the country's leading Consultancy and research organisation has been engaged for the preparation of such a report. This report will form the basis for developing **District level Environmental Management Plans** that will spell out specific action programs to be implemented by local / state institutions. This Report provides a brief account of the manner in which the **District** has been prepared and presented.

To achieve certain degree of uniformity in the presentation of Environmental data in the districts, it is considered necessary that certain forms are adopted for collection and presentation of the relevant data besides interpretations of the data thus collected. Accordingly the data compiled in the prescribed formats have been synthesised and presented in the following chapters.

Chapter

2

2.0 Background

Tiruvarur District forms part of eastern coastal plain of Tamilnadu State. The district is surrounded on north and east by newly carved out district of **Nagapattinam** on the south by Palk-Strait and on the west by its parent district i.e. Thanjavur. The administrative headquarters of this district is located at **Tiruvarur**. The bifurcation of this district was done in the year 1997. Main language spoken in the district is Tamil. The district has a good network of roads and metre gauge railway lines. The Brahmotsavam in Panguni and the Adi Pooram are two festivals celebrated annually in the temple of **Thygarajasamy** in Tiruvarur. Of the major festivals organised/celebrated in the district mention may be made of Skandha Sashti, Valli Kalyanam, Thirukarthigai, Navarathri, Avani Moolam, and Thula Uthsavam, which attracts thousands of devotees.

2.1 Geographical Location of the District

Nagapattinam and Thanjavur districts form the northern boundary of the Tiruvarur District. Part of the north-eastern boundary of the district also falls on the Pondicherry. Thanjavur district also forms the western and southern boundaries, as the Nagapattinam District constitutes the eastern boundary. The District lies between 10.40' and 11.02' North Longitude and 79.4' and 79.8' East longitude. The general geological information of the district is simple and flat. The Cauvery and its offshoots are the principal rivers. All along the course of Cauvery and its distributaries, on both the banks numerous narrow strips of river porombokes lands called Padugais that are cut up by countless patta lands. These strips ranging in width from about 3 metres to 100 meters are made up of bits of lands. Even though the Padugais and Poromboke lands are very dry they are very fertile. Flood banks of Cauvery and its distributaries are away from the watercourses in the upper reaches where the river is wide and closer in the lower reaches and the river become narrow gradually. The terrain is an open plain, sloping towards the east and devoid of any hills. In south and Southwest of Thanjavur the country rises and forms a small plateau known as Vallam table land, broken by small ridges of grits and sandstone's. A number of rivers are draining the district. Most of the rivers flow to the east into the Bay of Bengal. The most important feature of the division is the Cauvery River spread over with its numerous branches.

Tiruvarur District is made up the 6 Taluks of Tiruvarur, Nannilam, Kodavasal, Mannargudi, Nidamangalam and Tiruthuraiipoondi. The district is the most part of a flat plain, slopping very gently to the sea on the east. The total geographical area of the district is about 2,811.36 Sq. Km. The details of the Taluks and their respective area in Sq. Km. are given in the following table:

No.	Name of Taluks	Area in Sq.Km.
1	Tiruvarur	192.35
2	Nannilam	244.91
3	Kodavasal	480.00
4	Mannargudi	784.92
5	Nidamangalam	344.98
6	Tiruthuraiipoondi	764.20
	District Total	2811.36

The Community Development Blocks of the district comprises the blocks of Tiruvarur, Tiruthuraipoondi, Muttupet, Mdukkur, Kottur, Mannargudi, Nidamangalam, Koratacheri, Kodavasal, and Nannilam. Being the deltaic region of Cauvery River, the district consists of vast flat alluvial plain of unending paddy fields, interspersing with rich groves of mango, coconut and other trees. No hills or hillocks are found in this district. Bamboo's are common in the deltaic region. This district has no forest area of any commercial value other than the teak plantations artificially raised along the canals.

2.2 Administrative Arrangement in the District

Tiruvarur District comprises 6 Taluks, 9 Blocks and 513 Villages. As regards the hierarchy of administrative arrangement, there are 4 Municipalities, 6 Town Panchayats and 379 Village Panchayats in the District. The details regarding the number of blocks, villages, village Panchayats, town Panchayats and municipalities with regard to each taluk are given in Table: 1.

2.3 Meteorological Information

Temperature: The average maximum temperature for the division (from 1991 to 1996) as a whole is about 32.46°C and the average minimum temperature is 24.75°C. (The maximum temperature reaches as high as 39.40°C and the minimum falls to 20.30°C)

Wind: Dust Storms, whirl winds and dusty winds blow from various quarters towards the end of May. The Southwest winds sets in during April is strongest in June and continues till September. Northeast monsoon starts during the month of October and blow till January. Cyclonic storm with varying wind velocity affects once in 3 or 4 years during the month of November-December. Both these storms affect the plantation crop. During Southwest monsoon the air is calm and undisturbed.

Rainfall: The district recorded on average annual rainfall of 1306.38 mm spread over 53 rainy days. The Northeast monsoon, which starts in October and ends in December, contributes about 60% of the total annual rainfall. The Southwest monsoon rains from June to September and summer rains from March to May accounts equally for the rest of the annual rainfall. The monthly average rainfall in the district is worked out and it is 108.87 mm.

Cyclone: Cyclonic storm havoc's normally once in 3 or 4 years and heavy downpour during Northeast monsoon leads to flooding of the district and damages field crops and wealth of soil. The average number of rainy days, mean maximum temperature, mean minimum temperature and mean relative humidity for the period 1991-96 are given in Table No: 2.

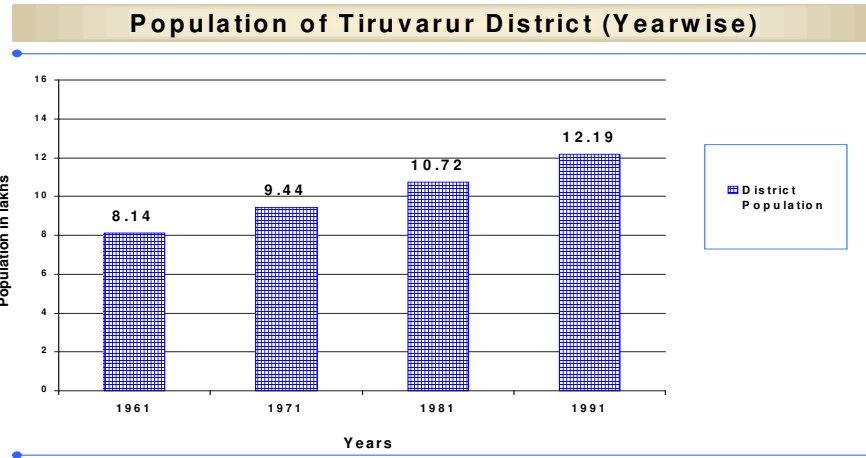
2.4 Demographic Details

The Growth of population over the past four decades and the essential characteristics of the population in terms of birth rate, death rate, infant mortality rate and literacy level are dealt under this section (Ref.: Table Nos. 3,4 & 5).

