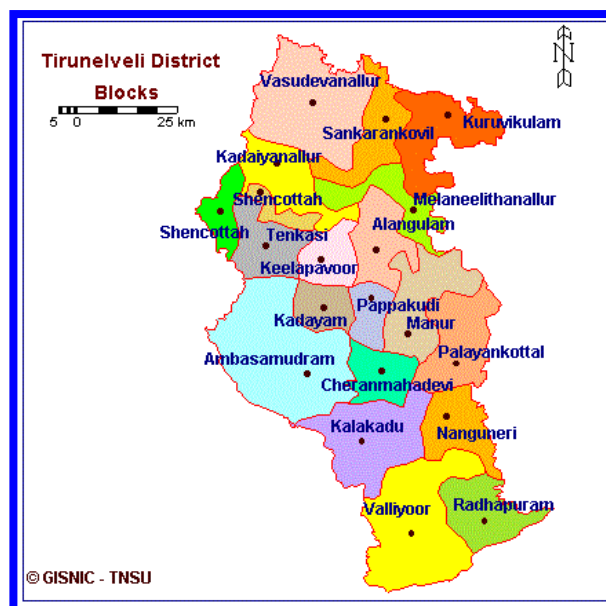
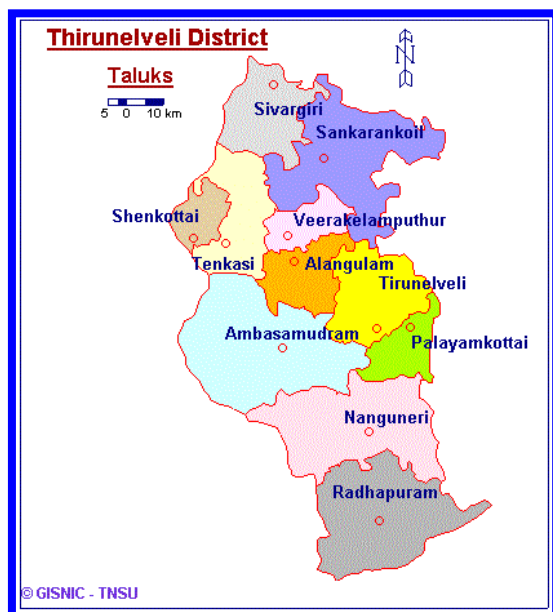


Environment Profile for Tirunelveli District



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 will ensure sustainable development in v–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 indicates that the health of such systems is 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 lies fragmented.

To manage the environment in a holistic manner and to develop the environment friendly sustainable development perspective, it becomes necessary to identify the gaps in the present management of resource bases. Such intervention would be realistic when data collected from the primary/secondary sources, compiled and presented in the form of

district environment profiles, provide a strong database. Thus the **AIMS Research (A Joint Venture of TCW/ICICI, IDBI and ICICI)** – a leading consultancy and research organisation has been engaged for the preparation of such a report. The report will form the basis for developing **Environmental Management Plans at District level and** this 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 Environment Profile for Tirunelveli 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

2.1 Location and Area

Tirunelveli, the name has been composed from the three Tamil words i.e. "Thiru-Nel-Veli" i.e. "Scared paddy Hedge". This district is fertile on account of the river Tambaraparni. In most parts of Tirunelveli district, paddy is the main (cultivation) crop. On the whole the district looks green always. The district is bounded on the north by Virudhunagar district, on the east by Tuticorin district, and Travancore areas of Kerala State and Kanyakumari district on the west. The Gulf of Mannar bound the southern side. In the west, hills of the Western Ghats ranging from 1000 to 2000 metres form the dominant boundary.

2.2 History

The history of this district is bound up with that of the Pandya just like Madurai and Ramanathapuram areas. Even earlier, a pre-historic race is said to have occupied this land. During the later half of the 18th century, the East India Company was frequently at war with the Poligars on behalf of the Carnatic Nawab in Tirunelveli and Madurai. With the fall of Tippu in 1799, British concentrated their force in the south and suppressed the Poligars. At about this time, the Nawab of Carnatic became powerless and left the management of

the territory to the British. The Nawab was pensioned off and the management of the revenues of Tirunelveli was made over to the British in 1801 under a treaty. Thus the British rule started which lasted till 1947. Before the establishment of British rule, the Portuguese and Dutch have occupied Thoothukudi and other port areas. After the British rule began in 1801, Swaraj movement was started and a number of prominent persons of this district fought against the British and clamoured for independence of the country. In the year 1986 the district was divided into two parts namely Tirunelveli - and Tuticorin vide State Government Notification G.O. Ms.No.1314 dated 27-9-86. Main languages spoken in the district are Tamil and Telugu.

2.3 Geography and Physical Features

The prominent hills are part of the Western Ghats and form the boundary between Kerala State and this district on the western side. The western ghats run to length of about 160 km. in the district starting from the north-western part in Sankarankoil Taluk and ending at about 15 km. from Kanyakumari. Valuable trees are found in the Western Ghats. The western ghats lie on the western part of Sankarankoil, Tenkasi and Ambasamudram taluks. Nearer the border of Tenkasi and Ambasamudram taluks, the ghats widen forming undulating hills, broad valleys and extensive plateau. The height of the hills diminished considerably near Sengottah and permits communication by road and rail to places in Kerala through the Sengottah pass. Besides this, a portion of the range lie on the southern part of Ambasamudram taluk and in the western and southern portion of Nanguneri taluk, it diminishes in height at Aramboly permitting road communication with Kanyakumari. The hills of the Western Ghats have valuable trees, which are being exploited for commercial purposes. The conspicuous among the hills are kallakadai Mottai (5721feet) above Sivagiri, Kottaimalai (6335 feet) over Puliyangudi and Kuliratti (5876 feet) near Kadayanallur Krishnapuram. Tambraparni River rises in the Agasthiyamalai (Pothigai hills) of the Western Ghats and descends to the plains at Papanasam in Ambasamudram taluk. The height of the Agasthiyamalai is 6132 feet and is considered as the seat of the Saint Agasthiyar who was conducting research in Tamil language.

2.3.1 Geographical Location of the District

Tirunelveli district is bounded by Virudhunagar district in the North, Kerala State and Kanyakumari district in the West, Gulf of Mannar in the South and Tuticorin district in the East. The district lies between 8° 10' and 9° 40' north latitude and 77° 21' and 77° 99' east longitude. The general geographical formation of the district is hill area. Tamiraparani River and Chittar River are flowing in the district and they will be dry during the summer season. The total geographical area of the district is about 681657 sq.km. The district is divided into 19 blocks. The name of the taluks and area has shown in the following Table:

S.No.	Name of Taluks	Area in Sq. Km.
1	Ambasamudram	1910.60
2	Senkottah	162.54
3	Sivagiri	371.62
4	Sankarankoil	714.81
5	Radhapuram	642.55
6	Tirunelveli	264.79
7	Nanguneri	1311.74

8	Palayamkotti	440.94
9	Tenkasi	996.98
	District Total Area	6816.57

2.4 Administrative Arrangement in the District

The Tirunelveli district comprises 9 taluks, 19 blocks and 1717 villages. As regards the hierarchy of administrative arrangement, there are 1 corporation, 6 municipalities, 37 Town Panchayats and 424 village panchayats in the district. The community development blocks are Vasudevanallur, Sankarankovil, Kuruvikulam, Melaneelithanallur, Shencottai, Tenkasi, Alangulam, Keelapavoor, Kadaiyanallur, Manur, PalayamKottai, Ambasamudram, Kadayam, Pappakudi, Cherenmahadevi, Nanguneri, Kalakadu, Radhapuram and Valliyoor. The details regarding the number of blocks, villages, village panchayats, town panchayats and municipalities with regard to each taluk are given in Table No. 1.

