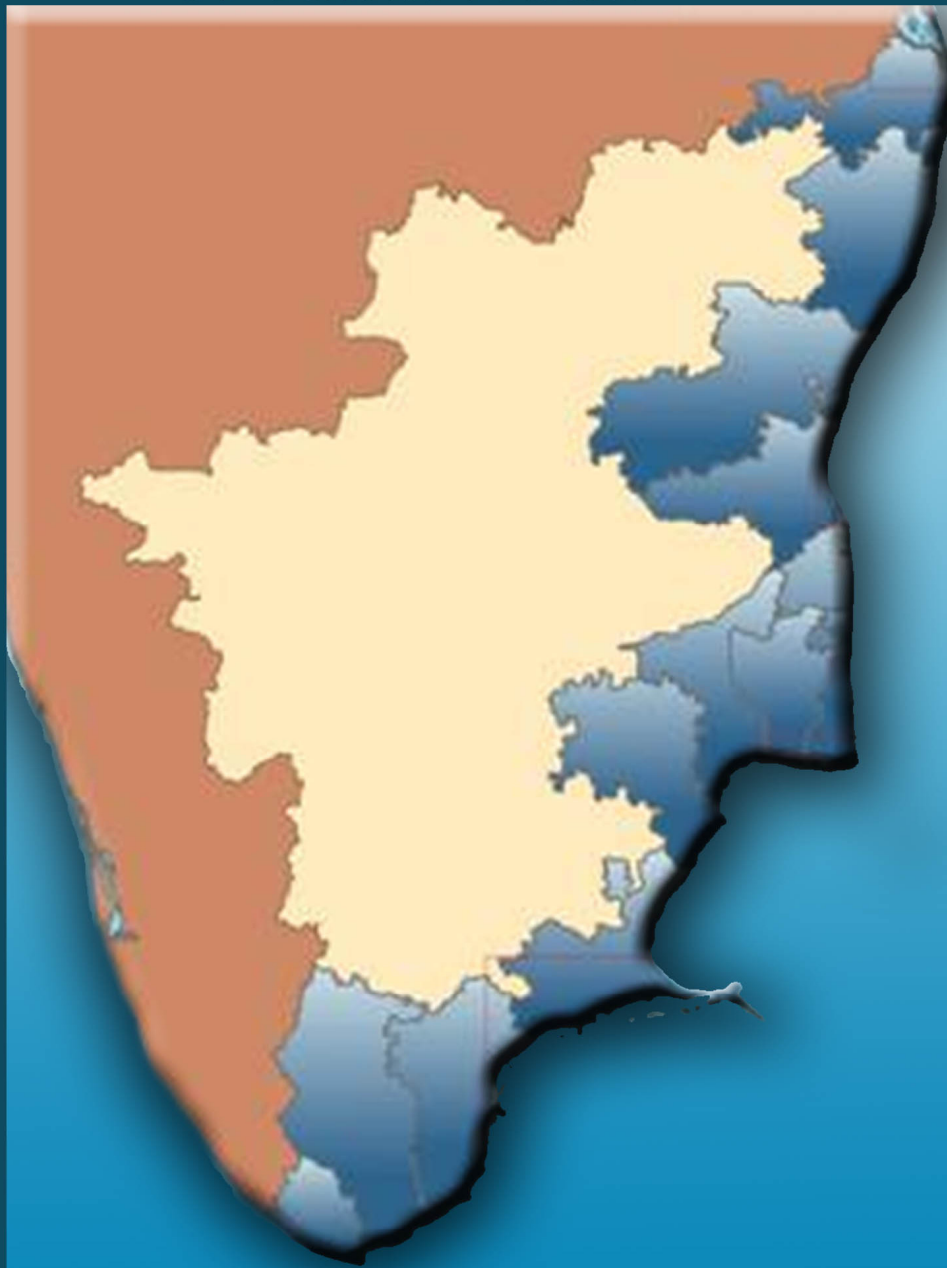
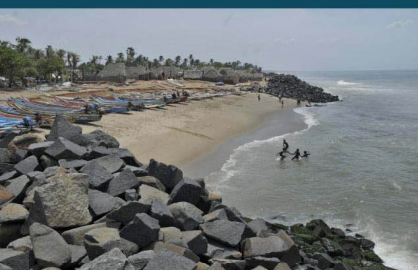
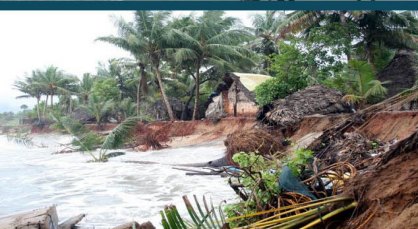




Government of Tamil Nadu
ENVIS Centre, Department of Environment



COASTAL DISTRICT PROFILES of Tamil Nadu



Prepared by
Suganthi Devadason Marine Research Institute,
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COASTAL DISTRICT PROFILES OF TAMIL NADU



ENVIS CENTRE

**Department of Environment
Government of Tamil Nadu**

Prepared by

Suganthi Devadason Marine Research Institute

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THIRUVALLUR DISTRICT

THIRUVALLUR DISTRICT

1. Introduction

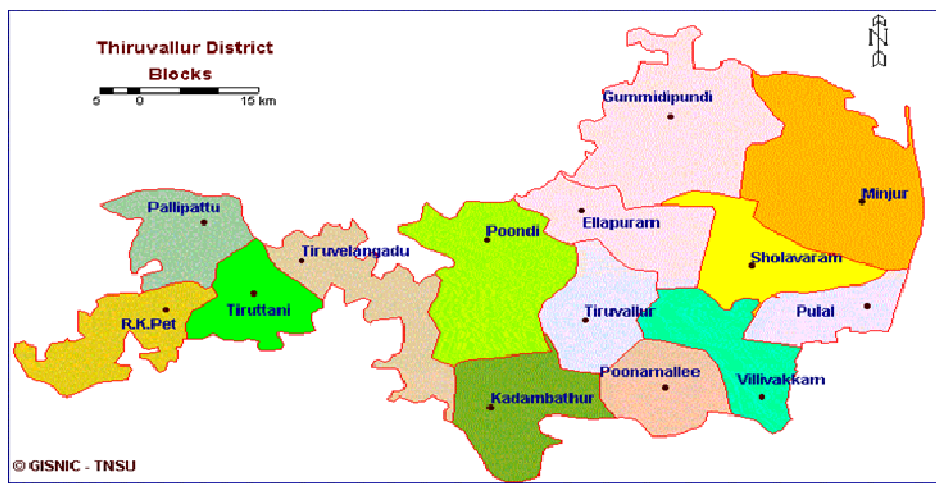
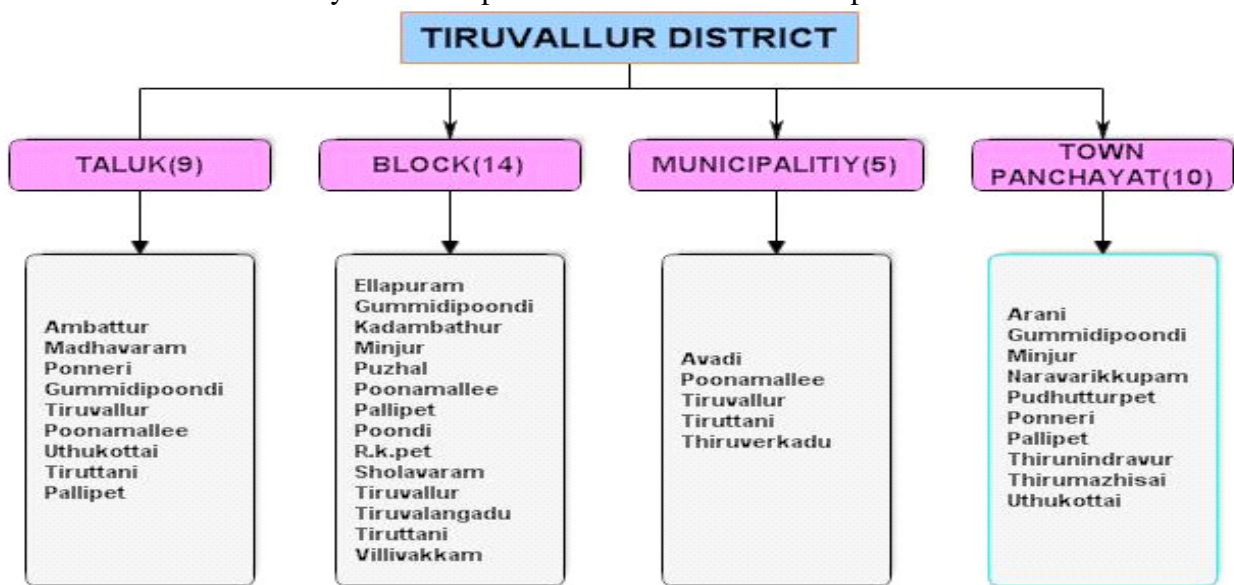
i) Geographical location of the district

Thiruvallur district, a newly formed district bifurcated from the erstwhile Chengalpattu district (on 1st January 1997), is located in the North Eastern part of Tamil Nadu between 12°15' and 13°15' North and 79°15' and 80°20' East. The district is surrounded by Kancheepuram

district in the South, Vellore district in the West, Bay of Bengal in the East and Andhra Pradesh State in the North. The district spreads over an area of about 3422 Sq.km.

ii) Administrative profile (taluks / villages)

The following image shows the administrative profile of the district.



Tiruvallur District Map

iii) Meteorological information (rainfall / climate details)

The climate of the district is moderate neither too hot nor too cold but humidity is considerable. Both the monsoons occur and in summer heat is considerably mitigated in the coastal areas by sea breeze. The months between April and June are generally very hot with temperature going up to an average of 37.9° C. During the winter (December - January) the average temperature is 18.5° C. The coastal areas receive more rains than the interior ones. The average normal rainfall of the district is 1104 mm. Out of the total 52% of the rainfall occurs during the northeast monsoon period and 41% during south west monsoon period. The district mainly depends on the monsoonal rainfall and faces distress conditions in the event of the failure of monsoons.

2. Resource-availability

i) Land resources (soil types)

The Coastal region is mostly flat while certain areas in Tiruttani and Pallipattu taluks are undulated and even hilly. The types of soil predominantly found are red noncalcareous and coastal alluvial. The soil found in the coastal region is of the erinaceous type (sandy), suitable for casuarina plants. The predominant soil types are sand and sandy loam which are found in all taluks with red loam in part of Tiruthani Taluk. Saline and alkaline soils also noticed in some patches of Ambathur, Ponneri and Tiruvallur Division.

ii) Agriculture and horticulture (crops cultivated)

The main occupation of the district is agriculture and allied activities. Nearly 47% of the total work force is engaged in the agricultural sector. Around 86% of the total population is in rural areas engaged in Agriculture and Allied activities. The major crops grown in the district are rice, cumbu - ragi, green gram, black gram, sugar cane and groundnut. Apart from this, certain horticultural crops like mango, guava and vegetables have also been cultivated successfully.

Total cultivated Area (ha)	:	184198
Net Area Sown (ha)	:	136648
Area Sown more than once (ha)	:	50550

Cropping Intensity	:	134.8%
--------------------	---	--------

Details of Crops Cultivated:

Paddy

Paddy is the principal crop extensively cultivated during three season & Sornavari (April to July), Samba (August to November) and Navarai (December to March). Normal area under paddy is 82869 ha and Normal productivity of rice per ha. is 3359 Kgs.

Millets

The normal area under millets is 1578 ha. Among millets, cumbu is major millet crop generally sown under rainfed condition in a normal area of 1220 ha. The normal productivity under millet is 2049 Kgs / ha.

Pulses

The normal area under pulses is 8611 ha under Kharif and Rabi seasons and larger

area of pulses is cultivated during Rabi season. The normal productivity of pulses is 549 Kgs. / ha. The predominant pulses crop cultivated are reengram, Blackgram and Redgram.

Oilseeds

Groundnut is the major oilseed crop cultivated in a normal area of 17401 ha under Kharif and Rabi seasons. More area is cultivated during Rabi Season. The Normal productivity is 4274 Kgs. / ha.

Sugarcane

Sugarcane is cultivated in a total area of 5848 ha. with normal cane productivity of 117 MT / ha.

iii) Forest resources (reserved forest area / protected areas)

Forests occupy 5.8% of the total area. The total extent of Reserved Forests and Reserve Lands are 19791 ha protected by this Division. About 1800 ha of Reserve Lands, notified under section 26 of Tamil Nadu Forest Act is also under active consideration for declaration of Reserve Forest. These Lands are in bits and pieces spreading over the district. The total no. of blocks is 108. The forest types available in the district are one of tropical in nature and they fall under dry thorn and dry evergreen types. Much of the natural forests have been converted into man-made forests since the late 50s. However, chunks of natural forests still exist but in various stages of degradation.

iv) Mineral resources (garnet etc.)

The district does not contain any precious mineral. However it has a few varieties of major and minor minerals.

Mineral Resources in Thiruvallur District Minor Minerals

Lime Shell : Pulikat Lake,
Sunnambukulam,
Annamalaicherry
Silica Sand : Elavoor, Eravanoor,
Ennore,
Gummidipoondi and
Ponneri Taluks
Stoneware Clay : Adhigathur, Odhapai,
Gudapakkam Kandigai

Major Minerals

River Sand : Kosasthaliyar, Araniar,
Kallar, Nandi, Coovam
Blue Metal : Pallipattu and Tiruttani Taluks
Gravel : Ponneri and Gummidipoondi
Taluks
Brick Clay : Thiruvallur and Ponneri Taluk

v) Water Resources (river / major lakes and estuaries)

Apart from seasonal rivers like Kesathaliyar, Aravar, Nandi, Kallar, Coovam and Buckingham Canal there is no perennial river in the district. Since these seasonal rivers are not sufficient, irrigation through tanks, tube wells and open wells are very common.

vi) Fisheries production (fish landing details / aquaculture)

The total coastal area of the district is about 49803 ha and has a coast line of 80 km for marine fisheries. Prawn/shrimp culture is famous along the coast line of Gummidipoondi and Minjur. The total marine fish production is to the tune of 7937 tonnes and inland fish production 14816 tonnes during 2009-10. The inland fresh water area spreads over 75006 ha. and

estuaries and brackish water area are 14841 ha.

Marine fishing is practised in 39 fishing villages of the district. Marine and inland production has increased both in quality and value. A comparison of fish production indicates that the coastal production is slightly higher than the inland fish production during 2009-10.

vii) Heritage Resources (shore temples / churches)

Lord Arulmigu Subramaniya Swami Temple, Tiruttani

The beautiful temple of Lord Muruga at Tiruttani crowns a single rock 700 ft. above sea level. It is situated amidst a range of hills with a panoramic view. This sacred place is situated in the Chennai-Mumbai 13 Kms. from Arakkonam and 84 Kms. from Chennai. Around this town are famous religious places such as Kancheepuram (Banares of the South) on highway South, Sholingar and Vallimalai on the West, the popular and renowned pilgrimage centre, Tirupati (otherwise called Balaji) and Kalahasti (with its Vayu



Lord Arulmigu Subramaniya Swami Temple, Tiruttani

Lingam) on the North and Tiruvalangadu (of puranic fame) with Lord Nataraja on the East.

Bhavani Amman Temple, Periyapalayam

Bhavani Amman Temple in Periyapalayam near Chennai attracts to many devotees, Bhavani Amman is the main deity of the temple, and people throng here in thousands on weekends and in the month of Aadi and Avani. Located at about 45 kms. from Chennai at Chennai-Kolkata highway near Red Hills people can reach Periyapalayam early.

The Temple is busy throughout the year and people visit the temple with their families and seek the blessings of Bhavani Amman. Especially on the weekends people visit here in groups and have a divine get together here.

Vadivudaiamman Thygarajaswami Temple, Thiruvottriyur

North Chennai, the industrial face of Chennai, from refineries to the transport offices North Chennai stands as the densely populated place of the city. Thiruvottriyur nestled in this part of the city is the place of importance during the month of Aadi as Vadivudaiamman thygarajaswami temple is located here.

Sri Viswaroopa Panchamukha Anjaneyaswami Temple

There is a shrine for Panchamukha Hanuman at Kumbakonam. This is taken as the reference for the sculpturing of the Swami Murti ashram. The Mahapradishtai of 32 ft. tall Sri Viswaroopa Panchmukha Anjaneyaswami at Periakuppam Village at Tiruvallur (45 kms. from Chennai, enroute to Tirupathy) was performed on the 6th June, 2004 with the blessings of Gurudev Poojyasri "Mantramurthy Dasan" S.Venkatesa Bhattachariar Swamigal,

Founder Trustee of Sri Viswaroopa Panchmukha Anjaneyaswami Foundation, a registered trust.

This happened to be a unique event for the entire humanity. The uniqueness is due to the fact that this is the one and only Pradishtai in the entire world under the mantra shastra.

Devi Karumariamman Temple, Thiruverkadu

The city of Chennai is well connected by Air, Rail and Road Routes. At Chennai, we have International and Domestic Airports facilitating the people from all over the world to reach the city with ease. Chennai has two Railway Terminals facilitating the movements of North South, East and West bound trains. Large number of Government and Private buses are plying between Chennai and other major Cities.

Chennai is well known for hospitality where accommodation is available to suit the purse of people belonging to all walks of life from dormitory to Seven Star Hotels. All kinds of foods are also available. Thiruverkadu is just 18 km. from Chennai. Bus facilities are available from Chennai.

viii) Biodiversity (Mangroves/corals/sea grass/important flora and fauna)

Thiruvallur coast has a very vast coastal plain, which extends from North of Toppala Palayam to South of Sattangadu. There are three strand lines, with intervening broad tidal flats occurring in the coastal plains. Lagoons, mangrove swamps, salt marshes, estuaries, creeks, sand dunes, splits and beach terraces represent the marine landforms. The Pulicat brackish water lake of Bay of Bengal in Ponneri block is a potential hot spot along the coast. It was a

site of Old Dutch settlement. Migratory birds from various countries flock here every year between December and February.

3. Impacts

i) Urbanization (municipal solid waste dumping / sewage etc.)

The proportion of urban population to total population has shown fluctuations over the decades in the district. The estimated sewage generation is at 284.67 mld in urban centres with a break up of 202.42 mld for municipalities and 82.25 mld for town panchayats. There is no treatment plant in the district and therefore there is no organised disposal of sewage. Underground drainage systems are partially available only in Tiruvottriyur municipality and Tiruverkadu and Maduravayal town panchayats. Overall solid waste generated in the district adds up to 422.6 tonnes with a break-up of 366 tonnes in municipalities and 56.6 tonnes in town panchayats. The solid waste generation is highest in Ambathur among municipalities and in Porur among town panchayats. The overall collection efficiency is 88 % with of 344 persons engaged in solid waste management. Thiruvallur municipality alone has furnished the details on solid waste. The primary component of the waste is compostable matter constituting 90% in the total waste.

ii) Industrial development (effluent discharge / pollution – air water land etc)

Thiruvallur district is one of the fastest developing districts in Tamil Nadu in terms of Industrial Development. The district has many leading industries like Madras Refineries, Madras Fertilizers, Manali Petro Chemicals, MRF, Ashok Leyland, TI Cycles, Britannia India Ltd, Parry India Ltd and Hindustan Motors. It

also boasts of the Ennore Thermal Power Station and the Avadi Tank Factory. The district has 16 Industrial Estates, all in operation: 11 developed by the Government and 5 by Private Organisations. There are a total of 1926 industrial units in Thiruvallur district. These units are further classified into Red, Orange, and Green on the basis of their intensity of pollution. For the disposal of hazardous solid wastes, the TNPCB has identified a site at Manalur in Tiruvallur district. Rapid environmental impact assessment study has been conducted for the site. There is a common effluent treatment plant for tanneries at Madhavaram namely CETP Company, Madhavaram.

Government

- Ambattur Industrial Estate, Ambattur.
- Electrical Industrial Estate, Kakalur.
- SIDCO Industrial Estate, Chennai-98.
- Industrial Estate, Madhavaram.
- SIDCO Industrial Estate, Kakalur
- Petrochemical Industrial Estate, Vichoor
- SIDCO Industrial Estate, R.K. Pet
- SIDCO Industrial Estate, Gummidipoondi
- Industrial Estate, Mugappair

Private

- G.K. Industrial Estate, Porur
- M.M.Industrial Estate, Alapakkam
- Moccaram Industries, Velappan Chavadi
- Nagappa Industrial Estate, Puzhal
- Ekambara Naicker Industrial Estate, Alapakkam

This district has 16940 Small Scale



Pulicat brackish water lake

Industries, notable among them being food, wood, and textile, chemical, engineering, non - metallic and leather industries.

Pulicat Lake was identified as a site of international importance by the International Union for the Conservation of Nature (IUCN). This area had rich mangroves but due to industrialization these have been degraded.

iii) Thermal power generation (hot water discharge)

The MTPS (Madras Thermal Power Station) is a major source of pollution in the Pulicat lake as it discharges fly ash and hot water into the lake directly. The hot coolant water released by the MTPS is damaging the Pulicat ecosystem.

iv) Natural hazards (erosion / accretion / sea level rise/ climate impact)

The coastline is mainly accreting with noticeable erosional effects particularly near Ennore. Development of offshore bars and shoals are observed near Ennore and Pulicat. Madras Thermal Power Station

(MTPS) has been located near the Pulicat Lake. Boulders and groynes were laid along a continuous stretch till the power plant area. This has resulted in sea erosion of the adjacent villages, especially at the villages located north of the power plant. Groynes and sea walls constructed near Ennore and the boulder wall of 3.3 m height and 2.3 m width opposite the Coromandel Cement Factory at Ennore also aggravated the impact of the tsunami affecting the coastal communities living nearby. The Ennore port has further aggravated the erosion problem by inducing it further north. According to the local people the sea had come in about 500 m and had completely wiped out two streets in Sattan Kuppam. In Korrai Kuppam the community well was lost. The strip of land between the Bay of Bengal and Pulicat Lake faces severe sea erosion.

v) Rare earths mining (garnet etc.)

No information available.

Table. SEED PRODUCTION AND TARGET ACHIEVEMENT

Station	2008-09			2009-10		
	Target	Achievement	Revenue	Target	Achievement	Revenue
Poondi						
Breeding Seed Production	125.00	95.7		-	2.00	
Seed rearing	11.00	11.74	168113/-	--	1.100	Rs.34400/-
Late Fry				1.44	2.178	Rs.18603/-
Fingerlings				6.55	9.62	Rs.96200/-
Early Fry						

**vi) Natural disaster prone areas
(tsunami / cyclone / floods)**

Generally flood occurs during north east monsoon when there is heavy rainfall coupled with cyclonic storm in Bay of Bengal. Floods often occur in the basins of Kosasthalaiyar, Araniar, Cooum and Adyar and its tributaries. The entire coastal length of the district is prone to tsunami.

4. Government initiatives

i) Initiatives to improve fisher folk livelihood (schemes for education / health fish seed production)

The seed production and target achievement fixed for the O/o. the Inspector of Fisheries at Poondi for the periods 2008-09 & 2009-10 are as follows.

Sathya Moorthi Sagar Reservoir						
Seed Stocking	5.00	2.97	--	19.58	9.62	--
Department Fishing (in tonne)						
Stocked	7.40	0.185	1075.50/-	--	0.037	Rs.1850/-
Unstocked	7.00	0.0555	1162.50/-	--	0.003	Rs.40/-
Licence Fishing						
Stocked	100.00	131.648		--	167.799	
Unstocked	330.00	232.330		--	335.599	
Licence issued	3672		Rs.128180/-	2826		98910/-

Fishermen Co-Operative Societies

No of FCS (Men) / Total No. of members 20 / 1953

No of FCS (Women) / Total No. of members 1 / 90

Total No. of FCS/Total No. of Members 21/2043

Free Housing Scheme

Sl. No.	Name of the Society	2005-2006		2006-2007	
		No. of Houses Allotment	Construction completed	No. of Houses Allotment	Construction completed
1.	Sri.Lakshmi Amman	50	32	20	11
2.	Kuppammal Chathiram	05	04	24	23
3.	Athupakkam	15	12	10	06
4.	Pattarai Perumbudur	02	-	-	-
5.	Kannimma Pettai	-	-	15	11
6.	Kaivandoor	-	-	08	04
7.	Athur	-	-	09	01
8.	Krishnapuram	-	-	11	09
9.	Arumbakkam	-	-	03	03
Total		72	48	100	68

The stage of payment made for the period 2005-06 was at Rs.18,05,000/- & for 2006-07 Rs.20,02,000/-

Fishermen Welfare Board

No of Applications Issued - 2680 & No. of Identity Cards received - 2030

Society Members in Welfare Board			Non- Members in FMWB			Marriage	Education	Natural Death	Accident Death	Total
Men	Women	Total	Men	Women	Total					
1085	279	1364	336	330	666	16	13	6	2	37
						60000	21250	60000	200000	341250

Fishermen Accident Insurance Scheme

The member of Fishermen Co-operative Society members are insured by the government. If the fishermen die due to accident or during fishing, relief has been given to fishermen & women (Rs.50,000) in case of partial disability Rs.25,000/-. For giving as a relief during 2008 – 09 Rs.1,00,000/- was released to the deceased family members and for the year 2009-10, no relief measures has been given so far.

Pro-water bodies

As per G.O. Ms. No.332 Animal Husbandry, Dairy and Fisheries Dated.17.11.1993, the Inland fishermen Co-operative societies have taken 5 years lease of fishing over a total water spread area of 1207.91 Ha.

Fisheries Development Mission Programme and Fish Farmers Development Agency

As per GO.Ms No.27, the Animal Husbandry Dairy and Fisheries Government has given a subsidy @ of Rs.1875/- per ha. to the fresh water / prawn farmers.

No of Beneficiaries - 19
Total No of Water spread Area - 97.95 ha
Subsidy released – Rs.1,31,587/-

Suitable fish farmers were selected and subsidy was released to encourage & enhance the fish production.

The details are as follows.

Sl. No	Particulars	2007 - 2008
1	Water Spread area ha.	29.80
2	Subsidy released Rs.	6,85,962/-

Coastal Aquaculture Authority (CAA)

All the Existing shrimp farms must register their farms in the coastal aquaculture authority as per the CAA Act 2005.

The details of applications received and processed are as follows.

1	No. of Applications Received	72
2	No. of Registration Issued	53

3	Farms to be Inspected	-
4	Rejected by District Level Committees	14
5	Rejected Application re-inspected	5
6	Additional particulars pending with farmers	1
7	Total No. of Shrimp farms	113
8	Farms in Patta land	96
9	Farms in Govt. Poramboke land	37
10	Authorization issued by the earlier AAI	16
11	No. of Farmers not applied to CCA	24

BFDA Subsidy Details

Sl. No.	Particulars	2007 - 2008	2008 - 2009	2009 - 2010
1	No. of Beneficiaries	2	7	2
2	Subsidy amount released (Rs.)	101200	268800	83200
3	Total water spread area (ha.)	2.53	6.72	2.08

Research and Extension

The State Fisheries Research council assigned a three years research problem during the period 2008-10. To the Research Assistant, Vanianchavadi titled the "Study on the prevalence of shrimp diseases". Based on the findings the extension activities will be taken up for the benefits of the shrimp farmers at Tiruvallur district.

A.G.A.M.T

During the period 2008-2009 in Tiruvallur District 13 Blocks were Identified. Out of the 52 Tanks selected, only 33 tanks for stocking was major carp

(1,40,900 Nos.) Similarly during 2009-10 only 8 Blocks were selected and the AGAMT work is in progress.

S.G.S.Y. Training Programme

A Training Programme was implemented to the Tsunami affected coastal villages in Tiruvallur. The details are as follows

Sl. No.	Training Components	No. of Beneficiaries	Amount Rs.
1	Value added Programme	375	350223
2	Seaweed Culture	249	170526
3	Engine Repair and Net Mending	1716	991152
4	Crab Fattening	10	37000
5	Solar Drying	25	22833

During the 1st fortnight of March 2010, 25 Marine fishermen from 8 Coastal districts were trained by Central Institute of Brackish Water Aquaculture (ICAR) Chennai. Out of 25 Marine Fishermen, two fishermen from Tiruvallur district participated in this (TOT) training programme on Finfish culture in floating net cages

National Fisheries Development Board (NFDB)

Under this newly implemented scheme fund was provided to renovate the existing prawn/ fish farm or to construct a new farms for spur fish and fishery development at Tiruvallur district. For the period 2008-09, eight applications were received and recommended to NFDB.

A three days training programme was also conducted under this scheme titled "Reservoir Fishery Management" and 250 imparted were maintaing Poondi fishermen.

National Agricultural Development Programme (NADP)

The Fisheries staff training institute, Chennai has been conducting various training programme including ornamental fish culture. Under this scheme the beneficiaries belonging to Tiruvallur district who are actively involved in fish culture / capture were identified and selected by this office. During 2008-09 30 FFDA farmers were trained under the NADP programme.

Fish Culture in Floating Net Cages

The Inland Fisherman Co-operative Society members were selected and trained under NFDB programme for fish culture in floating net cages. The fishermen belongs to

Sadhurangapettai near Poondi belonging were selected for this project for upgradation of their livelihood support. The fish seeds were stocked in cages on 09.07.2009 and fed with floating pellets as a supplementary feed. This experiment is in progress.

IAMWARM

The Araniyar & Kosasthalaiyar sub basins were selected for IAMWARM scheme under which the fishery activities covered construction of farms ponds, fish ponds, seed rearing in cages, ornamental fish culture, provided fishing implements & Kiosks for hygienic fish marketing were set up. The physical & financial details are as follows:

Arvaniyar Sub Basin

Sl. No.	Components	Total Project		2009-10		2010-11	
		Phy.	Fin.	Phy.	Fin.	Phy.	Fin.
1	Aquaculture in irrigation tank	300 Ha.	3.15	80 Ha	0.95	220 Ha.	2.20
2	Fish seed rearing in cages	5	1.50	5	1.50	-	-
3	Farm Ponds	20	3.00	10	1.50	10	1.50
4	Ornamental fish culture	4	8.00	1	2.00	3	6.00
5	Fish Kiosk	1	4.00	1	4.00	-	-
6	IEC/CB & documentation		0.80		0.70	-	0.10
	Total (Rs. in lakhs)		20.45		10.65		9.80

Kosasthalaiyar Sub basin

Sl. No.	Components	Total Project		2009 - 2010		2010 - 2011	
		Phy	Fin.	Phy.	Fin.	Phy.	Fin.
1	Aquaculture in Irrigation tanks Establishing Fish Seed Bank	1	4.00	1	3.10	1	0.90
2	Aquaculture in farm ponds	15	2.25	15	2.25	-	-
3	Fish Kiosks	1	4.00	1	4.00	-	-
4	Fishing Implements	20	1.20	20	1.20	-	-
5	Ornamental fish culture	4	8.00	1	2.00	3	6.00
6	IEC / CB		0.80	-	0.70	-	0.10
Total (Rs. in lakhs)			20.05		13.76		7.51

ii) Coastal protection initiatives (bio shields / sea walls etc.)

Kaatupallikuppam

This village is situated north of Ennore Port and south of Pulicat Lake. During tsunami, water wall of height 3 m has penetrated about 300 m into the coast. As the Ennore port breakwaters are intercepting the net northerly littoral drift, there is slight erosion at this village. This erosion may be magnified if not tackled. Hence, soft measures like plantations and sand nourishment (dredged spoil from Ennore port) are recommended.

Ennore Creek

The river Kosasthalayar discharges into the Bay of Bengal at Ennore. The Ennore port is located on the northern part of this river mouth. The breakwaters of Ennore port are acting as permanent littoral barriers and hence trapping the sediments into the river mouth. These trapped sediments have choked the river mouth. However, during

the tsunami, the mouth of this river was opened due to the penetration of water mass

from the ocean. Presently, the dredging is in full swing to keep the river mouth open. The dredged spoil is being disposed south of the mouth of the Ennore creek, which was found resettling into the mouth. This exercise is futile as it is clear that the net littoral drift along the East coast of India is directed towards north.

In order to have better solution two groins one on each side of the mouth as training walls need to be constructed. The Southern groin can extend up to a water depth of about 5m, whereas, the Northern groin can extend up to a water depth of 4m. The approximate lengths of the two groins could be about 250m and 200m. In addition, a sand trap on the south of the Southern groin is proposed.

Ennore to Royapuram

(Ennore to Ernavoor Kuppam)

The stretch of about 15km. from Ennore towards its south upto Royapuram comprises of a number of fishing hamlets. Most of the reaches have been protected by a seawall and combination of seawall and groins. Even though, the reach from Chinna Kuppam (about 3 km. from South of Ennore creek mouth) to Ennore mouth has been protected by a seawall this stretch is liable to be eroded in future. Hence, this should be strengthened by a groin field, by which additional beach width can be gained, thereby not only stabilizing the seawall but also to win additional beach. The additional benefit will be the reduction of sand entering the Ennore river mouth and also the maintenance dredging being carried out by the Ennore port. The number of groins for this stretch of 3km. will be about 10, wherein, the average length of the groin will be 150m.

iii) Awareness initiatives (tsunami / CRZ issues)

Various awareness creation activities have been made among the fisher folk about tsunami and CRZ issues by different Government and Non Government organizations. Attempts have been made to develop bioshields, rebuild livelihoods, and reclaim soil in the tsunami affected agricultural fields in Thiruvallur district.

iv) Bio diversity (coral, mangrove conservation and restoration)

No information available on the restoration and conservation of important natural resources.

v) Other initiatives taken by private sector

No information available.

5. Summary / Conclusion

- Thiruvallur district is situated on the North Eastern part of Tamil Nadu and is surrounded by Kancheepuram district in the South, Vellore district in the West, Bay of Bengal in the East and Andhra Pradesh State in the North.
- The district spreads over an area of about 3422 Sq.km.
- This district comprises 9 taluks, 14 blocks, 5 municipalities and 10 town panchayats.
- The Coastal region is mostly flat while certain areas in Tiruttani and Pallipattu taluks are undulated and even hilly.
- The types of soil predominantly found are red noncalcareous and coastal alluvial.
- The main occupation of people in this district is agriculture and allied activities. Nearly 47% of the total work force is engaged during the agricultural sector.
- Paddy is the principal crop extensively cultivated in three – seasons Viz sornavari (April to July),

Samba (August to November) and Navarai (December to March)

- Forests occupy 5.8% of the total area. The total extent of Reserved Forests and Reserve Lands is 19791 ha.
- The district does not contain any precious mineral. However it has few varieties of major and minor minerals.
- Apart from seasonal rivers like Kesathaliar, Aravar, Nandi, Kallar, Coovam and Buckingham Canal there is no perennial river in the district.
- The total coastal area of the district is about 49803 ha and has a coast line of 80 km..
- Thiruvallur district is one of the fastest developing districts in Tamil Nadu in terms of Industrial Development.
- The hot coolant water released by the MTPS is impacting the Pulicat ecosystem.
- The coastline is mainly accreting with noticeable erosional effects particularly near Ennore.
- Pulicat Lake was identified as a site of international importance by the International Union for the Conservation of Nature (IUCN). This area had rich mangroves but due to industrialization these have been degraded.
- The MTPS (Madras Thermal Power Station) is a major source of pollution of the Pulicat Lake as it discharges fly ash and hot water into the lake directly.

CHENNAI DISTRICT

CHENNAI DISTRICT

1. Introduction

i) Geographical location of the district

Chennai is situated in the North-Eastern end of Tamil Nadu on the coast of Bay of Bengal. It lies between 12° 9' and 13 ° 9' North and 80 ° 12' and 80 ° 19' East. The total area of the district is 178.2 sq.kms. It is bounded by the Bay of Bengal in the east and on the remaining three sides by Kancheepuram and Thiruvallur districts. The topography of the district is almost flat and the ground level in the district slightly rises up to 22 ft. above the mean sea level.