2.4.1 Population

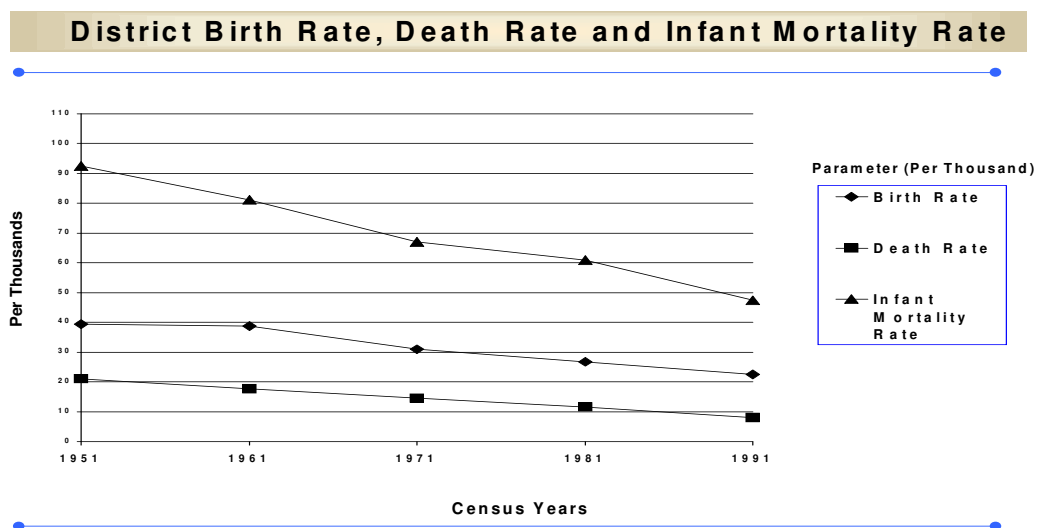
The population of Tiruvarur District has grown from 8,13,667 in 1961 to 12,18,986 in 1991. The growth rate indicates that there has been a significant increase during the 1981-91 decade with the average growth rate being 13.71%. The growth rate has however stabilised over the past two decades 1961-1971 and 1971-1981 at about 16.01% and 13.58% respectively. According to the 1991 census, Tiruthuraipoondi taluk is the most thickly populated and

Needamangalam taluk is the least populated in the district. The details of population growth along with the Growth Rate-taluk wise are given in Table No: 3.



2.4.2 Trend in Birth/Death Rate and Infant Mortality Rate

There has been a steady decline in Birth Rate, Death Rate and Infant Mortality Rate over the past four decades in the district. The Birth Rate has gone down from 39.50 in 1951 to 22.50 in 1991 (figures - per thousand) and the Death Rate from 21.0 in 1951 to 7.99 in 1991 (figures - per thousand). The infant mortality rate has also gone down from 92.50 in 1951 to 47.50 in 1991 (figures - per thousand). The details of Birth rate, Death rate and Infant mortality rate over the past four decades are given in Table No: 4.



2.4.3 Literacy Level among the Population

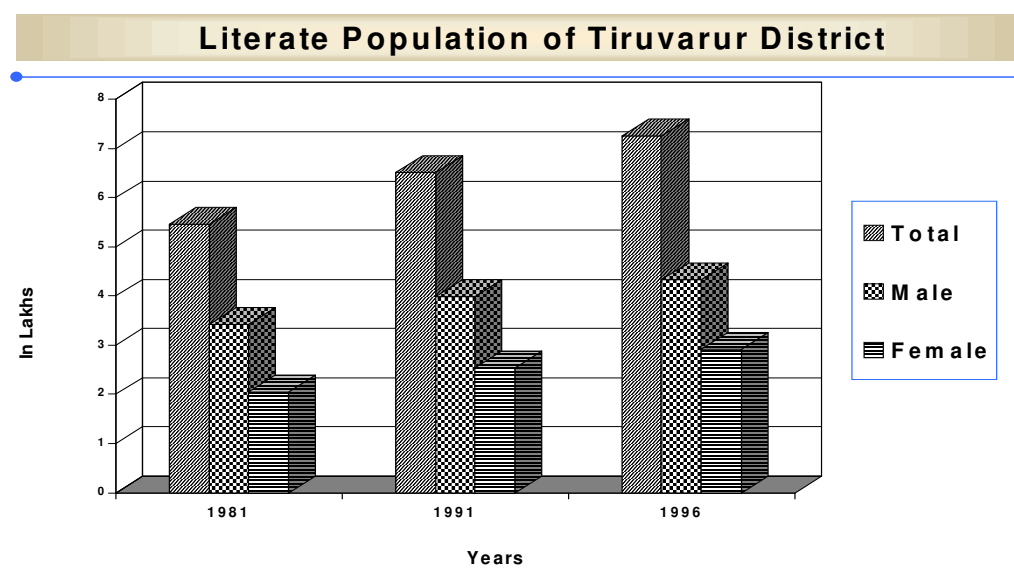
The literacy level of Tiruvarur district according to figures available for the year 1996 is 54.99% with male literacy level being more than the female literacy level. It is also observed while the male literacy level has grown steadily from 63.44% in 1981 to 64.67% in 1996, there has been a significant increase of female literacy level from 38.51% in 1981 to 45.01% in 1996. The information on literacy level of the district is given in Table No: 5.

Education

The following table gives the type and number of educational institutions that are available in the urban centres of this district.

Name of the towns	Educational Institutions	PL / RR ⁺
Koothanallur	Higher Secondary / Intermediate School (1), Secondary / Matriculation School (1), Junior Secondary and Middle Schools (3)	PL : 1
Mannargudi	Arts and Science College (1), Higher Secondary/Intermediate Schools (3), Secondary / Matriculation Schools (3), Junior Secondary and Middle Schools (5), Primary Schools (18)	PL : 2 RR : 3
Muthupet	Higher Secondary / Intermediate Schools (2), Secondary / Matriculation Schools (2), Junior Secondary and Middle Schools (2), Primary Schools (4)	PL : 1 RR : 1
Nidamangalam	Higher Secondary School (1), Secondary / Matriculation School (1), Junior Secondary and Middle Schools (2), Primary Schools (3)	PL : 1
Tiruvarur	Arts and Science College (1), Higher Secondary / Intermediate Schools (2), Secondary / Matriculation Schools (4), Junior Secondary and Middle Schools (10), Primary Schools (18)	PL : 1
Tiruthuraiipoondi	Higher Secondary / Intermediate Schools (2), Secondary / Matriculation Schools (2), Junior Secondary and Middle Schools (3), Primary Schools (7)	PL : 1