2.5 Meteorological Information

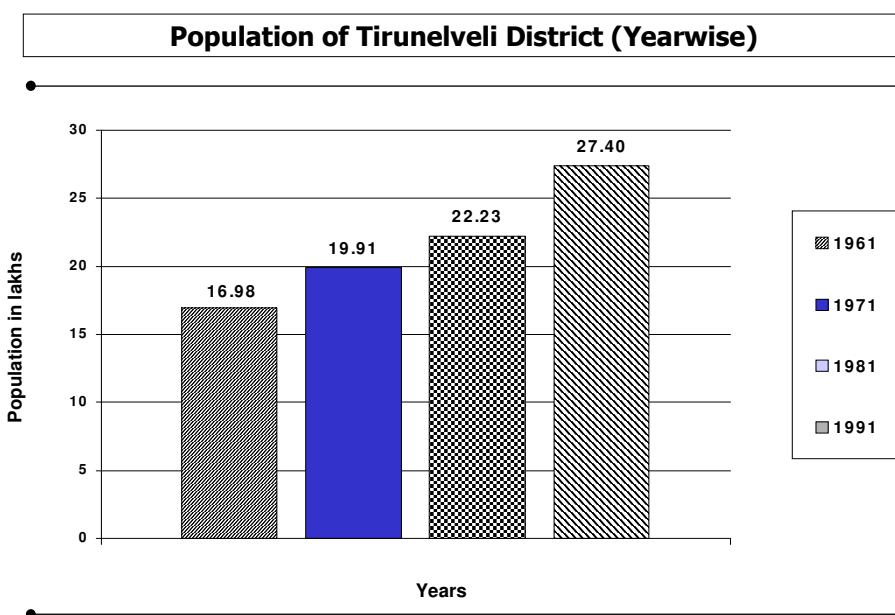
The monthly average rainfall in the district was 57.23mm during the year 1991-96. The district receives a rainfall which is more than the annual average rainfall in the months of May, October, November and December. This is due to NorthEast and Southeast monsoons. The average maximum and the average minimum temperatures have been 31.88(c) in May and 23.82(c) in January respectively. The average number of rainy days, mean maximum temperature, mean minimum temperature and mean relative humidity for the period 1991-96 are given in the Table 2.

2.6 Demographic Details

The growth of population over the past four decades and the essential characteristics of the population for the past few decades in terms of birth rate, death rate, infant mortality rate and literacy level are given in Table Nos. 3,4,5.

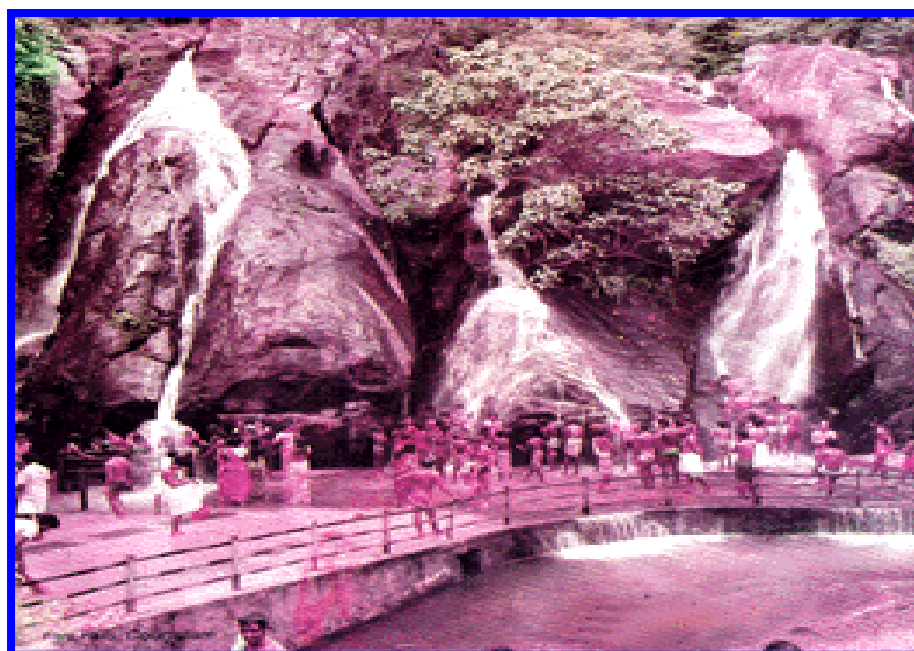
2.6.1 Population

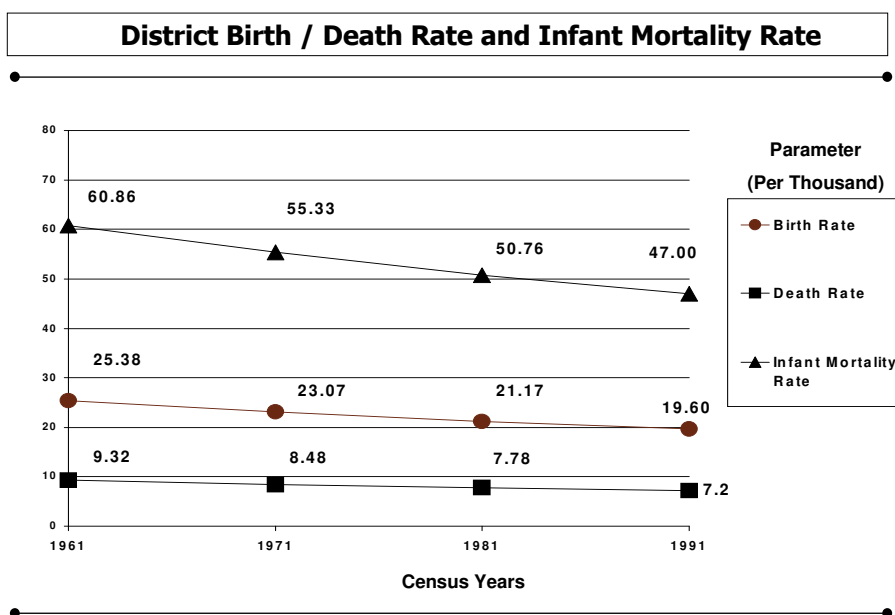
The population of Tirunelveli district has grown from 16,98,578 in 1961 to 27,40,065 in 1991. The growth rate indicates that there has been a significant increase during the 1981-91 decade with the average growth rate being 2.33% per annum during this decade. According to the 1991 census Tenkasi taluk is the most populated and Shenkottah 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.



2.6.2 Trend in Birth/Death Rate and Infant Mortality Rate

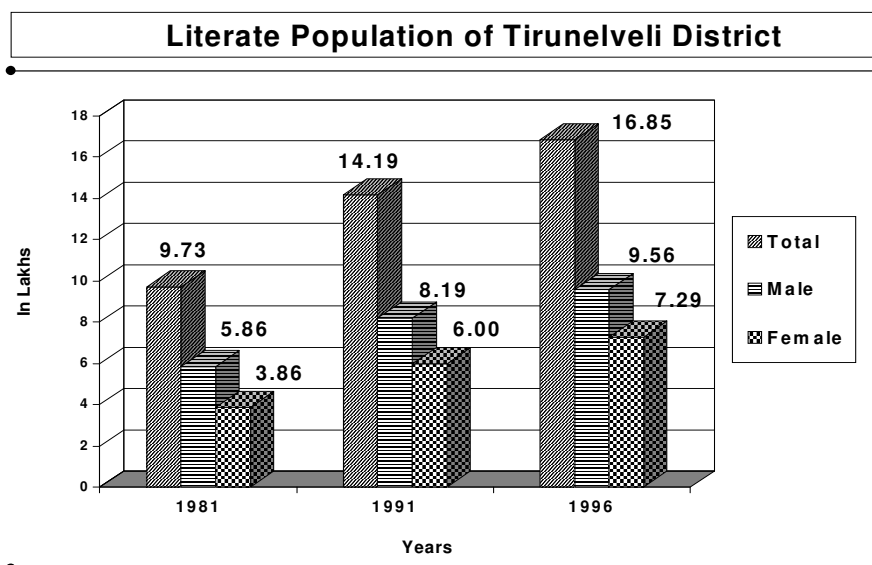
There has been a steady decline in birth rate, death rate and infant mortality rate over the decades in the district. The birth rate has come down from 25.38 in 1961 to 19.60 in 1991 (figures - per thousand) and the death rate from 9.32 in 1961 to 7.20 in 1991 figures - per thousand). The infant mortality rate has also gone down from 60.86 in 1961 to 47.0 in 1991 (figures - per thousand). The details of birth rate, death rate and infant mortality rate over the past 3 decades are given in Table No. 4.