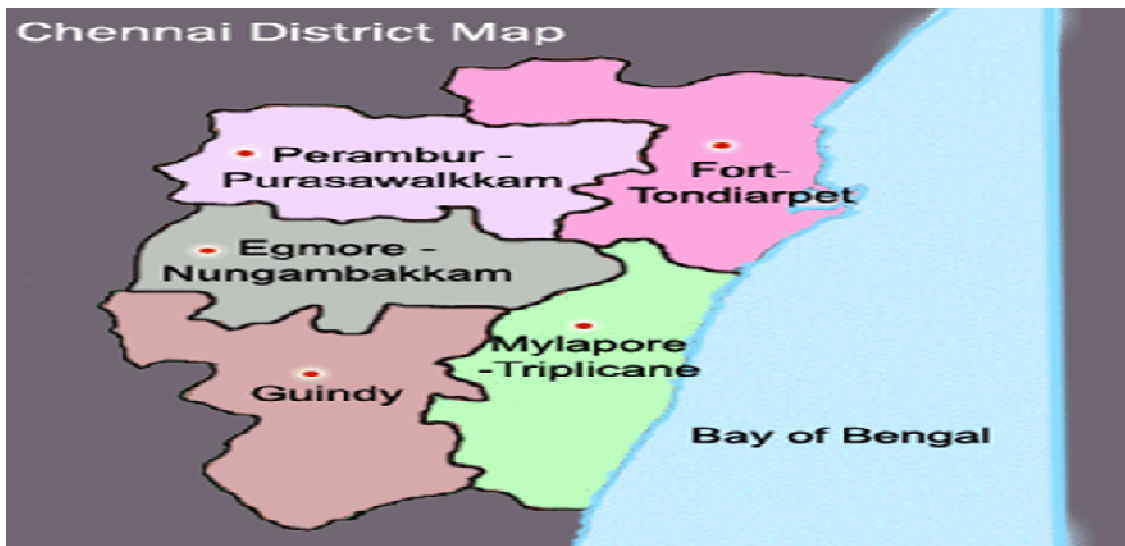
Chennai has a long Beach, which stretches nearly 25.60 km. from Thiruvottiur in the north to Thiruvannmiyur in the south and it is sandy for about a km. from the shore. The bed of the sea is about 42' deep and slopes gradually for a distance of about 5km.s from the coast and attains a depth of about 63'. The two principal currents, one from the north sets in about the middle of October and continue till February and another from the south flow parallel to the coast, which starts during early days of

August and continues till the middle of October.

ii) Administrative profile (taluks / villages)

Chennai City is one of the oldest cities of India. Chennai district encompasses the entire Chennai Corporation including 19 villages added in the year 1979 from out of the Chengalpattu district. The Following table shows the administrative profile of the district

Taluk Name	No. of Villages
Egmore - Nungambakkam	13
Mylapore - Triplicane	8
Mambalam - Guindy	15
Fort - Tondiarpet	7
Perambur - Purasawakkam	12



Chennai District Map

iii) Meteorological information (rainfall / climate details)

Chennai has a tropical wet and dry climate. The city lies on the thermal equator and is also on the coast, which prevents extreme variation in seasonal temperature. The weather is hot and humid for most of the year. The hottest part of the year is late May to early June, known regionally as Agni Nakshatram ("fire star") or as Kathiri Veyyil, with maximum temperatures around 35–40 °C (95–104 °F). The coolest part of the year is January, with minimum temperatures around 15–22 °C (59–72 °F). The lowest temperature recorded is 13.8 °C (56.8 °F) and the highest recorded temperature is 45 °C (113 °F). The average annual rainfall is about 140 cm (55 in). The city gets most of its seasonal rainfall during the northeast monsoon period from mid–October to mid–December. Cyclones in the Bay of Bengal sometimes hit the city. The highest annual rainfall recorded is 257 cm (101 in) in 2005. Prevailing winds in Chennai are usually southwesterly between April and October and northeasterly during the rest of the year. Historically, Chennai has relied on annual monsoon rains to replenish water reservoirs, as no major rivers flow through the area. Chennai has a water table at 2 m. for 60 percent of the year.

2. Resources-availability

i) Land resources (soil types)

The total geographical area of Chennai District is around 17400 ha. The urban nature of district indicates that there no activities are being carried out with respect to Agriculture and Horticulture. Therefore, data pertaining to agriculture, horticulture practices, soil types, soil

problems; soil conservation works are not applicable to Chennai districts.

ii) Agriculture and horticulture (crops cultivated)

Chennai city today is devoid of any typical agriculture areas but can still be proud of some of the well maintained green belts found in the Peoples park, the Napier park, the Horticulture-gardens, My Lady's Park, Children's Park Guindy, Snake Park, Nehru Park, Nageswara Rao Park, Independence Park, Anna Square Park, the Raj Bhavan, the Theosophical Society Campus, and a number of bungalows and newly developed colonies where provisions for public parks, etc. have been made.

The indigenous trees found include among others neem, mango, tamarind, rain-tree, vagai, banyan, coconut, palm and pipal. Stretches of casuarina plantations are available on the sea-coast beyond the mouth of the Adyar in the South and Tondiarpet in the North, supplying firewood to the city. House gardening is not very common these days due to shortage of water and lack of space.

iii) Forest resources (reserved forest area / protected areas)

Chennai district is not endowed with many forest resources except the Guindy National Park with an area of 270.57 ha, which is under Reserve Forest category. In terms of density of vegetation cover, the area falls under sparse category. The Guindy National Park is classified under tropical dry evergreen forests of the Coromandal coast and is being used for recreational purposes. However, much of this park area botanically represents dry deciduous scrub jungle of the Southern dry zone interspersed with more than 30 species of trees. The entire

vegetation looks dry during summer months. But trees acquire a verdant look with the onset of monsoons. The forests are interspersed with open grassland, which is the ideal habitat for black bucks. Besides forest/land vegetation different water plants are seen in the lakes and ponds inside the park.

iv) Mineral resources (Garnet etc)

The district does not experience any exploration of the minerals and mineral deposits have not been recorded in the district.

v) Water resources (river / major lakes and estuaries)

Rivers

The city is intersected by two languid streams, the Cooum and the Adyar. Cooum runs through the heart of the city and enters the sea in-between the university buildings and the Fort St. George underneath the Napier Bridge, while the latter wends its way through the Southern part of the city and enters the sea near Adyar. These two rivers are almost stagnant and do not carry enough water except during rainy seasons.

Cooum river starts from Kesavaram Anicut in Kesavaram village built across Kortaliyar river. The surplus from Cooum tank joins this course at about 8 kms. lower down and this point is actually the head of Cooum river which is located at 48 kms. West of Chennai. The river receives a sizeable quantity of sewage from its neighbourhood for disposal. Though the river Adyar can be traced to a point near Guduvancheri village, it assumes the appearance of a stream only after it receives the surplus water from the Chembarambakkam tank as well as the drainage of the areas in the south-west of Chennai. The river has no commercial

importance, but the fishermen in the neighbourhood make their living by fishing in the river.

Canals

The Buckingham canal which runs through the States of Tamil Nadu and Andhra Pradesh is a navigation canal. This canal runs almost parallel to the Coromandal coast within the limits of 5 kms. from the coast. It joins up a series of natural backwaters and connects all the coastal districts from Guntur to Caddalore. Entering the city at Tondiarpet in the north and running along the western outskirts of George Town, it joins the new canal, south-west of General Hospital. The other canal worth mentioning in the city is the Otteri Nullah which commences from the village Mullam, runs eastwards upto Purasawalkam and then passes through Buckingham and Carnatic Mills and finally joins the Buckingham Canal, north of Basin Bridge Railway Station.

Chennai has 25.6 kms. of sea coast which is flat and sandy for about a km. from the shore. The bed of the sea is about 42' deep and slopes further in gradual stages for a distance of about 5 kms. from the coast attaining a depth of about 63'. The two principal currents, first from the north and second from the south flow parallel to the coast. The former sets in about the middle of October and continue till February while the latter starts by about August and continues till the burst of the northeast monsoon in the middle of October. These two principal currents must be caused by the winds.

vi) Fisheries production (fish landing details / aquaculture)

Chennai has 19 km. long coastline and is one of the major fishing centres in Tamil Nadu with nearly 44 villages engaged in fishing activity in and around the district.

Following is the fishery profile of the Chennai district (2005-06).

Area:

- a). Total coastal line of the district: 19 km.
- b). i. Total inland fresh waterspread area: 240 ha.
- ii. Estuaries and brackish water area: 40 ha.
- c). Marine fishing villages : 44

Fish Production: Item Quantity Value

	(Item) (1)	(tonne) (2)	(Rs.in lakhs) (3)
Inland	NIL	NIL	NIL
Fisheries Development			
Marine Inland		14031	7576.74

- a) Freezing Plants : 1.5 tonnes Capacity run by T.N.F.D.C.
- b) Iceplants, Cold storages : 5.0 tonnes Capacity Ice Plants run by T.N.F.D.C. And walk in coolers : -Nil-
- c) Sea food processing : -Nil-
Units in private sector : -Nil-
- d) Fisheries Training centre :
i. Marine : -Nil-
ii. Inland : -Nil-
- e) Fishing Vessels Mechanised : 1229
- f) Active Marine Fishermen : 16299
- g) Active Marine Fishermen : 4279

Export

Fish and Fish Products:

- a) Quantity (Tonne) : 42246 MTS
- b) Value (Rs.in crores) : 1382.55 Crores

vii) Heritage resources (Shore Temples / churches)

The protected and conserved monuments in the Chennai district include St. George Fort, Egmore Museum, Parthasarathy Temple, Kapaleeswarar Temple, High Court, Madras University, Mosques – Thousand light, St. Thomas Mount, Mosque – Triplicane, Theosophical Society, Adyar. These monuments are maintained by Archaeological survey of India (ASI) in the district (Table 26).

The major tourist area in the district includes Fort St. George, which was built in 1653, as a trading centre by the British East India Company. At present a portion of the fort is used to accommodate the legislature and the secretariat of the Government of Tamil Nadu. Within the Fort St. George, St Mary's church was built in 1680, which is considered as historically the most important building, and Fort Museum, which preserves most remarkable treasures relating to history of British Empire in Chennai District.

In addition Valluvarkottam, Marina beach, Guindy Children's park area, Government Museum at Egmore, also attract both domestic and international tourists. Among the many attractions of Chennai, the two ancient shrines of Sri Kapaleeswarar Temple in Mylapore and Sri Parthasarathy Temple in Triplicane are also included in Tourist Map in the Chennai district.

Maximum numbers of domestic tourists are visiting Parthasarathy Temple, Marina Beach, Valluvarkottam, Guindy Park, Crocodile Park & Gandhi Mandapam. Maximum number of International tourists visit Marina Beach, Shrines in Mylapore, Triplicane and Besant Nagar Cholamandal Artist Village & Crocodile Park.



Valluvarkottam

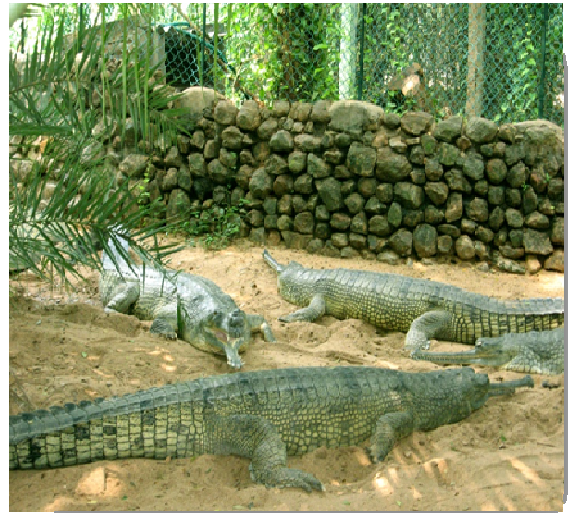


Marina Beach

viii) Biodiversity (mangroves/corals/sea grass/important flora and fauna)

No record of mangroves, corals and sea grasses was made along the Chennai coast. South of the city, along the East Coast Road, is the Madras Crocodile Bank Trust, which hosts several fresh-water and salt-water crocodiles, alligators, gharials, and also turtles and snakes. It is considered an

important institute for herpetological research and performs services such as snake venom extraction for preparing antidotes.



Madras Crocodile Bank

A large number of cattle egrets, pond herons and other water birds can be seen in the rivers of Cooum and Adyar. In addition, the Government of India has plans to classify the Adyar Estuary into a protected eco-system. About 75,000 birds migrate to Chennai every year.

Marshy wetlands such as Pallikaranai also play host to a number of migratory birds during the monsoon and winter. It is one of the prioritized wetlands of Tamil Nadu. Unfortunately, this wetland is being degraded by pollution and garbage dumping and is converted into housing colonies, railway terminus, institutions, and the like with utter disregard for its wildlife and ecosystem values. However, steps are being taken to restore this marshland. Over 300 species of birds have been recorded in the city and its neighbourhood by members of Madras Naturalists' Society since its inception in 1978.

3. Impacts

i) Urbanization (municipal solid waste dumping / sewage etc)

Chennai is a 100% urbanised district. This has naturally led to an increase in congestion, overcrowding, steady growth of slums and squatter settlements and heavy strain on the infrastructure and services. Moreover, there is the migration from neighbouring and other districts in Tamil Nadu for employment opportunities; increase in population put pressure on available land, the overall density has increased. Most of the slums in the city are of linear type located along waterfront (i.e., banks of the Adyar River, Buckingham canal, Coovum River and Otteri Nullah) and along the roadside.

City's sewerage system consists of a network of gravity main, force mains and pumping stations serving the different parts of the city. The sewage collected from each area is pumped from one pumping station to another by relay and conveyed to Kasimedu north of the Harbour from where it is disposed in to the sea. The present system covers 85% of the city's population. Due to inadequacy of the system, the overflow of pumping station finds its way to the waterways of Cooum, Buckingham canal and Adyar. This raw sewage causes high level of BOD in the waterways.



Kodungaiyur solid waste land fill

Solid waste generation in the district is 2500 tonnes/day of which nearly 84% of the waste is being collected and nearly 8400 workers are engaged in the existing solid waste collection system either directly or indirectly. Segregation of solid waste materials is by rag pickers taking place at the dumping yards. However, no composting is practised in the district though there are two land fill pits at Kodungaiyur and Perungudi. With regard to the composition of garbage in the city, it is seen that compostable matter constitutes only 16.4% of garbage while ash and fine earth account for nearly 20% of weight.

ii) Industrial development (effluent discharge / pollution – air water land etc.)

Chennai is one of the important industrial centres of Tamil Nadu and in India. As a district, it ranks third in industrial development after Coimbatore and Salem district in Tamil Nadu.

The major industries in and around the Chennai district included

- Ashok Leyland Ltd.
- T.I. Cycles of India Ltd.
- Enfield India Ltd.
- Sundaram Fasteners Ltd.
- Parry Confectionery Ltd.
- Wheels India Ltd.
- India Cements Ltd.
- Automobile Products of India
- ACT India Ltd
- Amrutanjan Ltd
- India Meters
- The K.C.P Ltd
- Madras Refineries Ltd
- Manali Petrochemical Ltd
- Ponds India Ltd
- Rane Brake Linings Ltd ,etc
- Madras Fertilizers Ltd.
- TVS – Lucas Ltd.

However, no emission inventory has been indicated to be undertaken for the above units.

To check the air pollution, Tamil Nadu Pollution Control Board has identified 5 places in the district. (Anna Nagar, CLRI, Kilpauk, T.Nagar, Vallalar Nagar) to monitor the emission levels of vehicles. The recent data on air quality in T. Nagar and Kilpauk indicate that the Respirable Dust Particles (RDP) are more than 100 micro gram/M³ (Permissible level) and particulate matters are also exceeding the permissible level of 200 micro gram/M³ in the above areas. Moreover, TNPCB lays and modifies the effluent standards for the sewage/ trade effluents and for the emission of air pollutants into the atmosphere from industrial plants and automobiles. Though some of the industrial and urban areas are categorised as air pollution stressed, ambient air quality monitoring in residential, commercial and industrial locations indicate that the concentration of ambient air pollutants are within permissible levels.

In terms of discharge of industrial effluents by the industries, Tamil Nadu Pollution Control Board has identified seven major industries in red category, which are listed below

- Simpson & Co.,
- Rane Madras Ltd.
- I.C.F. Shell division
- Apollo Cancer Hospital
- Addison & Co.
- Tractors and Farm Equipment Ltd.
- Southern Railway, Chennai Central

These industries are disposing 509.2 Kiloliter (KL) of sewage, 42.3 KL of trade effluent and 360 KL of wastewater in the city drains every day, and these are treated before disposal. Tree plantations also help in reducing the air pollution by the absorption of CO₂ gases for their metabolic activities.

Due to discharge of domestic sewage and industrial effluents in to the waterway certain amount of tidal influence average water quality parameters exceed the permissible limits respect of suspended solids, dissolved solids and chlorides.

iii) Thermal power generation (hot water discharge)

The Ennore Thermal power station and Basin Bridge Thermal power station are the two power plants located in and around Chennai City. The higher percentage of electricity consumption is registered in domestic sector i.e. 63%, as the district is predominantly a settlement area, and the commercial establishments consume 16%. The district is electrified 100%. In Chennai district non-conventional energy resources are absent as the scope is limited. The production of energy as well as the consumption by the end-user results in environmental problems. The thermal power plants emit pollution into the atmosphere and the fly ash deposited in the sea causes marine pollution. Alternative energy sources such as solar, Bio -gas and windmills would augment supply and be environment-friendly in comparison to fossil fuel.

v) Natural hazards (erosion / accretion / sea level rise/ climate impact)

As a coastal city, Chennai district is susceptible to erosion particularly on the Northern side. The coastal expressway, a vital link to the industrial area of Manali has been washed away on numerous occasions. Habitations of fishermen have also been damaged. New developments such as the thermal station and satellite port at Ennore must take sufficient note of these natural hazards.

vi) Rare earths mining (garnet etc.)

No such activities happen in Chennai district.

vii) Natural disaster prone areas (tsunami / cyclone / floods)

Chennai is subjected to flooding during the Northeast monsoon. Catastrophic flooding occurred in 1976 and 1985 causing enormous damage to property, infrastructure and the economy. Relief and rehabilitation measures had to be taken up by the public agencies. Households on the banks of the waterways and living in flood plain locations are most vulnerable.

Chennai is a low-lying area and the land surface is almost flat like a pancake. The damage was severe during 2004 Indian Ocean tsunami as it accounted for thousands of human lives and severe material damage. The even topography of the land throughout the district renders sub-divisions into natural regions rather difficult. It rises slightly as the distance from the sea-shore increases but the average elevation of the city is not more than 22' above mean sea-level, while most of the localities are just at sea-level and drainage in such areas remains a serious problem.

4. Government initiatives

i) Initiatives to improve fisher folk livelihood (schemes for education / health)

Following are the schemes to improve fisher folk livelihood

- National Savings- cum- Relief scheme for Marine Fishermen
- Savings- cum- Relief scheme for Marine Fisherwomen
- Enhanced Financial Assistance of Rs.2000/- to Marine Fishermen Families during Fishing Ban period.

- Special Allowance of Rs.4000/- for fishermen families during Non-fishing period.
- Group accident insurance scheme for fisher-folk.
- Fishermen personal accident insurance scheme.
- Motorisation of Traditional Crafts.
- Cash awards to 10th and +2 students belonging to fishermen community.
- Payment of daily relief to the Missing fishermen family while conducting fishing into the sea.
- Fishermen Welfare Board schemes.
- Scheme of creating employment opportunities to educated fishermen youth through up gradation of skills in Maritime Education and Nautical Sciences.

ii) Coastal protection initiatives (bio shields / sea walls etc.)

Kaatupallikuppam

This village is situated north of Ennore Port and south of Pulicat lake. During tsunami, water wall of height 3 m has penetrated about 300 m into the coast. As the Ennore port breakwaters are intercepting the net northerly littoral drift, there is slight erosion at this village. This erosion may be magnified if not tackled. Hence, soft measures like plantations and sand nourishment (dredged spoil from Ennore port) are recommended.

Ennore Creek

The river Kosasthalayar discharges into the Bay of Bengal at Ennore. The Ennore port is located on the northern side of the river mouth. The breakwaters of Ennore port act as permanent littoral barriers and hence trap the sediments to the river mouth. These trapped sediments have choked the river mouth. However, during

the tsunami, the mouth of this river was opened due to the penetration of water mass from the ocean. Presently, dredging is in full swing to keep the river mouth open. It is seen that the dredged spoil is being disposed on the south of the mouth of the Ennore creek, which was found resettling into the mouth. This exercise is futile as it is clear that the net littoral drift along the East coast of India is directed towards north.

In order to have a better solution two groins one on each side of the mouth as training walls need to be constructed. The Southern groin can extend upto a water depth of about 5m, whereas, the Northern groin can extend upto a water depth of 4m. The approximate lengths of the two groins could be about 250m and 200m. In addition, a sand trap on the south of the Southern groin is proposed.

Ennore to Royapuram

The stretch of about 15km. from Ennore towards its south upto Royapuram comprises a number of fishing hamlets. Most of the reaches have been protected by a seawall and combination of seawall and groins. Even though, the reach from Chinna Kuppam (about 3 km. from South of Ennore creek mouth) to Ennore mouth has been protected by a seawall this stretch is liable to be eroded in future. Hence, this should be strengthened by a groin field, by which additional beach width can be gained, thereby not only stabilizing the seawall but also to win additional beach. The additional benefit will be the reduction of sand entering the ennore river mouth and also the maintenance dredging being carried out by the Ennore port. The number of groins for this stretch of 3km. will be about 10, wherein, the average length of the groin will be 150m.

Reach between the two groin fields (Masthan Koil Kuppam to Popular Weigh Bridge)

A portion of this stretch of the coast has been proposed to be protected by two groin fields in addition to a seawall, out of which one stretch with six groins is completed and the second stretch is to be taken up by TNRDC. In between the two groin fields the expressway, industries and fishing hamlets are located along this stretch. Even though some parts of this stretch are being protected by a seawall, it needs further protection, as Ennore expressway adjacent to this stretch may be affected. Hence as an immediate protection measure it is recommended to rehabilitate the existing seawall for a length of about 2km. The cross section of the seawall should be carefully arrived. The other solution that could be effective is construction of a groin field (4 groins with an average length of about 150m).

Stretch between Savorit to Northern breakwater of fishing harbor

The existing seawall at this stretch is in a depleted condition. The stretch of the coast from the North of Northern breakwater upto stretch II of the groin field is to be constructed by TNRDC. The expressway, some hamlets and industries are located in this stretch. With a view to safeguard this stretch, the existing seawall has to be replenished. Hence for this stretch of coast of about 1km., the existing sea wall needs to be strengthened preferably with a flatter section, the details of which need to be work out.

Stretch between Chennai port to Foreshore estate

The Marina beach is World's second longest beach formed due to the interception of the long shore sediment transport by the Chennai harbour Southern breakwater. This has resulted in the sand bar formations at the mouth of rivers Cooum and Adyar. Both the rivers run within the city of Chennai, out of which the Cooum River is more contaminated and is stagnant during most parts of the year, thus acting as an excellent breeding ground for mosquitoes and that way pose a health hazard. The tsunami had opened the mouths of both the Adyar and Cooum rivers.

Hence there is an urgent need for implementing river mouth improvement scheme consisting of a pair of groins as training walls. The training wall on the south of the Cooum mouth should extend up to a water depth of about 6m, whereas, the Northern groin can extend up to a water depth of about 4m. The reason for longer groins is to trap the sediments for 1.5 to 2 times the surf width. In the case of Adyar, regular maintenance dredging of the mouth is recommended.

Besant Nagar

The beach from Besant nagar upto Kovalam is in a stable condition. Hence, no intervention is recommended, except that dwelling units have to be re-located away from the coast.

iii) Awareness initiatives (tsunami / CRZ issues)

NGOs are mainly dealing with environmental issues like Environmental impact studies, Environmental awareness, Environmental Education etc. and around 45 NGOs have been identified in the District.

Various awareness creation activities have been made among the fisher folk on tsunami and CRZ issues.

iv) Bio diversity (coral, mangrove conservation and restoration)

Since there are no marked resources like corals, mangroves and sea grasses no restoration measures have been made.

v) Other initiatives taken by private sector

No data available.

5. Summary / Conclusion

- Chennai is situated in the North-Eastern end of Tamil Nadu on the coast of Bay of Bengal.
- The total area of the district is 178. 2 sq.km. It is bounded by the Bay of Bengal in the east and on the remaining three sides by Kancheepuram and Thiruvallur districts.
- Chennai City is one of the oldest Cities of India with 5 taluks and 55 villages.
- Chennai has a tropical wet and dry climate. The city lies on the thermal equator and is also on the coast, which prevents extreme variation in seasonal temperature.
- The urban nature of district indicates that no activities are being carried out with respect to Agricultural and Horticulture.
- Chennai city today is devoid of any typical agriculture areas but can still

be proud of some of the well maintained green belts.

- The indigenous trees found include among others neem, mango, tamarind, rain-tree, vagai, banyan, coconut, palm and papal and stretches of casuarina plantations are available on the sea-coast beyond the mouth of the Adyar in the South and Tondiarpet in the North.
- Chennai district is not endowed with many forest resources except the Guindy National Park with an area of 270.57 ha., which is under Reserve Forest category.
- Chennai is a 100% urbanised district. This has naturally led to an increase in congestion, overcrowding, steady growth of slums and squatter settlements and heavy strain on the infrastructure and services.
- No marked resources like corals, mangroves and seagrasses have been recorded in this district.

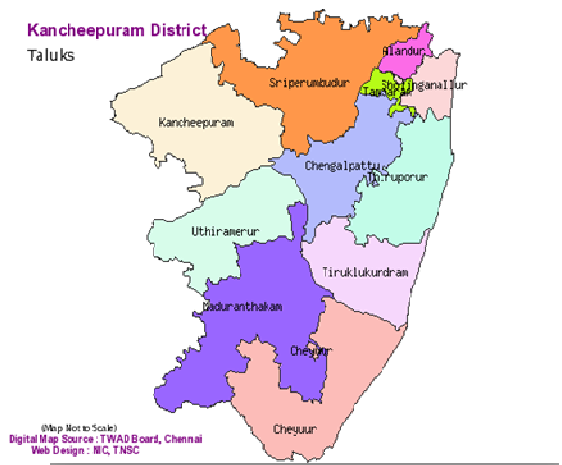
KANCHIPURAM DISTRICT

KANCHIPURAM DISTRICT

1. Introduction

i) Geographical location of the district

Kanchipuram district is situated on the Northern East Coast of Tamil Nadu and is adjacent by Bay of Bengal and Chennai city and is bounded in the west by Vellore and Thiruvannamalai districts, in the north by Thiruvallur district and Chennai district, in the south by Villuppuram district and in the east by Bay of Bengal. It lies between 11° 00' to 12° 00' North and 77° 28' to 78° 50' East. The district has a total geographical area of 4393.37 Sq.Km. and coastline of 57 Km. Kanchipuram, the temple town is the district headquarters.



Kancheepuram District Map

ii) Administrative profile (taluks / villages)

For administrative reasons, the district has been divided into 4 revenue divisions comprising of 11 taluks with 1137 revenue villages. For development reasons, it is divided into 13 development blocks with 648 village panchayats.

iii) Meteorological information (rainfall / climate details)

The pre-monsoon rainfall is almost uniform throughout the district. The coastal taluks get more rains rather than the interior regions. This district is mainly depending on the seasonal rains, the distress conditions prevail in the event of the failure of rains. Northeast and southwest monsoons of contribute respectively the total annual rainfall. The coastal areas receive more rains than the interior land. The normal rainfall of the district has been 1213.3 mm and actual rainfall has been 1133 mm. The months between April and June are generally hot with temperatures going up to an average maximum of 36.6° C. In winter (December - January) the average minimum temperature is 19.8° C.

2. Resources-availability

i). Land resources (soil types)

The following table shows the soil types in the district.

Type of soil	Places in district
Red Loam	Kanchipuram, Uthiramerur Blocks
Lateritic Soil	Pleatus in the district
Black Soil	Spread in all Blocks
Sandy Coastal Alluvium	Some Places Thirukazhukundram, Thiruporur, St. Thomas Mount.
Red Sandy Soil	Kanchipuram, Urban Blocks

ii) Agriculture and horticulture (crops cultivated)

Agriculture is the main occupation of the people with 47% of the population engaged in it. Paddy is the major crop cultivated in this district. Groundnuts, Sugarcane, Cereals & Millets and Pulses are the other major crops cultivated. 76.50 Metric Tonnes lands are cultivated in Fuel wood and 8.039 tonnes in Cashew. Palar River along with Tanks and wells are the main sources of irrigation in this district. Following table shows the details of agriculture in the district.

Classification	Area in ha.)
Total Cropped Area	198543
Nett Area Sown	160090
Area sown more than once	38453
Area Under Principal Crops	
Rice	145966
Millets and Cereals	1217
Pulses	2966
Sugarcane	7586
Groundnut	28766
Gingelly	912
Cotton(BL)	53

iii) Forest resources (reserved forest area / protected areas)

The total forest area in the district is 23,586 ha, spread in the interior regions of the district. In this 366.675 ha. are Reserved Land. 76.50 Metric Tonnes lands are cultivated in Fuelwood and 8.039 Tonnes in Cashew. Much of the natural forests have been converted into man-made forests since the late 50s. However, chunks of natural forests still exist but are in various stages of

degradation. Hanumanthaputheri, Maiyur and parts of Kelambakkam R.F. still support the original vegetation. Kanchipuram district has the singular distinction of having established woodlots in community (Poramboke) lands vested with the panchayat. Way back in 1961, the first ever community plantation- the precursor of the present day social forestry was raised near Sunguvarchatram in panchayat lands.

The major forest product, the industrial pulpwood obtained from Eucalyptus plantations, is supplied to M/S Seshasayee Paper and Boards Ltd. The lops and tops left after extracting the pulpwood is sold as fuelwood. Fuelwood is extracted also from the casuarina plantations. Cashew is the important NTFP which contributes a major share of forest revenue.

iv) Mineral resources (garnet etc)

Granite, stone quarry, sand quarry, silica sand and clay are the minerals available in Kanchipuram district. Following table shows the availability of mineral resources.

Estimated Availability of Mineral resources

Sl. No.	Name of the mineral	Estimated Availability (in m.t.)
1.	Silica Sand	6,00,000
2.	White Clay	5,00,000
3.	Black Granite	3,75.000
4.	Stone	75,00,000
5.	Sand	45,00,000

v) Water resources (river / major lakes and estuaries)

River Palar is the main river in the district, which is not perennial. This is the only river that flows thorough the district, originating from Nandhi Durg in Karnataka. It runs through for a length of 350. km. and nearly half of it in this district covering a basin area of 2187 sq. km. The river has part of its basin in Karnataka and Andhra states. Most of the year it remains dry, due to the construction of dams across the river in Andhra Pradesh. Cheyyar and Vegavathy rivers are tributaries of Palar and join it at Thirumakkudal.

vi) Fisheries production (Fish landing dertails / aquaculture)

The Kanchipuram District is rich in fish resources. Scope for exploitation of marine fisheries in the District is high with the coastal line of 57 Km. A comparison of fish production indicates that the coastal production is higher than the inland fish production. The fish production from both inland and marine sources has increased in both quantity and value.

vii) Heritage resources (shore temples / churches)

Kanchipuram

Kanchipuram is known as the "city of a thousand temples". The 192 ft. high temple tower of Ekamabaranadhar temple and the 100-pillar mandabam (building) in Varadaraja Perumal temple in this town are famous, and are considered marvels of the architectural beauty of the Vijayanagara dynasty. The British Viceroy Robert Clive, who is responsible for the British rule in India, had exclaimed the architectural beauty of Varadharaja perumal temple and presented a fabulous jewelry to this temple. Today, apart from its temples, this small town is also known for its thriving handloom industry. The city is quite famous for its silk sarees, considered to be one of the best varieties of silk sarees. Walajapet near Kanchipuram is also famous for silk saree weaving.

Vedanthangal

Vedanthangal is one of India's main water-bird sanctuaries situated at a distance of 48 km. from Kanchipuram. Storks, egrets, cormorants, darters, flamingos, pelicans, moorhens, herons, kingfishers, sandpipers, white ibis, spoonbills, swans and grey wagtails are some of the birds which visit seasonally. Between October and March, many migratory birds visit. The birds can be viewed from the bank or from the watch tower.



Vedanthangal water-bird sanctuaries

Muttukadu

Muttukadu is a large lake formed out of the backwaters from Bay of Bengal. It has boating and wind surfing facilities. It is located at a distance of 80 km. from Kanchipuram. The backwaters of Muttukkadu have been developed by the Tamil Nadu Tourism Development Corporation to serve as a picnic spot and a center for water sports. Training and demonstration programmes are also organised for beginners.

Mamallapuram

It is a place of architectural interest and lies on the east coast, 55 km. south of

Chennai. It is an important tourist center. The shore temple and the monolithic chariots, known as the “Five Rathas”, Arjuna’s peanace, the Krishna Mandapam, Mahishasura Mandapam, the elephant etc., are all magnificent pieces of sculpture which attract hundreds of tourists throughout the year. The place is also known as the Seven Pagodas and along with the sea-shore and its temple provides a beautiful picnic spot abounding in natural beauty. There is also a lighthouse here. A training center for sculpture has been set up here by the government. The group of sculptures in Mamallapuram is listed out by UNESCO as World Heritage Sites.



Mamallapuram

Covelong

This is a small fishing village 40 km. from Chennai on the Mahabalipuram road. The remains of a fort here now functions as a luxury beach resort. Facilities for windsurfing and swimming are available here. A dargah and an ancient church are also located here.

Dakshina Chitra

Dakshina Chitra has relocated 18th, 19th and early 20th century houses and re-created village streets and work places providing authentic insights into the domestic architecture, spatial organisation, life-styles and character of the essential Tamil or Keralite or Andhrite or Kannadiga.

The Crocodile Bank

The Madras Crocodile Bank, a crocodile breeding center, is located about 14 km. from Mamallapuram. At this center, about 5000 crocodiles of 6 different species, alligators and other reptiles are bred in captivity, kept in open, marshy enclosures. There is also a snake farm where anti-venom is produced and there is a regular venom extraction show.

viii) Biodiversity (Mangroves/corals/sea grass/important flora and fauna)

Following are the important flora and fauna in the district.

Characteristic species

- *Manilkara hexandra*
- *Mimusops elengi*
- *Albizia amara*
- *Memecylon umbellatum*
- *Diospyros ferrea* syn *maba buxifolia*

Top Canopy

- *Mimusops elengi*
- *Diospyros ebenum* (occasional)
- *Strychnos nux vomia* (occasional)
- *Strychnos potatorum* (occasional)
- *Diospyros chloroxylon* (occasional)
- *Drypetes sepiarea* (rare)
- *Syzygium cumini*
- *Canthium decocum* (frequent)
- *ziziphus glaberrima* (frequent)
- *Acacia leucophloea* (frequent)
- *Catunaregam spinosa* (frequent)
- *Buchanania lanzan* (occasional)
- *Sapinda emarginatus* (occasional)
- *Albizia amara*
- *Albizia lebbek*
- *Tamarindus indica*
- *Azadirachta indica*
- *Borassus flabellifer*

Under wood

- *Carissa carandas* (abundant)
- *Flacourtia indica* (locally abundant)
- *Diospyros ferrea* (frequent)
- *Grewia* sp. (abundant)
- *Gymnosporia* spp (frequent)
- *Ixora arborea* (frequent)
- *Tarenna ascatica* (frequent)
- *Memecylon umbellatum*
- *Garcinia spicata*

Shrubs

- *Strobilanthus*
- *Dodonaea viscosa* (abundant)
- *Glycosmis pentaphylla*
- *Ochna squarrosa*
- *Gmelina asiatica*

Herbs

- *Hemidesmus indicus*

Tropical dry evergreen scrubs

- *Diospyros ferrea*
- *Ziziphus glaberrima*
- *Calliea cinerea*
- *Catunaregam spinosa*
- *Carissa spinarum*
- *Albizia amara*
- *Buchanania lanzan*
- *Dodonaea viscosa*

Thorn forests

- Karunkali - *Acacia chundra*
- Usil - *Allizia amara*
- Neem - *Azadirachta indica*
- Sarakonnai - *Cassia fistula*
- Namai - *Anogeissus latifolia*
- Karai - *Randia dumentorum*
- Vagai - *Albizia odoratissima*
- Kala - *Carissa carandas*
- Etti - *Strychnos nuxvomica*
- Virali - *Dodonaea viscosa*
- Avaram - *Caesia auriculata*

- *Canthum dicocum*
- *Aristida setaca*
- *Heteropogon contortus*.

Fauna

- Jackal - *Canis aureus*
- Jungle cat - *Felis chaus*
- Palm squirrels - *Funambulus pennanti* and *F. palmarum*
- Hare - *Lepus nigricollis nigricollis*
- Common mongoose - *Harpestes edwardsi*
- Shrew - *Suncus sp.*
- Pangolim - *Manis crassicaudata*.
- Pariyakite - *Milvus migrans govinda*
- Brahminy kite - *Haliastur indus*
- Partridge - *Francolinus pondicerianus*
- Koel - *Eudynamis scolopacea*.
- Spotted owlet - *Athene brahma*
- Common rat snake - *Ptyas mucosus*
- Cobra - *Naja naja*
- Green whip snake - *Ahaetulla nasutus*.