PL/RR⁺ - Public Library / Reading Rooms



Chapter

3

3.0 Resources – Availability, Use and Environmental Status

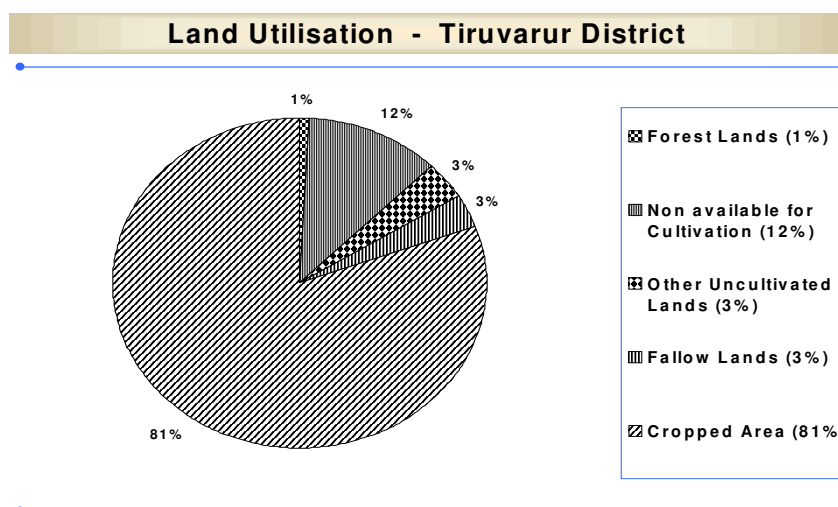
3.1 Land Resources

Resources of the district, their availability, use and environmental status is discussed in the following chapters.

3.1.1 Agriculture and Horticulture

i. Land Utilisation

Tiruvarur district abounds in green paddy fields, tall coconut groves, vast gardens of mango and plantain tree and other verdant vegetations. Paddy is the main crop of this district and it is grown three times in a year. The first crop is known as 'Kuruvai' (the short-term crop) with duration of three and half to four months from June - July to October - November. The second crop called the 'Thaladi' has duration of five to six months from October - November to February-March. Third is the 'Samba' (the long term) crop and has duration of almost six months from August to January. Other cereal crops of the district are cumbu, ragi, maize, korra and varagu. The pulses grown in the district are redgram, greengram and blackgram. Other food crops are condiments and species, sugar cane, fruits and vegetables. Among non-food crops, cotton/fibre, edible oil crops (groundnut, gingelly and coconuts) non-edible oils crops (castor, miger seeds, though in very small area) are the important ones. The total geographical area of the district was 2,811.36 Sq. Km. in 1995-96. Cropped area accounts for 80.50% of the total area. Forest cover is very minimum accounting for only about 0.87% of the total area. However this figure seems to be at variance with the reported extent of forest area by the forest department. A significant portion of the land falls under the category of 'non available for cultivation' and 'fallow lands'. The land utilisation pattern in Tiruvarur District (Block-wise) is given in Table No: 6.



ii. Trend in Production and Productivity of Important Crops

Cereals, pulses and oil seeds are the three important crops produced in the district. The production of cereals, pulses and oil seeds fluctuate for the past five years (1991-96). The reason for the fluctuation could be using rotation of crops seasonally. The details on the productivity performance in relation to Cereals, Pulses and Oil Seeds for the past 5 years are given in Table No: 7. The trend in consumption of fertilisers and pesticides was high but the production trend fluctuated for the past few years.

iii. Horticultural and Plantation Crops

Fruits and Vegetables are cultivated in the district. During the 1996-97 period, total area of Fruits and Vegetables cultivated in the district were 3143 ha. Plantation crops were cropped in the district to an extent of 1392 ha. Nurseries and Vegetable forms are available. It is feasible to have vegetable forms for brinjal, tomato, ladies finger, snake guard, bitter guards, beans, cluster beans, etc and nursery for seedlings of coconut, bamboo's, casuarina, teak (Refer Table: 8)

iv. Consumption of Fertilisers and Pesticides

54,748 metric tonnes of Chemical Fertilisers were used in 1995-96, out of which more than a half is constituted with Nitrogenous fertilisers. There has also been an intensive use of Bio-fertilisers in each block of the district, followed by overall Pesticides. 17,980 metric tonnes of Urea and 2,46,902 pockets of Bio-fertilisers were used in 1995-96. Among Pesticides, the Powder variety was more popular with 5,30,976 kilos being consumed in 1995-96 and 31,218 litres of Liquid Pesticides were used. The details on consumption fertilisers and pesticides are given in Table No: 9.

v. Trend in consumption of Fertilisers and Pesticides

The usage of Chemical Fertiliser has increased from 53,741 tonnes to 54,748 tonnes during the past 5 years. In a general manner, the consumption pattern of fertilisers & bio-fertilisers indicates that there is a steady increase in the usage of chemical fertilisers except in 1995-96. Both the Powder and the Liquid varieties of Pesticides fluctuate in their consumption over the past 5 years. The details with regard to the trends in the consumption of fertilisers and pesticides over the past 5 years are given in Table No: 10.

vi. Soil Types

Since the district is represented by Cauvery Deltaic Zone, sandy coastal alluvium is the predominant soil type in this district accounting for 56.78% and other types of soil cover 43.22% of the total area. The details are given in Table No: 11.

vii. Soil Problems

About 3.49% of the land available for Cultivation suffer from Salinity/Alkalinity and another 56.21% are prone to floods. About 7.09% of the land is water logging and marshy land. As the district is irrigated to a larger extent by extensive canal system of Cauvery basin, problems associated with floods and excess water seepage result in more areas getting affected by flooding or water logging. About 17.69% of the land are sandy, desert/coastal. The details in this regard are given in Table No: 12.

viii. Status of Soil and Water Conservation Programs

Statistical information about construction of new wells and construction of check dams/stop dams have been indicated to be nil. (Refer Table No: 13).

3.1.2 Forest Resources

The forests in the Thanjavur Forest Division which comprise Tiruvarur also can be divided into three regions from the topography, and flora point of view. They are 1) The Alluvial Regions or Riverine Land areas. The areas on the banks of river and canal in the form of narrow strips. Teak plantations mostly cover these areas and wherever the soil is unsuitable for teak, Sisso, Arjun and Eucalyptus have been planted in such areas.

The Lateritic region: This region contains mostly thorny scrub jungles, tropical thorn forests and Tropical dry evergreen forests.

The Coastal regions: This zone contains the Causurina plantations, the mangrove scrub, mangrove forest and the Southern Thorn scrub jungle. The entire stretch of coastal mangroves with lagoons and back waters lying along the coast falls in the category.

i. Forest Area

The Thanjavur Forest Division is spread over the entire undivided Thanjavur district, now trifurcated Thanjavur, Tiruvarur and Nagapattinam districts. Likewise management of the Vedaraniyam Swamp forest constituting the Point Calimere Sanctuary and the Muthupet Mangrove areas are vested with wild life warden Nagapattinam. There are 18 forest areas in Tiruvarur District constituting a total area of 13,625.38 (136.25 Sq. Km) hectares. 11 areas fall under the Reserve Forest category with 12556.78 (125.56 Sq. Km) hectares and 5 under reserved land with 158.6 (1.58 Sq. Km.) hectares. 2 nos. of blocks are categorised as unclassified forests. The details regarding the classification of forest area of their extent are given in Table No: 14a.