2.6.3 Literacy Level among the Population

The literacy level of Tirunelveli district according to figures available for the year 1996 is 55.16% with male literacy level being more than the female literacy level. It is also observed while the male literacy level has grown from 53.78% in 1981 to 63.50% in 1996, there has been a significant increase of female literacy level from 34.16% in 1981 to 47.06% in 1996. The information on literacy level of the district is given in Table No. 5.



2.6.4 Education

Three polytechnics, one Engineering College and two Medical Colleges including a Siddha College are functioning in this district. The ratio of Higher Secondary schools is 0.54, Secondary schools are 0.65, a middle school is 1.49 and Primary schools are 3.31 for every 10000 urban population in Tirunelveli district.

The educational institutions in the district include Sri Parasakthi College for Women (Autonomous Courtallam), Tirunelveli Pope's College (Sawyerpuram, Tirunelveli), Sadakathulla Appa College (Palayamkottai, Tirunelveli), Sarah Tucker College, (Palayamkottai, Tirunelveli), Rev. John Thomas College of Education for Women, (Meignanapuram), Tirunelveli Pasumpon (Muthuramalinga) Thevar college (Melaneelithanallur), Tirunelveli. Rajas Dental College (Vedakkankulam, Tirunelveli) Tirunelveli Medical College, S. A. Raja College of Pharmacy (Vedakkankulam, Tirunelveli), Ambai Arts College (Ambasamudram, Tirunelveli), Manonmania Sundaranar University, University Campus (Abishekapatti, Tirunelveli), Government Arts College for Women, (Tirunelveli), Government College of Engineering, (Tirunelveli), Indian engineering college (Vadakkankulam, Tirunelveli), St. Ignatius Training College for Women (Palayamkottai, Tirunelveli), The Indian Eng. College (Vadakkangulam, Tirunelveli), Pasumpon Muthuramalinga College, Melaneeliphanalloor, Tirunelveli. M D T Hindu College, Tirunelveli. St. John's College (Palayamkottai, Tirunelveli). St Xavier's College (Autonomous) (Palayamkottai, Tirunelveli), St. Xavier's College of Education (Palayamkottai, and Tirunelveli), The Madurai Diraviyam Thayumanavar Hindu College (Tirunelveli), St. Mary's college (Thoothukudi, Tirunelveli), Tirunelveli Dakshina Mara Nadar Sangam college (T Kalikulam, Tirunelveli), Sri Paramkalyani College (Alwarkurichi, Tirunelveli).



Chapter

3

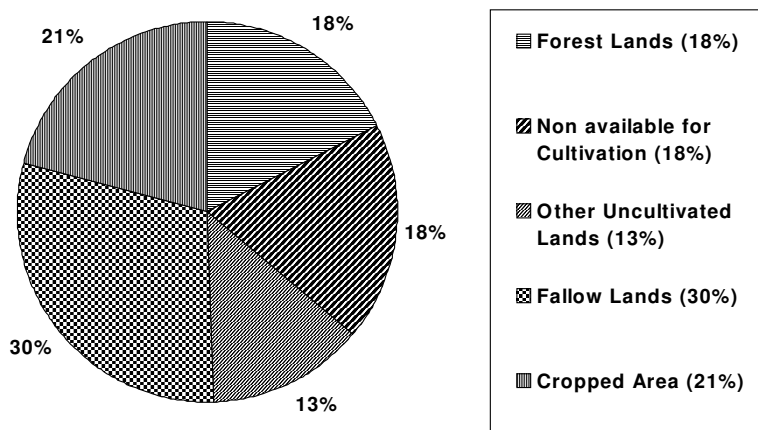
3.0 Resources – Availability, Use and Environmental Status**3.1 Land Resources**

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: Paddy is cultivated mainly in Sankarankoil, Tirunelveli, Tenkasi, Sencottah, Ambasamudram and Nanguneri taluks. Cambu, Cholam and Kudiraivali are being cultivated in the dry tracts of this districts namely Sivagiri and part of Sankarankoil taluks. Cotton is being cultivated mainly in Sankarankoil taluk. The total geographical area of the district was 6816.57 Sq. Km. in 1995-96. Cropped area accounts for about 20.91% of the total area. Forestlands cover about 17.62% of the total land. A significant portion (48.06%) of the land falls under the category of 'non available for cultivation' and 'fallow lands'. The land utilisation pattern in Tirunelveli district (Block-wise) is given in Table No. 6.

Land Utilisation - Tirunelveli District



ii. Trend in Production and Productivity of Important Crops: Cereals, pulses and oil seeds have been the three important crops produced in the district. The productivity pattern over the past 16 years indicates that the productivity of cereals, pulses and oil seeds have fluctuations but they have significantly gone down in the years 95-96. Another significant feature is the decrease in the area under production for cereals, pulses and oil

seeds in the years 1995-96. The details on the productivity performance of the district in relation to cereals, pulses and oil seeds for the past 16 years are given in Table 7.

iii. Horticultural and Plantation Crops: There were fruit crops with a yield of 351000 tonnes and vegetables crops with a yield of 59000 tonnes plantation crops with a yield of 63000 tonnes, Spices with annual production of 10,000 tonnes and flower crops of 8700 tonnes cultivated over an area of 10167 ha. 2835 ha. 3779 ha. 4243 ha. and 841 ha. respectively in the years 1995-96. The fruit crop yield is the highest while compared to other crops. (Refer Table No. 8).

iv. Consumption of Fertilisers and Pesticides: About 42000 metric tonnes of chemical fertilisers were used in 1995-96, out of which around 50% constitute the nitrogenous fertilisers. There has also been an intensive use of urea in the district, followed by bio-fertilisers and pesticide in 95-96. Information was not available regarding the use of block wise details of chemical fertilisers, urea, bio-fertilisers & pesticides. The details on the total of consumption (block wise details are not available) fertilisers & pesticides are given in Table 9.

v. Trend in consumption of Fertilisers and Pesticides: The chemical fertiliser has increased from 39,000 tonnes in 1993-94 to 42,000 tonnes in 1995-96. The usage of bio-fertilisers has also shown an increase from 70,500 kgs. in 1993-94 to 71,500 kgs. in 1995-96. The decreases in percentage of chemicals and bio-fertilisers are 2.44 and 0.70 respectively in the years 1995-96. The details with regard to the trends in the consumption of fertilisers and pesticides over the past 16 years are given in Table No. 10.

vi. Soil Types: The two major groups into which the soils of the division may be divided are the red and black. The black soil is restricted to the cultivated area. The red soils being generally the result of decomposition in situ of underlying ferruginous rock vary considerably in character depending upon the local edaphic factors.

Over hornblende and other ferruginous forms of gneiss, the soil is of deep red colour with high iron content as observed in the plain cultivable areas of Shencottai taluk. The soil tends to become swampy in the wet weather and hard and bared during the dry weather, possibly due to pan formation at no great depth below the surface. Tree growth, especially teak, does not flourish on such soils.

The soil derived from the decomposition of highly siliceous variety of gneiss is more sandy and of pale red colour. Where this soil is present in sufficient depth and the rainfall comparatively abundant, as seen near Kodamadi and upper dam,

Red loam is the predominant soil type in this district accounting for 48.21% followed by black soil of 30.09%. The other types of soils are lateritic soil, sandy coastal alluvium, red sandy soil and others. The details are given in Table No. 11.

vii. Soil Problems: About 5.82% of the land available for cultivation suffer from salinity/alkalinity followed by water logging and marshy land with 4.52% while more than 2% each, are prone to floods, gullied, ravenous land and sand desertic / coastal. The total type of problem soil covers 20.15% of the total land by the district (excluding forestland and land not available for cultivation). The details in this regard are given in Table No. 12.

viii. Status of Soil and Water Conservation Programs: Soil conservation works are undertaken in about 145209 ha. of cropping area. These conservation works have been done all 19 blocks in the district. There have been no new constructions of wells in the district. There have been a total of 69 check dams/stop dams. As regards to construction of check dams/stop dams, Kuruvikulam is the block where 49 check dams have been constructed as on 1995-96. Soil conservation works are being undertaken not available. The details in this regard are given in Table No. 13.

ix. Animal Husbandry: The livestock population comprises mainly of cattle and buffaloes, sheep, goats, pigs and poultry. The following veterinary institutions are available in the district: 1. Clinic centres 2. Veterinary hospitals 3. Veterinary dispensaries 4. Veterinary dispensary cum-key village centre 5. Clinical laboratories and 6. Animal disease intelligence unit under the Special Animal Husbandry Project, a sheep production program is implemented. 129 sheep breeding co-operative societies have been covered under this project besides 8 societies functioning under the Agricultural Refinance Development Corporation. A mass dowering program for augmenting mutton production is being implemented.