3. Impacts

i) Urbanization (municipal solid waste dumping / sewage etc)

The proportion of urban population to total population has increased over the decades in the district. Acceleration in density of population is felt heavily in urban areas. The decadal growth rate indicates that the urban centers have increased in the

district adding enormously on the urban population. The estimated sewage generation is at 383.33 lakh liters per day in urban areas with a breakup of 222.10 lakh liters per day for municipalities and 161.23 lakh liters per day for town panchayats. The district is not equipped with any treatment plant and hence there is no organised disposal of sewage. Underground drainage system is partially available only in Kanchipuram, Maraimalai Nagar and Uthiramerur. Overall solid waste generated in the district adds up to 437.14 tonnes with a break-up of 379.00 tonnes in municipalities and 58.14 tonnes in town panchayats. Kanchipuram municipality alone has furnished the details on solid waste. The primary component of the waste is compostable matter constituting 86% in the total waste.

ii) Industrial development (effluent discharge / pollution – air water land etc)

One of the largest industrial areas of Tamil Nadu, Kanchipuram has the pride in being home to vital production bases of international industrial groups like: Ford, Hyundai, Saint Gobain as well as many export houses in and around the Madras Export Processing Zone. The reasons for this are not far to seek:

- Proximity to the Chennai urban area
- Proximity to an international airport and two sea ports at Chennai and Ennore
- Excellent connectivity through the world class East Coast Road and upcoming upgraded NH4 & 45
- Moderate cost of land
- Good industrial parks at Maraimalai Nagar, Alanthur, Irungattukottai, Sriperumbudur, Siruseri, Oragadam and Paranur

- Reasonably good power supply with the North Madras Power Station and Kalpakkam Atomic Power Station located in and around the District.
- Availability of skilled and highly qualified manpower at Chennai and suburbs with IIT, Chennai and Anna University .

For the disposal of hazardous solid waste, the TNPCB identified a site at Siruseri in Kanchipuram district. Rapid environmental impact assessment study has been conducted for the site. However, data are not available on quantum of waste. As no major town or industry is located on the coastal areas of the district, problem arising from industrial and domestic wastewater discharge into sea can be considered to be not significant.

iii) Thermal power generation (Hot water discharge)

The only power project available in the district of Kanchipuram is the atomic power plant which is located in Kalpakkam. The EIA report, based on the Marine study conducted by college of Fisheries, Ratanagiri, funded by NEERI, referring to Kalpakkam study on marine ecology, EIA claimed that no impact on marine life is anticipated.

iv) Natural hazards (erosion / accretion / sea level rise/ climate impact)

As any other coastal environment, coast of Kanchipuram district also gets affected with regular erosion and accretion. Sea level rise and elevation in sea surface temperature are also seen here as the consequences of global climate change.

v) Rare earths mining (garnet etc)

No data available.

vi) Natural disaster prone areas (tsunami / cyclone / floods)

Information on drought, flood and cyclone in the district is very limited. However, it has been ascertained from the available information that there had been cyclones in 1985-86 and 1992-93. As a consequence flood has occurred during the above years. The north east monsoon contributes more rainfall than the south west monsoon. Generally flood occurs during north east monsoon as there is heavy down pour coupled with cyclonic storm formed in Bay of Bengal. Floods occur in the zones such as Uppar Cheyyar and Kiliyar of Palar basin. Heavy floods had occurred in 1985, causing heavy damages to Madurantagam tank and washing away of Kiliyar Railway Bridge and NH Road Bridge. There were also floods during 1992-1993 causing heavy damages to lives and properties. The cyclonic storm which crossed the coast at Karaikal on 4.12.93 had caused substantial damages in the basin area. Several hectares of garden crops were also damaged due to the flood. Coastal area is prone to tsunami.

4. Government initiatives

i) Initiatives to improve fisher folk livelihood (schemes for education / health)

The following schemes from the Government of Tamilnadu are available to the fishermen of this district.

- National Savings- cum- Relief scheme for Marine Fishermen
- Savings- cum- Relief scheme for Marine Fisherwomen
- Enhanced Financial Assistance of Rs.2000/- to Marine Fishermen Families during Fishing Ban period.
- Special Allowance of Rs.4000/- for fishermen families during Non-fishing

- period.
- Group accident insurance scheme for fisher-folk.
- Fishermen personal accident insurance scheme.
- Motorisation of Traditional Crafts.
- Cash awards to 10th and +2 students belonging to fishermen community.
- Payment of daily relief to the Missing fishermen family while conducting fishing into the sea.
- Fishermen Welfare Board schemes.
- Scheme of creating employment opportunities to educated fishermen youth through up gradation of skills in Maritime Education and Nautical Sciences.

ii) Coastal protection initiatives (bio shields / sea walls etc)

Kovalam

The stretch of the coast from Kovalam upto Chinnakuppam is a bay like formation from north of the above and this formation as per the local public appears to be quite stable. This bay formation is likely due to the outcrops on its south acting as a natural littoral barrier. A significant stretch of coast south of Kovalam has a wide beach conducive for plantations as a long-term measure for protecting the coast.

Devaneri

This stretch of the coast has a flat beach. However, in the vicinity of this coast, a large number of dwelling units has suffered damages due to the tsunami. This stretch of the coast can be protected with a flat seawall with a higher crest elevation for 0.5km. backed up by plantations in between the dwelling units and crown of the seawall. On the south of Devaneri, existing plantations acted as barriers in reducing the tsunami run-up. Hence, Devaneri stretch of

the coast can be protected by combination of Rubble mound Seawall and plantations.

Mamallapuram

In the coastal stretch between Devaneri and Mamallapuram, it is understood that the shoreline undergoes short-term changes and hence this stretch of the coast need not be considered for putting up any hard structures and only plantations could be taken up as a long-term solution.

Meyyur Kuppam and Sadras kuppam

This village lies south of Kalpakam Atomic Power Station. Local people have said the water level receded prior to the tsunami up to the intake structure of Kalpakam Atomic plant. The action of tsunami was severe in this stretch. In the immediate south of this village, presence of coconut plantations has given slight relief, as the land in this area is not in an elevated location. During tsunami the water level rose by 3m and penetrated into land. Further south, the flat beach with less elevated region enabled the tsunami to exhibit its might. This stretch of the coast has a number of houses, which need to be protected.

Oyyalikuppam

A number of dwelling units adjacent to the coast has been washed away due to tsunami and leveling of ground and debris is in progress. This village is situated north of Palar River. The Palar River traps some of the sediment transport directed towards North leading to a deficit of sediment supply, leading to erosion along this stretch of the coast. A compound wall of CISF quarters in this village suffered damage, which is being rectified.

iii) Awareness initiatives (tsunami / CRZ issues)

There are at least eight environment NGOs dealing with environmental awareness programs and cleaning campaign. Various awareness creation activities have been made among the fisher folk on tsunami and CRZ issues by different Government and Non Government organizations. Attempts have been made to develop bioshields, rebuild livelihoods, establish the 'Village Knowledge Centres' and reclaim soil in the tsunami affected agricultural fields in Kanchipuram district.

iv) Bio diversity (coral, mangrove conservation and restoration)

There are no marked resources like corals, mangroves and seagrasses in this district and there is no report of restoration.

v) Other initiatives taken by private sector

No data available.

5. Summary / Conclusion

- Kanchipuram district is situated on the Northern East Coast of Tamil Nadu and is adjacent by Bay of Bengal.
- The district has a total geographical area of 4393.37 Sq.Km. and coastline of 57 Km.
- For administrative reasons, the district has been divided into 4 revenue divisions comprising of 11 taluks with 1137 revenue villages.
- For development reasons, it is divided into 13 development blocks with 648 Village Panchayats.
- Agriculture is the main occupation of the people with 47% of the population engaged in it.
- Paddy is the major crop cultivated in this district. Groundnuts, Sugarcane, Cereals, Millets and Pulses are the other major crops cultivated.
- The total forest area in the district is 23,586 ha., spread over the interior regions of the district. In this forest area there are 366.675 ha. of Reserved Land.
- Palar is the major river in the district, which is not perennial. This is the only river that flows thorough the district, originating from Nandhi Durg in Karnataka.
- The Kanchipuram District is rich in fishing resources. Potential for exploitation of marine fisheries in the District is high with a coastal line of 57 Km.
- The proportion of urban population to total population has increased over the decades in this district.
- One of the largest industrial areas of Tamil Nadu, Kanchipuram has the pride in being home to vital production bases of international industrial groups
- The only power project available in the district of Kanchipuram is the atomic power plant which is located in Kalpakkam.
- Important marine resources like corals and mangroves are not found in this district and no restoration attempt has been made.

VILLUPURAM DISTRICT

VILLUPURAM DISTRICT

1. Introduction

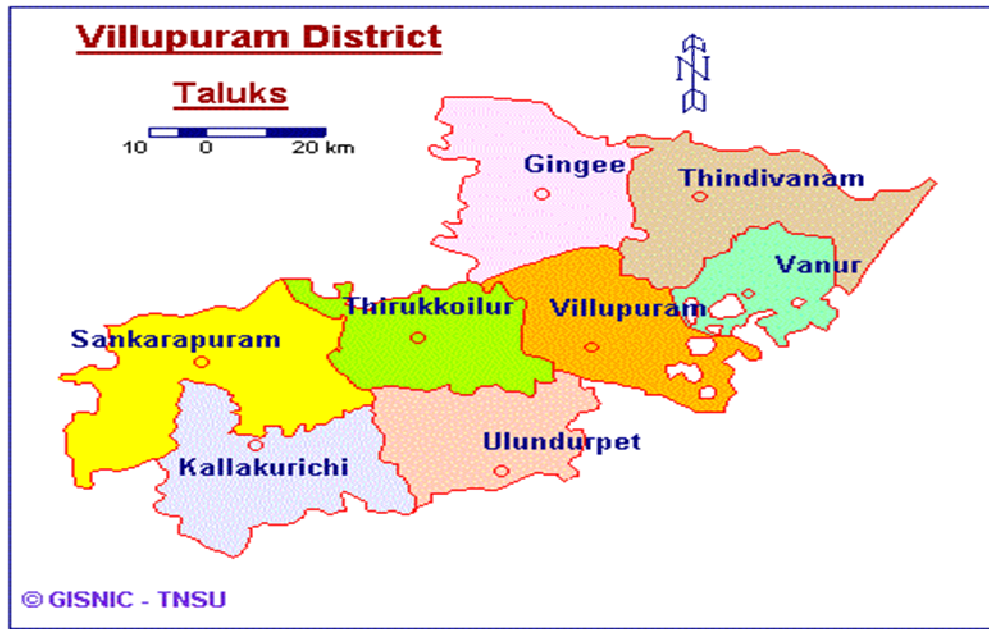
i) Geographical location of the district

Villuppuram District lies between 11 38' 25" N and 12 20' 44" S: 78 15' 00" W and 79 42' 55" E with an area of 7194 Sq. km. It was carved out from the South Arcot District on 30.09.1993 and was rechristened as Villuppuram District. The residual part of the erstwhile South Arcot district was named as Cuddalore District. It is surrounded on East and South by Cuddalore District; the

West by Salem and Dharmapuri districts and on the North by Thiruvannamalai and Kanchipuram districts.

ii) Administrative profile (taluks / villages)

At present Vilupuram district comprises of 1490 revenue villages, 4 revenue divisions, 9 administrative taluks 22 blocks, 15 town panchayat unions, 1104 village panchayats and 3 municipalities.



Villupuram District Map

iii) Meteorological information (rainfall / climate details)

The district does not get heavy rainfall with the exception of Marakanam and Vanur blocks, In Kandamangalam and Koliyaur blocks, the rainfall is moderate it is scarce in Kallakurichi and

Sankarapuram. The total rainfall during the year 2002-03 was 617.4mm against 1030 mm of normal rainfall. The percentage of deviation was (-) 38.9 mm. The average maximum and minimum temperatures for the district have been 32.78⁰ C in May and 24.08⁰ C in January respectively.

2. Resources-availability

i) Land resources (soil types)

The soil types found in the district are red, black cotton and costal sand. The topography is almost plain in major areas. The Kalrayan hills and Gingee hills are with undulating terrain. The details about the types of soil and the places in where they are found are given below.

Types of soil in the district

Red soil - Ulundurpet, Vanur, Gingee, Tindivanam

Black soil - Kallakurichi, Chinnasalem
Red sandy soil Kanai – Thiruvennainallur

ii) Agriculture and horticulture (crops cultivated)

The major crops grown in the district are paddy, groundnut, sugarcane, cumbu, gingelly and tapioca. Out of the total geographical area of 7.22 lakh Ha., the net area sown was 3.31 lakh Ha. in 2006-07. Forest area accounts for about 10 per cent. Sericulture is also coming up in this district in a modest way.

Major crops and their area in Villupuram district

Sl. No.	Name of the crop	05-06	06-07	07-08 (upto Feb'08)
1	Paddy	168435	166400	166363
2	Cholam	1465	1000	1151
3	Cumbu	14810	12700	19870
4	Ragi	959	3600	2297
5	Maize	1377	7800	11353
6	Pulses	21476	48500	51455
7	Cotton	5023	9800	8387
8	Sugarcane	56564	54500	46444
9	Groundnut	58252	70500	84111
10	Gingelly	6840	12400	12231
11	Sunflower	995	2900	2496
12	Castor	147	400	414
TOTAL		336343	390500	406572

Paddy occupies the maximum area of 1.66 lakh Ha., followed by Groundnut (0.84 lakh Ha.), pulses (0.52 lakh Ha.), sugarcane (0.46 lakh Ha.) and cumbu (0.20 lakh Ha.) in 2007-08. Maize, gingelly and cotton are grown in an area of about 10,000 Ha. each. The area of cumbu, ragi, maize and pulses has increased dramatically in the three years period from 2005-06 to 2007-08. The area of paddy and sugarcane is more or less constant over the years. The oilseed crops like groundnut, sunflower and castor have increased markedly over the years.

iii) Forest resources (reserved forest area / protected areas)

Total area come under Villupuram Forest Division is 48703.13 ha. Out of this 24017.24 ha. has been leased out to Tamil Nadu Forest Plantation Corporation (TAFCON).

Out of the balance of 24685.89 ha. 20707.92, ha. fall under Villupuram District

and 3977.97 ha. under Cuddalore District. Villupuram Forest Division consists of 26 Reserve Forest areas. Gingee and Kalrayan Hills are the two hills in the district. Forest area in the district constitutes about 9.9% of the total area of the district and lies in the areas bordering Salem, Dharmapuri and Thiruvannamalai Districts with divisions of reserve forest, interface forest and social forest.

Teak wood, rose wood and sandal wood trees are grown in the hills. In the Kalrayan Hills and Gingee areas some medicinal plants are also grown. In the social forest areas, trees raised are mainly for firewood and paper making. Babul, *Eucalyptus* and *Casuarina* are found to be grown in the district. In some pockets of the district, cashew is also grown.



Kalrayan Hills

iv) Mineral resources (Garnet etc.)

Silica sand, River sand, Black Granite, Blue Metal and Gravel are the mineral resources under production in the district.

v) Water resources (river / major lakes and estuaries)

The major rivers flowing through the district are indicated below.

- Gadilam River flows through Thirukoilur Taluk.
- Malattar River joins Gadilam before flowing into the Bay of Bengal.
- Pennar River flows through Thirukoilur and Villupuram Taluks
- Sankaraparani rises in Gingee Taluk and flows through Villupuram Taluk.
- Gomukhi the of main tributary of Manimuktha River joins into Vellar River in Cuddalore District.

The rivers are only seasonal, mostly carrying flood waters and none of them is perennial. These rivers could not be used for irrigation purpose to the expected level because of low precipitation.

vi) Fisheries production (Fish landing details / Aquaculture)

Villuppuran district has a coastal length of about 32 km. in Vanur and Marakanam blocks in Bay of Bengal. Inland fresh water area spreads over 83014 ha. and estuarine & brackish water area is 2072 ha.. There are about 19 landing places here patronised by active fishermen population of 2986. Fishermen co-operatives societies, fisher women co-operative societies and inland fishermen co-operative societies are

functioning in the district. There is one fish net making unit in Vanur block.

There are about 18 brackish water aquaculture farms in the district. The scope for inland fisheries in the district is limited. Inland fishing is mostly carried out in tanks and reservoirs owned by PWD.

vii) Heritage resources (shore temples / churches)

Ozhindampattu

The Lord of the temple is praised in the Thevaram hymns of Tirugnana-sambandar. Says the saint, Arasili is the abode of Lord who drove away Kala the God of Death, who conquered cupid (Manmatha) the deity of passion and lust, living on the alms offered by others, wearing Kondrai flower and tortoise garlands and sacred ash sprayed over His body. This is the 31st temple in the Thondainadu region praised in Thevaram hymns. 10 day Vaikasi Brahmotsavam in May-June, Maha Shivrathri in February-March and Tirukarthikai in November-December are the festivals celebrated in the temple.

Lord Shiva is swayambumurthy in the temple. Sage Vamadeva visited many Shiva sthalas seeking relief from a curse he incurred. When he came to this place, he relaxed for a while under an Arasu tree thinking how pleasant would it be if Lord Shiva was there under the tree. Knowing the Sage's wish, Lord appeared there as a swayambumurthy, relieved Vamadeva of his curse. The sage immediately had a bath in the nearby spring, installed the Linga and worshipped. As Lord appeared under an Arasu tree, He is named Arasaleeswarar and the place Arasili. In the days that followed, the Shivalinga in the place had disappeared.

The region was under the rule of Chalukya king Satyavradhan. He was a staunch Shiva devotee. He had no issues. He created a garden, installed another Shivalinga in the place and was worshipping. One day his servant found the plants without flowers and informed the matter. The king did not take it seriously. The servant had to repeat the news next day too. To catch the flower thief, the king closely watched the place in the wee hours and found that a deer was happily eating the flowers. The king was angry that an animal ate the flowers meant for Shiva Puja and shot an arrow. The deer escaped and hid in the hole in the Arasu tree. The king shot an arrow at the tree. The tree bled. The king thought that the animal was wounded and looked into the hole but found a Shivalinga only and not the deer. It was the Linga that disappeared long back. The king bowed before the bleeding Lord and sought His directions. Lord appeared before the king and said that the deer was but He. He blessed the king with children. The temple came into being with the efforts of the king.

Lord Shiva as a small swayambu-murthi Linga graces the devotees under a Rudraksha (108 beads) Pandal – tent. The arrow scar on the Linga is still visible. Both as a mark of respect to the Lord and as if to cover the scar injury, a turban is tied on the Linga during the pujas. Saint Sambandar stayed here for a while and sang pathigams – set of 10 verses. Mother Perianayaki graces from a separate shrine facing south. Sendamangalam.

"Abath Sahayeswarar Lord Shiva Temple" is located in the entrance of village. This temple is part of the Koperunchingan kadavarayan King fort and it was destroyed a many years ago. Now this temple has been undertaken by the Central government and the restoration work is programming going

on. This village is in NH 45 and is next to Gedilam river when drives one from Chennai.

Thirukoilur (derived from Tirukovilur)

Thiruvikkrama Lord Vishnu Swamy & Vedavalli Thaayaar (Vaamana Avathaaram) temple is located in the center of this town. This temple comes under 108 Divya Desams. In the east of the town is the Sivan Temple situated on the banks of River Thenpennai. Near to the temple, in the river, there exists Kabilar (Saint) Kundru (tiny mountain). Tirukoilur is one of the "Ashta Veeratanams" - eight and - Place of Bravery. Tirukoilur is also a regarded place for madhwas (followers of Dvaita philosophy of Sri Madhwacharya).

On the banks of River Pinakini, we can find the Moola brindavana of Sri Raghuatthama Teertha (1595 AD) and Sri Satyapramoda Teertha (1997), very eminent pontiffs of the Uttaradi Mutt of Madhwa lineage. One of the famous Jyotir ling mutts of Sri Gnananda Tapovanam is on the Tirukoilur - Thiruvannamalai Road. This mutt was started by his holiness Sri Gnananda Swamikal and still continues to be thronged by pilgrims seeking his blessings.

Melmalaiyanur

Melmalaiyanur is famous for its Ankaala Parameswari temple which is thronged by devotees on new moon days.

Anniyur

Anniyur is famous for two important temples of Lord Shiva and Vishnu. They are located inside the village. The Saneeswaran statue inside an shiva temple is the important one.

Thiruvamathur

Thiruvamathur is a temple dedicated to Lord Shiva. In this temple, the shrines of Lord Shiva and Goddess Parvathi are opposite to each other. Because of this, this temple is believed to unite lovers.

Mailam

Mailam is famous for its Murugan temple atop a hillock. It is located off the National Highway proceeding to Chennai from Villupuram and the nearest railway station is Mailam (on the Villupuram - Chennai Egmore railway line) The belief is that he gives the peace to our mind. Most of the people are willing to get married here in the temple. Mailam also very near to Thenpair Village.

Thenpair

Thenpair village is very near to Vikravandi. The Famous Kaaliyamman Kovil is here.

Kandachipuram

The Lord Shiva temple decorates Kandachipuram. The legend is that the Shivalingam is made up of sand and it was installed by Lord Rama during his tenure in the forest as depicted in the Hindu epic, the Ramayana.

Tiruvakkarai

Tiruvakkarai, a small peaceful village situated on the banks of a river is famous for its Vakkara Kali Amman temple. Full moon days are considered auspicious days to visit this temple. Also look out for the fossil wood park where century old trees have been transformed into rocks. On the full moon day or at the time of valarpirai in Monday (after the new moon day) every one

must visit the temple. Particularly Chandramouleeswarar is a powerful god.

Alambadi Perumal Temple

There is a Perumal temple (Kundusatti Perumal) here. The legend is that the Perumal idol is nothing but a stone, which has Sangu-chakra inside it. The speciality of this stone is that it is a part of the Lord Venkatachalapathy idol at the Tirumala-Tirupati temple. So worship at this temple is considered an equivalent to that of going to the Tirumala-Tirupati temple.

Perumpakkam

It is a village located 8 km. away from Villupuram town. There is a temple for Sri Yoga Hayavadhanar and Sri Vedanthadesikar. This village is located at the distance of 14 km. Villupuram to Thirukoilur road. There is on Saneeswarar temple here. The Lord has been covered out of the biggest stone. It is one of the biggest of Asia.

Poovarasankuppam

A village located 17 km. away from Villupuram. It hosts one of the famous Lakshmi Narashimhar temples in south India.

Siruvanthadu, Mokshakulam

Its original name is "sirubanthadu", later derived as siruvanthadu. This village is located 15 km. away from villupuram town. It is famous for its silk weaving & silk saree production. Also plays a vital role in State's Handloom Silk Saree Production after Kancheepuram. It also hosts one of the famous Lakshmi Narayana Perumaal temples in south India. A famous temple of Lord shiva is also situated here.

Thiruvannainallur

A township located from Villupuram towards Tirukoilur. It hosts the famous "Sundarar" timed temple Kirubapureeswar temple.

Kalpattu

This village is famous for St.Paul the Hermit's Catholic Church. The annual feast is celebrated every year on 8 August. People come from all walks of life to receive God's grace through this saint. Also 21 Ft. Saneeswara Sannadhi was built in this village to commemorate the 50th Maha Samadhi celebrations of Sri Swayam Prakasha Saraswathy Avadhutha Swamigal.

Thimmalai

Thimmalai village is located 2 km. away from the national highway salem to Chennai. Agriculture is the occupation of thimmalai people. There is one middle school with the name Kuzhandaivel middle school. Ancient Lord Siva temple is located near the pond. Big lake is located which is the main source for cultivation.

Mel Sithamur Jain Math

Mel Sithamur Jain Math or Jina Kanchi Jain Math, is a Jain Matha that is located near Gingee in Villupuram district. It is the primary religious center of the Tamil Jain community. It is headed by the primary religious head (Bhattaraka) of this community, Bhattaraka Laxmisena Swami.

viii) Biodiversity (Mangroves/corals/sea grass/important flora and fauna)

No data available. There has been no conservation measure on Biological resources and no conscious effort has been taken by the district administration to conserve the rare and threatened species of flora and fauna in the district.

3. Impacts

i) Urbanization (municipal solid waste dumping/ sewage etc.)

The proportion of urban population to total population has increased. Among the urban areas, Villupuram municipality accounts for a greater share of urban population when compared to the other urban areas. The estimated sewage generation is 31 lakh litres among municipalities and 54.32 lakh litres among town panchayats. The district does not have any organised disposal of sewage. Quantity of sewage disposed through land is 71.82 lakhs litres in municipalities. Both the town panchayats and the municipalities have complete open drainage system. There have been 13.30 lakhs litres, sewerage disposal from Town Panchayats.

The level of solid waste generated by municipalities and town panchayats are 12 tonnes and 40.80 tonnes respectively. The solid waste collection in municipalities and town panchayats is claimed to be 90%. It was observed that 70% of the solid waste was compostable on wet basis, 6% of bricks and stones and 24% of rags, wooden matter, rubber & leather, plastics, etc., are compostable in the district.

ii) Industrial development (effluent discharge/ pollution–air water land etc.)

Villuppuram district is developing in the industrial sector. Sugar plant is the major industry in the district. There are 4 sugar factories at Mundiampakkam, Periasavalai, Kacharapalliyam and Mungailthuraipattu. In the area of small scale industries there are 67 Rice mills, 17 Sago factories 5 Rice bran oil extracting units and 8 Cotton Ginning Mills. Besides there mineral water, ceramics, automobile workshop are also running in the district. There is no Industrial Estate in the district and when compared to the population the industrial establishments are quite inadequate to meet the job requirement of the educated youth.

MAC (Marginal Abatement Cost) has identified the highest emission rates in terms of SPM [$325 \mu\text{g}/\text{m}^3$], SO_2 [$39.3 \mu\text{g}/\text{m}^3$] and NO_x [$26 \mu\text{g}/\text{m}^3$] while the emission rates of Carbon Monoxide (CO) and hydro Carbon (HC) are not available from the authorities. However, industries of the district are found to be having the emission rates above the set standards. As far as the urban air quality status is concerned the average residential SPM values seem to be on the higher side compared to the standards. Rest of the indication on air quality status is found to be well within the limits.

Under MINAR's scheme TNPCB is monitoring the quality of water from 16 places of Cauvery riverbed. As per the test, the quality of water is normal. In Pichavaram TDS and Chloride content of water is exceeding the standard value. Because of more water evaporation and backwater of sea, pH of water is slightly more than the standard. Disposal of sewage

and drainage water into the Cauvery River is the main reason which affects the quality of water.

iii) Thermal power generation (hot water discharge)

There is no power generation by Electricity Board in Villuppuram district. But the Electricity Board purchased power from two private power units located at Panchalam.

vi) Natural hazards (erosion / accretion / sea level rise/ climate impact)

As any other coastal environment, coast of villupuram district also gets affected with regular erosion and accretion. Sea level rise and elevation in sea surface temperature are also seen here as the consequences of global climate change.

v) Rare earths mining (garnet etc)

No data available.

vi) Natural disaster prone areas (tsunami / cyclone / floods)

It has been ascertained from the available information that only 8 taluks and 22 blocks were affected by flood in the years 1992-94 and affected by cyclone in the years 1993-94. Banana cultivation faces the cyclone havoc in most years.

4. Government initiatives

i) Initiatives to improve fisher folk livelihood (schemes for education / health)

Issues of Concern

- Unpredictable monsoon leads to water scarcity at times. Many water bodies receive water only during north east monsoon.
- Mismatch of major carp breeding season and water availability in tanks.
- Lack of proper infrastructure facilities for seed rearing, fish landing and marketing.
- The average fish production in long seasonal tanks at present is 360 kg/ha against its potential of 2000 kg/ha.
- Fish culture in natural small water system is being practiced by stock and harvest system and not by scientific culture method.
- Unstable export price for shrimps.
- Non-availability of alternate species for shrimp aquaculture.
- Over fishing pressure for limited inshore coastal resources.

Key Areas of Intervention

- Infrastructure development to attain self -sufficiency in seed production through private and Government.
- Expansion of fish culture in hitherto unutilized water bodies
- Infrastructure development to conserve the endangering native fish.
- Mariculture activities such as cage culture of fin fishes and seaweed unit
- Development of Integrated Model for Coastal Aquaculture.
- Infrastructure development to modernize the existing marketing facilities in key areas
- Trainings are arranged to fish farmers to develop their knowledge in fish culture

ii) Coastal protection initiatives (bio shields / sea walls etc.)

Chinnakuppam

This area is experiencing marginal erosion. Two training walls upto a water depth of about 4m near the mouth of the river Palar is recommended. The training walls of river Palar will stabilize the beaches of Chinnakuppam and Periyakuppam. After monitoring the shoreline evolution due to these training walls, a decision can be taken to provide further protection. As a long-term solution, plantation can be started in between these two villages, as there is enough barren land. The location of which in between these two villages, is slightly far away from the shoreline.

Sodanaikuppam - Nadu Kuppam

There is an existing seawall at Sodanaikuppam. There is a dispute between the local public of Sodanaikuppam and Rahamathnagar, which is adjacent to Sodanaikuppam locations. On the land ward side of the seawall a permanent road exists, where which a number of buildings in damaged due to tsunami as this stretch of the coast, north of this seawall is unprotected. Two remedial solutions are suggested. One is to connect this seawall with the seawall in Nadukuppam which is north of Rahamathnagar. The distance between these two seawalls is about 850m. The other option is to construct a short transition groins.

The public of Sodanaikuppam is pressing for 60m beachfront to be kept open for their fishing activity, whereas, the public of Rahamathnagar wants to connect the seawalls. It is recommended to construct a transition groin field, whereas, the local public is demanding for a breakwater and harbour. As a technical solution and as

preparedness for future, against natural hazards, it is strongly recommended to construct a groin field for the left out portion of about 850m consisting of 5 groins. For estimate purpose the average length can be considered as 50m. As the erosion at Rahamathnagar is quite alarming, constant monitoring of the shoreline is to be done and if the shoreline does not stabilize even after the construction of the groin field, this stretch should be further protected by a seawall with a higher crest elevation.

Thanthiriyankuppam

From this village, a stretch of about 3.5km. north of this village (Muthialpet, Mudaliarchavadi, Bommayapalyam) is densely populated and hence need to be protected with a growing field. The growing field will consist of 9 groins with an average length of 150m. Sandy beaches are also available at few pockets, where, plantations can be done as a long-term measure for the protection of the coast.

Mudaliarkuppam

This stretch exhibits the existence of sufficient beach width for which a soft measure like plantation should be taken up immediately.

iii) Awareness initiatives (tsunami / CRZ issues)

Various awareness creation activities have been made among the fisher folk on tsunami and CRZ issues by different Government and Non Government organizations. Attempts have been made to develop bioshields, rebuild livelihoods, and reclaim soil in the tsunami affected agricultural fields in Villupuram district.

iv) Bio diversity (coral, mangrove conservation and restoration)

There are no noticeable resources like corals, mangroves and seagrasses in this district and there is no report of restoration.

v) Other initiatives taken by private sector

No information available.

5. Summary / Conclusion

- Villupuram district is surrounded on East and South by Cuddalore district; the West by Salem and Dharmapuri districts and on the North by Thiruvannamalai and Kanchipuram districts with an area of 7194 Sq. km.
- At present Villupuram district comprises of 1490 revenue villages, 4 revenue divisions, 9 administrative taluks, 22 blocks, 15 town panchayat unions, 1104 village panchayats and 3 municipalities.
- The soil types found in the district are red, black cotton and coastal sand. The topography is almost plain in major areas.
- The major crops grown in the district are paddy, groundnut, sugarcane,umbu, gingelly and tapioca.
- Total area coming under Villupuram Forest Division is 48703.13 Ha.
- Gingee and Kalrayan Hills are the two hills in the district.

- Forest area in the district constitutes about 9.9% of the total area of the district, which lies in the areas bordering Salem, Dharmapuri and Thiruvannamalai Districts
- Silica Sand, River sand, Black Granite, Blue Metal and Gravel are the mineral resources under production in the district.
- Gadilam, Malattar, Pennar, Sankaraparani and Gomukhi are the rivers flowing in the district.
- The rivers are only seasonal, mostly carrying flood waters and none of them is perennial.
- Villuppuram district has a coastal length of about 32 km. in Vanur and Marakanam blocks in Bay of Bengal.
- Villuppuram district is developing in the industrial sector and Sugar industry is the major industry in the district.
- There is no power Generation by Electricity Board in Villuppuram district.
- There are no resources like corals, mangroves and sea grasses in this district and there is no report of restoration.

CUDDALORE DISTRICT

CUDDALORE DISTRICT

1. Introduction

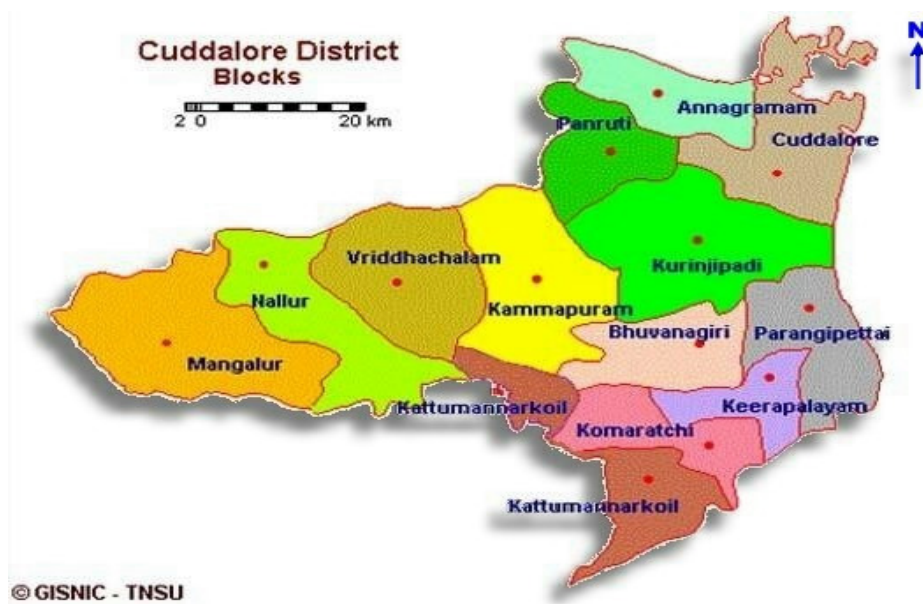
i) Geographical location of the district

The district of Cuddalore lies on the east coast. It is bounded on the north by Villupuram district, on the south by Nagapattinam district, on the west by Perambalur and Villupuram districts and on the east by Bay of Bengal. Headquarter of this district is Cuddalore. The Southern boundary follows for the greater part of the length the of two rivers - the Vellar and the

Coloroon. The district lies between $78^{\circ} 38'$ and 80° east latitude and $5^{\circ} 5' 11''$ and $12^{\circ} 35'$ north longitude. The total geographical area of the district is about 3,678 Sq.km.

ii) Administrative profile (taluks / villages)

The Cuddalore district comprises 3 revenue divisions, 7 revenue taluks, 32 firkas, and 896 revenue villages.



Cuddalore District Map

iii) Meteorological information (rainfall / climate details)

The normal month rainfall during the North East monsoon is 716.5 mm and 373.6 mm during South West monsoon while the actual rainfall during North East monsoon was 1346.1 mm and 340.3 mm during South West monsoon. From the month of August to December, the district receives a rainfall, which is more than the annual average

rainfall. This is due to North East and Southwest monsoons. The average maximum and the average minimum temperatures have been 36.8(C) in May and 19.9(C) in January, respectively.

2. Resources-availability

i) Land resources (soil types)

Black soil is the predominant soil type in this district accounting for 45.2% of

the total area under agriculture. Red Loam and red sandy soil are the other types of soil prevalent in the district.

ii) Agriculture and horticulture (crops cultivated)

The most part of the district is a flat plain sloping gently from the west to the sea on the east and also from the north to the south except for a strip of high ground running across the district from Pondicherry to Virudhachalam. The region can be distinguished into the following natural divisions. The eastern region consists of red soil tracts and wide spread paddy fields and green groves of fruit bearing trees marked here and there by broad open tanks-special characteristics of these parts. The Southern region of the district, particularly Chidambaram taluk and a few parts of Virudhachalam taluk, is

comparatively green and fertile and is made up of even expanse of irrigated land which resembles to a great extent, the deltaic part of Thanjavur district. This is in contrast to the rest of the composite South Arcot district. The seashore is fringed with a belt of blown sand of varying width. Following tables show the details of agriculture during the year 2005-2006. The fruit crop yield comprising mango, guava, etc., is the highest when compared to the other crops. The main plantation crop is cashew nut.