ii. Green cover classification of forest

In composite Thanjavur district comprising of Thanjavur Forest Division, total area of forest is 19971 ha. Dense and Sparse forest are 2079 and 4947 ha. respectively. There is no grass land in the region. Degraded forest area cover is 9567 ha. in Thanjavur division. The given figures are composite figure of Thanjavur, Tiruvarur and Nagapattinam districts (Table. 14b).

iii. Trend in Per Capita Forest Area

There is no change in Forest Area over the past 15 years [13625.38 ha]. The per capita forest area has shown a steady decline from 0.017 ha in 1961 to 0.010 ha in 1996 due to the steady increase in population. The details are given in Table. 15.

iv. Man Made Forest Plantations

The Man Made Forest Plantations have been extended to the irrigated canals and padugai lands besides the existing forest areas in Tiruvarur district. About 12,074.40 Ha. of Man Made Forest Area is available in the district which is predominantly Teak Plantation covering 10,231 Ha., and followed by Fuel Wood, Soft Wood, Neem, Tamarind other man made forest plantations, Casuarina and Cashew Nut are in 595.2 Ha., 422.00 Ha., 472.00 Ha., 197.10 Ha., and 157.10 Ha. respectively. At the outside forest area, strip plantations are in 77 ha. Necessary details are given in Table No: 16.

The Thanjavur Forest Division contains extensive plantation of teak, sometimes mixed with Sisoo, Bamboo, Eucalyptus and Arjun in the river and canal banks. They form a network of plantations along the canal bank area distributed throughout the forest division. The extent of such areas under canal bank plantation teak has been raised as the principal species. Wherever soil is not suitable, sisoo has been planted. These have been raised as avenue plantation as well as compact block plantation. Teak has been raised in Thanjavur forest division since 1956 and at present there is 29694.67 ha. of linear area under the teak plantation. (Composite district)

Casuarina equisetifolia “Forst (family casuarinaceae) trade name as Beat wood and in Tamil known as Savukku. Casuarina is exotic to mainland of India. It was first introduced in the Karwar coast in 1668. However it occurs naturally in the Andamans, Bangladesh and Burma Coast. Casuarina grows best on loose, fine coastal sand where its roots have access to ground water. It is fast growing, light demanding species. Casuarina makes excellent fuel and is considered to be the best firewood in the world. It is used for poles, scaffolding transmission poles and rafters. A rotation of 6 years is followed.

v. Details of Villages Abutting Forest Area

There are several fisherman settlements located in the taluk of Tiruthuraipoondi which abut forest areas of the district. The details regarding the villages abutting the forest area and population figures are not available.

vi. Tribal Villages

There is no designated tribal villages in the district.

vii. Forestry Area Diverted for Non Forestry Purposes

There has been no forestry area diverted for non-forestry purpose in the district (Refer Table No: 18).

viii. Conservation of Biological Resources, Wild life Census, Rare / Threatened Species of Flora and Fauna

Uhayamarthandapuram Birds Sanctuary:

There is a sanctuary including Bird Sanctuary at Tiruthuraipoondi Taluk in Tiruvarur District over a extent of 46 ha. of water spread area. Wild life census in Tiruvarur district (Composite districts of Tiruvarur and Nagapattinam) indicates that 2043 animals are in the Point Calimere Sanctuary. There has been a conscious effort by the district administration to conserve rare/threatened species of Flora and Fauna.

Point Calimere sanctuary nurtures, interallia, a variety of rare and endangered animals in abundance. Mammals available in the district are Black buck, Bonnet macaque, Black naped hare, Fruit bats, Spotted deer, Civet cat, mangoose, Dolphins, Wild boar, Jackal and Semi wild ponies.

Prominent bird species protected in Udayamarthandapuram birds sanctuary are little cormorant, darter, spoonbill, Indian reef heron, grey heron, white necked egret, pond heron, etc. The best season is November to February. Necessary information is furnished in Table No. 19, 20 & 21.

Vaduvor Birds Sanctuary is also located in Tiruvarur district. Total area of wild life

sanctuary is 128 ha. Best season to visit the sanctuary is November to February.

Animals: The herbivores such as the porcupine, hare nibble the young seedlings of the miscellaneous species in the forest areas.

Noxious plants: Species of Dendrophthe and Viscum are found to occur as semi-parasites on many trees. Teak is seen very often harbouring the growth of cuscuta over its top portion of trunk. Mangrove species growth is adversely affected by Cassytha filliformis, Cuscuta reflexa and viscum species. Acacia intsia, Pterolobium indicum and Deris trifoliata can be seen as aggressive climbers in the forest areas.

Rare Endangered Species: Rare vulnerable endangered species possibly extinct in the district are Rhyncosia Velutina and Santapava madurensis.

Rare Endangered Animals: Mugger or Crocodylus paulistris are rare to be seen in the large water bodies abutting forest area. Endangered Marine Turtle prefer nesting at certain coastal stretches of the district.

ix. Animal Husbandry

Animal Husbandry could not keep pace with the development works undertaken in the field of latest agricultural techniques and so the district cannot boast of any special breed of cattle and the indigenous cattle still continue to be of poor quality. Of late, cattle development has taken place through setting up of an intensive cattle development project. Apart from the cattle and buffaloes, goats, sheep and pigs are other important livestock found in the district.

3.1.3 Mineral Resources:

There have been no Mineral Reserves that have been proved to be available in the district as reported by the concerned agency (Refer Table No: 22).

3.2 Water Resources

3.2.1 Rivers, Canals & Waterways

The river Cauvery and its tributaries are the main rivers of the district. The bounteous Cauvery is considered to be the best of the rivers that drain in southern peninsula of India. It flows through Mysore, Dharmapuri, Salem, Erode, Tiruchirappalli and Thanjavur districts covering a distance of about 770 kms. draining an area of about 72,800 Sq. Kms. in all. Springing from a spot lying on Brahman Giri mountain of western ghat at a height of 1,320 mt above sea level, it meanders it's way across Karnataka and Tamilnadu not only showering economic prosperity on millions of people but also has earned a niche of itself in their lives, in the historical, cultural and religious realm.

3.2.2 River Basins and their Catchment areas

i) Catchment areas

Vettar, Odambegiar, Kaduvaiyar, Pandavayar and Vellayar are the minor basins in Tiruvarur district. The place of origins, total length and length within the district and area of the basin in sq.km. are given in Table No. 23.

ii) Basin-wise status of the ground water availability.

Statistical information about basin-wise status of the ground water availability for the Cauvery basin is made available only for composite Nagapattinam district comprising bifurcated Tiruvarur district (Table No.24).

iii) Details of Dams and Reservoirs

There is no dam or reservoir available in the district (Table No.25).

iv) Irrigation by Different Sources

The main sources of irrigation in Tiruvarur district are Canals, Tanks and Wells. Tanks and Wells are not used in some blocks for irrigation in the district. The total area irrigated by canals, tanks, wells and other sources is 1,46,245 Hectares. The gross area irrigated by canals, tanks and wells are 97,867 Ha. 7,250 Ha. and 1,374 Hectares respectively. Therefore canal irrigation constituting 66.99% of the total cropped area remains the predominant source of irrigation. On an average about 64.62% of the total cropped area is irrigated. All blocks are achieving about 60% except Muthupet block. The block wise details on water spread area and irrigated area by different sources are given in Table No: 26 & 27.

v) Incidence of Drought, Flood and Cyclone

There are 6 Taluks and 9 Blocks in the district. Information on this head is very scarce. However it has been ascertained from the available information that all the 6 Taluks and 9 Blocks were affected by Flood during the year 1991-92 and affected by Cyclone during the year 1993-94. The details on flood and cyclone are given in Table No: 28.