3.1.2 Forest Resources

The forest areas are mostly in the ghat regions in the district. The ghat regions are under the influence of the Southwest monsoon and have thick forests. The forests are of light deciduous growth in the lower slopes and dense masses of short trees from an elevation of 1000' to 3000'. Above 3000, evergreen forest with very tall trees is found. Teakwood, black wood, rose wood etc. are the most important among them. The important forest products of Tirunelveli division are honey, wax, cashew, palmyrah, cane pepper, tamarind, bamboo etc.

i. Forest Area: There are 58 forest areas in the Tirunelveli district constituting a total area OF 119469.62 ha. 55 forest areas fall under the RF category with 40373.62 ha. And 3 under Sanctuary areas with 79096 ha. The details regarding the classification of forest areas and their extent are given in Table No. 14a

ii. Green cover classification: Total area of forest in Tirunelveli district was 134633 ha. Dense and sparse forest constitute 44565 ha and 39181 ha respectively 4726 ha of grassland available in the district. Degraded forest area cover is 20860 ha in Tirunelveli district. The details regarding the classification of forest area with their extent are given in Table No.14 b.

iii. Trend in Per Capita Forest Area: The forest area has not shown any fluctuation over the years. The area covered under forest is 119469.62 ha. from the years 1961 to 1996. The Percapita forest area has shown a declining trend from 0.070 ha. in 1961 to 0.039 ha. in 1996 due to steady increase in population. The details are given in Table No. 15

iv. Man Made Forest Plantations: The man made forest plantations have been restricted to the existing forest areas in Tirunelveli district. About 7620.40 hectares of man made forest plantations are available in the district. Eucalyptus, teak, casuarina, cashew, red sander, cloves, sandal, Neem, tamarind and other species are the man made forest plantations. Necessary details are given in Table No.16.

v. Details of Villages Abutting Forest Area: The villages located in the taluks of Tirunelveli, Kuthalam, Senkottai, Sankarankoil and Nanguneri forest areas in the district. Out of these taluks, Kuthalam has more number of villages the abutting forest areas. These areas covered by 55 blocks. Name of the revenue villages abutting forest area and population for the villages are not available in the district. The details regarding the villages the forest areas are given in Table No. 17.

vi. Tribal Villages: There are 4 revenue villages and 7 tribal hamlets in Tirunelveli district. The population of tribal hamlets in Ambasamudram taluk and Sivagiri taluk were not available (Refer Table No.18).

vii. Forestry Area Diverted for Non Forestry Purposes: Five cases with 234.042 hectares of forest area were cleared for non-forestry purposes in Tirunelveli district under Forest (Conservation) Act, 1980 upto 1995-96. Necessary information is given in Table No.19).

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

Wild Life: Wild Life strictly means "the uncultivated flora and undomesticated fauna" which otherwise includes both "plants and animals". The faunal population both territorial and Avi-fauna, of this division is also varied and fascinating like its varied floral composition. Persecution of wild life, as in the case of other parts of India, here also was prevalent in the past and few of them were driven to the point of extinction. Poaching of elephants for their tusks, poisoning the carnivores for their skins and killing indiscriminately herbivores for their flesh and hides etc. have accounted for reduction in number of animals like Elephants, Tigers, Panther, Langhurs, Deers, Sambhurs, etc. It is difficult, even when you go deep into the forests, to get the glimpses of such wild life now days. Where numerous private enclosures are present within the RFs as in the case of Shencottai Range, it is still more difficult to encounter the wild life, the reasons being self-explanatory. Elephants stray into Vasudevanallur and Sivagiri forests from Kerala during monsoon seasons and occasionally pose threat to persons and plantations in those areas.

Protective Regulations: Fortunately, the whole area of this district was closed to shooting of wild birds and animals as early as from 1st October 1982 as per the decision taken in VIII wild life Board Meeting held in May 1982.

Two separate wild life divisions in the Tirunelveli Ghat forests were formed from 1st April 1977 namely, Kalakadu Wild Life Division for the preservation of the only primate endemic to this region of western ghats, the Lion Tailed Macaque and Mundanthural Wild Life Division primarily for the preservation of mostly persecuted Panthera tigris, the Tiger. There is a move to form a new sanctuary called Megamalai Wild Life Sanctuary, north of the Sivagiri RF of this Division. If the same materialises, the western ghats region of this Tirunelveli forest division will be sandwiched between the present Mundanthurai Wild Life Sanctuary in the south and proposed Megamalai Wild Life Sanctuary in the north and the higher ranges of this ghats may well serve as a corridor to the wild life connecting the two sanctuaries, and in turn, assumes greater significance and responsibility of keeping the higher range forests in proper preservation. Already there is spill over of wild life from

Mundanthurai wild life sanctuary in the adjoining Courtallam RF of Tirunelveli division and from Seithur Forests of Grizzled Squirrel Sanctuary in Virudhunagar district to Sivagiri and Vasudevanallur RFs. This phenomenon is strengthened by the reports given by Kuthalam and Pularai section subordinates of sighting 4 tigers in Mathalamparai, Ayiraperi and Puligarai beats which is adjacent to Mundanthurai wild life (Tiger) sanctuary and the report of sighting elephants from adjacent Rajapalayam ghats (a portion of proposed Megamalai sanctuary).

Ironically, about the elephant population, the figures obtained through last All India Census is only 5 for this Division, whereas, groups of elephants are sighted by the beat subordinates in different beats of Courtallam and Sankarankoil Ranges amount to 69. The main route for elephant migration in Kuthalam Range from Kerala Forest is said to be along Kuliratiaru, whereas in Sivagiri Forests, 3 or 4 routes are being mentioned.

List of important animals reported by beat personnel: The unique primate, which is endemic to the western ghats, namely the Lion tailed monkeys is said to be confined to Kalakadu Hills where a sanctuary has been created solely for that species, and it is reported, in the high ranges of this division also which deserves investigation by Naturalists also especially in Kerala Frontier in Vallam Beat of Courtallam range.

Other important mammals of this district: The tiger, leopard, The Busty spotted Cat, Common Palm Civet, Brown Palm Civet, Common palm civet, Small Indian civet, Common Mongoose, Striped Hyena, Ruddy or Long tailed Mongoose, Jackal, Dhole or Indian Wild Dog, Sloth Bear, Common Otter.

Other important birds of the district: Dendrocitta Vagabunda, Turdoides straitus, Chloropsis aurifrons, Pycnonotus cafer, Saxicolopides, Copaychus saularis, Lanis excubitor, Dicrurus adsimilis, Pyrrhuloxia socialis, Oriolus oriolus, Sturnus pagodarum, Metacilla caspica Metacilla maderaspatensis, Cuculus varius, Pave cristatus, Terpsiphone paradisi, Pericrocotus peregrinus, Mereps orientalis, Coracina melonoptera, Egretta grassetta.

For the promotion of public awareness among the public the services of non-governmental organisations are much useful and wanted. In this division, a wild life Association called Tirunelveli North and South Division Wild Life Association is functioning. A plot of 40 ha. was leased out to this association in Gangaikondan RF (eastern part) just abutting the National Highways 7 from 15-km north of Tirunelveli for a period of 3 years with annual renewal of lease. The whole plot was chain link fenced and houses 40 sambhar and 15 chitals at present. Due to poor maintenance, the fence is sagging and has given way in number of places, bringing in the risk of animals spilling away from the plot, endangering their own life. And so far no attempts have been made by the association to improve the park and to make it useful to the public. It is under consideration of the forest administration that the leased out area can be resumed by the department (as there is Field Director, Project Tiger is stationed at Palayamkottai) and the whole of Gangaikondan RF including Deer Park, around 200 ha. in areas, can be transformed into a Drive-in Deer Park.