Agriculture (2005-2006)

a) Total Cultivated area Ha.	2,72,159
b) Net area sown Ha.	2,19,891
c) Area sown more than once Ha.	52,268

Area and production of Principal Crops-(2004-2005)	Area Ha. in (tonne)	Production in (tonne)
i) Rice	115	316
ii) Millets and other cereals	126	332
iii) Pulses	36	12
iv) Sugarcane (Gur)	30	355
v) Groundnut	21	49
vi) Gingelly	4	1
vii) Cotton(BALES)	2	1734

Agricultural land holdings (2005-2006)

i) Holdings	2,97,836
ii) Area Ha.	2,39,279.28
iii) Average size of holdings	0.8

Important Food crops	Paddy, Groundnut, Sugarcane, Cholan, Cambu, Redgram, Cotton, Gingelly, Tapioca, Greengram, Blackgram, Coriander, Banana, Maize, Varagu, Cashewnut
Important Non food crops	Gingelly, Cotton, Groundnut, Coconut

iii) Forest resources (reserved forest area / protected areas)

Total forest area of Cuddalore district was 9718.85 ha.. Reserve Forest category was 9467.13 ha. and Reserve Lands was 196.52 ha. while unclassified forest was 55.20 ha..

Out-turn of Forest Product,

- a) Fuel wood (MT): 15.500
- b) Timber (Cu.m): Teak-13.634 m³
- c) Cashew (MT): 0.55
- d) Others
 - i) Palmyra leaves: 3400 Nos.
 - ii) Palmyra Nuts: 5000 Nos.

iv) Mineral resources (garnet etc)

The district has fairly rich mineral deposits. The fossiliferous cretaceous limestone is found in Parur and Northwest of Vrindhachalam. The Cuddalore sand stone form stick which is a more recent sedimentary deposit in this part forms the Red Hills near Pondicherry and the mount Capper Hills, south-west of Cuddalore. The alluvial beds are found in Vellalar and that of the combined Ponnaiyar, Gadilam and Gingee rivers.

The Neyveli Lignite Corporation (NLC): The NLC was registered as a Company on 14th November 1956. The mining operations in Mine- I were formally inaugurated on 20th May 1957 by the then Prime Minister Pandit Jawaharalal Nehru. The main constituent Units are the two Lignite Mines, two Thermal Power Stations, a Fertiliser Plant and the Briquetting and Carbonisation Plant.



Neyveli Lignite Corporation

Mine –I with a capacity of 6.5 million tonnes lignite per annum feeds Thermal Power Station – I (600 MW), Briquetting and Carbonisation plant (2,62,000 tonnes of Coke achievable capacity) and the Process Steam Plant. Mine – II with a capacity of 10.5 million tonnes lignite's per annum feeds Thermal Power Station –II (1470MW).

The Lignite deposits in India occur mostly in sub-surface deposits and as part of tertiary formations. Their depths of occurrence vary from 100 m to depths deeper than 300 m, as in Mannargudi and East of Veeranam block in Tamil Nadu.

Mine - I

The lignite steam was first exposed in August 1961 and regular lignite mining was commenced in May 1962. The continuous mining technology in open cast mining, with German Bucket Wheel Excavators, Conveyors and Spreaders were put to use for the first time in India. Lignite excavated from mine – I meet the fuel needs of Thermal Power Station – B C&C and process Steam Plants.

Mine - II

In February 1978, the Government of India sanctioned the Second Lignite Mine with a capacity of 4.7 million tonnes of lignite per annum and in February 1983, it has sanctioned the expansion of Second Mine to a capacity of 10.5 million tonnes. Mine – II had to face problems in the excavation of sticky clayey soil during the initial stage. The method of mining and equipment used are similar to Mine – I. Similarly, the seam is as that of Mine-I and is contiguous to it.

The lignite seam in Mine-II was exposed in September 1984 and lignite excavation was commenced in March 1985. The last overburden system (Surface Bench System) under the expansion scheme was commissioned on 15.12.1991. The lignite excavated from Mine-II meets the fuel requirements of Thermal Power Station-II.

Details of the mineral resources of Cuddalore district is given in the table below.

Major Mines

Sl.No.	Minerals	Name of the lessees	G.O.No & Date	Taluks Covered	Extent	Period of Lease	Whether the leased out area situated in patta Land/poramboke land	Status of the lease
1.	Lignite	Neyveli lignite corporations Ltd.,	636 Ind.(MMA1) Dept. Dt.3.08.99	Chidambaram, Panruti, Vridhachalam, Cuddalore	259 Sq. Km.	20 years 6.12.96 to 5.12.2016	-	-
2.	Crude Oil and Natural Gas	Tvl Oil and Natural Gas Corporation Ltd.	G.O.Ms.No.439 Ind.(M1), dept., dt.15.3.88	Chidambaram, Bhuvanagiri	1.Sq.K m.	15.12.1987 to 14.12.07	-	-
3.	Lime Shell	Lakshmi kumar Chidambaram	G.O.Ms.No.58/ MMAI/dept dt.06.0397	Chidambaram, Keelathirukazhi palai	8/2 4.61.5 Sq.Km	27.1.2000 to 26.1.2020	Patta land	Oper ative

v) Water resources (river / major lakes and estuaries)

The principal river of the district is the Pennar or the Ponnaiyar. The river flows across the boundary between Cuddalore and Villupuram taluks and empties itself into the Bay of Bengal about 3 miles north of Cuddalore. The Gadilam River, which rises in eastern part of

Tirukkoyilur taluk of adjoining district, flows through Cuddalore taluk. In Cuddalore taluk, Malattar joins it on the right and then it flows into the Bay of Bengal at a point, just north of Cuddalore. The Ponnaiyar and the Gadilam are connected by a river course called the Malattar, which serves to carry the surplus water of the former into the latter. The Paravanar, also called Uppanar, rises in

Vridhachalam taluk. This river flows between Cuddalore and Chidambaram taluks, steers northwards and falls into the Bay by the mouth of Gadilam. The Coleroon, which splits off from Cauvery River in Tiruchy district, is more a river of the Thanjavur district. It flows on the Southern boundary of Chidambaram taluk for 36 miles and joins the Bay of Bengal 6 miles south of parangipettai.

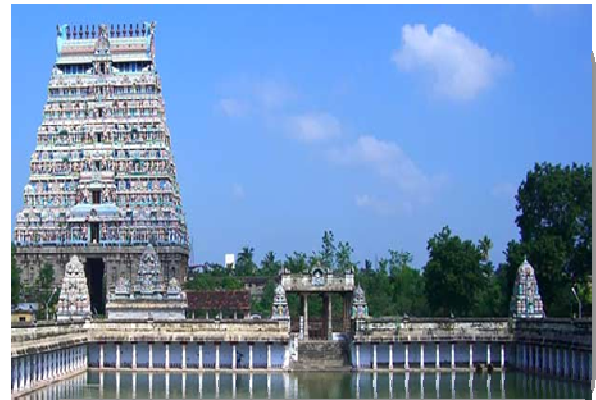
The junction of the rivers, Vasishtanadi and Swetanadi, which rise in Salem district, forms the Vellar River. The Vasishtanadi enters the then South Arcot district through Attur, passes just south of the Kalrayan and Tiruchirapalli for 16 miles. After it joins the Swetanadi, the united streams still follow the boundary and the river flows for another 20 miles, gathering the waters of Manimuktanadi, Gomukhanadi and Mayuratnadi which drain the eastern slopes of the Kalrayan. The river then passes through Chidambaram taluk and joins the Bay of Bengal near parangipettai. There are backwaters on the seacoast caused by the seawater breaking into the watercourse of streams and rivers. One such backwater is found near Cuddalore.

Net Area Irrigated (in ha.)-(2005-06)

i. Govt. Canals	: 46,584
ii. Tanks	: 7,104
iii. Tube wells	: 92,451
iv. Other wells	: 8,644
v. Other sources	: 230

vi) Fisheries production (fish landing details / aquaculture)

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 has been steadily increasing. The Cuddalore district has a coastal line of 57.5 kms. The Inland fresh water area spreads for about 8113 (81.13 sq.km.) ha. and estuarine and brackish water area over 8072 (80.72 sq.km.) ha.. Marine fishing is practised in 41 coastal villages of the district. Number of coastal blocks 3; Marine fish production was 18000 MT and inland fish production was 5823 MT; Number of fishermen engaged in fishing was 13769. The fish production has increased in both quantity and value from 1991.



Temple of Lord Nataraja

vii) Heritage resources (shore temples / churches)

Chidambaram is a temple town and the headquarters of Chidambaram taluk. It is famous for the ancient temple of Lord Nataraja. It is one of the largest temples in South India, covering an area of not less than 39 acres. Lord Siva is worshipped here

in the form of Akasalingam and is therefore invisible. The temple is noted for its five Sabhas and or halls known as Raja Sabha - Deva Sabha, Chita Sabha, Kanaka Sabha and Nritta Sabha. Of these, the Raja Sabha is a thousand-pillared Mandapam, 340 ft. by 180 ft.. This temple which is differently known in religious literature as Chit Ambalam, Ponnambalam and Tillai Ambalam, is associated with Saint Manikka Vaagar who had the triumph of his life in defeating the Ceylonese Buddhists who attempted to overthrow the worship of Siva. The anniversary of the event is still celebrated. The saint is also said to have attained Nirvana at this place. Saints Tirugnanasambandar, Appar and Sundarar are also worshipped at this temple in December-January Ani Tirumanjanam in June-July is attended by a large number of people from all over the State. The famous Saivite temple of Chidambaram is one of the ancient temples of South India renowned for its sculptures of dances in various Natya poses.

Cuddalore is the headquarters of Cuddalore taluk and the Cuddalore district. It can be divided into four parts, viz., Cuddalore Old Town, the commercial quarter on the shore, Cuddalore New Town or Tirupapuliyur on the south bank of the Gadilam river, Manjakuppam, the official centre where the public offices are situated, and Fort St. David on the north of the river Gadilam. Cuddalore Old Town is an important river port and a commercial centre. In Tirupapuliyur, there is an old Siva temple dedicated to Lord Pataleswarar, which is referred to in the Thevarams. The Brahmotsavam festival in this temple is largely attended by people in this taluk as well as other taluks. Mannargudi is a small town in Chidambaram taluk. It is called Kattumannargudi to distinguish it from Raja

Mannargudi in Thanjavur district. The village is reputed as the birthplace of the Vaishnavites saints, Nadamunigal and Alavandar. The local Vaishnavite temple is famous for its sanctity.

Neyveli is a well-known place in Vridhachalam taluk, situated 18 km. to the east of Vridhachalam and 43 km. to the south west of Cuddalore. Due to the mining of Lignite by the Neyveli Lignite Corporation, this place has now achieved international recognition. Lignite deposits are spread over more than 100 square miles in and around the place. A new township has been established at considerable cost. Thermal power stations and other allied factories have also been established.

Parangipettai is situated on the north bank of Vellar estuary. The Portuguese were the earliest European settlers of the place from whom it passed into the possession of the Dutch. The Dutch finally handed it over to the English in 1824. This town has a large Muslim population engaged mostly in sea-trade. Tombs of several Muslim saints are situated in this place, most important among them being the dargah to Saint Malumiyar, Araikasu Nachiyar, Hafiz Mir Sahib and Sayed Saheb. The Marine Biological research station of Annamalai University is located here.

Virudhachalam, the headquarters of Virudhachalam taluk, is noted for its ancient Siva temple dedicated to Vridhagiriswarar, celebrated in the Thevarams. There are several legends connected with this temple. Masi Magam is an important festival of this place when a large number of pilgrims flock to this place to have bath in the scared Manimukthar River. There is ceramic factory near the railway junction.

This is one among the important tourist places in Tamil Nadu with historical monuments, edifices, sacred and ancient temples. The Lord Nataraja Temple in Chidambaram (Cuddalore Block) and the Boat Club of Pichavaram (Parangipettai Block) are the two main tourist spots in the district, which are visited throughout the year. Tourist arrivals both domestic and foreign have been steadily increasing and estimated at 2, 33,581 during 1997. These two tourist spots are also included in the tourist circuits identified by the Tourism department.

viii) Biodiversity (mangroves/corals/sea grass/important flora and fauna) mangrove forests

All the mangrove formations in Tamil Nadu occur along the east coast, at the confluence points of major and minor rivers with the Bay of Bengal, mangrove of Pichavaram lies between $79^{\circ} 45'$ to $79^{\circ} 50'$ E longitude and $11^{\circ} 20'$ to $11^{\circ} 30'$ N latitudes at the Northern extremity of the Cauvery delta in the Cuddalore district. It is located between the Vellar in the North and the Coleroon in the South. It communicates with the sea by a shallow passage, which is only opening in the sandy littoral sand.



Pichavaram Mangrove Forests

The mangroves of Pichavaram are distributed in three reserve forests with a total area of 1357.72 ha. Excluding the lagoons and waterways, mangrove vegetation occupies an area of 475 ha.

People have arrested the inflow of tidal waters after clearing the mangrove vegetation, and used the land for farming or construction of buildings. Cattle's grazing is the major cause for the destruction of mangroves especially in Pichavaram of Tamilnadu.

The Pichavaram forest not only offers waterscape and backwater creeks but combine another rare occurrence- the mangrove forest- where trees are permanently rooted in a few feet of water. The Pichavaram mangroves are considered among the healthiest mangrove occurrence in the world. Pichavaram consists of a number of islands interspersing a vast expanse of water covered with green trees. The area is about 2800 acres and is separated from the sea by a sand bar which is a patch of extraordinary loveliness. The Pichavaram mangrove biotope, with its peculiar topography and environmental condition, supports the existence of many rare varieties of economically important shell and finfishes.

The Pichavaram mangroves attract an appreciable bird population of residents, local migrants and true migrants. At the mangroves, so far, 177 species of birds belonging to 15 orders and 41 families have been recorded. The season for birds is from September to April every year. Peak population of birds could be seen from November to January. This is due to high productive nature (in terms of prey organisms) of the ecosystem and coincidence of the time of arrival of true migrants from foreign countries and local migrants from their breeding grounds across India. The availability of different habitat

types such as channels, creeks, gullies, mud flats and sand flats and adjacent sea shore offers ideal habitat for difference species of birds.

3. Impacts

i) Urbanization (municipal solid waste dumping / sewage etc)

The estimated sewage generation is 216 lakh liters per day among municipalities and 105.74 lakh liters per day among town panchayats. The district does not have any treatment plant and hence there is no organized disposal of sewage. The district also lacks underground drainage system with the exception of Chidambaram Municipality wherein partial underground drainage system is available.

Cuddalore Municipality is responsible for Solid Waste Management in the town. The management includes collection, transportation and disposal of the solid waste generated within the municipal limits. generation of waste from households, hospitals, restaurants, markets etc. are dumped in the communal waste storage pins. Subsequently the municipality collects transports and dumps the solid waste at dumping yard located at Thirupapuliyur, Cuddalore old town & Semmandalam, which are situated at a distance of 3 km. / 5 km. & 4 km. respectively. The current details of solid waste management in town is given below :

1. Waste generation tonne /day : 80
2. Per capita waste generation
grams/day : 505
3. Waste collected in %age : 77
4. Total no. of vehicle available : 11
5. Total vehicle capacity for
collection tonne : 23
6. Total area of disposal site (Acres) : 10.66

Solid wastes are segregated as degradable and non degradable. Primary collection is carried out by 70 nos. of tricycle from door to door in wards and segregated to disposal points. Under 11th Finance Commission New Tractor Dozer Front and Loader was purchased for dozing these solids in roads and dumping yards. As per Government order this Municipality introduced privatization of Solid Waste Management in Thirupapuliyur area covering 8 wards (22 to 29 wards) and is going on satisfactorily.

ii) Industrial development (effluent discharge / pollution – air water land etc.)

Growth of chemical industries in and around Cuddalore District contributes to the degradation of air, water and soil in the industrial belt. The major contribution to the degradation is done by the lignite mining industry of the Neyveli Lignite Corporation (NLC) through the release of CO₂ SO₂ and NO₂ during the burning of lignite for power generation and urea production and by letting out the treated and untreated effluents, which contain organic and inorganic matter.

The district has many other special and hazardous industries, which are classified as “Red” by TNPCB. These are mostly chemicals, textiles and pharmaceutical industries. The bifurcation of the district in 1993-94 has resulted in the redistribution of industries based on location. The details on the number of industries are given below.

INDUSTRIES

A. Industries in the District

1. No. of Working Factories	:	228
2. No. of Trade Unions	:	57
3. Large Scale Industries	:	35
4. Small Scale Industries	:	617
5. Cottage Industries	:	200
6. Medium Scale Industries	:	114

B. Name of the Important Industries in the District

1. Neyveli Lignite Corporation , Neyveli
2. MRK Sugar Mill, Sethiathope
3. EID Parry (I) Ltd, Nellikuppam
4. Ambiga Sugar Mills, Pennadam
5. TANFAC, Cuddalore O.T
6. Vanavil , Cuddalore O.T
7. National Cotton Mills, Chidambaram
8. SPIC Pharma Chemicals , Cuddalore O.T
9. Asian Paints (I) Limited, Cuddalore O.T
10. Tagros Chemicals (I) LTD., Cuddalore O.T
11. Clariant Chemicals LTD., Cuddalore O.T

C. Name of the Industrial Park

1. SIPCOT , Cuddalore O.T
2. SIDCO, Semmandalam, Cuddalore
 - a) Cuddalore
 - b) Vridhahalam
 - c) Vadalur
3. Neyveli Lignite Corporation, Neyveli

The industrial complex in Cuddalore, is operated by SIPCOT. The first phase of this SIPCOT industrial complex covers an area of 200 ha and is planned to house 53 units. The second phase of the development will cover an additional area of 88 Ha. The unit produces dyes, organic chemicals,

pesticides, aluminium fluoride and other chemicals. The effluents produced from the existing units in the SIPCOT complex are acidic or neutral. Fluoride content is in the high range.

iii) Thermal power generation (hot water discharge)

Thermal Power Station – I is the first Unit of 600 MW capacity Thermal Power Station – I was synchronised in May 1962 and the last unit in September 1970. This power station consists of six units of 50 MW each and three units of 100 MW each. This power station continuously achieved over 70% power load factor from 1982 – 83 to 1991 – 92 against the national average of around 50%. Thermal Power Station - II is the 1470 MW Thermal Power Station consists of 7 units of 210 MW each.

iv) Natural hazards (erosion / accretion / sea level rise/ climate impact)

As any other coastal environment, coast of Cuddalore district also gets affected with regular erosion and accretion. Sea level rise and elevation in sea surface temperature are also seen here as the consequences of global climate change.

v) Rare earths mining (garnet etc)

No data available.

vi) Natural disaster prone areas (tsunami / cyclone / floods)

The district is predominantly a flood and cyclone prone district. In 1992-93, three taluks and 9 blocks were affected by flood and in 1993-94 six taluks and 13 blocks were affected by flood. Generally, flood occurrence is more in Kattumanarkudi and Chidambaram taluks.

Moreover, 2004 Indian Ocean tsunami hit this district heavily as severe damages to lives and materials were witnessed and hence coast line is always prone to tsunami.

4. Government initiatives

i) Initiatives to improve fisher folk livelihood (schemes for education / health)

Following schemes from the Government of Tamil Nadu are available to the fishermen of this district

- National Savings- cum- Relief scheme for Marine Fishermen
- Savings- cum- Relief scheme for Marine Fisherwomen
- Enhanced Financial Assistance of Rs.2000/- to Marine Fishermen Families during Fishing Ban period.
- Special Allowance of Rs.4000/- for fishermen families during Non-fishing period.
- Group accident insurance scheme for fisher-folk.
- Fishermen personal accident insurance scheme.
- Motorisation of Traditional Crafts.
- Cash awards to 10th and 12th students belonging to fishermen community.
- Payment of daily relief to the missing fishermen family while conducting fishing into the sea.
- Fishermen Welfare Board schemes.

- Scheme of creating employment opportunities to educated fishermen youth through up gradation of skills in Maritime Education and Nautical Sciences.

Following table shows the training given to the fisher folk

Training requirement for SHGs	2004-05	2005-06	2006-07	TOTAL
For fish shrimp pickle production	9.00	8.00	8.00	25.00
For fattening of crab	8.00	9.00	8.00	25.00
TOTAL	17.00	17.00	16.00	50.00

ii) Coastal protection initiatives (bio shields / sea walls etc)

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. In Pichavaram mangroves, the main cause of degradation is increase in soil salinity,

caused by changes in the topography of the wet land by formation of troughs, which favour stagnation of tidal water.

Tsunami affected area apart from livelihood activities.

iii) Awareness initiatives (tsunami / CRZ issues)

Various awareness creation activities have been made among the fisher folk on tsunami and Coastal Regulation Zone issues by different Government and Non Government organizations. Attempts have been made to develop bioshields, rebuild livelihoods, establish the 'Village Knowledge Centres' and reclaim soil in the tsunami affected agricultural fields in Cuddalore district.

Though various development activities have been undertaken under various schemes, in all 16 Town Panchayats in Cuddalore District, the Tsunami works have also been under taken by various NGOS. Tsunami Emergency Assistance Project (TEAP) and Emergency Tsunami Reconstruction Project schemes are in operation in the following two Town Panchayats and several development activities have also been taken up in the

Killai & Parangipettai Town panchayats :

Sl. No	Scheme	No. of packages	No. of works	Length of road	Amount in lakhs
1	EPA	30	116	21.50	573.78
2	ETRP	10	37	10.00	375.12
Total		40	153	31.50	948.90

Economic Activities - SHG (G.O.Ms. No. 781, Dated. 30.12.2005)

Name of the Town Panchayats	Target		Achivement		Subsidy		Loan		Assets Created
	Nos	Amount lakhs	Nos	Amount lakhs	Nos	Amount lakhs	Nos	Amount lakhs	
Parangipettai	13	36.80	13	36.80	13	18.40	13	18.40	13
Killai	30	78.78	30	78.78	30	39.39	30	39.39	30

Economic Activities (For disabled person)

Name of the Town Panchayats	Target		Achivement		Subsidy		Assets Created
	Nos	Amount lakhs	Nos	Amount lakhs	Nos	Amount lakhs	
Parangipettai	63	6.30	63	6.30	63	6.30	63
Killai	60	6.00	60	6.00	60	6.00	60

Revolving Fund

Sl. No	Name of the Town Panchayats	No. of SHG	Achievement		Revolving Fund	
			Nos	Amount lakhs	Nos	Amount lakhs
	Parangipettai	143	85	19.50	85	19.50
	Killai	235	183	41.90	183	41.90

iv) Bio diversity (coral, mangrove conservation and restoration)

In the Pichavaram mangrove wetland of Cuddalore district, wave energy along

the coast is high but a sandy beach, located between the mangroves and the sea, protects the mangroves. Mangrove restoration has been done by M.S. Swaminathan Research foundation after the tsunami.

v) Other initiatives taken by private sector

No data available.

- The most part of the district is a flat plain sloping gently from the west to the sea on the east and also from the north to the south except for a strip of high ground running across the district from Pondicherry to Vridhachalam
- Total forest area of Cuddalore district was 9718.85 ha.. reserve forest category was 9467.13 ha. and reserve lands was 196.52 ha. while uncclasses forest was 55.20 ha..

5. Summary / Conclusion

The district of Cuddalore lies on the East Coast bounded on the north by Villupuram district, on the south by Nagapattinam district, on the west by Perambalur and Villupuram districts and on the east by Bay of Bengal. The total geographical area of the district is about 3,678 Sq.km.

- The Cuddalore district comprises 3 revenue divisions, 7 revenue taluks, 32 firkas, and 896 revenue villages.
- Black soil is the predominant soil type in this district accounting for 45.2% of the total area under agriculture. Red loam and red sandy soil are the other types of soil prevalent in the district.
- The district has fairly rich mineral deposits. The fossiliferous cretaceous limestone is found in Parur and Northwest of Vridhachalam.
- The Neyveli Lignite Corporation (NLC): The NLC is in operation since 1956.
- The principal river of the district is the Pennar or the Ponnaiyar. The river flows across the boundary between Cuddalore and Villupuram taluks and empties itself into the Bay of Bengal about 3 miles north of Cuddalore.
- Pichavaram mangrove area lies at the northern extremity of the Cauvery delta.

- Growth of chemical industries in and around Cuddalore district contributes to the degradation of air, water and soil in the industrial belt.
- The major contribution to the degradation is done by the lignite mining industry of the Neyveli Lignite Corporation (NLC) through the release of CO₂ SO₂ and NO₂ during the burning of lignite for power generation and urea production and by letting out the treated and untreated effluents, which contain organic and inorganic matter.
- The district has many other special and hazardous industries, which are classified as “Red” by TNPCB.
- The district is predominantly a flood and cyclone prone district.
- Mangrove wetlands provide an important ecological asset and an invaluable economic resource to the coastal communities.
- Mangrove restoration has been done by M.S. Swaminathan Research foundation after the tsunami.

NAGAPATTINAM DISTRICT

NAGAPATTINAM DISTRICT

1. Introduction

i) Geographical location of the district

Nagapattinam is a coastal district of Tamil Nadu situated on the eastern side of Nagapattinam the district headquarter lie 326 km, south of the state capital, Chennai, 145 km from Trichy, This district lies south of Cuddalore district and another part of the Nagapattinam district lies to the south of Karaikkal and Tiruvarur districts. Nagapattinam lies between Northern Latitude 10.7906 degrees and 79.8428 degrees eastern longitude. The district spreads over an area of 2715.83 sq.km.



Nagapattinam District Map

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 months of November-December. The storms affect the plantation crop. During Southwest monsoon the air is calm and undisturbed. 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.

ii)Administrative profile (taluks/ villages)

This district is enveloping 11 panchayat unions, 4 municipalities, 8 town anchayats on its development side. on the revenue side it is housing 2 revenue divisions and 523 revenue villages.

Revenue Divisions	2
Taluks	8
Municipalities	4
Panchayat Unions	11
Town Panchayats	8
Panchayats	434
Habitations	2508

ii) Meteorological information (rainfall / climate details)

The average maximum temperature of the district as a whole is about 32⁰ C and the average minimum temperature is 24.6⁰C. Dust storms, whirl winds and dusty winds blow from various quarters towards the end of May. The Southwest winds sets in during April, it is the strongest in June and continues till September.

The average normal and actual rainfall is 265.2 and 250.6 mm respectively during south west monsoon while it is 908.8 and 969.2 mm respectively during north east monsoon.

2. Resources-availability

i) Land resources (soil types)

Sandy coastal alluvium and black soil types cover 88.71% and 6.58% respectively in this district. The other soils in the district comprise 4.71%. The soil of

the district is mostly alluvial but varies greatly in quality. The rich soil is found in the north and the south of the railway line between Mayipaduthurai and Thiruthuraippundi. The worst land in the delta is found in the Tirutturaippundi and Nagapattinam taluks where the soil is saline and arenaceous and drainage is very defective.

ii) Agriculture and horticulture (Crops cultivated)

One of the major economic activities of the district, agriculture contributes a higher share of rice production in the state. Important crops in the district include rice, groundnut, pulses, gingelly, sugarcane and cotton.

Details of important crops in district		
Sl. No.	Name of the crop	Normal area in ha.
1	Rice	1,54,945
2	Sugar cane	8,824
3	Cotton	650
4	Groundnut	5,820
5	Gingerly	2,950
6	Green gram	17,130
7	Black gram	48,400
8	Vegetables	746
9	Coconut	3,116

This coastal 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 a 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 crops, fruits and vegetables. Among the non-food crops, cotton/fibre, edible oils crops (groundnuts, coconut and gingelly) non-edible oils crops (castor, miger seeds, though in very small area) are the important ones.

iii) Forest resources (reserved forest area / protected areas)

There are 41 forest areas in the Nagapattinam district constituting a total area of 5311.70 ha. will 35 forest areas falling under the reserve forest category with 5037.21 ha. and 6 under reserve land category with 274.49 ha. Forestry activities in the district are being carried out by Wildlife Division, with Wildlife Warden as the administrative head. The division consists of 4 ranges with headquarters at Nagapattinam, Kodiakkarai, Muthupet and Thanjavur. The basic responsibilities of the division include afforestation activities like raising coastal shelterbelt, greenbelts, mangrove restoration, wildlife management and attending to environmental issues. The important forest and wildlife areas in the division includes Point Calimere Wildlife sanctuary.

1. Vaduvor
2. Udayamarthandapuram
3. Karaivetti bird sanctuarie
4. Muthupet mangroves

Tropical dry-evergreen forest covers nearly 15 sq.km.s of Pt. Calimere Wildlife sanctuary. The forests are mostly of the nature of scrubland that stands on low sand dunes located on the western half of the sanctuary. *Manilkara hexandra*, locally called Palai is the most important evergreen species of the sanctuary. In the sanctuary grasslands the dominant graminoid is *Aeluropus lagopoides* followed by *Sporobulu tremulus* and *Cressa cretica*. The forest is home to 154 species of medicinal plants like *Mucuna pruriens*, *Solanum trilobatum*, *Tinospora cordifolia*, *Randia dumetorum* and *Cissus quadrangularis*. A forest rest house at Kodiakkarai is available for visitors to the sanctuary.

Point Calimere Wildlife Sanctuary and the Muthupet mangroves are the most important forests and wildlife areas of Nagapattinam district. Pt. Calimere Wildlife sanctuary is located 60 km. from Nagapattinam and Muthupet mangroves is located 70 km. from Nagapattinam. Pt. Calimere Wildlife sanctuary with a total protected area of 30 sq.km.s, is home to the largest population of the endemic Blackbuck in south. Other animals of the sanctuary include the jackal, spotted deer, jungle cat, feral horses, black napped hare, etc. including a variety of reptiles. From October to January nearly 90 species of migratory water birds visit the sanctuary and its surroundings. They include Flamingoes, Painted storks, Pelicans, Spoonbills, ducks, teals and a variety of shore birds. The best time to visit the sanctuary for bird watching is November-December. The sanctuary is open to visitors throughout the year.

The forests of this division can be divided into two regions from the topography, and flora point of view; the alluvial regions or riverine land areas and The coastal regions. Riverine areas lie on the banks of river and canal in the form of narrow strips. Teak plantations mostly cover these areas, wherever the soil is unsuitable for teak, Sisso, Arjun and *Eucalyptus* have been planted in such areas. Although the soil is light and porous with high water table, the forest areas under these zones are subjected to tremendous biotic pressure and at present their poor floristic composition consists of limited number of herb and thorn species.

The present situations do not bring them in any category of Forest type as per Classification of forests made by Champion and Seth 1968. The Coastal regions contain the Casurina plantations, the mangroves and the scrub jungle with the exception of a portion of Point Calimere sanctuary where about 23 sq.km. of tropical dry evergreen forests are existing.

iv) Mineral resources (garnet etc.)

MAJOR MINERALS

The important major minerals available in Nagapattinam District are as follows:

1. Crude oil
2. Natural gas
3. Silica sand
4. Lime shell
5. Heavy mineral sand (Garnet, Iluminite, Rutile Zircon, Monozite)

Area of occurrence of silica sand in Nagapattinam district			
SL.NO.	BELT NO.	NAME OF THE BELT	AREA(IN SQ.M)
1	I.A	Vadamalai-Manakkadu	1795
2	I.B	Kariappattinam-Chettipulam	6,985
3	I.C	Avarikkadu	1,000
4	I.D	Nagakkudaiyan	3,200
5	II	Vellikidankku-Tanikkottagam	6,500
6	III	Dumbavanam-Vanduvancherri	10,250
7	IV	Thillaivilagam-Melvaymedu	16,500
8	V	ambuvamadal-Therkku Thillaivilagam	9500

Silica sand

The silica sand is an oxide of silicon which is used mainly for the manufacture of Sodium Silicate, which in turn is used in the soap and detergent manufacturing industries and also used in foundries, glass making, ceramics as an abrasives. The Silica sand deposit is 4.86 million tonnes, occurring in Vadamalai Manakkadu, Vanduvancherri, Thanikottagam villages of Vedaranyam Taluk in Nagapattinam District. There are 7 silica sand leases functioning in Nagapattinam District.

Grude oil and natural gas

Crude oil is petroleum in its natural state before it has been refined. Petroleum is naturally occurring hydro-carbons in free state whether in the form of natural gas or in a liquid viscous (or) solid form. Natural gas means gas obtained from bore holes and primarily consisting of hydro-carbons. The oil and natural gas are being extracted in Narimanam, Kuthalam villages by the oil and natural gas commission.

Lime-shell

Lime-shell deposits are available in Sirkali and Nagapattinama taluk of Nagapattinam district (1,87,064 Tonnes). It is used for making lime-mortar and bleaching agent in sugar industries. In Nagapattinam district, one lime-shell lease is functioning.

Mineral Table	
Mineral	Volume
Ilmenite	8670 metric tonnes
Garnet	8450 metric tonnes .
Zircon	430 metric tonnes
Monozone	330 metric tonnes
Rutile	110 metric tonnes
Leucozime	430 metric tonnes
Magnetite	1720 metric tonnes

Heavy minerals

The heavy mineral sands comprise an assemblage of minerals of higher specific gravity and occur as placer deposit along the sea coast in the beach sand. It occurs in Tharangamapdi and Sirkali taluks in Nagapattinam district,. Garnet is used in the abrasive industries, and manufacturing synthetic gems. Illuminate is used for aircraft industry.

Zircon is used for manufacturing Zirconium crucibles. Silliminate is used in Aluminum industries. The estimated reserve of the following minerals are

The above estimation does not include seasonal replenishment of heavy minerals in the coastal area.

Minor minerals

In Nagapattinam district, minor minerals such as sand and brick earth quarries are available. There are 8 sand quarries operating in this district in Kollidam river, Thirumalairajan river and Vettar areas. The details of quarrying leases granted for quarrying various minerals are given in the following table.

Quarry details				
Sl. No.	Name of the minerals	No. of leases in patta lands	No. of leases in poramboke lands	Remarks
1.	Crude oil and natural gas	2	--	--
2.	Silica sand	7	--	--
3.	Lime shell	-	1	--
4.	Sand	2	8	--
5.	Brick earth	4	--	--
	Total	15	9	--

v) Water resources (river / major lakes and estuaries)

The district is situated in the deltaic region of the famous river Cauvery and criss-crossed by lengthy network of irrigation canals. Kollidam river forms the Northern boundary of the district, whereas Arasalar, Tirumalairajanar, Vettar and Vennar rivers drain the other parts of it. All there are tributaries and branches

of the river Cauvery. Canals serve nearly 80 percent of the total net area irrigated and only the river Cauvery feeds these canals. The Cauvery delta system is the most ancient of all irrigation schemes in the undivided Thanjavur. This comprises mainly of three important projects. They are the famous Grand Anicut, the Upper Anicut and the Cauvery Vennar Regulator Project. Tanks and wells are rarely used for

irrigation is the district. The gross area irrigated by canals and other sources is 1,13,374 ha. and 21,405 ha. respectively. The gross area irrigated by the tanks and the wells are 40 Ha. and 50 Ha. respectively. Therefore canal irrigation constituting 84.07% of the total irrigated area remains the predominant source of irrigation. On an average about 58.20% of the total cropped area is irrigated. Mayiladuthurai block achieves about 74% irrigation at the maximum and Vedaranniyam achieves 17.85% at the minimum. Some blocks achieve irrigation at about 60%.

vi) Fisheries production (fish landing details / aquaculture)

The Nagapattinam district has a coastal line of 165 km. Fishery is the the Economic backbone of this coastal district. Having a long coastal area, this district plays a major role in marine commodities. The marine ecosystem provides mankind with food, medicines, industrial products and pleasure. This ecosystem has to be maintained in a healthy state, if it is to provide people the benefits in a sustained manner. Natural, healthy ecosystems have evolved over millions of years, resulting in complex interactions of the environment and all the species living in them. Such interactions allow the optimal utilization of the ecosystem resources by a maximum number of species that includes the human beings.