3.2.3 Fisheries Production

This district has a coastal line of 40 kms. Marine fishing is practised in 6 coastal villages of the district. The fish production has fluctuated in quantity and value has increased steadily from 1991 to 1996 (Refer Table No: 29).

i. General Fish Seed Production

The Fish Seed production was 10545 Thousands Standard Fry and the highest production was in the year 1993-94. However in the period of 1991-93, there was no fish seed production in this district. The district has good fishing potential in view of its rich coastal area. The coastal fish production is more than inland fish production and the production have increased steadily in the coastal area but it has fluctuations in the inland area. As regards fish seed production, there has been a significant reduction from 1993-96. The details on fish and fish seed production are given in Table No: 30.

3.3 Heritage Resources**i. Protected and Conserved Monuments**

There is no protected monument maintained by the State Archaeology department or ASI, Govt. of India in the district (Refer Table No: 31).

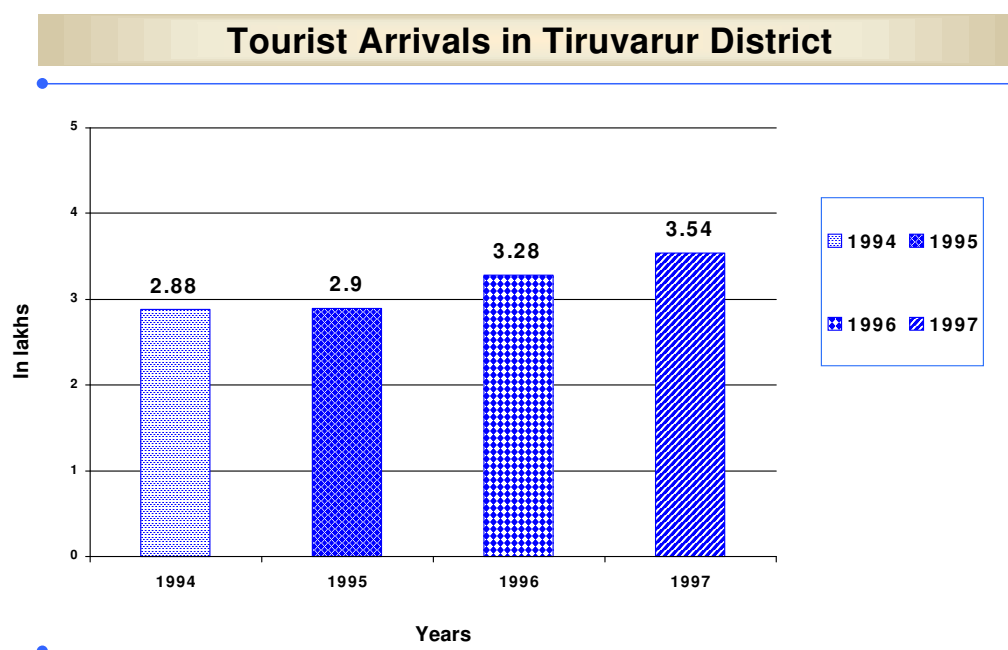
ii. Places of Tourist Attraction

Sri Thyagarajaswamy temple at Tiruvarur dedicated to Lord Siva dates back to pre-historic days. It is the second biggest shrine. As Sri Sambandai and Appa have sung about the deity, this temple can be presumed to be in existence even in the 7th century AD. This is one of the 'Panch Boothe' (five elements) 'Sthalam' and is famous as the seat of the 'Prithvi' (earth) Lingam. The three giants of Carnatic music namely Sri Thyagaraja, Sri Syama Sastry and Sri Muthuswamy Deekshitar were all born at Tiruvarur. This is one of the well-known shrines of South India and covers an area of 30 acres. The main structure consist of a pagoda; three prakaram, 1,008 stone pillars, four sanctum and six mandapas. Sri Thyagarajaswamy and his

consort Sri Kammalambal, Sri Vanmiganathai with his consort, Nilothpalambal are the principal deities of the temple. The Moolavur, Sri Vamikanthan is a Swayambu Lingam. The Brahmotsavam in Panguni and the Adi Pooram are the two important festivals celebrated annually.

Tiruvarur is a place for the musical Trinity and most of the South Indian musicians are connected with it in one way or the other. The wooden car of Tiruvarur is the biggest of all the temple cars in the state. Historical importance of Tiruvarur lies in the legend of Manu Chola's just judgement of death of his only son, for killing a calf by driving his chariot over the calf.

Muthupet and Udayamarthandapuram are the other main tourist spots in Tiruvarur district. The special significance of area is Lagoon and Bird Sanctuary. The two tourist spots are visited from August to March. Tourist Arrivals of domestic and foreign visitors have been steadily increasing. These two tourist spots are also included in the tourist circuits identified by the Tourism Department (Refer Table No: 32 & 33).



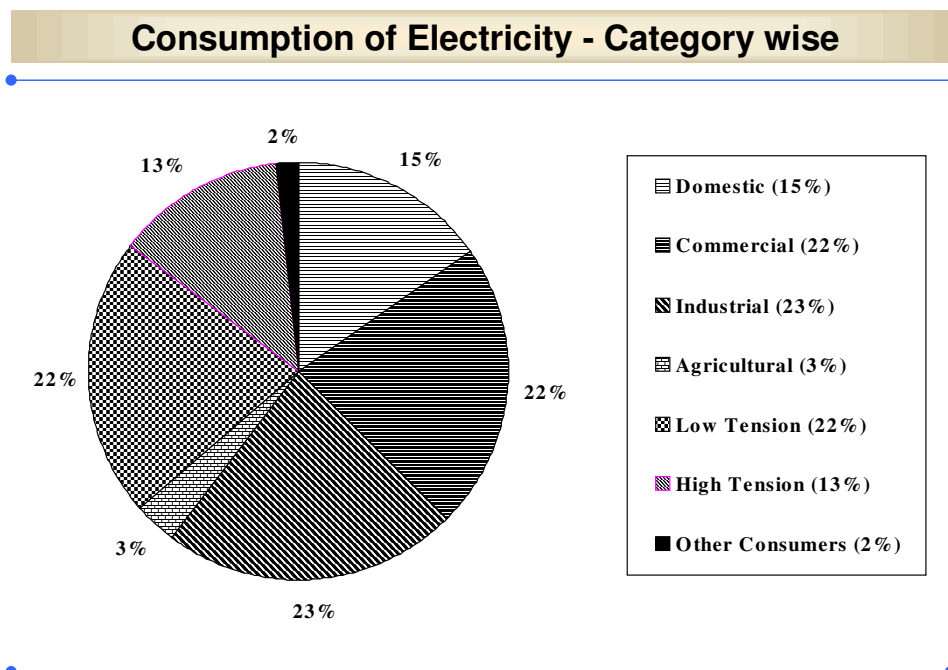
3.4 Energy Resources

i. Installed Power Projects

30 MW gas based Kovilkalappal Thermal Power Project is coming up through TNEB in this district (Refer Table No: 34).

ii. Consumption of Electricity

There were 44,769 electrical connections with a total consumption of 3,92,81,410 KWH as on 1995-96. Commercial and Industrial types have the maximum consumers accounting for nearly 45%(22.22% and 22.8% respectively) of the total consumption, followed by Low-Tension (LT) type (21.7%). The category wise consumption of electricity is given in Table No: 35.