There were sanctuary including bird sanctuary at Koonthakulam, kalakad, Mundanthurai villages of Nanguneri taluk of Tirunelveli district in 129 ha., 22358 ha. and 56738 ha.

respectively. There were more of prominent species are protected. Wild life census in Tirunelveli district indicates that may be 571 animals available in the sanctuary. More of migratory birds living in kootha seasonally. Necessary information is furnished in Table Nos. 20, 21 & 22.

3.1.3 Mineral Resources

Lime stone and garnet sand is the mineral reserves found in the district. The details are given in Table No. 23

Limestone is a major industrial mineral found in the district and the requirements of M/s. India Cement, Talaiyuthu with a capacity of 2550 tonnes per day are met from the crystalline limestone deposit located around Tirunelveli. There are large reserves of limestone of the crystalline, sedimentary, corraline and tufaceous types amounting to 59 million tonnes in the Nanguneri, Ambasamudram, Sankarankoil and Tenkasi taluks. Alluvial gypsum occurs in the Sankarankoil taluk. The mineral is being utilised chiefly of cement manufacture.

White and buff coloured siliceous clay occurs with lithomarge around Tisayanvilai in Nanguneri Taluk. Although a reserve of 5 million tonnes has been estimated in these area the clays have been found unsuitable for use in the ceramic, paper and other industries due to the non-plastic and highly ferruginous and siliceous nature. Heavy mineral placer sands consisting of illuminite and associated minerals occur in the district in the Nanguneri taluk along the coast. Garnet sands occur widely in the Ovari navaladi area where a reserve of 23000 tonnes has been estimated. Other occurrences containing illuminite, magnetite, rutile, sillimanite, onazite and garnet occur near the mouths of Vaippar and Vembar where a total reserve of 35000 tonnes of illumonite has been estimated. Since the reserves are limited, there is no scope for the establishment of a mineral separation plant in the area. The garnet sands are being mined and utilised for polishing optical glasses. A deposit of graphite containing about 1350 tonnes occurs near Kuinjakulam near Sankarankoil, but is not of economic significance. Other minor occurrences have also been recorded near Panagudi, Therku Kallikulam and Vijayanarayanam in the Nanguneri taluk. The State Geology Branch in Mudavankulam and Kanakkankulam in Nanguneri taluk have also located the occurrence of cat's eye chrysoberyl, which used as is gemstone.

3.2 Water resources

3.2.1 Rivers canals and Water ways

Tambraparni rises in Agasthiyamalai of the Western Ghats. It joins the plains near Papanasam in Ambasamudram taluk. It flows through Ambasamudram and Tirunelveli taluks and joins the sea at Punnakayal in Srivaikuntam taluk of Thoothukudi district. The river gets water from both Southwest and north- east monsoons and is never dry. The river drains a considerable extent of mountain country before entering the plains. At Banathirtham, the river forms the waterfall, which is a magnificent sight. Pambar joins Tambraparni at the foot of the hills and by Koriyar further down. At Papanasam, it has another fall known as kalyanathirtham fall. At Papanasam, the river has been dammed for regulating the supply of water for irrigation and for generation of electric power. The

river Tambraparni has its origin in the district. Pambayar, Peyyar, Ultar, Pambar, Koriyar and Servaiyar are the chief tributaries of Tambraparni. The other important rivers in the district are Chittar, Jambunadi and Gatananadi. Chittar rising in the Courtallam hills flows through Tenkasi and Tirunelveli and joins the Tambraparni at Sivalaperi in Tirunelveli taluk after running a distance of about 60 km. Jambunadi rises in Kuliratti hills on the borders of Tenkasi and Ambasamudram taluks. It joins the Ramanadhi and becomes known as Varahanadhi. Small anicuts are found in these rivers. Gatananadhi originates in Sivasailam hills in Ambasamudram taluk, join Varahanadi at Pappankulam and finally join Tambraparni at Tirupudaimarudhur. In Sankarankoil taluk small rivers - Vadamalayar, Kotamalyar, Nikshepanadi, Kakanadi and the Palayar are found. They join Vaippar flowing through Kovilpatti taluk of Tuticorin district.

i. River system: General aspect of drainage is towards east and in some projections, south east, and so all the rivers and streams follow the same direction. About 27 rivers and streams are identified in this ghat section of the district which implies and impresses the importance of the ghat forests as the water shed which in turn has to be murmured carefully and judiciously. One heartening feature is that the catchment areas are situated in the inaccessible sholas and thick evergreen forests in the highest reaches. Another important and interesting phenomenon is that, the District generally come under the description of "Dry" region, almost all the river waters are utilised for irrigation and very little finds its way to Bay of Bengal. Due to the erratic monsoon and reduction in the density of vegetation in the middle lower reaches of watershed region, most of the rivers and streams go dry. Seasonal and flash floods have become very common. The riots now are tapping ground water resources for their water needs.

In general, the surface drainage is good though in some parts of the ghats above the sholas, the ground tends to be spongy owing to the high contents of clay and heavy rainfall.

ii. Catchment Area of River basins: Tambraparani, Nambiyar and Vaipar are three Catchment areas of the river basins in the district. The places of origin, total and with in the district length and the area of the basin in acres are given in Table No.24.

iii. Basin-wise status of the ground water availability: surface water potential available annually in Tambraparani and Nambiyar basins has been 1375 MCM and 203.87 MCM respectively. Basinwise Status of the ground water availability is given in Table No.25.

iv. Details of Dams and reservoirs: There have been 5 dams/ reservoirs in the district, of which are used for irrigation two of them are used for power generation purposes also. Papnasam dam / reservoir has the maximum water spread areas as well as designated capacity. Refer Table No.26.

v. Availability of water spread area: Total No. of tanks available in the district are 2170 and available water spread area in the district cover is 44105 ha. Panchayat tanks details are not available in the district. The details are given in Table No. 27.

vi. Irrigation by Different Sources: The total cropped area is 142509 hectares and the percentage of irrigated area to cropped area is 81.44. The gross area irrigated by canals,

tanks and wells is 25008 hectares, 44105 hectares and 46889 hectares respectively. The details on irrigated area by different sources are given in Table No. 28.

vii. Incidence of Drought, Flood and Cyclone: There are 9 taluks and 19 blocks in the district. It has been ascertained from the available information that 9 taluks and 15 blocks were affected by drought during the years 1991-96, except the year 1992-93 when severe flood caused extensive loss of property. Few blocks were affected by cyclone during the years 1991-93 and 1995-96 in the district. The details on drought, flood and cyclone are given in Table No. 29.

3.2.2 Fisheries Production

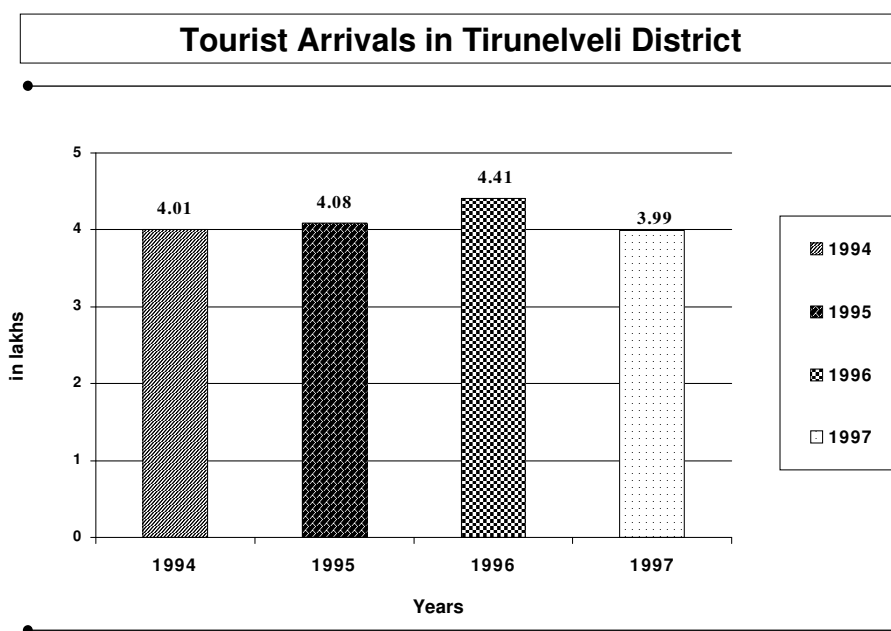
There has been no information on estuaries & brackish water area and marine fishing villages in the district. The fish production fluctuates both in quantity and value and had a declining trend from 1994-95 to 1995-96. The inland fresh water area spreads about 702.3 hectares in the district. Length of coastal line existing in the district is not available. Prawn is an export variety of fish, which is largely available in these coastal areas. These varieties are found mostly in the deep sea where the water is less salty. The details are given in Table No. 30.

i. General Fish Seed Production: Both the inland and coastal fish seed production fluctuate from 1991-96 and the highest inland fish production was 2648 tonnes in the year 1995-96 and highest coastal fish production is 4527 tonnes in the year 1992-93. As regards fish seed production, there has been a fluctuation in the district. The details on fish and fish seed production are given in Table No 31.