The waters along the Bay of Bengal coast of India are biologically very productive and possess several unique environmental features. However, little is known about the marine biodiversity resources along the Bay of Bengal coast near Sirkali taluk, Nagapattinam district (Tamilnadu State). Numerous industries, chemical factories and aquaculture farms are also developing along this coast, which

already threatens the mangrove forests and marine life along the coast in Sirkali taluk. The input of freshwater and silt impacts the salinity of the coastal and estuarine waters as well as coastal circulation patterns. Some coastal areas serving as nursery grounds for commercially valuable species of prawns are polluted. The areas of critical biological diversity are the mangrove rich habitat along the coast of Nagapattinam district. The district has good fishing potential in view of its rich coastal area. The coastal fish production is more than the inland fish production and the production has seen fluctuations.

vii) Heritage resources (shore temples / churches)

Nagapattinam

The district came into existence in the year 1991 with its headquarter in Nagappattinam town. Its long stretch of beach runs along the Bay of Bengal for 188 km. Nagappattinam boasts of having one of the most thriving harbours of India. It has Shri Kayahorana Swami Neelayathatchi Amman Temple, Sowriraja Perumal Temple, and Nellukkada Mariamman Temple. The mini museum, the towering lighthouse and the long beautiful beach are some of the worth visiting places in this city. The pillar located in front of the district collectorate stands for the achievement of the administration along with the citizens of this district in taking the guinness record achievement of planting the maximum no. of saplings in 24 hours.

Poombuhar

Poombuhar is in Sirkali taluk of Nagapattinam district. It is known as Kaveripoompattinam. Tourists have to alight at Mayiladuthurai junction to proceed to Poombuhar by road, visitors from Chennai

by train have to get down at Sirkali. Poombuhar is connected to Mayiladuthurai as well as Sirkali by road. The distance from Poombuhar to Mayiladuthurai is 24 km and to Sirkali 21kms. Tourists from Chennai to Poombuhar by private carriers can take the route via Tindivanam, Puducherry, Cuddalore and Sirkali. Those who come from Madurai, Ramanathapuram and Tirunelveli may proceed via Melur, Tiruppathur, Karaikudi, Pattukkottai, Thiruthuraipoondi, Nagapattinam, Karaikkal, Tharangambadi and Akkur. They can also come via Pudukkottai, Thanjavoor, and Mayiladuthurai

Nagore

The Dargha in Nagore near Nagapattinam, the district headquarters is a holy place. Not only the followers of Islam but also of all faiths visit this sacred centre throughout the year to offer their prayers and get the blessings of the saint.



Dargha in Nagore

Nearly five hundred years ago a son was born in a devout Muslim family in a village in the central provinces [Madhy Pradesh], He was named Abdul kadhar. With lust for the grace of Alkah, he wandered with his followers far and wide. He came to Tamil Nadu after visiting

different places like Keelakkarai and preaching the doctrine of love, service devotion to the Almighty. He settled down in Nagore in a piece of land granted by a devotee of this saintly preacher. His words and deeds were divine and prophetic. He said Islam preaches the fatherhood of God and brotherhood of Man. He sent his disciples to work among the people and spread the message of Prophet Mohammed. He passed away in 1558 at the age of 68 in Nagore dargha. The relics of this God-man. Khandoori festival is the anniversary celebrations and devotees from all over the world join the festivals to get blessed by Nagore Andavavar.

Velankanni

Velankanni is one of the most visited pilgrim centres in India. It is a town situated on the shores of Bay of Bengal. This renowned shrine Basilica of the Lady of Health draws pilgrims from all over the world. Not only Christians but also the people of other faiths come to this church to pray at the shrine of our lady of health.



Velankanni Church

Knowing the importance of this town the Pope in the Vatican city has declared Velankanni as a Holy city. This Roman Catholic Church has an extended Basilica, which has two floors where one can find the statue of Jesus Christ. The Gothic style of architecture is a unique feature of the church. The church itself is an imposing building with inspiring architecture. While the buildings have been painted white, roof of the church is made by tiles with striking red in contrast to the colour of the walls. The environment around the shrine is spick and span. There is also a shrine of 'lady of sorrow' where in the sorrowing Mother is depicted carrying infant Jesus in her hand.

Tarangampadi

It is 35km north of Nagapattinam on the east coast line of Bay of Bengal. Danish Architecture is the attraction of Tranguebar. Bus facilities are available to this place from Nagapattinam, Mayiladuthurai, Poompuhar, Sirkali and Chidambaram. Built in 1620 it exhibits Danish architecture. The fort is now under the control of TamilNadu Archeological Department. It houses an archaeological museum. This museum is open on all days except Friday.

Kodikkarai

Kodikkarai (55Km.) also called Point Calimere, is situated abutting the Palk Strait. Spread over an area of over 312.17 Ha., this Wild Life Sanctuary boasts of mammals like blue buck, spotted deer, wild boar, semi wild ponies, bonnet macaque, water birds like flamingoes, ibises, herons, and spoonbills. Sea turtle, starred tortoise, vipers, marsh crocodiles, etc., are some of the reptiles. Fish, dolphins, dugong, sea lion, sea cow are occasionally found here.



Point Calimere Wildlife Sanctury

Sikkal

A beautiful Muragan Temple dedicated to Lord Singaravelan is housed in a large complex. The pillars of this temple are adorned with intricate and exquisite carvings. The beautiful paintings of a bygone era are amazing in colour and portrayal. Beside this temple has the shrine of Siva, Vishnu and Hanuman. It is a rare combination, indeed. Worship in this temple removes all the hurdles of the devotees, it is believed.

Thirumullaivasal

This town is 14Km. east of Sirkali. It is popular for its fine beach, which is full of natural beauty. This town has an ancient temple. The presiding deity of this temple is Arulmigu Mullaivananathar. This temple is glorified in divine songs.

Keelaperumpallam

Situated 3km from Poompuhar, Keelaperumpallam receives a stream of devotees every day for worshipping Shri

Naganatha Swami. This temple is the seat of the Ninth Navagraha, the Kedhu.

Thiruvengadu

Thiruvengadu is situated 8 km. from Poompuhar. Navagraha Budhan is situated inside the Temple of Arulmigu Swetharanya Swami. Devotees from all over India and abroad come to worship Budhan every day. This temple is glorified in divine songs.

Vaitheeswarankoil

In the divine songs of Devaram, Vaitheeswarankoil is called Pullirukkuvellur. The Presiding deity Lord Vaithiyanathan and the Devi is Thaiyalnayagi. Lord Muruga is called here as Arulmigu Muthukumaraswami. Vaitheeswarankoil is situated 12km from Mayiladuthurai and 5km from Sirkali. This temple is the seat of another Navagraha, the Mars.

Thirunangore

Situated 10 kms. from Sirkali, Thirunangore is one of the most sacred places for Vaishnavaiter. Shri Narayanaperumal Temple, Purushothama Perumal temple, Kudamadum Kootha Perumal kovil, Semponnarangar kovil, Pallikondaperumal kovil, Varadharaja Perumal kovil which had been performed Mangala Sananam by Thirumangai Azhwar are located in this small town. Around Thiru Nangore, there are other Vaishnava temples in Thiruvali, Thirunagiri, Keezhasalai and Perumal kovil.

Thirukkadaiyur

Thirukkadaiyur is and the bus route between Chidhambaram - Nagappattinam. In this temple, Lord Siva had annihilated Yama, the God of death and destruction to save the life of Markandeya and bestowed

immortality on him. It is one of the most important seats of Sakthi. Inside the precincts of the temple of Arulmigu Amerthakadeswarar is located the temple of Shri Abirami Amman. The great Saint Abirami Bhattar composed the divine songs of Abirami Anthathi. On attaining 60th year of age in conjugal life of the husband, the couple, belonging to the Hindu family, celebrates their Sashti Abthapurthy ceremony here inside the temple.

Sirkazhi

Sirkali is located on the main route between Mayiladuthurai and Chidhambaram. Shri Arulmigu Sattanatha Swami temple has many wonderful architectural and sculptural features. This temple has been glorified in the divine songs of Thevaram. One of the four great divine poets, the Saiva Saint Thirugnana Sambandar was bestowed with the divine grace by Lord Siva and Parvathy here. Every year in the Tamil month of Chithirai, Thirumulaippal festival is celebrated in a grand manner.

Mayiladuthurai

Arulmigu Mayuranathar temple is located here. According to the Hindu mythology, Annai Parasakthi danced in the form of a peacock and hence the place is called Mayiladuthurai. Devotees after worshipping Mayuranathar can travel from here to all the places of Navagrahas and other important temples by bus. The festival of Holy bath known as Kadai Muzhukku in the river Cauvery is celebrated in the month of Ippasi.

Ananthamangalam

On the east coast between Nagappattinam and Chidhambaram, Ananthamangalam is located 5 kms. from Thirukkadaiyur. People from all over Tamil

Nadu visit the temple of Lord Anjaneyar for His grace. The divine statue of Anjaneya here is unique with its three eyes and ten hands. Special worship of Anjaneya is held on Saturdays and on the days of Amavasya.

viii) Biodiversity (mangroves/corals/sea grass/important flora and fauna)

The Muthupet mangrove wetland is located in the Southernmost part of the Cauvery delta with Palk Strait in the south and extensive mudflats in the north. Many of the drainage arteries of the Cauvery River, namely, Pamini, Korayar, Marakakoryar, Pattuvanachi and Nasuvini, empty their water into the Muthupet mangrove wetland. The Muthupet mangrove wetland comprises healthy and degraded mangroves, large lagoon and canals, besides creeks and manmade fishing canals.

According to the 1996 remote sensing data, the total area of the Muthupet mangrove wetland is about 12,000 ha. and for administrative purposes it is divided into 6 Reserve Forests. The presence of two large lagoons of about 1,700 ha. which are contiguous, is one of the characteristic features of the Muthupet mangrove wetlands. The data also show that the area of the healthy mangrove forest is only about 1855 ha. whereas nearly 7,178 ha. of mangrove forest is in degraded condition. Only 5 mangrove species namely, *Acanthus illicifolius*, *Agiceras corniculatum*, *Avicennia marina*, *Excoecaria agallocha* and *Lumnitzera racemosa* are present in the Muthupet mangrove wetland. Among them, *Avicennia marina*, which is locally called Alaiyathi is dominant, constituting more than 95% of the tree population. But unlike Pichavaram, trees of *Avicennia marina* are very tall in Muthupet and form a beautiful line along the banks of the tidal creeks, lagoons and canals. Hyper salinity in soil

and water is the main reason for the presence of low number of mangrove species.

The harvestable forest resources such as timber and non-timber produce are very limited in the Muthupet mangroves. Though fodder is available in the wetland, no regular grazing is practised since mangrove forest is located far away from the villages and access is very difficult due to muddy soil. Use of mangroves for firewood for household consumption is also very less but about 75 families, mostly headed by destitute women and widows, collect dead wood and dry twigs of the mangroves and sell them at the local market for their livelihood. People belonging to 26 hamlets of 16 revenue villages live around the Muthupet mangrove wetlands. The total population of these hamlets is about 37,255 but average use of the mangrove wetland for fishing is only limited.

Only during the monsoon season (October to December) fishers of all these fishing hamlets are engaged in fishing in the mangrove lagoon and trough-shaped degraded area (locally called thottam); in other seasons, the number of people fishing in the mangrove waters is limited. During the non-monsoon period, most of the fisherfolks fish in the nearby coastal waters.

3. Impacts

i) Urbanization (municipal solid waste dumping / sewage etc)

The estimated sewage generation is 123.75 lakh liters among municipalities and 45.57 lakh liters among town panchayats. The towns of the district do not have any treatment plant and hence there is no organised disposal of sewage. Nature of disposal and quantity through river water is 123.75 lakh liters in municipalities and 45.57 lakh liters in town panchayats. The

district also lacks underground drainage system. The solid waste generation is highest in Nagapattinam among municipalities and Vedaranniyam among town panchayats. Overall the solid waste generated adds up to 37.16 tonnes with a collection efficiency of 75.22%. There is no recycling process of manure in the district. It was observed that 85% of the solid wastes are compostable on wet basis and 15% of rags, plastics, etc. are not compostable in the district.

ii) Industrial development (effluent discharge / pollution – air water land etc.)

The district is deprived of any major industry but it is a flourishing centre of cottage industries and handicrafts alike. The district is equally well known for its pith articles consisting of beautiful models of Hindu idols, temples, mosques, flower garlands, bouquets, parrots and peacocks. The making of musical instruments of jack wood like the veena, the tambura, the violin, the mridangam, the tabla and the kanjara exhibit excellent taste, knowledge and workmanship.

There are 490 industrial units situated in the composite Thanjavur district, of which, four sugar units, a petroleum refinery, a distillery, a thermal power plant are coming under highly polluting industry. M/s. ONGC has explored crude oil and natural gas in Nagapattinam District. The crude oil is made available for Madras Refineries Limited whereas natural gas is utilized as fuel in ten numbers of sodium silicate units. Also this gas is utilized as a fuel for one thermal power generation unit (2X5 MW) by TNEB in this area. A SIDCO Industrial Estate is located at Nagapattinam. The industrial units in these estates are non-polluting or less polluting in nature.

Madras Refineries Limited (MRL), a major refinery in South India with an exemplary track record, has been conscious of its role in maintaining the eco-balance through a number of environmental control measures. Cauvery River Basin Refinery at Panangudi in Nagapattinam, MRL refines 0.5 million metric tonnes per annum of crude. MRL, ever since its inception, has been methodically planning and implementing several environment relative projects to contain pollution within the Minimal National Standards (MINAS) on several fronts.

MRL has been working on reducing air pollution on two fronts: at its own plants as well as in vehicles using petrol or diesel. At its plants, MRL has switched over to LSHS fuel – far less polluting than the high sulphur fuel used earlier. A Sulphur Recovery Unit has been installed at MRL, resulting in substantial reduction of sulphur dioxide emission. Taking its activities beyond the greening of MRL and its environs is another fact of environmental conservation. Planting and maintaining thousands of trees and shrubs form a Green Belt around MRL's Plant in Panangudi. This mitigates fugitive emission, dilutes accidental releases and balances eco-environment-besides beautifying the surroundings.

Environmental protection is becoming an issue of great importance – for the present and future generations. Releasing this national priority, the R&D Centre has established a separate group for environmental studies and research, leading to effective measures to minimise air and water pollution. The ambient air is monitored regularly by a mobile unit to generate baseline data.

Taking its activities beyond Manali, MRL has commissioned a new grass-root refinery with a 0.5 million tonnes capacity per annum at Panangudi in the Cauvery River Basin together with a gas sweetening and LPG separation unit producing 16,000 tonnes of cooking gas. MRL's Effluent Treatment Plants are operating to achieve MINAS. The Tertiary Sewage Water Treatment Plant of MRL, the first of its kind in Indian Refineries, augments water supply to the refinery complex. Also, MRL is working towards zero discharge.

The areas with air pollution are the Thalainayar and Panangudi villages where sugar factory and refinery are functioning. As per the ambient air quality status, the average industrial SPM values seem to be on the lower side compared to the standards. Rest of the indication on Air Quality Status is found to be well within the limits. ground water contamination is observed in certain locations due to sea water intrusion. 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 sea water into the land aquifers. The area mainly affected from sea water intrusion into the land acquires, are Kuttam area in Nagapattinam District. Further information is not available for water quality in the Nagapattinam district Under MINAS Scheme,

TNPCB is monitoring the quality of water from 16 places in 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 contents of water are 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 to affects the biological quality of water.

iii) Thermal power generation (hot water discharge)

One Thermal Power Project with installed capacity of 10 MW is (2x5 MW) available in the district and no information is available on the hot water discharge.

iv) Natural hazards (erosion / accretion / sea level rise/ climate impact)

The tsunami caused heavy damage to houses, tourist resorts, fishing boats, prawn culture ponds, soil and crops, and affecting the livelihood of large numbers of the coastal communities. It was found that 1,320 ha of agricultural and non-agricultural lands were affected by tsunami. The lands were affected by soil erosion, salt deposition, water logging and other deposited sediments and debris. Pre and Post Tsunami surveys on soil quality showed an increase in pH and EC values, irrespective of distance from the sea. Rainfall during season showed dilution of soluble salts in sediments. Pumping of water has reduced the salinity levels in the well water samples as well as in the open ponds. Following the 2004 event, it the hazards pored by tsunami have become apparent.

v) Rare earths mining (garnet etc)

No information available.

vi) Natural disaster prone areas (tsunami / cyclone / floods)

About 7.09% of the land is affected by water logging and 56.21% is prone to floods. It has been ascertained from the

available information that all the 6 taluks and 12 blocks were affected by flood during the year 1991-92 and cyclone during the year 1993-94.

As India and the world witnessed the catastrophic loss of humanity due to tsunami on 26th December 2004, Nagapattinam also unintended the worst tragedy with 6065 confirmed deaths. During this period what stood out was the constant resolve shown by the people to learn from nature's lessons and the resilience of the people and the Government to develop communities for a safer world. Simultaneously the focus has been on not only restoring what was lost but also aiming to change lives for the better as the rehabilitation process moves forward.

The entire coastline was devastated in the district. Around 73 habitations in 38 revenue villages and 5 taluks were affected. Out of 6065 people died, 1776 were children (887 male, 889 females), and 2406 were women. The high death toll of children and women highlighted the fact that Tsunami had caught people unawares. A possible explanation for the high number of deaths among women was that the tsunami struck at a time when most of them were in the shore receiving their men folk returning from the sea. Added to this was the fact that it was a day after the Christmas and a Sunday morning, which had a large number of people, enjoying the morning breeze. Nagapattinam district alone accounted for 76 percent of the deaths of entire state and was the worst affected district in India. In the education front, 41 elementary/primary schools, two high schools and 1 higher secondary school were damaged. On the health side four public health centres and one government hospital was damaged.

4. Government initiatives

i) Initiatives to improve fisher folk livelihood (schemes for education / health)

Following initiatives were taken after the tsunami for the coastal fisher folk, Construction of permanent houses

1. Construction 19,736 permanent houses have been planned for tsunami victims who lost their houses in tsunami. 15,038 houses have been relocated and 4,698 houses are being constructed on in-situ sites.
2. Of 19,736 houses, the construction of 19,019 have been completed handed over to the beneficiaries 717 houses are under various stages of completion.
3. Of 19,736 houses, the constructions of 17,701 houses have been taken up by 58 NGOs and 2,035 houses have been constructed by Government.
4. In the 2,035 houses constructed by the Government 1,143 houses are built by tsunami district implementation unit in rural areas and 892 houses by Tamil Nadu Slum Clearance Board in urban areas.
5. Of 717 houses which are under various stages 409 houses by NGOs were completed before December 2009 and remaining 276 houses by Government by November 2009.
6. Rs.170.60 crores were spent against the sanctioned amount of Rs.170.60 crores on basic amenities on the construction sites like internal road, approach road, land filling, electricity connection, streetlights and livelihood.
7. Rs.11.50 crores sanctioned for execution of common sewerage system in urban areas by Tamil Nadu Water Supply & Drainage Board (TWAD). Work is under progress.

8. All the houses in rural areas are built with attached toilet with individual septic tank with leach pit except 1,733 houses which were taken up by Government at the cost of Rs.150.41 lakhs
9. All the houses are insured for 10 years for the sum of Rs.69,07,600/-

Relief assistance to loss of life

1. Ex-gratia relief assistance was paid to the legal heirs of 4,987 deceased in Tsunami at the rate of Rs.1.00 lakh from the Chief Minister's Relief Fund and Rs.1.00 lakh from the Prime Minister's Public Relief Fund. Rs.99.74 crores were sanctioned 4,230 victims belonging to Nagapattinam district, 517 to other districts and 240 in other States.
2. Rs.138.25 crores were spent on relief assistance to 2,611 injured persons in Tsunami.
3. Rs.7.00 lakhs were spent on recanalisation to 40 women who lost their children in due to tsunami.
4. Rs.14.00 crores were paid as a premium under Universal Health Insurance Scheme covering 68 lakhs Tsunami victims under Insurance coverage.

Reconstruction of vulnerable houses:

1. Reconstruction of 87 vulnerable houses within 200 mtrs from HTL in rural areas was taken up under Rajiv Gandhi Rehabilitation Package for Tsunami Affected Areas. All the houses were handed over to the beneficiaries.
2. Reconstruction of 269 vulnerable houses within 200 mtrs from HTL in urban areas were taken up under

Rajiv Gandhi Rehabilitation Package for Tsunami Affected Areas 255 houses were handed over to the beneficiaries. 11 houses around. 3 are progresses.

3. 1985 vulnerable houses have been identified from 200 m. to 1000 m. of HTL in rural areas which are to be constructed under the assistance of World Bank by Rural Development and Panchayat Raj Department.

Tsunami relief and rehabilitation activities in Nagapattinam in a nutshell

1. The Office of Prime Minister sanctioned Rs.111.39 crores for Tsunami victims of which Rs.107.19 crores have been utilized.
2. Rs.81.13 crores were sanctioned from Rajiv Gandhi Rehabilitation Package for Tsunami Affected Areas for construction of houses and basic amenities of which Rs.78.98 crores have been spent.
3. BSNL sanctioned Rs.26.02 crores for construction of 1,020 permanent houses for Tsunami victims and Rs.26.02 crores have been spent.
4. Rs.148.46 crores have been spent from the Chief Minister's Public Relief Fund for ex-gratia payment to Loss of life and injured.
5. Rs.160.70 crores have been spent against Rs.119.20 crores from the Calamity Relief Fund.
6. Rs.46.67 crores have been spent for immediate restoration like debris clearance, approach road, etc., by the Government of Tamil Nadu.
7. Rs.6.17 crores have been utilized against Rs.6.25 crores under MPLADS for creation infrastructures like old age home, school buildings, etc.
8. Rs.133.47 crores were sanctioned by Asian Development Bank under

TEAP for creation of infrastructures and livelihood in Tsunami affected areas. Rs.110.80 crores have been spent out of Rs.133.47 crores.

9. The World Bank sanctioned Rs.112.49 crores under ETRP of which Rs.77.24 crores have been spent.
10. IFAD sanctioned Rs.49.83 crores for livelihood assistance in Tsunami affected areas through Self Help Groups.
11. Apart from this the NGOs contributed around Rs.300 crores on various schemes for Tsunami Relief & Rehabilitation activities.

ii) Coastal protection initiatives (bio shields / sea walls etc.)

Nagapattinam port

The barren land North of Nagapattinam port is an excellent place for dense plantations. The presence of the vertical wall constructed for the Nagapattinam port at a distance of about 60m from the shoreline has acted as a barrier only marginally against the powerful tsunami. In spite of the presence of this wall, a number of boats were carried away to the land and water on its rear side has moved to a distance of 300m and a height of about 8m.

Keechankuppam

This is the worst affected area due to tsunami and a number of casualties and loss of property were reported. The plantations have just begun along the coast. The plantations should be more dense compared to what has been done as of now. The tsunami has resulted in damage to several bridges and houses along this stretch.

Velankanni

The hutments close to the beach have been washed away by the recent tsunami. A clear width of beach is available. The river Vellayar joins the sea adjacent to this stretch of the coast. It is recommended to dredge the mouth of river Vellayar and nourish the beach on its Northern side as well as to construct a sand dune. Plantations backed up with sand dunes and masonry buffer blocks are recommended for this stretch of the coast. The buffer blocks may also serve as a relaxing facility for the pilgrims and locals.

Vellapallam

This area can be taken up for dense plantations as hutments are away from the shoreline at a distance of about 200m. The shoreline is found to be stable. Two long training walls for the improvement of the mouth of Nallar Straight cut should be taken up.

Tharangampadi (Tranquebar)

This stretch of the coast at Tharangampadi comes under the protection of monuments and places of National heritage. The length of the groins and the spacing between them has made the scheme totally ineffective in trapping the sediments.

It is recommended to rehabilitate the groin with a proper head with an increased top elevation of +3.35 m. Also, an extra groin of length 70 m at a distance of 50 m South is recommended. The existing two groins on the South should be rehabilitated and the length should protrude to a distance of 50 - 60 m from shoreline with a top level of +3.35 m. Plantations on the leese of the

existing seawall is recommended as a long-term measure.

The village Sathankudi, located North of the fort has suffered huge loss of life and dwelling units. The water has penetrated to a distance of about 750 m from the shoreline. The PWD has a proposal for construction of a seawall for a distance of about 850 m from the existing seawall. While, the construction of the seawall is recommended, the crest level has increased by 4.35m. In addition to the seawall, a groin field consisting of 5 transition groins of average length of 100m, with one or two groins is to be formed as 'Thoondilvalivu'. This will help the fishing community as there are number of boats. The Rubble mound seawall may be considered after construction of the groins and monitoring the shoreline changes. In the barren land due to the damaged houses, plantations are recommended.

Poombuhar

The beach south side of the above location is protected by an existing seawall. The tsunami has penetrated to a distance of about 75m from shoreline with a run-up of about 1.5m. The performance of the existing seawall is good as beach has formed. However, the seawall has to be rehabilitated with a crest elevation of + 4.3 m. The North of this village has to be protected by a seawall for a distance of about 650 m. The large extent of barren land is to be developed with plantations.

Vaanagirikuppam

This stretch of the coast is situated South of Poombuhar and South of Cauvery infall point. This is a location, where, a number of casualties and damages to houses have taken place. The damages on the

Southern side of the location showed that land has been cleared. This area has again been cleared of the debris and barren land is an ideal location for plantations. The beach can be protected by groin field and the rubble mound seawall with cross-section similar to Tharangambadi.

Pudukuppam

The entire village has been washed out by the tsunami and the people have totally abandoned their houses. Only plantations are recommended in this stretch of the coast.

Palayur

A number of casualties and damages to the property have taken place in this stretch of coast. As the village is right on the banks of river Coleroon, one suggestion is to retain the dunes already constructed by the local people and the top level of the dune may be further raised. The ditch in front of the dune should be shifted to rear side of the dune. The dune should take the shape for a distance of about 1Km. Plantations on the seaside and on the dune are recommended.

No further construction of houses should be allowed along this stretch. As a long term measure, the dunes can be converted to revetments or with Geo-tubes with its top level of 6.0m above MSL. For this purpose, the shallow regions can be dredged and the dredged spoil can be used for the creation of the dune. A portion of the bank can also be planned for landing jetty in future after the protection of the river bank with spurs.

Thirumalaivasal

The local people report a number of casualties and damage to property. This stretch of the coast is at the confluence point of the river Vellapallam Uppanar. Entire

stretch needs to be dredged and a bund has to be created using this dredged spoil for a distance of about 1 km. from the mouth. Two training walls, at the mouth of the river Vellapallm Uppanar are recommended. A few spurs along the banks of this river need to be provided in order to divert the flow into the ocean. Plantation along the banks of the river is recommended.

iii) Awareness initiatives (tsunami / CRZ issues)

Various awareness creation activities have been made among the fisher folk about tsunami and CRZ issues by different Government and Non Government organizations. Attempts have been made to develop bioshields, rebuild livelihoods, and reclaim soil in the tsunami affected agricultural fields in Villupuram district.

iv) Biodiversity (coral, mangrove conservation and restoration)

Mangrove restoration has been done by M.S. Swaminathan Research foundation after the tsunami. MSSRF started a project during 1993 in Muthupet mangrove wetlands to identify causes of degradation of Muthupet mangrove wetlands and to develop and demonstrate techniques to restore the degraded areas.

v) Other initiatives taken by private sector

No information available

5. Summary / Conclusion

- Nagapattinam is a coastal district of Tamil Nadu, which lies on the east coast south of Cuddalore district and part of the Nagapattinam district lies to the south of Karaikkal and

Tiruvarur districts with an area covering 2715.83 sq.km.

- This district is enveloping 11 panchayat unions, 4 municipalities, and 8 town panchayats on its development side. On the revenue side it is housing 2 revenue divisions with 4 and 3 taluks respectively and 523 revenue villages.
- The soil type comprises of sandy coastal alluvium 88.71%, black soil 6.58% and other soils 4.71%.
- Agriculture, the major economic activity the districts contributes higher share of rice production in the state. Important crops grown in the district are rice, groundnut, pulses, gingelly, sugarcane and cotton.
- There are 41 forest areas in the Nagapattinam district constituting a total area of 5311.70 ha.. 35 forest areas fall under the reserve forest category with 5037.21 Ha. and 6 under reserve land category with 274.49 ha.
- The important major minerals available in Nagapattinam district are crude oil, natural gas, silica sand, lime shell and heavy mineral sand (garnet, iluminite, rutile zircon, monozite).
- The district is situated in the deltaic region of the famous river cauvery and is criss-crossed by lengthy network of irrigation canals.
- The Nagapattinam district has a coastal line of 165 km. Fishery is the economic backbone of this coastal district.

- The muthupet mangrove wetland is located in the Southern most part of the cauvery delta with Palk Strait in the south and extensive mudflats in the north.
- According to the 1996 remote sensing data, the total area of the Muthupet mangrove wetland is about 12,000 Ha.
- The district is deprived of any major industry but it is a flourishing centre of cottage industries and handicrafts alike.
- One Thermal Power Project with installed capacity of 10 MW is (2x5 MW) available in the district.
- The tsunami caused heavy damage to houses, tourist resorts, fishing boats, prawn culture ponds, soil and crops, and consequently affected the livelihood of large numbers of the coastal communities.
- It was found that 1,320 ha of agricultural and non-agricultural lands were affected by the tsunami.
- The tsunami left around 6065 people dead and the entire coastline was devastated in this district. Around 73 habitations in 38 revenue villages and 5 taluks were affected.
- Mangrove restoration has been done by M.S. Swaminathan Research foundation after the tsunami.

THIRUVARUR DISTRICT

THIRUVARUR DISTRICT

1. Introduction

i) Geographical location of the district

The district of Thiruvavarur was carved out as a separate district by detaching Valangaiman Taluk from Thanjavur District and Thiruvavarur, Nannilam, Kudavasal, Needamangalam, Mannargudi, Thirutturai-ppoondi Taluks from Nagappatinam District on 01.01.1997. It lies between 10.20' and 11.07' North latitude and 79.15' and 79.45' East longitude. The total area of the district is 2377 sq.km.



Tiruvavarur District Map

ii) Administrative profile (taluks / villages)

There are 2 revenue divisions, 7 taluks, 10 community development blocks, 3 municipalities, 7 town panchayats and 573 villages in Thiruvavarur district.

iii) Meteorological information (rainfall / climate details)

The maximum is about 35.19°C and the minimum temperature is about 26.39°C. Duststorms, whirl winds and dusty winds blow from various quarters towards the end of May. The Southwest winds set in during April are strongest in June and continue 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. 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.

Rainfall in mm

South West

Normal	301.8
Actual	532.5

North East

Minimum	665.4
Actual	1118.8

2. Resources-availabilitys

i) Land resources (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.

About 3.49% of the land available for Cultivation suffers from Salinity/Alkalinity and another 56.21% is prone to floods. About 7.09% of the land is water logged 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 is sandy, desert/coastal.

ii) Agriculture and horticulture (crops cultivated)

Thiruvarur lies in the Kaveri River basin and the main occupation of the inhabitants of the town and surrounding regions is agriculture. More than 70% of the workforce is involved in agriculture; 14%

being cultivators and rest are agricultural labourers. Paddy is cultivated in three seasons namely Kuruvai (June – August) Samba (August – January) and Thaladi (January–March). 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. Cereals, pulses and oil seeds are the three important crops produced in the district. Fruits and vegetables are cultivated in the district with proper nurseries and

Total cultivated area ha.	265281	
Net area sown ha.	152632	
Area sown more than once	112649	
Area and production of principal crops	Area in (ha.)	Production in (tonnes)
Rice	160	483125
Pulses	94	25310
Sugarcane (Gur)	0.94	171958
Groundnut	1.90	6832
Gingelly	0.36	367
Cotton (BL)	0.005	996
Agricultural Land Holdings (2005-2006)		
Holdings	158100	
Area ha.	146028	
Average size of holdings	0.924	
Important food crops	rice, greengram, blackgram	
Important non food crops	cotton, groundnut, coconut, gingelly, palm, flowers, palmolin, oil seeds	

vegetable farms.

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, causuarina, teak.

iii) Forest resources (reserved forest area / protected areas)

The forests in the Thanjavur Forest Division which comprise Thiruvarur can be divided into three regions from the topography, and flora point of view. They are 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, *Dalbergia sisso*, *Terminalia arjuna* and Eucalyptus have been planted.

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.

Forest area (ha.)	
Reserved forest (ha.)	9476.547
Reserved lands (ha.)	11.055
Forest products	
Teak poles (Cum.)	1229.916
Pulp wood (MT)	502.241
Mino forest products (MT)	1.957

iv) Mineral resources (garnet etc)

Thiruvarur has no major mineral resources. Sand is the only minor mineral available at river beds. It has got natural gas deposits. Two large scale power generation plants and few more natural gas units have already been started in the district. Due to fluctuation in gas availability, further natural gas based units are not encouraged.

v) Water resources (river / major lakes and estuaries)

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 km. draining an area of about 72,800 Sq. Km. in all. Springing from a spot lying on Brahman Giri mountain of western ghats at a height of 1,320 mt above sea level, it meanders its way across Karnataka and Tamil Nadu not only showering economic prosperity on millions of people but also has earned a niche for itself in their lives, in the historical, cultural and religious realm. Vettar, Odambegiar, Kaduvaiyar, Pandavayar and Vellayar are the minor basins in Tiruvarur district. 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.

vi) Fisheries production (Fish landing details / aquaculture)

This district has a coast line of 47.2 km. 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 has increased steadily in the coastal area but it has fluctuations in the inland area.

No. of coastal blocks 1
 No. of coastal centres 14
 Marine fish production (tonne) 12360
 Inland fish production (tonne) 9730
 No. of fisherman engaged (Marine/In land)
 5750 / 7042

vii) Heritage resources (shore temples / churches)

Sri Thyagarajaswamy temple

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



Sri Thyagarajaswamy temple

area of 30 acres. The main structure consists 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 Brahmothsavam 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



Udayamarthandapuram Bird Sanctuary

of area is lagoon and bird sanctuary. The two tourist spots are visited from August to

March. Tourists from inland and foreign countries have been steadily increasing. These two tourist spots are also included in the tourist circuits identified by the Tourism Department.

viii) Biodiversity (mangroves/corals/sea grass/important flora and fauna)

Muthupet mangrove forest is located at the Southern end of the Cauvery delta, covering an area of approximately 13,500 ha of which only 4% is occupied by well-grown mangroves. The rivers Paminiyar, Koraiyar, Kilaithankiyar, Marakkakoraiyar and other tributaries of the river Cauvery flow through Muthupet and adjacent villages. At the tail end, they form a lagoon before meeting the sea.



Muthupet mangrove forest

The Northern and western borders of the lagoon are occupied by muddy silt ground which is devoid of mangroves. The mangroves beyond Muthupet Lagoon are discontinuously found along the shore extending up to Point Calimere. Muthupet mangrove forest was under the control of Chatram Department from 1853 to 1912 (Chengappa, 1918). The gazette of the presidency of Madras Gazette (1937) shows,

that, half of the revenue from 1923 to 1936 obtained through selling of mangrove products was paid to the revenue department and the remaining half was spent to maintain the “Chatrams” (Charity homes). The government declared the Muthupet mangrove forest as revenue forest in February 1937 and accordingly the mangrove forest was handed over to the forest department of the Madras presidency.

The forest is maintained by the Tamil Nadu Forest Department. The mangrove forest is divided into the Palanjur, Thamarankottai, Maravakkadu, Vadakadu, Thuraikadu and Muthupet Reserve forests.

Muthupet reserve forest covers the lagoon, river creeks and the mudflats. Muthupet lagoon (mullipallam) is a spectacular natural creation, which is 8 km. from nearby Muthupet town and can be reached only by boat. The lagoon is shallow with an average depth of 1 m. The bottom of the lagoon is formed of silt clay substratum. The tidal fluctuations can be observed well with the exposure of oyster beds and roots during low tide.

The tidal fluctuations play a major role in dispersing mangrove seeds. Dense mangroves mostly cover the lagoon shore. The islets are found on western sides which are submerged during high tide. The salinity is the major environmental factor, controlling zonation of Muthupet mangrove forest. *Avicennia marina* is the conqueror of the forest which is found as a single dominant species.

The southern mudflat separates the lagoon from the adjacent sea that leaves a permanent mouth of lagoon with seasonally opened shallow waterways. The width of mudflat increases from lagoon mouth to the eastern direction. The mudflat looks like a desert in summer, but the presence of dead gastropods under the surface soil layer and the erosion of soil at the centre of mudflat

reveal the submergence of mudflat during flood. There is a difference between the lagoon shore and seashore of the same mudflat, in the aspect of distance of mangroves from fluctuating water level.