iii. Electrification of Villages

The Tiruvarur district has achieved 100% electrification prior to 1986. All 513 villages in the district are electrified. The number of pump connections has increased in 4 Taluks and decreased in two Taluks over the past 15 years. The status on electrification of the energised pumps is given in Table No: 36.

iv. Non Conventional & Renewable Energy Sources Utilisation

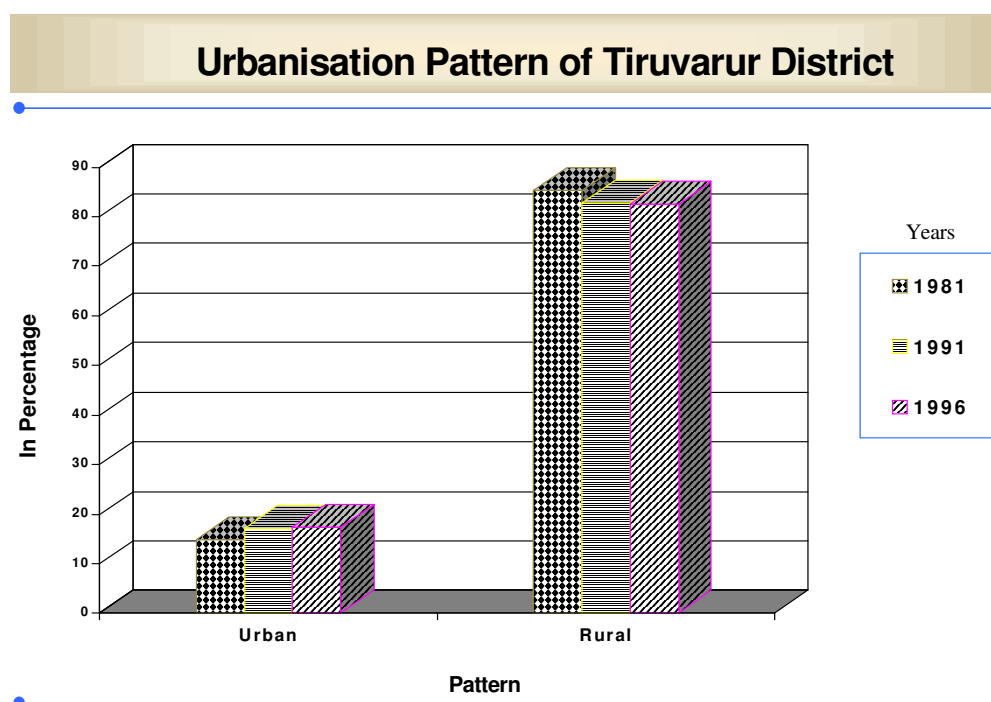
Bio-gas is the only method of non-conventional energy utilised in the district. The bio-gas plants are however able to generate 86.65% of there installed capacity of power. The details are given in Table No: 37.

Chapter

4

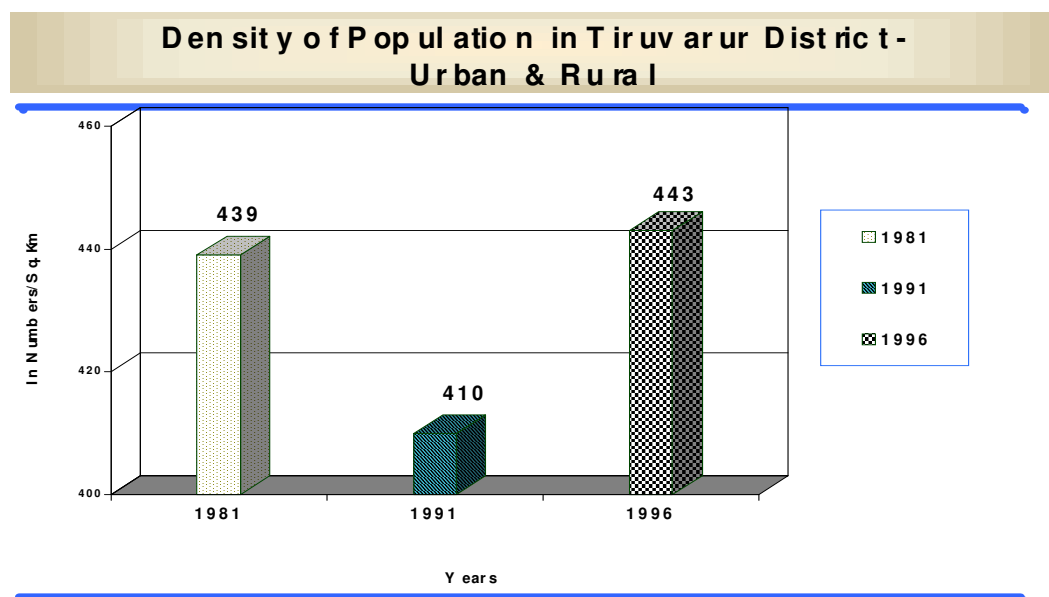
4.0 Infrastructure**4.1 Urbanisation****4.1.1 Urbanisation pattern**

The proportion of urban population to total population has increased during 1981-91 from 14.79% to 17.22% and is estimated at about 17.39% during 1996. Among the urban areas, municipalities account for a greater share of urban population when compared to the other urban areas. The proportion of Rural Population to Total Population has decreased from 85.21% to 82.61% during the years 1981-1996. The urbanisation pattern of the district is given in Table No: 38a & 38b.

**4.1.2 Density of Population**

The overall density of the district has increased from 439 persons / Sq. Km. in 1981 to 443 persons/Sq. Km. in 1996. The density in urban area has increased from 2,578 persons/Sq. Km. in 1981 to 2,918 persons/ Sq. Km. in 1996 and the density of rural area

has decreased from 384 persons/ Sq. Km. in 1981 to 376 persons/ Sq. Km. in 1996. The details on density are given in Table No. 39.



4.1.3 Decadal Growth rate in urban centres

The decadal growth rates in all Municipal Towns have increased from 1961 to 1996. The population of the district has grown from 8.14 Lakhs in 1961 to 13.20 Lakhs in 1996. The decadal growth rate indicates that there is a considerable growth in both urban and rural areas of the district. Mannargudi has registered the maximum growth rate and Koothanallur has the minimum growth rate among the Municipalities. The details of decadal growth rate are given in Table No: 40. The Decennial growth rate for both Urban population over the past three decades from 1961 to 1991 has been shown in Table No 41.