3.3 Heritage Resources

i. Protected and Conserved Monuments: Monuments founded in six villages located in the taluks of Ambasamudram, Nanguneri and palayamkottai, Mottai Andavar and sivatemple are located in pudukottai village of Ambasamudram taluk and Thiruneelakandan temple located in panajadi village of Ambasamudram taluk are maintained by department of Archaeology. Rajakalmangalam sculptures are located in Rajalakkalmangalam village of Nanguneri taluk and pola Udaiyar kalvettu in Seevalaperi village of Palamkottai taluk are Maintained by depart of Archaeology. Bakthavatchala Temple at Cheranmahadevi and Thiruvalaisuram Temple at Thiruvalaisuram which are maintained by the ASI. The details are given in Table No.32.

ii. Places of Tourist Attraction: The district has many interesting places like Courtallam famous for its waterfalls and health resort, large ancient temples of Tirunelveli etc. 2400 temples are listed by the Hindu Religious and Charitable Endowments Department, of which about 1500 are assessed by the department. More than 50 per cent of these temples are located in the taluks of Tirunelveli, Ambasamudram and Tenkasi. Out of the total of 2400 temples, village deity's account for 1300; Vinayakar 500 and the rest by Murugan, Siva, Vishnu and others.



Important temples of this district are: 1. Tirunelveli Sri Nelayappar and Gandhimathy temple 2. Kuttalam Sri Kntralanathaswamy temple 3. Sankarankoil Sri Sankaranarayanawamy temple Sri Sankaranarayanawamy temple 4. Tenkasi Sri Kasi viswanathaswamy temple 5. Veerakeralam Sri Navaneethakrishnan temple pudur Sri Nelayappar and Ganthimathy temple of Tirunelveli is one of the biggest and famous temples in the state. The name of the district is said to be called after the name of the presiding deity of this temple. The remaining temples are also famous and the annual income of these temples is more than a lakh. Waterfalls in Courtallam are considered a health spot. The main waterfalls from a height of 91 metres. The season for the falls are from June to September every year, where there will be drizzles and a bath at the falls is said to be very good for the body. The places of tourist importance are 1. Tirunelveli Sri Ganthimathy and Nelayappar temple history and sculptures 2. Mundanthurai Tiger sanctuary and 3. Kalakad wild life sanctuary.

There are 18 tourist places located at 18 villages/towns in the historical / cultural / natural areas. The special significance of the area is Coutralam Water falls, Manimutharu dam and Mundandurai dam reserve forest, wild life sanctuary, Bird sanctuary, tea estate and Hindu, Christian and Muslim temples / mosque. Tourist arrival both domestic and foreign has fluctuations. Wild life sanctuary, dam & reserve forest, tea estate and some temples are visited throughout the year. Other tourist places are visited seasonally. These tourist spots are included in tourist circuits identified by Tourism Department. (Refer Table No.33 & 34).

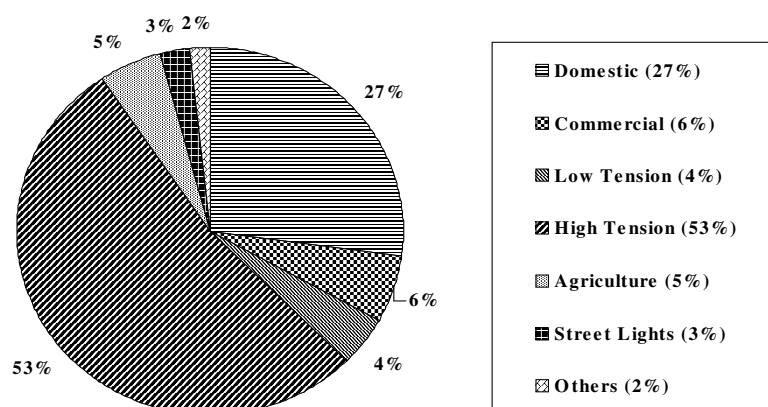
3.4 Energy Resources

i. Installed Power Projects: There are two Hydel power projects with an installed capacity of 48 Mega watts (Mw) and actual power generation of 91.56 Mega watts in 1996.

There has been a fluctuating trend in actual power generation from 106 Mw in 1986 to 91.56 Mw in 1996. The details are given in Table No. 35.

ii. Consumption of Electricity: There were 5,80,287 electrical connections with a total consumption of 615.35 lakh KWH as on 1995-96. High Tension (HT) consumption has the maximum consumers accounting 53.23% of the total consumption followed by domestic consumption of 27.22%. The category wise consumption of electricity is given in Table No. 36.

Category wise Consumption of Electricity



iii. Electrification of Villages: Tirunelveli district has achieved 100% electrification even prior to 1986. All 1717 villages in the district are electrified. The status on electrification of the energised pumps is not available. The details regarding electrification of villages (block-wise) are given Table No.37.

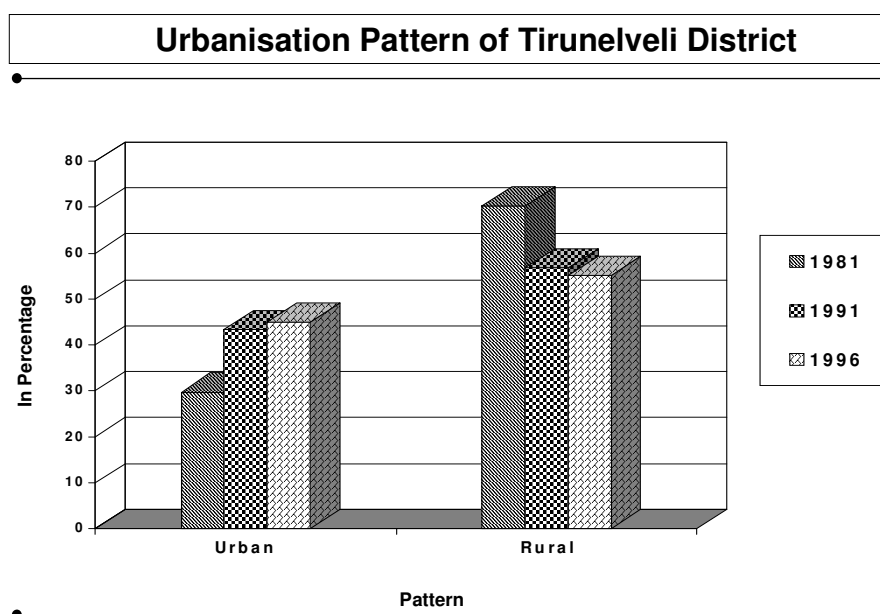
iv. Non Conventional & Renewable Energy Sources Utilisation: Bio-Gas and improved Chullah are the only methods of non-conventional energy utilised in the district. The details regarding actual generation and installed capacity of power are not available. The details are given in Table No. 38.