The mangroves have grown close to water level in lagoon side but not in seashore. The reason may be the difference in the nature of fine clayey silt deposition have carried by the rivers. The salt marshes herbs lining the inner side of the forest. In the degraded central part of the mudflat, the soft fine silt is found only around the salt marshes. The remaining barren ground is hard clay which may due to the erosion of surface silt by wind or floodwater. Thousands of partially decomposed rooted trunks found on the southeastern side of Muthupet lagoon are indicating the, indiscriminate exploitation.

With 100–150 m in the past width and 5–6 km. length, the density of mangroves in eastern side of Muthupet lagoon is comparatively lower than other areas. Tamil Nadu Forest Department has excavated several canals across the mudflat. Each main canal, which enhances the water movement between sea and lagoon has several subcanals on either side with a substantial number of mangrove seedlings. The western side has a protruding land pocket as formed an islet-like structure. This part of the lagoon lies near Koraiyar river mouth with small mangrove patches.

3. Impacts

i) Urbanization (municipal solid waste dumping / sewage etc.)

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 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%. Compostable matter covers 75% of the total compositions which include rags, wood species etc.

ii) Industrial development (effluent discharge / pollution – air water land etc.)

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.

As per the ambient air quality status, 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. Major air pollution sources in the district are located in two villages, Vadapathimangalam (Tiruvarur taluk) and Keeranur (Nannilam taluk). The industries of the district are found to be have the emission rates under the set standards.

Information was not available for discharge of industrial effluents in river basin/other water bodies as there are very few highly polluting categories of industries in this district. There are no major industrial/ sewage discharges in the coastal waters in the district. No urban centre is located in the coastal area.

iii) Thermal power generation (hot water discharge)

There is one thermal is plant in the district. No information available on the hot water discharge.

iv) Natural hazards (erosion / accretion / sea level rise/ climate impact)

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.

v) Rare earths mining (garnet etc)

No information available.

vi) Natural disaster prone areas (tsunami / cyclone / floods)

Cyclonic storm havoc occur normally once in 3 or 4 years and heavy downpour during Northeast monsoon leads to flooding of the district and damages to field crops and wealth of soil. It has been ascertained from the available information that all the taluks were affected by Flood

during the year 1991-92 and affected by Cyclone during the year 1993-94. Coastal region is prone to tsunami.

4. Government initiatives

**i) Initiatives to improve fisher folk livelihood (schemes for education / health)
Inland Fishermen Co-Operative Societies**

The following inland Fishermen Co-Operative Societies are functioning at Tiruvarur district.

List of inland Fishermen Co-operative Society wuth number of members

1. Tiruvarur inland Fishermen Co-operative Society 3496
2. Kudavasal inland Fishermen Co-operative Society 302
3. Thiruthuraipoondi inland Fishermen Co-operative Society 812
4. Mannargudi inland Fishermen Co-operative Society 503
5. Needamangalam inland Fishermen Co-operative Society 270
6. Valangaiman inland Fishermen Co-operative Society 1064
7. Nannilam inland Fishermen Co-operative Society 592

1. Welfare scheme implemented through Fishermen Co-operative Societies

Fishing Rights have been given to Fishermen Co-operative Society members after obtaining orders from the District Collector for every Fasali year through Fishermen Co-operative Society. Getting insurance claim when Fishermen Co-Operative Society members meet with Accident or happen to die (or) become handicap Rs.1 Lakh for deceased Family Rs.50,000/- for handicap member.

2. Thanjavur District Fish Farmers

Development Agency (FFDA)

The Thanjavur District Fish Farmers Development Agency is one of the oldest FFDA's established in 1977 covering Thanjavur, Tiruvarur and Nagapattinam districts working along with the office of the Assistant Director of Fisheries (inland fisheries) Tiruvarur. There are more than 1000 registered fish farmer as members of this agency. The Thanjavur district Collector is the chairman of the agency and the Assistant Director of fisheries the Chief Executive Officer. The agency is registering the fish farmers as its members. Ministry of Agriculture of Government of India fixed the norms to release subsidy for the development of fresh water aquaculture through Fish Farmers Development Agency for construction of new ponds. The unit cost is Rs.3.00 lakhs / ha. and subsidy is 20% of the unit cost @ Rs.60,000/- ha. for all farmers except SC, STS for whom it is Rs.75,000/- ha (25%) The assistance under FFDA is given only once to a beneficiary to a component. The beneficiary can avail subsidy for a maximum of 5 ha on seniority basis.

3. Fishermen Welfare Board

In Tami Nadu the male (or) female person aged from 18 to 65 years and engaged in fishing activities and allied can become the member in fishermen welfare board. This scheme started functioning from 2007 onwards. Relief Amount of Rs.1 lakh and cremation amount of Rs.12,500/- will be given for accident death members family and Rs.10,000/- will be given to natural death fisherman family. Besides, assistance for education and marriage also be given to the children of the members.

4. NADP

Under NADP Scheme (National Agriculture Development Programme) for setting up Fish Seed Hatchery unit of Rs.10,00,000/- (Ten Lakhs), 50% subsidy of Rs.5 lakhs is being given to beneficiary. Similarly for the setting up of fish seed rearing unit of Rs.3 lakhs, 50% subsidy of Rs.1.5 lakhs is being given to beneficiary.

5. ATMA

Under Agriculture Technology Management Agency (ATMA) Scheme Rs.4,000/- is allotted for Demonstration to the fish farmers by way of supplying fish seeds and fish feeds. Group Discussion with farmers to clarify doubts on improvement of the yield in fish culture for which a sum of Rs.500/- allotted for one group discussion.

6. Farm School

One Farm School has been started at Thirumakkottai which demonstrates the methods of fish culture from preparation of ponds to harvest.

ii) Coastal protection initiatives (bio shields / sea walls etc)

Muthupet mangroves act as a bio shield in this district. Thiruvarur district is expected to have future storm surges up to around 5.6 and 6.9m, It is assumed that the coastal zone up to 10m is at risk in these districts. Various projects are in operation to protect the coast.

iii) Awareness initiatives (tsunami / CRZ issues)

Various awareness creation activities have been made among the fisher folk on tsunami and CRZ issues by different Government and Non Government

organizations. Attempts have been made to develop bioshields, rebuild livelihoods, and reclaim soil in the tsunami affected agricultural fields in Thiruvarur district.

iv) Biodiversity (coral, mangrove conservation and restoration)

Mangrove restoration has been done by M.S. Swaminathan Research Foundation after the tsunami. MSSRF started a project during 1993 in Muthupet mangrove wetlands to identify causes of degradation of Muthupet mangrove wetlands and to develop and demonstrate techniques to restore the degraded areas.

v) Other initiatives taken by private sector

No information available

5. Summary / Conclusion

- The district of Thiruvarur was carved from Thanjavur district and Nagapattinam districts on 01.01.1997.
- The total area of the district is 2377 sq.km.
- There are 2 revenue divisions, 7 taluks, 10 community development blocks, 3 municipalities, 7 town panchayats and 573 villages in Thiruvarur district.
- The river Cauvery and its tributaries are the main rivers of the district.
- Thiruvarur lies in the Kaveri River basin and the main occupation

of the inhabitants of the town and surrounding regions is agriculture.

- Since the district is situated in the 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.
Paddy is cultivated during three seasons and other cereal crops of the district are cumbu, ragi, maize, korra and varagu.
- Total forest area includes 9476.547 ha. of reserved forest and 11.055 ha. of reserved lands.
- Thiruvarur has no major mineral resources. Sand is the only minor mineral available at river beds. It has got natural gas deposits.
- This district has a coast line of 47.2 km. and has good fishing potential in view of its rich coastal area.
- There are no major polluting industries in the district except sugar plants.
- Muthupet mangroves forest is an important marine ecosystem which acts as a bio shield in this district.
- 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.
- Mangrove restoration has been done by M.S. Swaminathan Research foundation after the tsunami.

THANJAVUR DISTRICT

THANJAVUR DISTRICT

1. Introduction

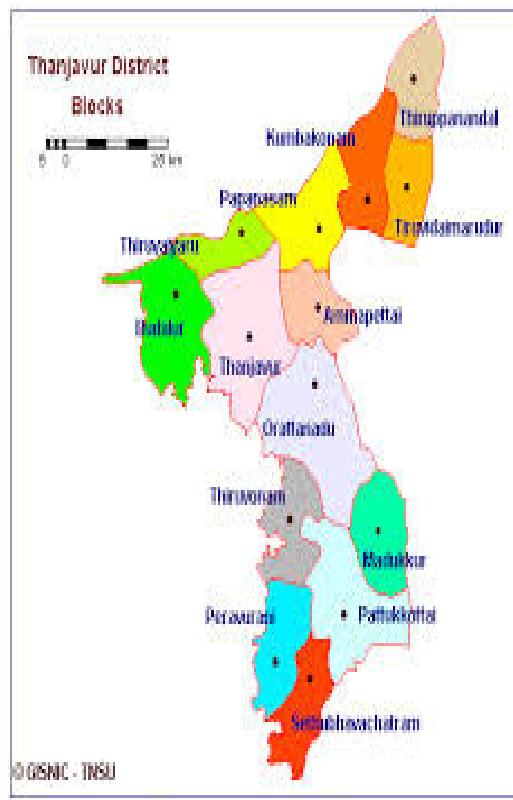
i) Geographical location of the district

Thanjavur district lies between 9° 50' and 11° 25' north latitude and 78° 45' and 79° 25' east longitude. It is bounded on the north by Thiruchirapalli and Cuddalore districts, on the east by Tiruvarur and Nagapattinam districts, on the south by Palk Strait and Pudukottai district and on the west by Pudukottai district and Tiruchirapalli districts. Total geographical area of the district is 3602.86Sq. Kms. This constitutes just 2.77 % of the area of the state.

ii) Administrative profile (taluks / villages)

Administrative profile of the district is given in the table below.

Number of taluks	8
Number of revenue villages	906
Taluk	Revenue villages
Kumbakonam	124
Orathanadu	125
Papanasam	120
Pattukkottai	175
Peravurani	91
Thanjavur	93
Thiruvaiyaru	89
Thiruvidaimarudur	



Thanjavur District Map

ii) Meteorological information (rainfall / climate details)

The mean maximum temperature was 37.48° C during May – July. Similarly, the mean minimum temperature was 20.82 ° C during November-January. The north east monsoon provides much rainfall with 545.7 mm and 953.2 as normal and actual rainfall respectively while southwest monsoon provides 342 and 303.1 mm as normal and actual rainfall respectively.

During May, dust storms, whirlwinds and dusty winds flow from various directions. The south west winds that set in during April, become strong in June and continue till September cyclonic storms of high velocity affect the district once in 3 or 4 years during November - December.

2. Resources availability

i) Land resources (soil types)

Thanjavur district is occupied by different geological formations. The different types of soils are derived from the formations:

Quaternary: Sand, silt and clay super imposed sand, natural levee complexes

Pliocene: Clays heavily weathered super imposed old drainage morphology

Miocene: Sands, clay bound clays gravels

Cretaceous: Reddish and yellowish calcareous sand stones, clays and lime stones.

ii) Agriculture and horticulture (crops cultivated)

Thanjavur district stands unique from time immemorial for its agricultural activities and is rightly acclaimed as the Granary of the South India lying in the deltaic region of the famous river Cauvery and criss-crossed by lengthy network of irrigation canals. Therefore this coastal district abounds in green paddy fields, tall coconut groves, vast gardens of mango and plantain trees and other verdant vegetation.

A. Total cCultivated area (ha.)	241292	
B. Net area sown (ha.)	192030	
C.Area sown more than once (ha.)	49262	
D.Area & Production of Principal crops	Area in ha.	Production in Tonnes
Rice	155	703
Millets & other cereals	Nil	Nil
Pulses	16	6
Sugarcane (In terms of cane)	15	1502
Groundnut	7	23
Gingelly	6	2
Cotton (bales 170 Kg. Lint each)	1	1
E. Agricultural Land Holdings (2000-2001)		
i. Holdings	291264	
ii. Area & average size of holdings (ha.)	227674 & 0.78	
F. a) Important food crops	paddy, sugarcane, greengram,blackgram& banana	
b) Important non-food crops	groundnut, coconut & gingelly.	

Thanjavur district is essentially a deltaic plain comprising of old and new delta. The old delta has a net work of canals and channels of the river Cauvery and Vennar. Upper portion of this new delta area is irrigated by Grant Anaicut canal. Tapping of ground water is done considerably in this area to advance the first cropping season Kuruvai to avoid damage due to North East monsoon and to accommodate two crops namely Kuruvai and Thaladi.



Paddy Fields

The soils of new deltaic area are amenable to wide variety of crops such as coconut, mango, guava, pulses, cotton, gingelly, groundnut, banana etc. Cultivation of oilpalm and Soyabean is also carried out in this district wherever assured water supply and drainage facilities are available. The major crops cultivated in Thanjavur district are paddy, pulses, gingelly, groundnut and sugarcane. The minor crops like Maize,

soyabeans, redgram are in rice fallows. In new delta area, the groundnut is the principal crop. Paddy is the principal crop grown in three seasons viz. Kuruvai, Samba and Thaladi. Pulses like blackgram, greengram and cash crops like cotton and gingelly are grown sugarcane is cultivated both in new delta and old delta. Banana is primarily grown in Padugai lands.

Micro-level agricultural planning at the village level to step up agricultural production was first introduced in composite Thanjavur district in the early 60s. This paved the way for concerted village level planning and contributed in a great measure to step up agricultural production manifolds. The setting up of Thiru Arooran Sugar Mills in the late fifties induced a section of the traditionally rice growing farmers to switch over to sugarcane. The setting up two more sugar factories has diverted part of the rice growing areas to sugarcane.

The important fruit crops are:

- Banana - *Musa sp*
- Mango - *Mangifera indica*
- Guava - *Psidium guajava*
- Acid lime - *Citrus aurantifolia*

Of these, banana is the major fruit crop cultivated over about 4000 ha, while all the other fruits put together are raised in about 1100 ha. In the lateritic soils of Vallam, Pattukottai and Peravoorani, cashew (*Anacardium occidentale*) is raised in about 4000 ha under rainfed conditions.

The major vegetable crops raised are,

Brinjal	<i>Solanum melongena</i>
Ladies finger (Vendai)	<i>Abelmoschus esculentus</i>
Onion	<i>Allium cepa</i>
Elephant yam (senai kizhangu)	<i>Amorphophallus esculentus</i>

iii) Forest resources (Reserved forest area / protected areas)

According to the latest figures of the Forest Department, the extent of forests is as follows:

A. Forest area (ha.)	
1. Reserved	1. 3836.03
2. Unclassified	2. Nil
3. Reserved Lands	3. 68.545
B. Out turn of forest products	
Timber (Cu.m.)	2678.685
Lop & top ends (Tonne)	774.305
Ply wood (MT), Sandal wood	Nil
Rubber (MT)	Nil
Bamboo (Nos.) , Tea green leaves (Tonne)	Nil
Wattle bark (MT)	Nil
Cashew nuts (Tonne)	4.176
Others	Nil
a. Teak poles (Nos.)	Nil
b. Sisoo timber (Cu.m)	Nil
c. Cut ends (Cu.m)	Nil
d. Casuarina (Tonne)	Nil

iv) Mineral resources (garnet etc)

The major portion of Thanjavur district is covered by Cauvery alluvium and reported to have potential for mineral wealth. Vallam stones, laterite, sandstone, kankar and yellow ochre have been reported from the district. Quartz crystals rolled into pebbles occur in the tertiary formation. Iron ore is found to exist in the neighbourhood of Vallam. Vallam area in Thanjavur taluk yield laterite of fine quality. Pebbles of transparent quartz occur in conglomeratic

sandstones near Vallam. These are of the amethystine citrine and smoky varieties.

Kanker and tuffaceous limestones occur under redsoil laterite ranging in thickness from 0.3 to 1.0 m. Kankar layers are also noticed in stream sections. The important occurrences are seen in the Grand Anicut canal cutting between Kuruvadipatti and Pudur and also in the neighbourhood of Thirumalaisamudram. The thickness of Kankar in Thirumalaisamudram area ranges from 2.0 to 2.5 m. and the total reserves have

been estimated to be about 0.5 million tonnes. The Kankar is of good quality, coal ranging from 48.42 % to 52.72 % and low in Magnesia.

v) Water resources (river / major lakes and estuaries)

The river Cauvery and its tributaries are the most remarkable feature of Thanjavur district. Cauvery is considered to be the best of the river that drain the Southern Peninsula of India. The river flows from Karnataka State and passes through Dharmapuri, Salem, Erode, Thiruchirappalli, Thanjavur, Thiruvarur and Nagapattinam districts covering a distance of about 770 km. draining an area about 72,800 sq.km. in all. Springing from a spot lying on Brahmagiri mountains on western-ghats at a height of 1,320 m. above sea level, Cauvery meanders its way across Karnataka and Tamilnadu and showering not only economic prosperity on millions of people but also carving a niche for itself in their lives in historical, culture and religious realms. Emerging as a small rivulet from the Coorg mountains the river Cauvery expands rapidly increasing in volume, as hundreds of streams and rivulet merge with it which are mostly fed by the heavy rainfall of the south- West monsoon. After Sivasamudram Falls in Mysore, the Cauvery again forms beautiful waterfalls at Hoganekal in Dharmapuri district.

The three minor tributaries, Palar, Chennar and Thoppar enter into the Cauvery on her course, above Mettur, where the famous dam has been constructed. The Mettur dam joins the Sita and Pala mountains beyond that valley through which the Cauvery flows, upto the Grand Anicut. The dam in Mettur, impounds water not only for the improvement of irrigation but also to ensure regular and sufficient water to the important Hydro-Electric generating station

at Mettur. The river further runs through Erode district where river Bhavani merges with it. While passing through Erode, two more tributaries namely Noyyal and Amaravathi join it before it reaches Thiruchirappalli district. Here the river becomes wide, with a sandy bed and flows in an easterly direction till it gets split into two at upper anicut about 14 km. west of Thiruchirappalli. The northern branch of river is called the Coleroon while the Southern branch retains the same name Cauvery and then goes directly eastwards into Thanjavur District. These two rivers join again and form the Srirangam island near Thiruchirappalli.

The Chola king, “Karikalan” has been immortalised as he has constructed the bank for the Cauvery all the way from Puhar (Kaveripoompattinam) to Srirangam. It was built as far back as 1,600 years ago or even more. On both sides of the river are found walls spreading to a distance of 1,080 ft.. The dam Kallanai on the border between Tiruchirappalli and Thanjavur constructed by him is a superb work of engineering, which was constructed with earth and stone and has stood the vagaries of nature for hundreds of years. In 19th century, it was renovated in a bigger scale. The name of the historical dam has since been changed to “Grand Anicut” and stands as the head of great irrigation system in the Thanjavur district. From this point, the Coleroon runs north-east and discharges herself into the sea at Devakottai, a little south of Parangipettai. From river Coleroon, Manniar and Uppanai branch off at lower Anicut and irrigate a portion of Mayiladuthurai taluk and Sirkazhi taluk. After Grand Anicut, the Cauvery divides into numerous branches and covers the whole delta with a vast network of irrigation channels and gets lost in the wide expanse of paddy fields. The mighty Cauvery river here is reduced to an insignificant channel and

falls into the Bay of Bengal at the historical place of Poompuhar (Kaveripoompatinam) about 13 km north of Tharangampadi. The river Cauvery flows the entire district in different names through its tributaries and branches viz., Grand Anicut canal, Vennar, Pannaiyar, Koraiyar, Vettar, Kodamuritiyar, Thirumalairajanar, Arasalar, Veerasozhanar, Mudikondan, Noolar, Vanjiar, Vikaraman, Nattar, Kirtimanar, Nandalar, Majalar, Mahimalayar, Palavar, Cholasudamani, Puthar, Valappar, Vadavar, pamaniar, Mulliyar, Ayyanar, Adappar, Harichandranathi, Vellaiyar, Pandavaiyar, Odambogiyar, Kattar, Kaduvaiyar and all these branch off into a number of small streams.

Among the various names by which the holy Cauvery is known during its course, the most popular in Tamil Nadu is “Mother Cauvery” due to the high sanctity attached to it. It is worshipped by the people irrespective of caste, creed or religion during Maha Magam festival celebrated at Kumbakonam once in 12 years. The Pilgrims after a bath in Mahamagam tank proceed for a holy dip in Cauvery which is belived to purge of all sins. In the Tamil month of Adi (July – August) on the 18th day, (Adi-Perukku), the people throng the bank of the river for the holy bath and pray the mother Cauvery for their prosperity. In the Tamil month of Aypasi (October- November) thousands of devotees participate in a festival called “Kuda Muzhukku” celebrated on the banks of the river Cauvery at Mayiladuthurai. Many famous temples on the banks of river Cauvery and its tributaries have also earned fame as either sacred religious centers or beautiful scenic spots, providing the much needed respite and mental solace to urbanites.

vi) Fisheries production (fish landing dertails / aquaculture)

Thanjavur is one of the 13 maritime district of Tamil Nadu engaged in marine

fishing and its fish production is about 5% of the total catch of the state. The State has a total coast line of to 1076 km embedded with 442 fishermen villages of which Thanjavur district occupies 45.1 km stretch in Palk strait. It has 27 fishing villages in the district from Thambikkottai in Pattukkottai taluk in the north and Sembagamadevi Pattinam in Peravurani taluk in the south. The total inland fish production is 11,530 tonnes and the respective figure for the marine fish production is 9020 tonnes.

Out of 4899 families, 490 families are living in terraced houses, 874 families are living in tiled houses, 736 families are living in fishermen free houses and remaining 2799 families are living in thatched houses (As per the marine fisher folk census 2000). The census data further reveals there are 370 mechanised boats which are operated from Kallivayalthottam, Mallippattinam and Sethubavachathram fishing villages. There is a “T “Jetty in Mallippattinam coastal village constructed in 1980 to facilitate easy landing of the catches of Mechanised boats. Around 2500 fishermen were involved in mechanised fishing operations. In addition to the mechanised boats, 924 plank built boats and 107 cattamarams are also operated from the coastal villages providing employment opportunity for more than 3000 fisherman of this district.

Thanjavur district is also richest in inland fishing due to the presence of Cauvery river system. The irrigation channels, canals major and minor tanks are the richest in high varieties. The inland fishing consists mostly of local carps, major carps and other varieties such as cat fish, murrells, tilapia etc., About 5,000 inland fishermen are engaged in fishing. Seeds of catla, rohu, mirgal and common carp, produced at Fisheries Department. Fish Seed

Production Centre. Silver carp, and grass carps early fry were brought from West Bengal and reared by private fish seed producers. Enormous numbers of fishermen are engaged in fish production by culture methods. Fishing rights in rivers, channels, tanks and water bodies of Forest Department have to be leased out only to Fishermen Co-operative Societies on priority basis and in turn these societies will lease out the fishing rights to its members. These fishing rights by leased will be lease out by the District Collector on the recommendation of the Assistant Director of Fisheries concerned.

vii) Heritage resources (shore temples / churches)
Big temple

The Brahadeewarar temple, called the Big Temple, is dedicated to Lord Siva. It was built by the great Chola King Raja Raja 1 (985 -1012 A.D). It is an outstanding exmple of Chola architecture. Recognizing its unique architectural excellence, UNESCO has declared it a World Heritage Monument. The 64.8 mt. tall vimanam (tower over the

sanctum sanctorum) is testimony to the engineering skill of the Cholas. In keeping with the size of the temple, it has gigantic “Mahalingam” in the shrine, measuring 4 meters in height. A monolithic Nandhi chiseled out of a single rock, measures 5.94 meters in length, 2.51 m. in breadth and 3.66 meters in height. It is the second largest Nandhi in India. The Nandhi or bull is the vehicle of Lord Siva. Beautiful Chola fresco paintings adorn the inner walls of the temple. One of the outstanding temples in South India, the Brahadeeshwarar temple is the Chola dynast’s finest contribution to Dravidian temple architecture. What makes the construction so unique is the variation from the usual temple building style of having a tall gopuram and smaller vimanam. At the Big Temple the vimanam soars high while the gopuram is smaller. The 64.8m tall, 14 tier pyramid shaped vimanam raised from a square base is topped by a huge monolithic cupola carved from an 81.3 tonne block of granite. It was raised with the aid of a 6 km. long inclined plane.



Brahadeeshwarar Temple

Palace

Just 1 km away from the Brahadeeswarar Temple is a magnificent palace, surrounded by huge fort walls. Dating back to the 14th century A.D., it was built partly by the Nayaks and partly by the Marathas. The Maratha royal family resides in this palace. It is a fascinating building with huge corridors, spacious halls, decorated rooms, tall observation towers, beautiful stucco works, wonderful fresco painted walls and ceilings, an underground tunnel and intricate carvings. The royal family's sacred "Chandramaulesshwarar Temple" is located within the palace walls.

Art gallery

The art gallery has a fabulous collection of bronze icons, stone sculpture and pieces of art. The Collection is unique for its representation of Hindu gods and goddesses, myths and legends. The exhibits are priceless for their historical association.

Saraswathi mahal library

The Thanjavur Maharaja Serfoji's Saraswathi Mahal Library is one among the few libraries in the world with texts of the medieval period. It is a treasure house of knowledge carefully fostered and nurtured by successive dynasties of Nayaks and the Marathas of Thanjavur. It contains a rare and valuable collection of manuscripts, books, maps and paintings on all aspects of Art, Culture and Literature. The Encyclopedia Britannica, in its survey of the Libraries of the world, describes it as "the most remarkable library. It was made a Public Library in 1918.

Sangeetha Mahal

Also in the Palace is the Sangeetha Mahal, an acoustically perfect music hall. It

is a striking example of the engineering skill of ancient builders.

Royal museum & Serfoji memorial hall

This is regarded as a 'Gurustalam' (Abode of Jupiter) where Lord Dankshinamurthy is held in great reverence. The shrine attracts a large number of devotees when Jupiter transits between zodiac signs. Parvati, the consort of Lord Shiva, is said to have reborn on the banks of Amrita Pushkarini within the temple precincts before reunited with Shiva.

Marattah durbar hall

Its huge pillars, beautiful stucco paintings and fresco-painted ceiling are eye-catching.

Schwartz church

The 18th-century Christ Church or Schwartz Church a legacy of Tanjore colonial past, stands to the east of the Shivanganga Tank. This church was founded by the Danish missionary, Reverend Frederik Christian Schwartz, in 1779. When he died in 1798, the enlightened Maratha ruler, Serfoji II, donated a striking marble tablet, made by John Flaxman and this has been placed at the western end of the church. It depicts the dying missionary blessing his royal patron, surrounded by ministers and pupils from the school that he established.

Rajarajan mani mandapam

It is in the southern part of Thanjavur. It was built during the 8th World Tamil Conference in 1995. This Manimandapam has a museum in its ground floor.

Sivaganga tank

This water tank lies beyond the North West compound of Brahadeeswarar Temple. It is surrounded by large walls and known for its sweet water.

Rajagopala beerangi (cannon)

This is a huge cannon placed at the eastern gate of the Fort. The place is called 'Beerangi Medu'. The Cannon is amazing in size and the quality speaks of the metallurgical knowledge of the people of those times. The Beerangi is the biggest in India.

Tholkappiyar sadukkam

This Sadukkam (Square) was built during the 8th World Tamil Conference. One

can have a panoramic view of Thanjavur town from the tower.

Tamil University

Established here in 1981, the Tamil University is engaged in research and advanced studies in Tamil. It is devoted to the cause of promoting Tamil Literature and Language. It enables advanced studies in Tamil like Literature, Grammar, Linguistics, Religion and Philosophy, Manuscriptology, History, Epigraphy, Sociology, Folklore, Anthropology, Arts Sculpture, Music, Drama, Legal Studies, Administration, Science, Engineering, Computer Science, Medical Science, Encyclopedia and Adult Education.



Tamil University

Poondi matha basilica

The Poondi village is about 35 km. from Thanjavur and the nearest railway station is Budalur. It is a Roman Catholic Pilgrim Centre like Velankanni. Accommodation is provided to the pilgrims by the church authorities.

Thirukarugavur

The Arulmighu Mullaivananathar and the Karpagarahshambigai temples are situated in the riverbed of river Vettaru a branch of the Cauvery at a distance of 20 km northeast of Thanjavur and at distance of 20 km southwest from Kumbakonam. This sthalam Thirukarugavoor is ancient and has

been extensively quoted by the Great Shaivite saints Thirugnana Sambandar and Thirunavukkarasar on the dieties Eswara Mullaivananathar and the Goddesses Gharbharakshambigai.

Patteeswaram

Sri Durgai Amman Temple is situated at Patteeswaram, a village near Kumbakonam, Tamilnadu, India. This Durga when worshipped by the Cholas was so powerful that the Chola kings have left an indelible mark in the history of India by their constructional work. With the blessings of Goddess Durga, the Chola princes were able to construct 1000 Shivalinga. The Goddess is so powerful that since her arrival at this temple, the original temple has lost its prominence and people throng for blessings from her only.

Manora

Rajah Serfoji built this 8-storey victory town in 1814 to commemorate the victory of the British over Napoleon Bonaparte at Waterloo. It is situated on the shore of Bay of Bengal in Sarabendrajanpathinam village about 20 km. South of Pattukottai town. Manora is the grand and gregarious old town with loery architecture and surroundings. This ancient fort Monument is styled 'Manora' a derivation from "Minors" of North Indian architecture. This historical monument majestically shooting up in thin air is 140 ft. height. Manora is a pleasing blend of Roman pillar architecture a combination very serious and striking to artistic eyes. This hexogen shapped 10 storyed fort represents the 19th Century architectural taste of Maratha king Serfoji of Thanjavur. The panosanic view of the sea, the floating boats, breezy coconut trees, scattered fisherman houses take different beautiful shapes at every storey.

Papanasam

In Papanasam (30 km) there are two temples; The Pallaivanatha Swamy temple constructed by the Chola King and the other is the 108 Sivalayam temples. There are also a Granary (storehouse of paddy) which measure 86 feet. in width and has a height of 36 feet. with a capacity of 3,000 kalam which is a measure. The Nayaks between 1600 and 1634 constructed it. The State Archaeological Department declared it as a monument. One can see the 108 Sivalingams only in the temple in Papanasam.

Swamimalai

Swamimalai (32 km) It is one of the six abodes or Arupadaiveedu dedicated to Lord Subramanya.

Darasuram

Raja Raja Chola II built the Airateswara or Darasuram temple. It is an excellent example of 12th century Chola architecture and is well preserved to this day. The frontal columns of the temple have unique miniature sculptures. During the 14th century the large stone statues surrounding the temple were replaced with brick and mortar statues similar to those found at the Big Temple in Thanjavur. The Archaeological Survey of India has restored the temple. This has been declared as a World Heritage Monument.

Kumbakonam

Kumbakonam (40km) The Sarangapani, Kumbeshwarar, Nageshwarar and the Ramaswamy temples are located here. The Mahamagam congregation takes place once in 12 years and it was last held in 2004.

Uppliyappan koil

Uppliyappan Koil is situated at a distance of 6 km from Kumbakonam and 46 km. from Thanjavur. Lord Venkatesaperumal like the Tirupathi Balaji is also called Oppil Upper.

Thiruvidai Maruthur

Thiruvidai Maruthur is about 8 km from Kumbakonam and 48 km away from Thanjavur. The river Cauvery passes through this village. The village is also called Madhyarjunam and the presiding deity is Mahalingeswarar and goddess is known as Perunamulaiammai.

Navagraha

There is a cluster of Navagraha temples near Kumbakonam. Each temple is located in a different village. Each of these temples is considered an abode of one of the Navagrahams. However, the majority of these temples are dedicated to Shiva.

viii) Biodiversity (mangroves/corals/sea grass/important flora and fauna)

In Thanjavur district, there are no typical mangrove forests in the strict sense. The vegetation found along the sea coast comprises mostly herbs and shrubs, the important species among them being

Umari	<i>Suaeda maritima</i>
Seetha pavalam	<i>Salicornia brachiata</i>
Yanai nerunji	<i>Pedaliun murese</i>
Mookaratti	<i>Boerhavia diffusa</i>
Kalapaai kizhangu	<i>Gloriosa superba</i>
Kandan kathiri	<i>Solanum surattense</i>
Kudhirai kulambu	<i>Ipomoea pescaprae</i>
Ravanam misai	<i>Spinifex littoralis</i>

3. Impacts

i) Urbanization (municipal solid waste dumping / sewage etc.)

The estimated sewage generation is at 321.5 lakh liters per day in urban areas with a breakup of 250 lakh liters per day for municipalities and 74.5 lakh liters per day for town panchayats. The district is not equipped with any treatment plant and hence there is no organised disposal of sewage. Underground drainage system is partially available in all the three municipalities. The sewage is disposed only in rivers. Overall solid waste generated in the district adds up to 102 tonnes with a break-up 70 tonnes in municipalities and 32 tonnes in town panchayats. The total workers involved here have been 928. The collection efficiency is 80% in municipality and 76% in town panchayats. The recycling municipal garbage as manure is done in all municipalities. Kumbakonam municipality alone has furnished the details on solid waste. The primary component of the waste is compostable matter accounting for 83% in the total waste.

ii) Industrial development (effluent discharge / pollution – air water land etc.)

There are totally 234 registered industrial factory units in Thanjavur district. Number of trade unions are 9; there are no large scale industries here; medium scale industries are 10; small scale industries are 357; cottage scale industries are 85. Thanjavur continues to be predominately an agricultural district and no wonder that it has been identified as an industrially backward district on the basis of Annual Survey of Industry (ASI) conducted during 1987-88. Out of fourteen blocks and three municipalities 11 blocks and one Municipality are declared as backward/ most

backward areas except Budalur, Orathanad and Papanasam blocks and Thanjavur and Kumbakonam municipalities.

During the decade two sugar mills one in Co-operative Sector at Kurungulam in Thanjavur taluk and another one in private sector viz. Thiru Arooran Sugar Mills at Thirumandankudi near Kumbakonam were setup. More than 3 modern rice mills run by Tamil Nadu Civil Supplies Corporation and one Food Corporation of India have also been setup. One spinning Mill is also functioning in this District. In addition one Sugarmill at Kottur village is Thiruvudaimaruthur taluk has been setup during this decade. Out of 14 blocks in this district 11 blocks have been declared as either industrially backward or most backward as such there is a great scope for the development of small scale industries in this district.

There are four small scale industrial estates in this district, three in Thanjavur and one in Kumbakonam. It is reported that 59 units in Thanjavur (Nanjikkottai road) and produce chemical, bakery, and polythene bags. There are 10 BHEL subsidiary units in Pillayarpatti, Thanjavur taluk 27 units at Thirupuvanam in Thiruvudaimarudur Taluk producing polythene, chemical and rubber products. The industrial estates are controlled by Small Industries Development Corporation of Taminadu Sidco which is also supplying paraffin wax (Type II) to SSI units.

From early days Thanjavur has been a flourishing centre of cottage industries and handicrafts like handloom cloth and cotton sarees produced here are renowned. Mat weaving is spread over a number of places but the superior varieties of mats are made in Vilankudi Chakkrappalli and Madukkur. Ornamental fans are made out of palmyrah

leaves and they are artificially painted and decorated with silk threads.

This district is also famous for a wide range of utility and decorative articles like Thanjavur bell metal plates, bronze images bowls, napkins and powder boxes etc made of bronze and copper images with inlaying and engraving work of motifs drawn from Hindu Mythology done in silver etc known as "Thanjavur Swamy works". Chief centres of Metal work are in Kumbakonam and in Nachiyarkoil. This district is equally well known for its pith works consisting of beautiful models of Hindu idols, temples, mosques, garlands, bouquets, parrots and peacocks. The flower garlands and bouquets are in much demand during Christmas days. Pith is growing on the river beds in Thanjavur and Kumbakonam taluks. The manufacturing of musical instruments from jack wood like Veena, ambura, Violin, Mrithangam, tabela and Kanjira exhibit excellent taste, knowledge and workmanship. The jack wood has a special quality for producing musical sounds.

Thanjavur, Kumbakonam are well known places for the manufacture of musical instruments. Handloom industry occupies an important place in the economy of Thanjavur district as it provides livelihood for more than 60,000 people in this district. It is reported that the number of looms in Thanjavur stood at 13233 of which 10662 looms come under co-operative sector.