4.1.4 Urban Slum Population

There has been a steady increase in the percentage of slum population to total population from 1991 to 1996. The total population has marginally decreased from 34.05% in 1991 to 34.04% in 1996 in view of several poverty alleviation programmes undertaken by the Government. Tiruvarur has the maximum number of Slum Population (19,324 persons) and Koothanallur has the minimum number of Slum Population (7,328 persons) in 1991 among the Municipalities. No information is available for Town Panchayats. Necessary details are given in Table No: 42a & 42b.

4.1.5 Trend in urbanisation and slums

The trend in Urbanisation in Slums indicates that though the urban population has increased, the percentage of slum population to the urban population has increased only

marginally from 24.49% in 1981-91 to 24.53% in 1991-96. The percentage of urban population to total population has a fluctuation and the percentage of slum population to total population has increased marginally from 4.22 in 1981-91 to 4.27 in 1991-96. The trend in urbanisation in the slum is given in Table No: 43.

4.2 Infrastructure Services and Environmental Status

4.2.1 Occupied Housing units

The information for occupied housing unit by water supply system with piped water and toilet installation by rural and urban in the district has not been available (Refer Table No: 44).

4.2.2 Urban Services

A quantum of 121.25 lakhs liters of protected water supply is made in the district. The average per-capita water supply is around 47.33 LPCD for the district. The Municipalities of Tiruvarur, Mannargudi and Koothanallur have the highest per-capita consumption of 55 LPCD each, while the Town Panchayat of Muthupet has 50 LPCD. In terms of population covered, the Municipality of Tiruvarur registers at the maximum 82% and among the Town Panchayats Muthupet registers the lowered of 82.5%. Details on water supply services are given in Table No: 45a & 45b.

4.2.3 Domestic waste water generation and treatment

The estimated sewage generation is 81.04 Lakh liters/day among municipalities and 31.40 Lakh liters/day among Town Panchayats. The district does not have any treatment plant and hence there is no organised disposal of sewage. Nature of disposal and quantity through river water is 81.04 Lakh liters/day in Municipalities and 31.40 Lakh liters/day in Town Panchayats. The district also lacks underground drainage system. The details on domestic wastewater generation and treatment in the district are given in Table: 46a & 46b.

4.2.4 Municipal Solid Waste Generation

The solid waste generation is highest in Mannargudi among municipalities and in Muthupet among town Panchayats. Overall the solid waste generated adds up to 31 tonnes with a collection efficiency of 72.51% with a manpower of 129 for Solid waste management. The availability of compost yards is four in municipalities (Table No. 47a & 47b).

4.2.5 Composition of Solid Waste

Compostable mater covers 75% of the total compositions other compositions like Rags, Wooden matter, etc. cover 25% in Tiruvarur District (Refer Table No: 48).

4.2.6 Coverage of Problem Villages

It has been identified that about 1,063 settlements out of the total 1,674 settlements in the district have had problems with regard to supply of Drinking Water. However 611 problem settlements have been covered during the VII Five Year Plan (1987-92) and 149 settlements covered during the VIII Five Year (1992-97). Necessary details are given in Table No: 49.

4.2.7 Reported cases of water borne diseases

Gastro-enteritis and Dysentery are the most commonly reported water borne diseases in the district. Incidence of Gastro-enteritis has been very high during 1994-95. Cases of

Cholera and Jaundice were also reported in the district. Deaths of Gastro-enteritis are reported from 1985 to 1996. The maximum deaths of 100 were reported during the year 1992-93 due to gastro-enteritis. Deaths of Jaundice were also reported during the year 1991-93. The details on the reported cases of water borne diseases are given in Table 50.

4.2.8 Facilities under Indian system of Medicines

Allopathic is the most commonly practised system of medicine in the district and facilities for medical education is also available. In addition, there are a few Siddha and one Homeopathy Hospital available but other systems of medicines are totally absent. The details on the facilities available under Indian Systems of Medicines in the district are given in Table No: 51.

Name of the towns	Medical Institutions	With number of Beds
Kootheranallur	Hospital (1)	12
Mannargudi	Hospital (1)	132
	Dispensary (1)	-
	TB Clinic (1)	-
	Others (2)	-
Muthupet	Hospital (1)	10
Nidamangalam	Health Centre (1)	-
Tiruvarur	Hospital (1)	91
	Nursing Home (4)	-
	TB Clinics	-
Tiruthuraipoondi	Hospital (2)	84

4.2.9 Population below poverty line

In Tiruvarur district no. of families below poverty line is 122954 (Refer Table No: 52).

4.3 Transportation

4.3.1 Development of Roads, Bridges

The composite Nagapattinam district has 43 Km length of State highways, 395 Km of Major district roads and 783 km of other district roads as on 1996. There are no National Highways in the district. There are 46 major bridges and 6,740 minor bridges and culverts in the district. Relevant information is provided in Table No: 53.

4.3.2 Growth of Vehicle population

There has been a significant increase of two, three and four wheeler vehicles in the district over the past 15 years. The details on the growth of vehicle population are given in Table No: 54.

4.4 Industrial Development and Environmental Status

4.4.1 Number of Industries

There are 490 industrial units situated in the composite Thanjavur district, of which, 4 sugar units, 1 petroleum refinery, 1 distillery, 1 thermal power plant are coming under highly polluting industry. There are no major polluting industries in the district except the two Sugar industries.

The district has been a flourishing centre of cottage industries. Mats made of korai, screw pine, palm and coconut leaves are much in demand. The mat weaving is spread over in a number of places, but the superior varieties of mats are made in Mudukkur. The district is also famous for safety matches. The district is equally well known for its pith articles consisting of beautiful models of Hindu idols, temples, mosques, flower garlands, bouquets, parrots etc. Pith is grown on the beds of tanks in Mannargudi. Tiruvarur is

known for the manufacture of musical instruments of Jack wood like the Veena, Tambura, Violin, Mridangam and Kanjara. The details on the number of industries are given in Table No: 55.

4.4.2 Emission Inventory of Major Industries

Thiru Arooran Sugar has been identified to have highest emission level in terms of SPM (157.3 $\mu\text{g}/\text{m}^3$), SO (2.7 $\mu\text{g}/\text{m}^3$), NO (11.6 $\mu\text{g}/\text{m}^3$) while the emission rates of CO and HC are nil. However the industries of the district are found to be having the emission rates under the set standards. Increase of vehicles may increase air pollution in urban area (Refer Table No: 56).

4.4.3 Air pollution stressed area

Major air pollution sources in the district are located in two villages, Vadapathimangalam (Tiruvarur Taluk) and Keeranur (Nannilam Taluk) (Refer Table 57).

4.4.4 Ambient Air quality Status

As per the ambient air quality status is concerned, the average industrial SPM, SO, NOX and CO values recorded near an industrial unit are found to be well within the limits in the district (Refer Table No: 58).