Chapter

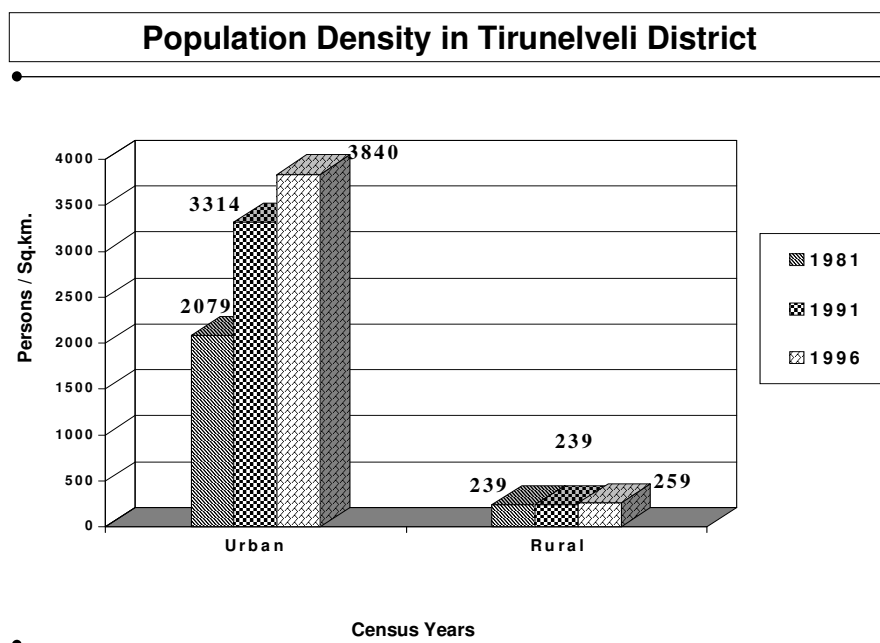
4

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

The proportion of urban population to total population has increased rapidly during 1981-96 from 29.74% to 44.91%. Among the urban areas, Town Panchayat accounts for a greater share of urban population while compared to the other urban areas. The proportion of rural population to total population has decreased from 70.26% to 55.09% during the years 1981-1996. The urbanisation pattern of the district is given in Table No. 39a & 39b.

**4.1.2 Density of Population**

The overall density of population has increased from 324 persons / sq.km. in 1981 to 446 persons / sq.km. in 1996. The density in urban area has increased from 2079 persons/sq.km. in 1981 to 3840 persons/sq.km. in 1996 and the density of rural area has also increased from 239 persons/sq.km. in 1981 to 259 persons/sq/km. in 1996. The details on density are given in Table No.40.



4.1.3 Decadal Growth rate in urban centres

The population of the district has grown from 16.98 lakh in 1961 to 27.40 lakh in 1991. The decadal growth rate indicates that there is a considerable growth in the Corporation, municipalities and town panchayats of the district. Tirunelveli Corporation has registered the maximum growth rate and Kadayanallur has the maximum growth rate among the municipalities. Vikaramasingapuram has the maximum growth rate among the town panchayats. The details of decadal growth rate are given in Table No.41. The decennial growth rate for both urban and rural population over the past three decades has fluctuated from 1961 to 1991 (Refer Table No.42).

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 percentage of slum population to total population has increased from 11.96% in 1991 to 14.41% in 1996 inspite of several poverty alleviation programs undertaken by the Government. Information regarding each municipality, town panchayat and corporation is not yet made available to the consultants and efforts are on to procure the same. Necessary details are given in Table No.43a & 43b.

4.1.5 Trend in urbanisation and slums

The trend in urbanisation in slums indicates that both the percentage of urban population and the percentage of slum population to the total population have increased from 1981 to 1996 in Tirunelveli Corporation. More over the percentage of slum population to urban population has increased significantly from 1991 to 1996. The trend in urbanisation and slums is given in Table No. 44.

4.2 Infrastructure Services and Environmental Status

4.2.1 Occupied Housing units

Total urban areas occupied house holds in Tirunelveli district is 172550. Out of the total households in urban areas 97445 households does not have any type of toilet facility. The details are given in Table No. 45.

4.2.2 Urban Services

Surface water and ground water are the major sources for protected water supply system corporation and town panchayats. The average water supply is around 54.3 LPCD for the district. The corporation of Tirunelveli has the highest consumption of 465 lakhs litres, while the municipality of Kadaianallur and the town panchayat of Ambasamudram have 40 lakh litres and 28.0 lakh litres respectively. The municipality of Coutralam has 40% at the maximum and the town panchayats, Kalakadu and Melagaram have 70% each at the maximum of percentages of population uncovered for water supply. Details on water supply services are given in Table No.46.

4.2.3 Domestic waste water generation and treatment

The estimated sewage generation is 326 lakh litres in corporation, 120 lakh litres among municipalities and 179 lakh litres among town panchayats. The district does not have any organised disposal of sewage. The local bodies have disposed the sewage in to the river. The Corporation has Under Ground Drainage system in parts at town and the municipalities and the Town Panchayats have completed open sewerage system. The details on domestic wastewater generation and treatment in the district are given in Table No.47.

4.2.4 Municipal Solid Waste Generation and Collection

The solid waste generation of corporations, municipalities and town panchayats are 48 tonnes, 49.75 tonnes and 66 tonnes respectively. The solid waste collection of Tirunelveli corporation, municipalities and town panchayats are 38 tonnes 36.5 tonnes and 27 tonnes respectively as on 1995-96. Overall the solid waste generated adds up to 163 tonnes with a collection efficiency of 62% with a manpower of 1509 on solid waste management. The availability of compost yards is 1 in corporation and 6 in municipalities and 27 in town panchayats (Refer Table No. 48a, 48b and 48c)

4.2.5 Composition of Municipal Solid Waste

It is observed that 73.6% of the waste are compositable matter that 26.4% of the waste are rags, plastics, bricks and stones etc. The details are given in the Table No. 49.

4.2.6 Coverage of Water problem Villages

It has been identified that about 992 villages out of the total 1717 villages in the district have had problems with regard to supply of drinking water. However 397 problem villages have been covered during the VII Five Year Plan (1987-92) and 595 villages covered during the VIII Five Year (1992-97). All the villages are covered during the VII & VIII Five Year Plans. Necessary details are given in Table No. 50.

4.2.7 Reported cases of water borne diseases

Gastro-enteritis, dysentery, jaundice and meningitis are the most commonly reported water borne diseases in the district. Incidence of gastro-enteritis and cholera were very high during 1991-92 and the incidence of dysentery and meningitis were high during the year

1995-96. The details on the reported cases of water borne diseases are given in Table 51.

4.2.8 Facilities under Indian system of Medicines

A medical college hospital is situated in Tirunelveli. 22 hospitals, 397 Registered Practitioners and 66 dispensaries are functioning in the district. Total bed strength of 1544 in the district. Allopathy, Siddha and Homoeopathy are the most commonly practised system of medicine in the district and facilities for medical education are also available. 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. 52.

4.2.9 Population below Poverty Line

As per the population Below Poverty Line survey done in 1992, number of families below poverty line is 151370 in the district (Table No.53).

4.3 Transportation

The district has adequate communication facilities by road, rail and sea. The State Transport Corporation mainly operates the road transport. Private Transports and State Transport Corporation were operating 168 routes. These figures include the city town bus routes also.

The district is linked by rail too. (i) Tirunelveli-Nagercoil / Kanyakumari, (ii) Chennai-Tirunelveli, (iii) Tirunelveli-Sencottah, (iv) Tirunelveli-Tiruchchundur, Tirunelveli-Nagercoil-Kanyakumari is the new broad gauge line operating from January' 81. Other lines are in metre gauge. In addition to passenger services, the goods trains are also under operation.

4.3.1 Development of Roads and Bridges

The district has 108.80 km. of National Highway, 135.97 km. of State highways, 837.18 km. of Major district roads, 1807.26 Km. of other district roads, 560.05 km. of Ghat roads and 1715.90 km. of panchayat roads and 573.80 Km. of roads maintained by urban local bodies in the years 1991-96. Over and above, there are 88 major bridges and 5952 minor bridges and culverts in the district in the year 1996. Relevant information is provided in Table No.54.

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 5 years. The total number of two, three and four wheelers in 1996 is 6781, 1481 and 6340 respectively. The details on the growth of vehicle population are given in Table No.55.

4.4 Industrial Development and Environmental Status

4.4.1 Industries

Though the main occupation of the people is cultivation in recent year's industries and services are also competing with this ancient occupation. M/s. India Cements of Talaiyutthu, Co-operative Spinning Mills situated at pettai near Tirunelveli and other spinning mills in Ambasamudram and Thoothukudi, Sun Paper Mill of Cheranmahadevi, Dharani Sugar mill at Vasudevanallur are a few large scale industrial units functioning in

the district.