As per Thanjavur district pollution control board no separate ambient air quality station is fixed in the district. Based on the discussion with the officials certain areas were considered as polluted which are located near sugar and chemical factories. Kurungulam, Thirumandankudi, Thukili and Vadaseri are the affected locations. No

monitoring of the water quality parameters of Cauvery river is done in this district.

iii) Thermal power generation (hot water discharge)

There is no a thermal power station in this district.

iv) Natural hazards (erosion / accretion / sea level rise/ climate impact)

No data available regarding the natural hazards in the coastal areas of this district. However, it is obvious that erosion, accretion, sea level rise and the impacts of climate change are no different from other districts.

v) Rare earths mining (garnet etc.)

No information available.

vi) Natural disaster prone areas (tsunami / cyclone / floods)

Cyclones ravage the district once in 3-5 years, during north east monsoon, resulting in flood and crop damage. During 1982-83, 1990-91 and 1992-93 cyclones of high intensity have affected the district. Every year monsoon cyclone flood and drought situation may occur during Rabi season which may also considerably affect the paddy production in Thanjavur district. After the construction of the Upper Anicut, floods often threatened the anicut and serious erosions on the banks of the Cauvery occurred. This danger was however minimised in 1845 by the construction of Cauvery dam. In order to avoid the danger completely, Upper Anicut was rebuilt in 1899 so as to provide passage flood water down the Coleroon in cases of emergency. Cauvery Vennar regulators which immediately below other Grand Anicut

divide the stream between rivers and control flow of water. Tsunami threat is there in all the coastal villages.

4. Government initiatives

i) Initiatives to improve fisher folk livelihood (schemes for education / health)

1. From 1996-97 onwards under Ma. Singaravelar memorial Fishermen free housing scheme, 718 concrete roofed houses were constructed and handed over to houseless poors of Fisher folk.

2. Link roads to the fishermen villages from main roads facilitate the fast and easy transport of the fish catches to the nearest market and the fishermen get good prices for their catch. Street lights to fishermen villages have been provided.

3. In 24 fishermen villages in Thanjavur district, 209 street lights and 10 sodium vapour light in 5 villages have been provided by the Fisheries Department. In addition to the lights provided by local body.

4. Guide lights had been provided in the fishermen villages to locate their shore during night times.

5. During rainy season (September – Decempber) due to unfavorable conditions the fishermen cannot venture into the sea and they are suffering without earnings. To minimise their sufferings and to create saving habit among fishermen, the saving cum Relief scheme was introduced. The subscription is collected at the rate of Rs.45/- for eight months (January to August) (45 x 8 = 360) from each fishermen. In addition to the fishermen share central and state Government shares are added and distributed to the fishermen during lean season.

6. All the members of the fishermen co-operative societies are covered under insurance scheme and the premium amount was paid by both central and state governments equally. In addition to the

above scheme another scheme called Group Janatha personal accident insurance scheme has also been implemented which the premium amount is paid by the fishermen themselves financial assistance is extended when the under this scheme fishermen meet with an accident or in the case of Death.

7. In addition to the above schemes so many other schemes are also implemented such as subsidy for purchase of inboard & outboard motors, fishing gears and crafts. During rainy season weather warning reports are received from met centre, Chennai and are informed to Fishermen villages.

8. Through fisherwomen co-operative societies Aluminium vessels, ice boxes and baskets were given at subsidised cost to improve their fish marketing business. Training was given to them in marketing, processing and net making.

9. Through Tamil Nadu States Fisheries Apex co-operative Federation (TAFCOFED) Integrated Marine fisheries development programme was also implemented in selected villages.

ii) Coastal protection initiatives (bio shields / sea walls etc)

Bio-shield projects like mount wall construction are in progress in this district along the coast after the tsunami.

iii) Awareness initiatives (tsunami / CRZ issues)

Various awareness creation activities have been made among the fisherfolk about tsunami and CRZ issues by different Government and Non Government organizations. Attempts have been made to develop bioshields, rebuild livelihoods, and reclaim soil in the tsunami affected agricultural fields in Thanjavur district.

iv) Bio diversity (coral, mangrove conservation and restoration)

No attempt has been made to restore mangroves or corals.

v) Other initiatives taken by private sector

No information available.

5. Summary / Conclusion

- Thanjavur district is bounded on the north by Thiruchirapalli and Cuddalore districts, on the east by Tiruvarur and Nagapattinam districts, on the south by Palk Strait and Pudukottai district and on the west by Pudukottai district and Tiruchirapalli districts.
- Total geographical area of the district is 3602.86 sq. km. This constitutes just 2.77 % of the area of the state.
- This district comprises of 8 taluks and 906 revenue villages.
- Thanjavur district is occupied by different geological formations with different types of soils.
- Thanjavur district stands unique from time immemorial for its agricultural activities and is rightly acclaimed as the Granary of the South India lying in the deltaic region of the famous river Cauvery.
- This coastal district abounds in green paddy fields, tall coconut groves, vast gardens of mango and plantain trees and other verdant vegetation.
- The major portion of Thanjavur district is covered by Cauvery Alluvium and reported to have potential for mineral wealth. Vallam stones, laterite, sandstone, kankar and yellow ochre have been reported from the district.

- The river Cauvery and its tributaries are the most remarkable features of Thanjavur district.
- Thanjavur district occupies 45.1 km stretch in Palk Strait with 27 Fishing villages in the district from Thambikkottai in Pattukkottai taluk in the North and Sembagamadevi Pattinam in Peravurani taluk in the South.
- The total inland fish production is 11,530 tonnes and the respective figure for the marine fish production is 9020 tonnes.
- In Thanjavur district, there are no typical mangrove forests. The vegetation found along the sea coast comprises mostly herbs and shrubs
- Thanjavur continues to be predominately an agricultural district and no wonder that it has been identified as an industrially backward district on the basis of Annual Survey of Industry.
- Cyclones ravage the district once in 3-5 years, during north east monsoon, resulting in flood and crop damage.

PUDUKOTTAI DISTRICT

PUDUKOTTAI DISTRICT

1. Introduction

i) Geographical location of the district

Pudukkottai district was carved out of Tiruchirappalli and Thanjavur districts in January 1974. The district has an area of 4663 sq. km. with a coast line of 42.8 km. The district lies between 78.25' and 79.15' of the Eastern Longitude and between 9.50' and 10.40' of the Northern Latitude. It is

bounded by Tiruchirappalli district in the North and West, Sivaganga district in the South, Bay of Bengal in the East and Thanjavur district in the North East.

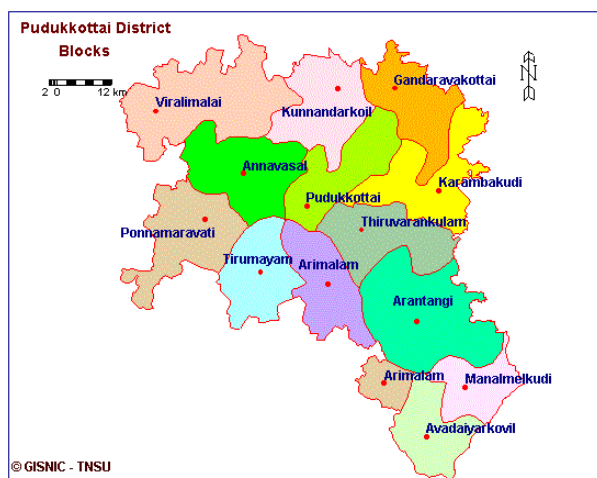
ii) Administrative profile (taluks / villages)

Administrative profile of Pudukottai district is given below

Sl. No.	Revenue Division	Taluk	No. of villages
1	Pudukkottai	Alangudi	73
2		Gandarvakottai	37
3		Kulathur	73
4		Illuppur	87
5		Pudukkottai	39
6		Thirumayam	81
7		Ponnamaravathi	49
8		Karambakudi	50
9	Aranthangi	Aranthangi	105
10		Avudaiyarkoil	96
11		Manamelkudi	72

Sl No.	Block	No. of Panchayats
1	Annavasal	42
2	Arimalam	32
3	Kunnandarkoil	37
4	Ponnamaravathi	43
5	Pudukkottai	28
6	Thirumayam	33
7	Viralimalai	45

Sl No.	Block	No. of Panchayats
8	Aranthangi	52
9	Avudaiyarkoil	35
10	Gandarvakottai	36
11	Karambakudi	39
12	Manamelkudi	28
13	Thiruvankulam	48
	Total	498



Pudukkottai District Map

Name of the municipalities	No. of wards
Pudukkottai	39
Aranthangi	27
Town Panchayats	No. of Wards
Alangudi	12
Karambakudi	22
Keeramangalam	21
Annavasal	20
Keeranur	18
Illuppur	10
Arimalam	13
Ponnamaravathi	16

iii) Meteorological information (rainfall / climate details)

The average rainfall in Pudukkottai is 821 mm. During northeast monsoons this district receives the highest rainfall of 397 mm followed by, South west monsoon with 303 mm of rainfall. The summer and winter rainfalls are 81 mm and 40 mm respectively.

Average rainfall shows that the rainfall is highest in the south eastern part of the district, which includes the coastal blocks of Manalmelkudi and Avudayarkoil. It gradually decreases towards the northeast where the average annual rainfall is found to be the lowest in Malaiyur. The temperature is very high during summer season, low during the winter season and moderate during other months.

2. Resources-availability

i) Land resources (soil types)

The total geographical area of the district is 4663 sq.km. The predominant soil of Pudukkottai is red loam. About one fourth of the soils suffer from one problem or other, the main problems being salinity/ alkalinity. Following table shows the land contribution of the district.

Land	Extent in ha.
Wet	1,03,418
Dry	1,84,057
Forest	24,010
Barren & uncultivable	9,807
Land Used for Non Agriculture Purpose	1,25,672
Cultivable Waste	14,677
Pasture Lands	5,484
Trees and Tope	6,546

ii) Agriculture and horticulture (crops cultivated)

Though agriculture is the main source of sustenance for a majority of the population, the scenario is not quite encouraging. Dry land farming which is predominant suffers badly due to frequent monsoon failure, affecting agricultural production. Cereals have shown fluctuations both in area cultivated and production from

1980-81 to 1995-96. The largest coverage was in 1985-86 spreading over 127,174 ha and the highest production of 314, 560 tonnes was achieved in 1993-94. The highest yeild of 3030 kg./ ha was achieved in 1994-95. The largest area coverage, highest production and highest yeild/ ha of pulses

were achieved in 1985 – 86. The area, production and yeild/ ha dwindled and fluctuated in the subsequent decade.

The important crops cultivated are as follows:

Category	Common name	Botanical name
Cereals	Rice Cholam Varagu Ragi Maize Cumbu	<i>Oryza sativa</i> <i>Sorghum bicolor</i> <i>Paspalum scrobiculation</i> <i>Eleusine coracana</i> <i>Zea mays</i> <i>Pennisetum typhoides</i>
Pulses	Red gram Cow pea Horse gram Black gram Green gram	<i>Cajanus cajan</i> <i>Vigna unguiculata</i> <i>Dolichos biflorus</i> <i>Phaseolus mungo</i> <i>Phaseolus aureus</i>
Oil seeds	Ground nut Coconut Gingelly Soya bean	<i>Arachis hypogaea</i> <i>Cocus nucifera</i> <i>Sesamum indicum</i> <i>Glycine soya</i>
Condiments	Chillies Tamarind	<i>Capsicum annuum</i> <i>Tamarindus indica</i>
Sugars	Sugarcane Palmyra	<i>Saccharum officinarum</i> <i>Borassus flabellifer</i>
Fibres	Cottan	<i>Gossypium hirsutum</i>

An interesting feature in the farm sector is the development of orchards using dry farming techniques and minimum irrigation in the formation stage. Banana is the main fruit crop under irrigation. The major fruit crops are,

Banana	<i>Musa sp.</i>
Mango	<i>Mangifera indica</i>
Jack	<i>Artocarpus heterophyllus</i>
Guava	<i>Psidium guajava</i>
Acid Lime	<i>Citrus aurantifolia</i>

Jack, guava and acid lime are raised only on a very limited scale. Except for banana, the rest are raised on the red or lateritic soil belts. Brinjal (*Solanum melongena*) and ladies finger (*Abelmoschus esculentus*) are the two major vegetables cultivated here. A noteworthy feature of this district is the cultivation of cashew as a rainfed crop over extensive areas in the lateritic belt. However, no cashew processing unit has been established locally. The nuts are taken to numerous processing units that have sprung around Panrutti in Cuddalore district.

iii) Forest resources (reserved forest area / protected areas)

Major portion of the forests of this district was the personal preserve of the kings of Pudukottai state. Large forest areas were preserved as the hunting grounds for the rulers, their families and friends. With the merger of the princely state with Indian Union, in 1948, the control of the forests were transferred initially to the Revenue Department in 1948 and subsequently to the Forests Department in 1950. Following tables show the details of the forest area.

Reserved forests	12082.6 ha.
Unclassed Forests	Nil
Reserved Lands	Nil

Timber (Cu.m)	7.991
Fuelwood (MT)	9996.527)
Pulpwood (MT)	22347.635
Cashew (ha).	717.70

iv) Mineral resources (Garnet etc.)

The district has no significant mineral deposits. Stone quarries exist in Pudukkottai, Tirumayam and Kulathur taluks. Multi-coloured stones, which are quarried and exported as raw stones, are found in Kulattur taluk in Narthamalai area. Clay deposits occur in Gandharvakottai and part of Pudukkottai Taluks while red ochre and yellow ochre are reported in Tirumayam taluk, though not in significant quantities. Terracotta clay is available in Mazhiyur village in Alangudi Taluk and is currently used for production of toys, grain storage bin and other clay articles. Fire clay is available in Gandharvakottai taluk. Small quantities of quartz and limestone are reported in Vellakkalpatti and Meppusakudi while

kankar is reported in Adhanakottai area. The low mineral base of the district is evident in the mineral production profile, which comprises 12000 tonnes of rough stones and 300 tonnes of multi-coloured stones. The recoverable mineral resources available in the district are granite of Kashmir white variety. However this has not been recovered so far here

v) Water resources (river / major lakes and estuaries)

Agniyar, Ammliyar, South Vellar and GA Canar are the flowing water sources of Pudukkottai district. Agniyar basin is the main source of surface water. Agniyar river basin consists of three sub basins, namely Agniyar, Ambuliyar and south Vellar. There are seven tributaries in this basin. Agniyar is having three tributaries viz Nariar I, Nariyar II and Maharajasamudram. The river Ambuliyar is having two tributaries, viz Nerunjikudiar and Gundar. There are three gauging stations in Agniyar river basin maintained by PWD.

An important point to be noted in this basin is that there are no reservoirs across any of the rivers of this basin, the main reason being none of the rivers has copious flow. There is no direct ayacut fed by the rivers of this basin. Even though there are no reservoirs in this basin it is somewhat nullified by the supplementation of Cauvery water to part of the command area through G.A.Canal. It is supplementing the ayacut under 16 anicuts located in Agniyar, Ambuliyar and their tributaries

vi) Fisheries production (fish landing details / aquaculture)

Pudukkottai district has a total coastal length of 42.8 km serving 32 coastal villages and towns. Fishermen population of Pudukkottai district is 25027 (male 7880,

female 6746 and children 10401). Among eleven taluks of Pudukkottai two taluks i.e. Manamelkudi and Avudaiyarkovil comprise all the 32 fishing villages. Its coastal length status from Kattumavadi and ends with Enathi. Entire coastal length is utilized by the fisher folk for fishing. The sea stretch is situated in Palk Bay entirely in continental shelf with a shallow region, muddy bottom having with various species of sea-weeds. Inland fishery, largely a seasonal activity, is concentrated in tanks and ponds in Alangudi Thirumayam and Kulathur taluks. The major fish varieties caught are ray fish, sharks, prawns, belonids, silver bellies, octopus and crabs.

vii) Heritage resources (shore temples / churches)

Sittannavasal

This ancient abode of Jains dating back to the 2nd Century B.C. is about 16 km. from Pudukkottai. The rock-cut cave temple here has beautiful fresco paintings in natural colours as in Ajanta. The natural cavern with stone beds in which the Jain monks were said to have sought refuge for meditation. This cave contains lithic record (Brahmi Script of 2nd Century B.C.). There are a few sculptures of Jain Thirthanharas in the ardhmandapam and the inner shrine of the cave temple. The ceiling of the ardhmandapam contains fresco paintings of the 9th Century A.D. The cave temple is said to have been excavated in 9th century A.D. and it is a pandya creation and art. Sittannavasal is one the oldest habitation of man in the district and is rich in megalithic sites. The cave temple and other sites are under the control of Archaeological Survey of India. Admission by tickets, open all days.

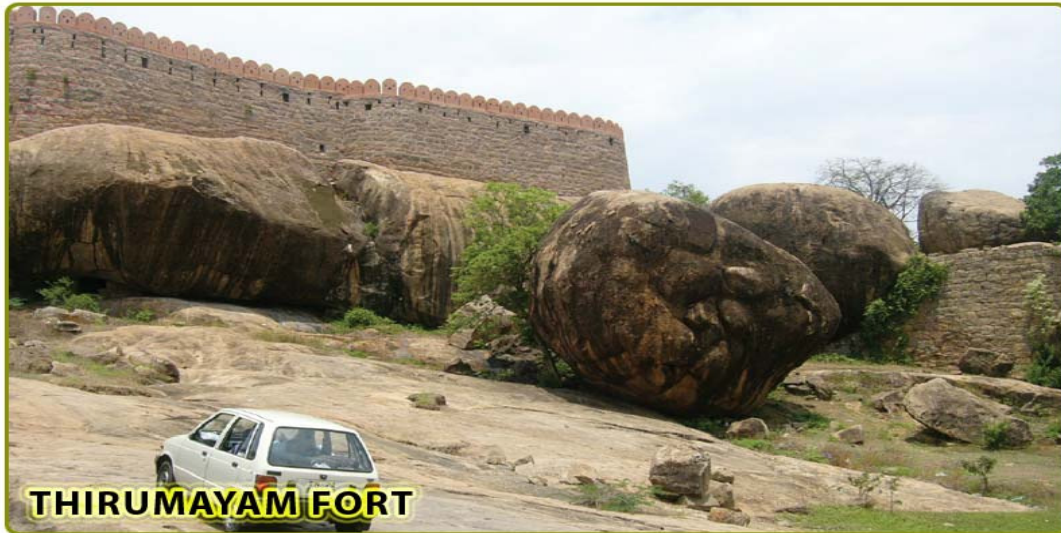
Frequent bus service is available from Pudukkottai.

Kudumbalur

Kudumbalur is 36 km. from Pudukkottai and 42 km. from Thiruchirappalli. It was formerly the seat of Irukkuvelirs, who were related to the Cholas. Kudumbalur is one of the ancient places in the district and is mentioned in Silappadikaram, The epic hero and his wife are said to have passed through this place on their way to Madurai. The early Chola temple here is known as "Muvarkoil". Of the three shrines of Moovarkoil only two exist now. These temples were built by Vikramakesari in the 10th Century A.D. The architecture of the temple is unique among South Indian temples and is the forerunner of all the grand Chola monuments. The sculptures of Kalarimurthi, Gajasamharamurthi, Ardhanaari, Gangadaramurthi. etc., are interesting masterpieces of art. The Muchukundeswarar temple of the early Chola period is another important temple of archaeological importance.

Thirumayam Fort

The Fort, the Siva and Vishnu temples are the tourist attractions here. The fort played an important role in the history of Tondaiman rulers of Pudukkottai and the British. The erection of this 40 acre-wide fort in 1687 A.D. is attributed to Sethupathi of Ramanathapuram. There are two cave temples one for Siva - Satyagiriswarar - and another for Vishnu - Satyamurti. Vishnu is in the form of Ananthasayi, called Adivangam. It is an of important Vishnavite centre.



Thirumayam Fort

Kudumianmalai

Kudumianmalai is 20 km from Pudukkottai. The presiding deity of the temple here is Sikhagiriswarar. There are beautiful sculptures in the temple. The temple is noted for numerous inscriptions. Remarkable among them is the one relating to a musical treatise. It is the only one of its kind, dating to 8-9th century AD., and the notations can be played in a Veena called 'Pirivadini' with 8 Strings. There is a rock-cut cave temple with massive bas-relief dwarapalakas and with the architectural features of Hoysala style and belongs to 8-

9th century A.D. The Anna Agricultural Farm and Agriculture Research Institute are the other interesting features of this place.

Viralimalai

The temple of Lord Subramanya at this place is on a hillock. It is a peacock sanctuary. It is 30 km. from Trichy and 40 km. from Pudukkottai. The Principal idol Lord Subramanya with Valli and Devasena is seated on a peacock. It is one of the important centres of Lord Muruga and various festivals relating to Lord Muruga are celebrated here.



Viralimalai

Avur

The old chapel here was constructed in 1547 A.D. by Father John Venantius Bouchet and the new Roman Catholic Church was constructed in 1747 A.D. The Tamil Scholar Rev. Father Joseph Beschi (Veerama Munivar) also served in this church. The Easter Passion play followed by car Festivals, takes place in summer, which attracts people of all faiths.

Sri Gokarneswara Temple - Thirugokarnam

The Rock-cut cave temple of Sri Gokarneswara - Brahadambal at Thirugokarnam is a Pandya art and belongs to 9th century A.D. It is the tutelary deity of Thondaiman rulers of Pudukkottai. The Pudukkottai Museum is situated at Thirugokarnam. It has rare collections in Geology, Zoology, Paintings, Anthropology, Archaeology, Numismatics, Economics, Botany and Philately. The Fine Sculptures and bronzes of various periods are the, attractive items of the Museum.

Pallivasal

One of the Islamic Pilgrim Centres, this is located on the Pudukkottai – Madurai highways. The saint entombed here is Bava Fakruddin, popularly called as Kattubava, is the grandson of the celebrated saint of Nagore Shahul Hameed. Both Hindus and Muslims visit this place and it is a symbol of religious harmony in the district. Annual ‘Urs’ takes place in the month of Rabiyyul Ahir.

Avudaiyarkoil

This is the most ornate temple in the district full of bursting baroque sculptures, the temple of Athmanatha. It is called

Thirupperundurai in inscriptions and intimately associated with Siva saint Manickavasakar. The sacred book Saivism, Thiruvacakam of Manickavasakar originated from this shrine. The God is worshiped formless and no images in the sanithanam. The utsavamurti of the temple is Manickavasakar. The mandapams are full breathtaking sculptures, a veritable galaxy of sculptures. Avudaiyarkoil is 49 km from Pudukkottai.

viii) Bidiveristy (Mangroves/corals/sea grass/important flora and fauna)

These forests are unique in nature and the floristic compositions are as follows,

Characteristic species

- *Manilkara hexandra*
- *Mimusops elengi*
- *Albizia amara*
- *Memecylon umbellatum*
- *Diospyros ferrea syn maba buxifolia*

Top canopy

- *Mimusops elengi*
- *Diospyros ebenum* (Occasional)
- *Strychnos nux vomia* (Occasional)
- *Strychnos potatorum* (Occasional)
- *Diospyros chloroxylon* (Occasional)
- *Drypetes sepiarea* (rare)
- *Syzygium cumini*
- *Canthium decocum* (frequent)
- *Ziziphus glaberrima* (frequent)
- *Acacia leucophloea* (frequent)
- *Catunaregam spinosa* (frequent)
- *Buchanania lanzan* (Occasional)
- *Sapinda emarginatus* (Occasional)

- *Albizia amara*
- *Albizia lebbek*
- *Tamarindus indica*
- *Azadirachta indica*
- *Borassus flabellifer*

Under wood

- *Carissa carandas* (abundant)
- *Flacourtia indica* (locally abundant)
- *Diospyros ferrea* (frequent)
- *Grewia* sp (abundant)
- *Gymnosporia spp* (frequent)
- *Ixora arborea* (frequent)
- *Tarenna ascatica* (frequent)
- *Memecylon umbellatum*
- *Garcinia spicata*

Shrubs

- *Strobilanthus*
- *Dodonaea viscosa* (abundant)
- *Glycosmis pentaphylla*
- *Ochna squarrosa*
- *Gmelina asiatica*

Herbs

- *Hemidesmus indicus*

Southern Carnatic umbrella thorn forests

Top canopy *Acacia planifrons*
Albizia amara
Choloroxylon swietenia
Canthium dicoccum
Gyrocarpus jacquinu
Givotia rottleriformis
Sapindus trifoliatus

Under growth *Acacia latronum*
Dichrostachys cinerea
Atalantia monophylla
Hemicyclia sepiaria

Shrubs *Randia dumetorum*
Carissa spinarum
Zizyphus spp
Acalypha fruticosa
Barleria sp
Soleannum toroum

Climbers *Pterolobium hexapetalum*;
Acacia pennata

Fauna

Mammals Bonnet macaque - *Macaca radiata*
Jungle cat - *Felis chaus*
Jackal - *Canis aureus*
Small Indian civet - *Viverricula indica*
Mongoose - *Herpestes edwardsi*
Black naped hare - *Lepus nigricollis*

Reptiles Green whip snake - *Ahaetulla nasutus*
Cobra - *Naja naja*
Indian Krait - *Bungarus caeruleus*
Russel's viper - *Vipera russelli*

Aves Peafowl - *Pavo sp.*
Black drongo *Dicrurus adsimilis*
Jungle and house crows
Egrets, Partridges

3. Impacts

i) Urbanization (municipal solid waste dumping / sewage etc.)

Over 85% of the town population is covered by protected drinking water supply. The estimated sewage generation is 91.8 lakh liters. There is no underground sewage

system. There is also no treatment plant in the district and therefore there is no organised disposal of sewage. The total daily solid waste in urban areas of Pudukkottai district is 45.5 tonnes with collection efficiency of 89%. Of these, 25 tonnes are generated in Pudukkottai town itself. About 250 workers are engaged in solid waste management throughout the district.

Pudukkottai municipality alone has furnished the details on solid waste composition. The primary component of the waste is compostable matter which accounts for 85% of the total waste.

ii) Industrial development (effluent discharge / pollution – air water land etc.)

There is not much industrial activity in this district. There are only 29 large and medium units operating in the district while as many as 3000 units are reportedly working in the small scale sector. A major facility available to industrial enterprises in the district is the developed plots and built-up sheds provided by SIPCOT and SIDCO respectively. There are no reported air pollution areas in Pudukkottai district. Data are not available for ambient air quality status.

iii) Thermal power generation (hot water discharge)

No thermal powers plant in the district. The main source of power supply to the grid in the district are Trichy (230 KVSS); Thanjavur (110KVSS); Karaikudi (66KVSS) and Manapparai (66KVSS). The distribution within the district is managed through 14 sub stations in different parts.

iv) Natural hazards (erosion / accretion / sea level rise/ climate impact)

No data available regarding the natural hazards in the coastal areas of this district. However, it is obvious that erosion, accretion, sea level rise and the impacts of climate change are no different from other districts.

v) Rare earths mining (garnet etc)

No information available

vi) Natural disaster prone areas (tsunami / cyclone / floods)

No major drought, flood or cyclone has been reported in this district. Coastal areas of this district are prone to tsunami as any other coast.

4. Government initiatives

i) Initiatives to improve fisherfolk livelihood (schemes for education / health)

1. National Fishermen / Women Savings cum Relief Scheme

This scheme envisages and supports the Fishermen / Fisherwomen financially during fishing off season i.e) October to December. Members of fishermen / Fisherwomen Co-operative Society those who are below poverty line, engaged in full time fishing and aged between 18 and 60 are eligible for this Scheme. Each fishermen/ Fisherwomen has to pay Rs. 70 per month for 8 months from January onwards and Rs. 40 for the 9th month. The total amount collected from fishermen is Rs. 600 and the contribution by Central/ State Government is Rs. 1200/-. Thus the contribution of Rs. 1800/- will be distributed to fishermen /Fisherwomen in 3 equal monthly installments of Rs. 600/- each.

2. Registration of fishing boats

Registration and licensing of fishing boats are done by the department after proper inspection as per the Tamil Nadu Marine Fisheries Regulation Act, 1983.

3. Issue of identity card to fishermen

Monitoring work for proper fishing is done by fisheries, coast guard and police official by issuing individual ID cards to fishermen. About 14962 ID cards were issued up to now for fishermen in Pudukkottai district. Recently, for the issuance of bio-metric I.D.card to all fishermen, their photographs and data entries were gathered and recorded. Further process is going on.

4. Fishing ban period relief assistance to fishermen

In order to protect the fisheries resources, fishing ban period have been announced during the fish breeding season in the east coast, the ban period is from April 15 to May 29. Mechanized fishing boats are not allowed for fishing during this period.

5. Fishermen Accident Group Insurance Scheme

Members of fishermen cooperative societies who are aged between 18 and 65 are eligible under this scheme. Annual premium for the insurance is Rs 30 and the same is contributed by the Central and State Governments on 50:50 basis. Rupees one lakh is given as relief for death while fishing and rupees fifty thousand is given as relief for becoming handicapped while fishing.

5. Fishermen Accident Individual Insurance Scheme

Members of fishermen cooperative societies are eligible under this scheme. Annual premium amount is Rs. 70/- Rupees one lakh is given as relief for death or becoming when fully handicapped and rupees fifty thousand as relief for partial handicapped to fishermen.

7. Diesel supply to fishing boats

Sales tax exempted diesel is supplied to fishing boats through TNFDC Bunks and selected private bunks. Required quantity of diesel for fishing boats is released daily ascertaining the hours of voyage and hours of fishing. Periodical inspection is done and the fishermen are allowed to carry the diesel only in the diesel tank of fishing boats. 560 mechanized fishing boats and 336 traditional fishing boats with outboard engine get the benefit in Pudukkottai district

8. Reimbursement of Central Excise Duty on HSD oil for mechanised fishing Boats

Beneficiary shall be an owner of less than 20 meters length mechanized fishing boat. The boat should have been registered with the Department on or before 31.3.2002 and possess the license for fishing. Log books should be maintained. The diesel shall be purchased only in the Fisheries Department approved bunks and used for fishing purpose only. Eligible fishing craft owners shall get subsidy of Rs.3.00/liter with ceiling of 500 liters/boat per month during active fishing months. The owners of the mechanized fishing boats should be below poverty line.

9. Regulation at berthing places for fishing crafts

All mechanized fishing boats are berthed in the fish landing centers at Kottaipattinam and Jegathapattinam. All eligible mechanized fishing boats are permitted for fishing after issuing a fishing permit token for a day fishing and their return to shore on the next day is ascertained by collecting back the issued fishing permits. All country fishing vessels both motorized and non motorized are berthed in a manner scattered in the marine fishing villages. Their movements for fishing are constantly watched by the department officials.

10. Supply of outboard engine to traditional fishing boats at subsidized rate (motorization of traditional Craft)

Traditional fishing boats which are registered and licensed through the department are eligible to avail the subsidy for outboard engine purchase at 50 % level.

11. Tamilnadu Fishermen Welfare Board

The following welfare schemes are implemented for the labours involved in fishing and allied activities by the Tamil Nadu Fishermen Welfare board.

- ✓ Accidental death
- ✓ Death while fishing
- ✓ Missing while fishing
- ✓ Natural death
- ✓ Disability due to accident
- ✓ Funeral expense
- ✓ Educational assistance to children
- ✓ Marriage assistance
- ✓ Delivery/abortion/miscarriage assistance
- ✓ Old age pension

This scheme is applicable to the labours who are involved in Fishing / Allied activities and the members shall be in the age group of 18 to 65 years. So far, 7250 labours have been enrolled as members.

12. SGSY (Swaranjayanti Grama Swarozgar Yojana) Scheme

In Pudukottai district, several trainings have been given under this scheme to fishermen and fisherwomen. Those who have undergone the Sea Weed Culture training are eligible to get the subsidy. Thereby 32 SHG (Self Help Groups) have availed a total amount Rs.24,84,000/-

13. Strengthening coastal security

Regular meeting with the fishermen of the fishing villages are convened by the Asst. Director of Fisheries to enlighten the importance of security issues, advising them about IMBL prohibition, serious issues of illegal fishing and to get support from the fishermen for imposing coastal security along with police officials.

14. Daily relief to marine fishermen apprehended in other countries

By entering into the borders of adjacent borders, fishermen are caught. If fishermen enter accidentally into other countries and getting a relief amount of Rs.50/- per day is offered by the Government until he returns.

15. Daily relief assistance to the families of missing fishermen

In case of missing fishermen who is enrolled as a member in Fishermen Co-operative Society a relief amount of Rs.50/- per day is offered by the Government to that fishermen's family until he returns.

16. Relief to the families of deceased/injured fishermen subjected to attack by Sri Lankan Navy

In cases such as death/injury to fishermen by Sri Lankan Navy shooting, a relief amount of 5 lakhs is offered to the families by the Government.

17. Cash awards to the top ranking students in 10th & 12th std. public examinations belonging to fishermen community

To encourage the students belonging to fishermen community students in their studies, the Government have announced an ex-gratia payment to the Top ranking boys and girls who are doing 10th and 12th as follows.

For 12th cash award of Rs.3000/- for

Dist.top ranking Boy & Girl.

For 12th cash award of Rs.5000/- for State top ranking Boy & Girl.

For 10th cash award of Rs.1000/- for

Dist.top ranking Boy & Girl.

For 10th cash award of Rs.500/- for Dist.IIInd ranking Boy & Girl.

For 10th cash award of Rs.3000/- for State top ranking Boy & Girl.

18. Training to fisher youth:

a) Modern fishing methods:- Candidates between 18 and 35 years of age having 5 years of sea experience can join in this

training. He will be given Rs.400/- month as stipend during this 10 months course.

b) Junior mechanic course:- Candidates between 18 and 35 years of age, 8th standard pass, 5 years of fishing experience can join this training course with a stipend of Rs.400/- month throughout 10 months.

19. Assistance for the upgradation of skills in maritime education

A financial assistance of Rs.50,000/- for the entire course to a candidate in two stages. Either of his parent should be a member of the fishermen Co-operative Society member.

ii) Coastal protection initiatives (bio shields / sea walls etc)

Bio-shield projects like mount wall construction are in progress in this district along the coast after the tsunami

iii) Awareness initiatives (tsunami / CRZ issues)

In the first year after the tsunami, glimmerings of hope shone through the darkness of utter devastation and misery. Panic stricken minds, flooded with repeated thoughts of that fateful day, found hope in the quick and proactive relief efforts, taken by the District Administration. Restoration and reconstruction progressed on a steady and definite schedule. After urgent attention was given to the primary needs of health, psychosocial support, child protection, shelter, water and sanitation and education, the focus of administration shifted to permanent reconstruction measures. These, in turn boosted livelihood support, activities. With these efforts, communities in coastal and adjoining villages were able to augment earning capacity and improve their quality of

life. Steps were also taken for averting a future tragedy, such as the one the December 26th, 2004 tsunami left in its wake. Bio-shield projects, shifting residences away from vulnerable zones, improving communication and warning mechanisms in coastal villages are being implemented.

iv) Bio diversity (coral, mangrove conservation and restoration)

No information available.

v) Other initiatives taken by private sector

No information available.

5. Summary / Conclusion

- Pudukkottai district was carved out of Tiruchirappalli and Thanjavur districts in January 1974.
- The district has an area of 4663 sq. km.
- The predominant soil of Pudukkottai is Red Loam.
- Though agriculture is the main source of sustenance for a majority of the population, the scenario is not quite encouraging.
- Reserved forests in the district is 12082.6 ha.
- The district has no significant mineral deposits.
- Agniyar, Ammliyar, South Vellar and GA Canar are the flowing water sources of Pudukkottai district.
- Pudukkottai district has a total coastal length of 42.8 km. serving 32 coastal villages and towns.
- There is no underground sewage system. There is also no treatment plant in the district and therefore there is no organised disposal of sewage.
- There is not much industrial activity in this district.
- No thermal power plant inside the district.
- No major drought, flood or cyclone has been reported in this district.
- Bio-shield projects like mount wall construction are in progress in this district along the coast after the tsunami.
- No attempt has been made to restore mangroves or corals.