4.4.5 Water quality

Sea water intrusion is one of the causes for ground water quality deterioration. In several places along the coast either the ground water is naturally saline or it is artificially made saline by over extraction and consequent intrusion of seawater into the land aquifers. The area mainly affected from seawater intrusion into the land aquifers are east of Tiruvarur District. However specific information was not available for Water Quality in Tiruvarur District.

Under MINAR's Scheme, TNPCB is monitoring the quality of water from 16 places of Cauvery River bed. As per the test, the quality of water is normal. In Kollidam, sampling station falling within the composite Nagapattinam district, TDS and Chloride content of water is exceeding the standard value, because of more water evaporation and influence of backwater. pH of water is slightly more than the standard. Disposal of sewage and drainage water into the Cauvery river is the main cause affecting biological quality of water (Table No: 59).

4.4.6 Discharge of Industrial effluents

Information was not available for discharge of industry effluents in river basin/other water bodies as there are very few highly polluting category of industries in this district (Refer Table No: 60).

4.4.7 Noise levels

Noise level at proposed project site Kovilkalappal in Tiruvarur district is within the ambient noise standards. Noise levels details are given in Table No: 61.

4.5 Environmental Status of Coastal Eco-system

4.5.1 Industrial sewage discharge in the coastal waters

There are no major industrial/ sewage discharges in the coastal waters in the district. No urban centre is located in the coastal area (Refer Table No: 62).

4.5.2 Aqua culture activities

Prawn culture and shrimp farming are done in coastal districts of Chengalpattu,

Cuddalore, Thanjavur, Nagapattinam, Tiruvarur, Pudukottai, Ramanathapuram, Tutukudi and Kanyakumari. There are about 1200 such aquaculture farms in Tamilnadu. The effluents let out of these farms containing bio-degradable wastes are not properly treated in many cases and hence pollute groundwater in adjoining areas, even upto a distance of 6 km. affecting agriculture. Added to this, a majority of the prawn farms have been flouting environmental guidelines by discharging untreated effluents into the neighbouring “Poromboke” lands.

There are about 22 Aquaculture units, which are conventional units in the district occupying an area of about 76 hectares. The estimate on wastewater generation from these units is not available (Table No: 63).

4.5.3 Wetland Habitats, their use and problems

Mangrove wetlands, the fragile but dynamic ecotone found between land and sea on tropical and subtropical coastlines, are an important ecological asset and an invaluable economic resource to the coastal communities. They act as a barrier against cyclonic storms, restrict the inland entry of saline water during storm surges and act as a buffer against floods, thereby averting soil erosion in the coastal zone. Besides, they provide habitats for wildlife ranging from migratory birds to estuarine crocodiles. Information was not available for water habitats, their use and problems though siltation is considered as one of the issues concerning wetland management. (Table No: 64).

4.5.4 Potential Hot Spots along the coast

Muthupet is the only Potential Hot Spot along the coast in the district. Various changes have been occurring in the physical features of the shoreline bordering mangroves. The shoreline is undergoing severe erosion. If this rate of erosion continues, mangroves will soon be exposed directly to the sea, where the wave action is high. This may result in the uprooting of trees that are exposed to high wave energy. Regeneration will be adversely affected as the waves wash away the seeds. In Muthupet, the tidal water flow into the mangrove wetland becomes less, leading to increased salinity of the stagnant water due to evaporation. Less than optimal environmental conditions such as these result in loss of bio-diversity (Table No: 65).

4.5.5 Trade, Commerce and Export

The table given below provides information on most important commodity manufactured, exported from and imported in the towns of this district. It also indicate the number of banks available therein:

Name of the towns	Most Important commodities			Banks
	Manufactured	Exported	Imported	
Kuttanallur	-	Paddy	-	4
Mannargudi	Safety Matches, Handloom, Cloth	Safety Matches, Handloom, Cloth	-	8
Muthupet	Coir	-	Coconut	3
Nidamangalam	-	Paddy	-	2
Tiruvarur	Homeopathic medicines	Paddy	-	12
Tiruthuraiipoondi	Safety matches	Paddy	Provisions	6

Chapter**5****5.0 Environmental Institutions****5.1 Environmental Education and Research Institutions**

There is no Environmental Education and Research Institution located in the district (Refer Table No. 66).

5.2 Environmental NGOs

NGOs are not functioning in this district, however 7 NGOs are working in the Nagapattinam District and these NGOs are also plays the major role in both the Districts. (Refer Table No. 67).

Chapter**6****6.0 Summary of Observations**

The key observations of the Environmental Profile of Tiruvarur District are briefed below:

Demography

1. During the decade 1981-91 there has been an increase of about 0.2% per annum in the growth of population.
2. The Literacy Rate in Tiruvarur District has marginally increased. Especially the percentage of Female Literacy has significantly increased for the past 15 years.

Land Resources

1. The use of Chemical Fertilisers and Pesticides has increased and the use of Bio-Fertilisers and Pesticides had fluctuations.
2. Sandy coastal alluvium (56.8%) is the predominant the soil type of Tiruvarur District.
3. No new construction of wells and check dam is done in the district for irrigation purposes.

Forest Resources

1. The Forest area in Tiruvarur district is only 0.87% of the total area. Littoral swamp, mangrove and mangrove scrubs are the forest types. The per-capita forest area has shown a steady decreasing trend. The man made forest plantations have been raised along the canal banks besides the existing forest area in the district.
2. Conservation of biological resources like, botanical garden, zoological park and bird sanctuary is to be strengthened by the district administration, as there are few measures of action.
3. Canals are the main sources for irrigation in the district and about 66.90% of the total Cropped Areas are irrigated from these sources. A few blocks do not have Tanks and Wells as sources of irrigation.
4. The district has good fishing potential in the coastal line of 40 km. The fish production has increased in values and has fluctuations in quantity over the years.

Urbanisation

1. Urbanisation process in Tiruvarur district has been taking place at a higher rate. But the infrastructure development particularly drinking Water, Electricity, Public Convenience, drainage, approach Roads and Health Centre are not increased at the pace of urbanisation.

-
2. There is an increase in urban slum population in Tiruvarur district for the past five years.
 3. There has been no much improvement of urban services particularly sewerage and Solid Waste Management in the district.
 4. Gastro-enteritis and Dysentery are the most commonly reported water borne diseases.

Transportation

1. There has been a significant growth of two, three and four wheeled vehicles in the district over the ten years, thus resulting in an increased quantity of the emission of suspended air particles and other gaseous pollutants in urban areas.

Industrial Development

1. The district has Red, Orange and Green categories of Industries. These categories are identified by TNPCB. Only few Red category industries are located in the district. Therefore, pollution due to industries is very minimal in the district.

Environmental Institution

1. There is no environmental education institute in the district of Tiruvarur.
2. NGOs are not functioning in this district, however 7 NGOs are working in the Nagapattinam district.
3. Participative planning for Environment Management, Creation of a Management Information System, Environment Management Training to officers of the stake-holding government departments would go a long way in the environment planning efforts of the **Directorate of Environment, Government of Tamil Nadu** in fulfilling its corporate objectives.

1.