The industries prevalent in the district may be classified under (i) household industries (ii) small scale and (iii) medium and large-scale industries. Beedi rolling, safety matches making, mat weaving and processing and manufacture of palm fibre and articles from palm trees and handloom weaving of textiles are the main household industries. Workers in household industries are concentrated mostly in Tenkasi, Ambasamudram and Tirunelveli taluks. Safety matches are manufactured mainly in Sankarankoil and Sivagiri taluks. Handloom weaving is prominent in Ambasamudram and Tenkasi taluk. Beedi rolling and mat weaving are chiefly found in Tenkasi, Ambasamudram and Tirunelveli taluks. Manufacture of articles from palm trees is mainly found in Nanguneri taluk where palmyrah trees cover large areas. There are about 2300 small-scale industries. Of all the 18 major groups, units manufacturing chemical products alone account for nearly one third. Next comes the manufacture of food products, under food products salt industry form about one third of the total number of registered units under food products. The chief items produced by large-scale industries in the district are cement, cotton yarn, textiles, chemicals and chemical products. M/s. India Cements Limited are having two plants, one in Sankarnagar and another in Thalayuthu for producing cement. The production of "Portland Cement" in 1979 was more than 13 lakh of tonnes. There are more than 20 textile mills situated in this district for the production of yarn. The first spinning mill under co-operative moment was established in this district during 1958 at Pettai near Tirunelveli. Most of them are situated in Ambasamudram, Tirunelveli, and Nanguneri taluks. Tamil Nadu Sugar Corporation Limited has established a factory at Tirunelveli, which has a capacity to crush 1250 tonnes of cane a day.

4.4.2 Number of Industries

There have been 24 red category, 52 orange category and 8 green category Industries in 1995-96, which are classified, based on the nature of hazardness by TNPCB. Red category industries are mostly chemicals, textiles and pharmaceutical industries. The details on the number of industries are given in Table No.56.

4.4.3 Emission Inventory of Major Industries

The India Cements Limited is the only Industry in the district which has the emission level carrying ambient levels in terms of SPM ($75 \mu\text{g}/\text{m}^3$), SO ($70 \mu\text{g}/\text{m}^3$), NO ($50 \mu\text{g}/\text{m}^3$) while the emission level of CO and HC is nil. The details regarding the emission level are given in Table No. 57.

4.4.4 Air pollution stressed area

Talaiyattu and Sivagiri are the air pollution stressed areas with major air pollutant being particulate pollutant and Odour. The details are given in the Table No.58.

4.4.5 Ambient Air quality Status

Information was not available for ambient air quality status in the district (Table No.59).

4.4.6 Water quality

The ground water in this district is generally good surface water quality in the areas around Cheranmadevi, Ambasamudram and Papanasam is affected by the industrial discharges from textiles and paper industries. The groundwater with in the towns of Tirunelveli-

Palayamkottai, which is to some extent, contaminated by the municipal and industrial discharges. Under MINAR'S Scheme, TNPCB is monitoring the quality of water from 5 places of Thamirabarani riverbed, As per the test the quality of water is normal. In five places DO content exceed the standard value. Except papanasam all other places are having BOD Content with in the limit. The details are given in table 60.

4.4.7 Discharge of Industrial effluents

Madura coats and Sun paper mills are the major industries located in the district. Effluents from these mills are being lead in to the Thamiraparani River. The public sector companies (TNSTC) located in Tirunelveli, Papanasam and Tenkasi discharged the effluents into the Thamiraparani and Chitaru. The necessary details are given in Table No.61.

4.4.8 Noise levels

Data on residential noise levels were not made available and it has been ascertained that no ambient noise level monitoring is undertaken (Refer Table No.62).

4.5 Environmental Status of Coastal Eco-system

4.5.1 Industrial sewage discharge in the coastal waters

There are two coastal towns in the district. There have been 240 domestic sewage discharge points with the total sewage quantity of 20 MLD in the district. (Table No. 63).

4.5.2 Aqua culture activities

There are two coastal towns located in the coastal areas. There are about 7 Aquaculture units functioning in the district with occupying the areas of about 16.00 ha. The estimated wastewater generation from these units is not available. (Refer Table No. 64).

4.5.3 Wetland Habitats, their use and problems

No information available for wetland habitats, their use & problems in the district (Table No. 65).

4.5.4 Potential Hot Spots along the coast

There are no identified potential hot spots along the East Coast in this district. (Table No. 66).

4.5.5 Trade, commerce and export

Even before independence the people of this district were very much interested in trade and commerce. History says that pearls and chanks available in coastal parts were sent abroad through Tuticorin. Chilly, groundnut, cotton and safety matches from the northern parts of the district and fruits, beedi, mats, handloom clothes, toys and yarn from central areas are transported to other parts of the State for sale. Cattle are exported to Kerala from the district. Tirunelveli and Sankarankoil are the main business centres of the district. Toys of Ambasamudram and palm leaf products of the coastal parts of this district are fine hand works of the people liked by the foreigners are also items much in demand from this district. The palm Jaggery, palm leaf products, some varieties of mats, fish and lungies are also exported to foreign countries. Cement produced at the India Cements Company is sent to other districts of the State. Bank of Tamil Nadu (Tirunelveli) which originated in this district is the leading bank to serve trade and commerce. In addition, some co-operative banks are also helping to improve the trade. M/s. Pandian Grama Bank, a unit of Indian Overseas Bank has taken much effort to improve the district's trade and commerce. There are many commercial banks in the district.

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

There has been one an Environmental Education and Research Institution namely Pamakalyani centre located in the district. The institution has been undertaking activities relating to education, research and awareness. (Refer Table No. 67).

5.2 Environmental NGOs

There have been 10 NGOs dealing with environmental related issues in the district. Their main activities are Environmental Education, Environmental Awareness, women's Education, Social development programme, public health and agriculture. About 6 NGOs working on entire district. The details are given in Table No. 68.

Chapter

6

6.0 Summary of Observations

The key observations of the environmental profile of Tirunelveli district are briefed below:

6.1 Demographic details

1. The growth rate of population has been in an increase at about 2.32 % per annum during the period of 1981-91.
2. It is encouraging to note that the female literacy rate has significantly increased in the past 15 years.

6.2 Land resources

1. Utilisation of land cropped area is upto 20.91% in the Tirunelveli district. The land area of 10.65% remains as cultivable wasteland.
2. The total use of chemical fertilisers and pesticides showed a fluctuating trend which the use of bio-fertilisers has gradually gone up.
3. Red loam (48.21%), Black soil (30.09%), Lateritic soil (14.80%), and sandy coastal alluvium (2.23%) are the soil types of the Tirunelveli district.

6.3 Forest resources

1. The forest area in Tirunelveli district is about only 17.62% of the land area. The details regarding forest types are not available.
2. Protection of wild life has received a major impetus in the district with declaration of Kalakad - Mundanthurai Sanctuaries on Tiger Reserve.
3. There have been 18 tourist places in the district. Both domestic and foreign tourist arrivals have had fluctuations.
4. The inland fresh water area of the district is 702.3 hectare. This shows that the district has high potential for fishing.

6.4 Urbanisation

1. Urbanisation process in Tirunelveli district has been taking place at a higher rate. However, certain essential needs of urban areas like drinking water, electricity, public convenience, drainage, approach roads and health centre have not been increased keeping the pace with the process of urbanisation.
2. There is an increase in urban slum population in Tirunelveli district for the past five years inspite of several poverty alleviation program under taken by Government.
3. There has been no much improvement of urban services particularly protected drinking water and solid waste management in the district.

6.5 Transportation

There has been a significant growth of two, three and four wheeler vehicles in the district over the ten years. Thus resulting in an increased quantity of the emission of suspended air particles.

6.6 Industrial development

The red, orange and green categories of hazardous Industries are identified by TNPCB. Most of the red category industries are very hazardous in nature.

6.7 Environmental institution

1. There is one environmental education institute in the district of Tirunelveli, which is conducting education, research and awareness activities.
2. There are 10 Environmental NGOs may be involved in protecting environmental of the district for which action plans for better environment shall be made with NGOs participation.
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.