**RAMANATHAPURAM
DISTRICT**

RAMANATHAPURAM DISTRICT

1. Introduction

i) Geographical location of the district

Ramanathapuram is one of the coastal districts bounded on the north by Sivagangai and Pudukottai districts, on the east and south by the Bay of Bengal, and on the west by Thoothukudi and Virudhunagar districts. The district headquarters is located at Ramanathapuram. The district lies between 9° 05' and 9° 5' north latitude and 78° 1' and 79° 27' east longitude. The general geographical information of the district is simple and flat. Vaigai river and

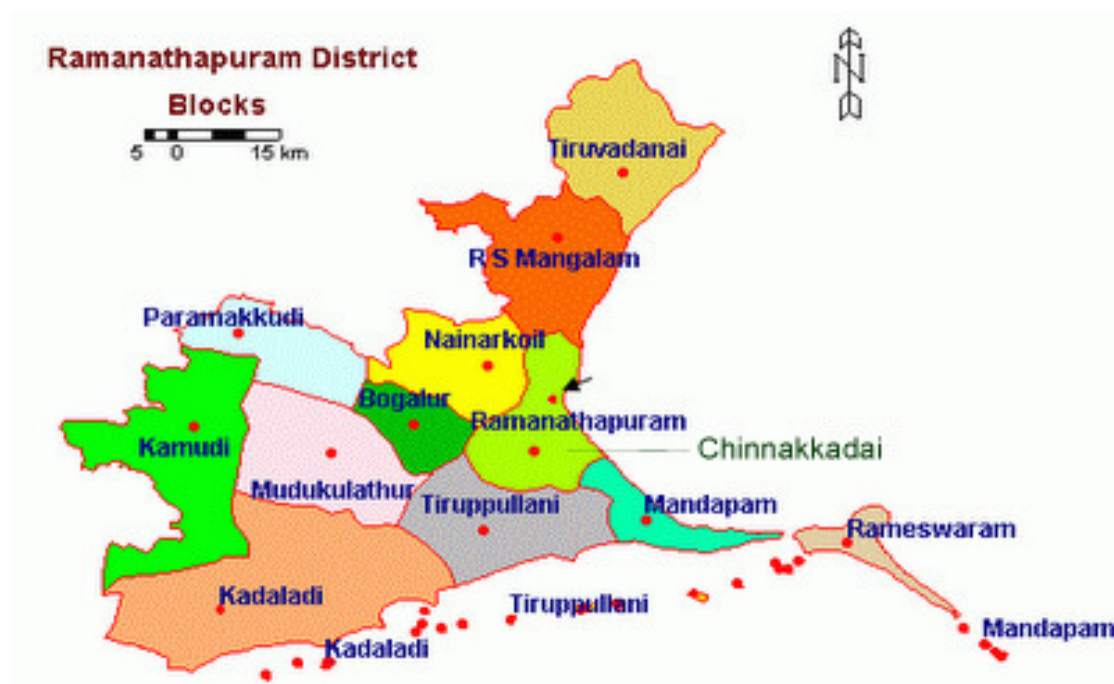
Gundar river are flowing in the district and they will be dry during the summer season. The total geographical area of the district is 4175 sq.km.

ii) Administrative profile (taluks / villages)

Ramanathapuram district comprises 7 taluks, 11 blocks and 2362 Villages. As regards the hierarchy of administrative arrangement, there are 2 municipalities, 7 town panchayats and 429 village panchayats in the district.

Revenue divisions and talk

Name of the division	Taluks comprised in the division	Total no. of firkas	Total no.of revenue villages	Total no.of hamelet villages
Ramanathapuram	Ramanathapuram	7	67	529
	Tiruvadanai	7	98	635
	Rameswaram	1	2	31
Paramakudi	Paramakudi	6	93	367
	Mudukulathur	6	46	207
	Kamuthi	5	49	352
	Kadaladi	6	45	241
Total		38	400	2362



Ramanathapuram District Map

Blocks and panchayats

Block name		No. of panchayats	No. of hamlets
1	Tiruvadanai	47	310
2	R.S.Mangalam	35	325
3	Paramakkudi	39	163
4	Bogalur	26	91
5	Nainarkoil	37	113
6	Kamudi	53	346
7	Mudukulathur	46	169
8	Kadaladi	60	285
9	Ramanathapuram	25	120
10	Tiruppullani	33	240
11	Mandapam	28	200
Total		429	2362

iii) Meteorological information (rainfall / climate details)

The climate of this district in the inland plains is generally hot and dry with a low degree of humidity except within a radius of about 20 km. from the coast, where the temperature is tolerable and cool on account of the sea breeze. The district has a hot tropical climate with temperature ranging from 22.3 C (min) to 37.8 C (max) and the relative humidity is high at 79% on an average and it ranges between 80 and 90% in coastal areas. Though the average rainfall is 827 mm per annum most of the rain fall occurs within a span of 45 days. March to May is the summer season, June to September is south-west monsoon and October to December is north east monsoon.

Most of the precipitation occurs during North east monsoon.

2. Resources availability

i) Land resources (soil types)

Most of the soil type is clay (45%) followed by coastal alluvial soil (17%) and sandy loam (15%). There is no scope for large scale mining in the district.

Mineral production 2005-2006

Crude oil	4548.358 mtn.
Natural gas	226742372 cbm
Gravel	25974 cbm
Earth	14294 cbm

ii) Agriculture and horticulture (crops cultivated)

Ramanathapuram district is deficient in rainfall. There are no major rivers providing perennial water supply for cultivation. Though a dry district, agriculture is extensively undertaken by irrigating the land from tanks and wells. The rainfall during the Southwest monsoon is rather poor. The rain during Northeast monsoon season is the major one but is not steady and is dependent on the vagaries of the monsoon. Whatever rainfall occurs, it is utilised to the best advantage through a large number of tanks and wells in the district. Paddy is the most important food crop of the district.

Paddy

In Ramanathapuram district, paddy is main the food crop cultivated in more than 63% of the net area sown. It is cultivated both as irrigated and rainfed. Rainfed sowing generally commences from August

and will extend upto October. In early sown area, farmers used to raise medium and long duration varieties of paddy. There is no marked area for late sowing, but when the monsoon rains are delayed, the sowing will be also taken up late. In the late sown areas medium and short duration paddy varieties are sown. Farmers are having 10 local paddy varieties in addition to high yielding varieties with the duration ranging from 105-130 days and they will choose varieties according to the need. Redgram is sown as a mixed crop with rainfed areas and also grown in garden lands to a limited extent. In tankfed ayacut area Irrigated paddy is sown generally during August to November. Sometimes sowing will be further extended upto December according to the filling of rainwater in the tanks and also release of water from Vaigai dam to the Vaigai fed system tanks.

Cholam

Rainfed cholam sowing is taken up in dry lands between July and September. Beyond September there would not be any sowing of cholam crop and Cumbu crop will be sown as alternate crop in these areas. Lablab pulses is also sown as mixed crop.

Cumbu

Rainfed cumbu sowing is generally taken up between September to November. Only in Ramanathapuram Taluk the sowing will be extended upto December. Irrigated Cumbu is taken up from February, March to June, July.

Ragi

Rainfed ragi sowing is taken up during September and October. Irrigated ragi is mainly sown in September to October

in East Ramanathapuram where the crop is sown in tankfed ayacut.

Minor millets

Minor millets are generally sown between July and November and the area is spread over whole the district.

Cotton

Rainfed cotton sowing is taken up during September-October. The sowing will be extended sometimes upto December depending upon rainfall. Rice fallow cotton is generally sown in Paramakudi and Kamuthi taluks during January-February months.

Pulses

Redgram is sown during June to August. Blackgram, greengram and cowpea

are sown as rainfed crop in September, October months. Redgram is sown as mixed crop with millets and groundnut. Blackgram and greengram are sown as pure crop as well as mixed crop in cotton and sugarcane. The cowpea is sown as pure crop and also in some places as mixed crop with millets.

Groundnut and gingely

Groundnut and Gingely are cultivated mostly in rainfed condition, during the months of December-January and April – May.

Chillies

Chillies are cultivated in both rainfed and irrigated condition. Chillies are directly broadcasted in the month of September. The transplanted chillies will be taken in the fortnight of November.

Normal area productivity and production of major crops				
Sl. No.	Crop	Normal area in ha.	Productivity per ha. in kgs.	Production in metric tones
1	Paddy	128000	2552	327859
2	Cholam	2117	862	1825
3	Cumbu	889	1123	998
4	Ragi	1448	1331	1927
5	Minor Millets	404	448	181
7	Pulses	3362	491	1651
8	Cotton	2733	2.40(Bales)	6559
9	Groundnut	6112	88.5	5409
10	Sunflower	145	351	51
11	Gingelly	1636	404	661
12	Chillies	16292	808	13164
13	Coriander	1748	254	443
14	Coconut	7942	14000	1112 lakh nuts
15	Sugarcane	231	124	28644

iii) Forest resources (reserved forest area / protected areas)

Forest Area

There are 18 forest areas in Ramanathapuram district constituting a total area of 5356.85 ha. 13 forest areas fall under the Reserve land category with 4139.39 ha. (41.39 sq.km.). and category of reserve forest areas in 702.46 ha. is Unclassified forest is available in 515 ha. in the district. The district total area of forest under green cover classification is 22149 ha. Dense and sparse forest spread over are 742 ha and 538 ha respectively. There is no grass land and degraded forest area covering this region. The forest area has not shown much fluctuation over the years. The Forest Plantations have been restricted to the existing forest areas in Ramanathapuram district. About 2562.65 ha. of manmade forest area is available in the district. Fuel wood is the only manmade forest plantation in the district. The villages located in the taluks of Thiruvadanai, Muthukulathur and Rameswaram abut forest areas in the district. Out of these taluks, Thiruvadanai has more number of villages abutting the forest area.

Gulf of Mannar Marine Biosphere Reserve :

Designated as a Biosphere Reserve, the Gulf of Mannar is one of the biologically richest coastal regions in all of mainland of India. Some of the islands are veritable 'biologist's paradise' It holds within high genetic diversity. It is equally rich in algae, seagrasses, coral reefs, pearl banks, sacred chank bed, fin & shell fish resources, mangroves, and endemic and endangered species. The seagrass beds form an important habitat for the highly endangered sea mammal, the Dugong dugon commonly called as sea cow.



Coral reefs of Gulf of Mannar

Gulf of Mannar Biosphere Reserve (GOMBR) was declared in 1989 as the first Marine Biosphere Reserve in the country. It encompasses the entire extreme south eastern Indian part of sea extending between Rameswaram and Kanyakumari to an extent of 10500 sq.km., including the Gulf of Mannar Marine National Park of 560 sq.km (the core zone of biosphere reserve), which includes 21 uninhabited islands and surrounding shallow coastal waters.

Considering the necessity for participatory co- management in the lines of Eco- development, Government of India with Government of Tamil Nadu introduced a GEF- UNDP funded project on "Conservation and sustainable use of Gulf of Mannar Biosphere reserve's coastal biodiversity" to address the threat issues of Gulf of Mannar. Gulf of Mannar Biosphere Reserve Trust, a special body of Government of Tamil Nadu is also formed in 2002.

The Trust is implementing various activities to bring in participatory co-management in the lines of Eco-development. It encourages basic inventory and management oriented research activities.

It facilitates awareness and capacity building among various meaningful stakeholders of the area. It promotes alternative livelihood and avocation diversification through skill up-gradation and employment. The multi dimensional approach of the Trust in simultaneously addressing the variety of threat issues of Gulf of Mannar has taken nearly five years to percolate down and in 2008, the reach is up to the bottom of the fishery system in the area.

iv) Mineral resources (garnet etc)

The eastern portion of the district consists of rocks formed in beds of swallow lakes and coastal backwaters where the salt and mud brought by the rivers are deposited. The sedimentary rocks extend into the whole of Tiruvadanai, Ramanathapuram and Mudukulattur taluks. These sediments, mostly of clay and sandstone, have been deposited for several million years from what is known in types of clays geological parlance as Gondwana age, to the present day. They contain limestones. Limestone of different grades, clays, euchres, gypsum, graphite and Limonite sands are the minerals of economic value found in the district.

Minerals – clay:

China clay with an average thickness of 0.91 mm. occurs over an area of 2.59 sq. km. in Sivaganga area. The total estimated reserve area of the order of 4.06 million tonnes upto a depth of 3.05 mm.

Garnet and ilmenite sands

The beach sands along the coast of Ramanathapuram district carry small quantities of garnet and ilmenite ranging in length from a few meters to 8 km and in thickness from 0.6 to 2.5 cm. The total reserves of ilmenite and garnet are 4165 and 1219 tonnes respectively.

Graphite

Graphite bearing zones have been met between 3m and 32m at several horizons in the boreholes. The percentage of graphite in the rock varies from 18 to 23. The graphite bearing zone has been proved along the strike direction for a distance of 2000m. The total preliminary estimated reserves are of the order of 1,80,000 tonnes of graphite bearing rock.

Gypsum

The total reserves of this area are estimated to be of 33,500 tonnes of which about 10,000 tonnes have already been mined.

Limeshell

Sub-recent shell limestone occurs at about 0.8 km. north of Ramanathapuram. The total reserves are of the order of 81,300 tonnes.

Limestone

Three bands of good quality crystalline limestone occur in the vicinity of (1) Pandalkudi (58 K/3; 9024', 78006'), (2) Palavanattam (58 K/2; 9033', 78000') and (3) Chinnayapuram (58 G/15; 9029', 77058').

v) Water resources (river / major lakes and estuaries)

The district has 2 rivers viz Vaigai and Gundar, but they are not perennial. Vaigai river starts in Gandamanaickanur hills of Madurai district traverse through Paramakkudi and Ramanathapuram taluks in a south-easterly direction feeding a large number of tanks. It joins the sea near Attangarai. The Gundar in the eastern slopes

of the Varushanadu and Andipatty ranges above Watrap flows through Aruppukkottai and empties into the Gulf of Mannar. Vaigai river basin, Pambar & Kottakaraiyar and Gundar, are the three catchment areas of river basin in the district. The existence of over 5000 number of tanks in the district makes it known as the Lake District of the State.

vi) Fisheries production (fish landing details / aquaculture)

The Ramanathapuram district has 271 km of coast line of which 130 km is in Palk bay and 140 km in Gulf of Mannar. No information was available on inland fresh water area and estuaries & brackish water area. Ramanathapuram coast is well known for pearl fishing. The Pandyan kings who ruled over this district exploited the pearl fisheries of the east coast. The Cholas who succeeded Pandyas not only patronized pearl fishing but also developed it with great care in the Palk and Gulf of Mannar. Marco Polo (1260-1300) who traveled here during this period says in his account that the pearl fishing was monopolised by Pandyas. The large quantity of pearls collected from the pearl beds were exported to Mediterranean countries.

The Regional center of the Central Marine Fisheries Research Institute Mandapam which was established in 1947 has developed proven technology for the culture of pearls, edible oyster, clam mussel and seaweed. Commercial pearl farming has come up near Kurusadai island and the Tamil Nadu Fisheries Development Corporation Limited maintains it.

Ramanathapuram district has distinct chank fishery. Jadhi Chanks are abundant in the Palk Bay strait and Gulf of Mannar. More than 2000 fishermen are engaged in active chank diving and sacred

chank collected by divers are marketed in West Bengal for making ornaments. This contributes significantly to the development of fisheries.

About 160 Prawn farms are operating in the district which follow intensive type of prawn culture. Prawns harvested from these farms are exported to Japan, USA and European countries, which earn sizable foreign exchange for the country.

In Ramanathapuram district 7 fish processing factories are functioning in Tondi and Mandapam. Prawn, squids, cuttle fish, Crabs and fish are processed and exported to foreign countries. Many small entrepreneurs are involved in fish drying and dried fish is used in poultry and cattle feed manufacturing.

vii) Heritage resources (shore temples / churches)

Rameswaram

The Holy abode of the Hindu God, Shri Ram (addressed so with all respect & humility) is a virtual paradise for the devout. No Hindu's journey is complete without a pilgrimage to both Varanasi and Rameswaram for the culmination of his quest for salvation and is hallowed by the epic 'Ramayana'. Folklore mentions about God Ram's presence in this land, after his 14-year exile.

Local legend has it that Shri Ram was helped back into Rameswaram and into India by his brother Lakshman and Hanuman along with his band of thousands of monkeys, after finally emerging victorious against the demon – Ravana. They helped build a bridge with rocks from the sea and shores to cross the 'Sethu canal' and reach India. Lord Rama is also believed to

have sanctified this place by worshipping and glorifying Lord Shiva and hence marks the confluence of Shaivism and Vaishnavism and is thus revered by both Shaivites and Vaishnavites alike and thus there is a strong belief that bathing in the 22 'Theerthams' or natural springs is a step forward in enlightenment. Therefore, Rameswaram has rightly been declared as one of the National Pilgrim Centres in the country.

The Ramanathaswamy temple by itself is a delight for every tourist. With its magnificent, imposing structure, long corridors, aesthetically carved pillars, the temple is adorned with a towering 38-metre 'Gopuram'. The temple itself was built by rulers since the 12th century with Sethupathy Maravar beginning the construction of the grand Ramanathaswamy temple that boasts of the 'Third Corridor', completed by his successor, Maravar – the longest one in Asia with a 197-metre span from East to West and a 133-metre span from South to North, the third largest in the world! It is said that Swamy Vivekananda offered prayers at this temple in 1897. Another important fact is that two important Hindu schools of thought – the Kanchi Kamakodi Peetam and Bannari Amman owe allegiance to the deity at the Ramanathaswamy temple in Rameswaram. This has a tremendous impact on the religious sentiments of both the local people as well as devotees throughout the state of Tamil Nadu.

Further down, the geographical terrain and landscape naturally tapers slowly but sharply toward the end, converging and gently sinking into the sea at Dhanushkodi – the country's tip in this part of the peninsular. This natural phenomenon has a lot of significance and most people revere the thought and hope to attain salvation as a culmination of their prayer, sacrifice and penance in this holy place. With this

backdrop, it is proposed to construct a Yogacum-Meditation Centre at Rameswaram which any tourist can use to attain solace and discover oneself through the Vedic science of Yoga and meditation. This could also pave the way for the establishment of a Vedic College where all students could be imparted with knowledge and inputs on Hindu religion and mythology, the Vedas, Upanishads and the teachings of the Bhagavad Gita. Taking cues from the renowned "Thirupathi Devasthanam", efforts may be initiated to project this temple with its strong and rich legacy and roots of Hinduism, being a National Pilgrim Centre. For instance, tourists may make advanced booking for Offerings at temples, on-line pooja, thereby reaching temples in the designated time (each temple has specific timings for 'dharshan' and special pujas).

Ramanathaswamy Temple

The legend says that Hunuman was sent by Lord Rama to bring a Lingam to worship at an appointed auspicious hour. As Human's arrival was delayed, Sita moulded a lingam for Rama's timely worship. It is the main deity being worshiped as Ramanathaswamy. Disappointed Hunuman was later consoled by Rama by installing the Lingam which was brought by him a little north of Ramanatha, and decreed that the Hunuman's lingam should have precedence over the Ramanatha in all honours.

Agni Theertham

The calm shallow water-spread of the sea, present hardly 100 meters in front of the temple gopuram is considered as sacred. A dip in the Agnitheertham is considered to remove the sins of the pilgrims. The other theerthams (holy water tanks) in and around the temple are also important for pilgrims.

Jadayu Theertham

Jadayu, King of the Birds, who fought in vain with Ravana, the demon to save Sita, is said to have fallen down here as his wings were severed. Sand dunes surround the temple and the pond. The water in the pond is as sweet as that of a tender coconut.

Villoondi Theertham

Villoondi literally translated stands for 'buried bow'. It is quite well known that Lord Ram always carried a bow. According to legend, at this sacred spot, located around 7 km. from the main temple on the way to Pamban, is this puranic place, significant because it was at this place where Lord Ram is said to have quenched the thirst of Sita by dipping the bow into the sea water. Even to this day, tourists throng this place to see where potable water is available within the vicinity of sea water.

Badrakali Amman Temple

A kilometer away from the main sanctum sanctorum is the Badrakali Amman Temple with Devi Durga as its chief deity. It is very popular among Devi Durga's worshippers hailing mainly from West Bengal. This temple is en-route to the Gandhamathana Parvatham.

Gandhamathana Parvatham

A hillock situated 3 km. to the north of the temple is the highest point in the island. There is a two storeyed mandapam, where Rama's feet. (padam) is found as an imprint on a chakra. Pilgrims throng in thousands to worship Gandhamathana Parvatham. Sukreevar temple and Theertham are situated on the way to Gandhamadana Parvatham.

Dhanushkodi

The Southernmost tip of the island is called Dhanushkodi. It was completely washed away by a cyclone in 1964. But the Kothandaramasamy Temple here remains intact. It is 18 km away from Rameswaram and can be reached by road. A popular belief is that, it is where Vibishana a brother of Ravana surrendered before Rama. Dhanush-kodi has a fine beach, where Sea surfing is possible.



Dhanushkodi

Kurusadai Island

This Island lies to the west of the Pamban Bridge between the mainland and the island. It is a Marine Biosphere, a paradise for the Marine Biologists and nature lovers. Marine wealth abounds here attracting many a scholars and researchers to this Island. It is about 4 km. from Mandapam. One should approach fisheries department for permission to visit this island. Off Kurusadai Island one could see plenty of coral-reef, fish. Dolphins and sea-cows (Dugong) are also often witnessed.

Ramanathapuram

An ancient town, and is now the head quarters of the district. It was from here the Sethupathis (Chieftains) ruled this territory. Ramalingavilasam Palace with good painting and tomb of Thayumana Swamigal, are the places worth visiting. A museum is functioning here.

Devipattinam

A coastal village is also known as Navashabashanam. It is believed that Lord Rama worshipped Navagraha here. The temple nearby here is dedicated to Devi, who is said to have killed the demon Mahishasura at this spot. Hindus perform religious rites for their forefathers here.

Thiruppullani

It is also called Dharbasayanam, the Vishnu temple here, is dedicated to Lord Adi Jaganathaperumal. It is about 64 km. from Rameswaram.

Uthirakosamangai

It is situated at a distance of 72 km. from Rameswaram is Uthirakosamangai. There is an ancient Siva temple, where the presiding deity is carved in Emerald. Annual 'Arudhra' festival in December attracts a large number of devotees.

Erwadi

The tomb of Sultan Ibrahim Syed Aulia, who came from Arabia via Cannanore is about 800 years old. Pilgrims from far off countries like Sri Lanka, Malaysia and Singapore are visiting this tomb. Santhanakoodu Festival is celebrated in

February-March and it attracts thousands of pilgrims.

Satchi Hanuman temple

This is where Hanuman is said to have delivered the good news of Sita's well being to Rama with an evidence choodamanai (Jewel) of Sita.

Five faced hanuman temple

Hanuman is adorned with senthooram here. The stone said to have been used for constructing the floating bridge Sethu Bandanam could be seen here.

Thiruvetriyur

The Patham Priya Koil is situated in Thiruvetriyur in R.S. Mangalam block of the district. The temple spreads over a vast area and has a large tank and pilgrims flock here in hundreds every day for getting the blessings and to pay obeisance.

Upoor

Around 85 km from Rameswaram is the Veyulugantha Vinayagar Alayam (temple). It is believed that Lord Ram worshipped Lord Vinayagar (Elephant God) in this very temple on his journey to Sri Lanka.

Sethu karai

A place of Puranic importance, Sethu karai (meaning the Sethu Coast) is an important pilgrim centre having religious significance owing to the belief that Lord Ram is said to have constructed a bridge from here over the sea waters to reach Sri Lanka. It is a hallowed place for Hindus as they conduct their religious rites in this place

and is at about around 68 km from Rameswaram and is near Erwadi Dharga.

Oriyur

Oriyur is one of the most revered pilgrim centers for Christians the world over as it is home to the martyrdom of St. John De Britto, a Portugese Jesuit better known as 'Arulanandar'. It was in this place that the saint was beheaded in 1693 and the sand dune is said to have turned red, believed to be stained by the blood of the saint. Here, one can see a magnificent shrine with its Portugese façade that contains a captivating statue of Arulanandar offering his neck in humble submission to the executioner.

Why this place has such significance is the healing power of the 'red sand' and the faith of the devotees. People are said to be cured of incurable diseases after applying the sand on their bodies. Couples are said to be blessed with children on visiting the shrine and praying to the saint. During festivities, pilgrims from Tamil Nadu and Kerala – Hindus, and Muslims jostle with Christians and throng the shrine in thousands in their eagerness to honor a holy man who shed his life blood in Tamil Nadu. Though primarily of religious content, the festivals are also a social gathering – an opportunity for these simple people to bring gaiety and variety in life. The strong faith and enviable ability to combine pleasure and piety on a pilgrimage gives a Chaucerian atmosphere to the Oriyur feast.

Devotees from other dioceses and districts visit the shrine on specific dates. In February they come from Dindigul, while in June, they hail from Karunguli and Nagapattinam. During September more than 25,000 pilgrims visit this shrine and offer prayers and offerings. In October another 25,000 pilgrims arrive from the neighboring Sivagangai district and in December pilgrims

from Madurai and Melur visit the shrine. Throughout the year, thousands of pilgrims from Sakthikulangara –the only parish in Kerala dedicated to the St. John De Britto come to seek blessings. This is also a favorite place for foreign tourists. Thus, the tourist potential is tremendous and perennial that can be exploited to the maximum extent possible.

Sea world aquarium

Just opposite the Rameswaram Bus Stand, one can catch a quick glimpse of an assortment of underwater creatures in their near natural habitat in the 'Sea World Aquarium' – the only one of its kind in the state, and probably in the country too, filled with such varied marine life forms including exotic species such as Octopus, Snake fish, Parrot fish, Sea lizard, Sea squid, Cow fish, Lion fish, Rabbit fish, Fire fish, Butter fish, Clown fish, Crabs, Lobsters, Prawns, Sea Lotus, Beach Tamet, Star Fishes, Sea Horses and Sharks. This is quite an eye-opener for young tourists & kids and lovers of marine life.

Mandapam & Pamban

Lying on the Ramanathapuram – Rameswaram National Highway and just 19 km before Rameswaram lies this sleepy coastal village of Mandapam. Prior to the 1914 train service linking the mainland with Rameswaram, boats were the only mode of transport to ship the pilgrims on their journey to Rameswaram. It is possible to take a boat for a cruise through the mangrove marshes to Kurusadai Island.

There is a possibility to convert this opportunity into a tourist attraction by providing small mechanized boats from Mandapam for both cruises as well as discovery of the coral reefs in neighbouring islands subject to non-pollution and destabilization of the fragile and precious marine ecosystem of this region.



Pamban bridge

Annai Indira Gandhi Bridge

The 2.2 km long length bridge connecting the Rameswaram island and the mainland is the longest bridge in India constructed over a bay. It is also called as Pamban Bridge. Similarly the railway bridge connecting the island is noted for its unique opening to pass the ships through the sea.

viii) Biodiversity (mangroves/corals/sea grass/important flora and fauna)

The diverse nature of ecosystems in the Gulf of Mannar limits entire stretch from Ramanathapuram through Tuticorin and Tirunelveli to Kanyakumari supports a wide variety of significant species including 117 species of corals, 13 species of seagrasses, 641 species of crustaceans, 731 species of molluscs, 441 species of finfishes and 147 species of seaweeds apart from the seasonally migrating marine mammals like whales, dolphins, porpoises and turtles. A unique endemic species of *Balanoglossus* -

Ptychodera fluva, a living fossil that links invertebrates and vertebrates, has been recorded only at Kurusadai. The coral reef resources of the Gulf of Mannar are unique. They grow surrounding all the 21 islands. They offer shelter to a variety of organisms and protect the mainland from storms, currents and shore erosion.

In view of the sensitive nature of the Gulf of Mannar Marine Biosphere Ecosystem and the dangers faced by it due to multifarious anthropogenic activities in recent years, the Government and other national and international organizations evinced great interest to protect and conserve this ecosystem. Towards this, the Global Environment Facility (GEF) through United Nations Development Programme (UNDP) has facilitated the project on “Conservation and Sustainable Use of Gulf of Mannar Biosphere Reserve’s Coastal biodiversity” which is being carried out by the Gulf of Mannar Marine Biosphere Reserve Trust (GOMMBRT). Coral reefs in the Palk Bay region are distributed on the Northern side

from Rameswaram island to Vedhaalai, covering a distance of about 25 km. In the Palk Bay, corals were found to be disturbed by human impacts through oil pollution, waste discharge from processing units and discharge of domestic household wastes from the nearby Mandapam town.

The Gulf of Mannar harbours mangroves of considerable diversity which support a variety of biological organisms. It is believed that the region was once covered with thick mangrove forests. There are indications that there was over-exploitation that led to vanishing of mangroves species. As a result, species such as *Bruguiera gymnorrhiza* and *Acanthus ilicifolius* could not be collected earlier in Rameswaram in recent years, and similar are the cases with *Pemphis acidula* in Pamban and *Acanthus ilicifolius* on Krusadai Island.

3. Impacts

i) Urbanization (municipal solid waste dumping / sewage etc)

Surface water and ground water are the major sources for protected water supply system in municipalities and town panchayats respectively. The estimated sewage generation is 56 lakh litres among municipalities and 72.80 lakh litres among town panchayats. The district does not have any organised disposal of sewage. Nature of disposal and quantity through river is 56 lakh litres in municipalities and 25.9 lakh litres in town panchayats, with the direct flow to sea disposal is 46.90 lakh litres. The town panchayats have complete open drainage system and the municipalities have partial underground pipe system. The solid waste generation of municipalities and town panchayats are 15 tonnes and 21.75 tonnes, respectively. The solid waste collection in municipalities and town panchayats is 15

tonnes and 20.3 tonnes. Overall the solid waste generated adds up to 36.75 tonnes with a collection efficiency of 96.05%. It was observed that about 86% of the solid wastes are compostable on wet basis 14% of rag, wood matter, glasses, brick and stone, etc, are non-compostable in the district.

ii) Industrial development (effluent discharge / pollution – air water land etc.)

The district is considered as an industrially backward area and the Government is giving incentives like allotment of sites at cheaper rates, adequate power supply and loans on low rates of interest to entrepreneurs for setting up industries. The Government on with its part also has set up few establishments in the public / co-operative sectors for providing employment to local population. The chief industries found in the district are handloom weaving of textiles, spinning and weaving of textiles in factories, salt and chemical industries, cement, matches, crackers and fireworks and printing and allied industries.

Handloom weaving of cotton textiles is an ancient occupation followed in this district. The important handloom centres are situated in Paramakkudi taluk. Silk weaving, using China Silk as raw material, is practised in Ramanathapuram and Paramakkudi. Textile mill is functioning in the district, which produce a variety of yarns. Mat weaving is followed in the vicinity of Ilaiyankudi. Boxes and other articles from palmyrah leaves are being manufactured in a number of places in Ramanathapuram taluk. Coconut coir fibre making is followed in the district, the important centre being Periyapattinam

There has been no discharge of industrial effluents in river basin/other water

bodies in Ramanathapuram district. Information was not available for air pollution stressed area in the district.

iii) Thermal power generation (hot water discharge)

No thermal power generation plant is available in the district currently.

iv) Natural hazards (erosion / accretion / sea level rise/ climate impact)

No data available regarding the natural hazards in the coastal areas of this district. However, it is obvious that erosion, accretion, sea level rise and the impacts of climate change are no different from other districts.

vi) Rare earths mining (garnet etc)

No information available.

vii) Natural disaster prone areas (tsunami / cyclone / floods)

Ramanathapuram district is highly drought prone because of the lack of rain and rivers. Floods and cyclones are rare in this district. During 1964 cyclone the Southernmost tip Dhanushkodi was washed out with much causality. Dhanushkodi town went under the sea water during that time. Since most of the district lies along the coast, the district is always prone to tsunami.

4. Government initiatives

i) Initiatives to improve fisher folk livelihood (schemes for education / health)

Following are the schemes from Tamilnadu Government to improve fisher folk livelihood

- National Savings- cum- Relief scheme for Marine Fishermen

- Savings- cum- Relief scheme for Marine Fisherwomen
- Enhanced Financial Assistance of Rs.2000/- to Marine Fishermen Families during Fishing Ban period.
- Special Allowance of Rs.4000/- for fishermen families during Non-fishing period.
- Group accident insurance scheme for fisher-folk.
- Fishermen personal accident insurance scheme.
- Motorisation of Traditional Crafts.
- Cash awards to 10th and 12th students belonging to fishermen community.
- Payment of daily relief to the Missing fishermen family while conducting fishing into the sea.
- Fishermen Welfare Board schemes.
- Scheme of creating employment opportunities to educated fishermen youth through up gradation of skills in Maritime Education and Nautical Sciences.

ii) Coastal protection initiatives (bio shields / sea walls etc)

The island of Sri Lanka act as a huge barrier even in the case of future tsunami damage to this coast was minimum during the earlier tsunami. Further, the stretch of the coast is in a bay formation with not much littoral drift activity. Moreover islands of the Gulf of Mannar, dynamic resources like coral reefs, mangroves and seagrasses of

both Gulf of Mannar and Palk Bay act as bioshields to protect the coast of this district.

Stretch from Devipattinam to Nambuthalai

This stretch of the coast covers Devipattinam, Thirupalakudi, Morpannai, Mullimanai and Nambuthalai. For all the above stretches, the details of the shoreline changes are not clearly evident. From local public, it was heard that there is continuous erosion but not alarming. Only during cyclones, damages have taken place. Tsunami did not affect this area. It is strongly suggested that measurement pillars may be erected for these sites to carry out the crest of berm variation for at least 2 years. For Nambuthalai, between the shoreline and an existing road there are number of hutments which are not permanent type may be relocated. No hard measures are suggested for this location as the sediment transport is almost nil and the shoreline oscillations are just temporary. Enormous amount of sea grass is available. Plantations are recommended.

iii) Awareness initiatives (tsunami / CRZ issues)

Various awareness creation activities have been made among the fisher folk on tsunami and CRZ issues by different Government and Non Government organizations.

iv) Bio diversity (coral, mangrove conservation and restoration)

Coral and seagrass restoration has been done by Suganthi Deavadason Marine Research Institute in Gulf of Mannar coast of the district. Mangrove restoration has been done by the Forest Department.

v) Other initiatives taken by private sector No information available.

5. Summary / Conclusion

- Ramanathapuram is one of the coastal districts bounded on the north by Sivagangai and Pudukottai districts, on the east and south by the Bay of Bengal, and on the west by Thoothukudi and Virudhunagar districts with an area of 4175 sq.km.
- Ramanathapuram district comprises 7 taluks, 11 blocks and 2362 villages. As regards the hierarchy of administrative arrangement, there are 2 municipalities, 7 town panchayats and 429 village panchayats in the district.
- Most of the soil type is clay (45%) followed by coastal alluvial soil (17%) and sandy loam (15%) and there is no scope for large scale mining in the district.
- Ramanathapuram district is deficient in rainfall. There are no major rivers providing perennial water supply for cultivation.
- In Ramanathapuram District, paddy is main food crop cultivated in more than 63% of the net area sown.
- There are 18 forest areas in Ramanathapuram district constituting a total area of 5356.85 ha.
- Designated a Biosphere Reserve, The Gulf of Mannar is one of the biologically richest coastal regions in

all of mainland of India with corals, seagrasses, mangroves and other important flora and fauna.

- Gulf of Mannar Biosphere Reserve (GOMBR) was declared in 1989 as the first marine Biosphere Reserve in the country.
- The district has 2 rivers viz. Vaigai and Gundar, but they are not perennial.
- Ramanathapuram district has 271 km. of coastal line of which 130 km. in Palk bay and 140 km. in Gulf of Mannar.
- The district does not have any organised disposal of sewage.
- The district is considered as an industrially backward area as there are no major industries in the district.
- Ramanathapuram district is highly drought prone because of the lack of rain and rivers.
- The island of Sri Lanka acted as a huge barrier during tsunami along with coral reefs, mangroves and seagrasses of both Gulf of Mannar and Palk Bay.
- Coral and seagrass restoration has been done by Suganthi Deavadason Marine Research Institute in Gulf of Mannar coast of the district.
- Mangrove restoration has been done by the Forest Department.

THOOTHUKUDI DISTRICT

THOOTHUKUDI DISTRICT

1. Introduction

i) Geographical location of the district

Traditionally known as “Pearl City” on account of the prevailing Pearl fish in the past in the area, Thoothukudi has a fascinating history. On 20th, October 1986 a new district, carved out of the erstwhile Tirunelveli district was born in Tamil Nadu and named after V.O.Chidambaranar, a great national leader.

Since 1997 as in the case of other districts of Tamilnadu, this district has also been named after its headquarters town, Thoothukudi. Thoothukudi district is situated in between latitude 0.8 and 45 and longitude

78⁰ and 11⁰ with an area of 4621 Sq.km. and it is a coastal district.

ii) Administrative profile (Taluks / villages)

The details on taluks, blocks, village panchayats and town panchayats are illustrated below:



Tuticorin district Map

I	Taluks	:	Tiruchendur, Srivaikundam, Sathankulam, Ottapidaram, Thoothukudi, Kovilpatti, Vilathikulam & Ettayapuram
II	Blocks	:	Thoothukudi, Ottapidaram, Srivaikundam, Karungulam, Tiruchendur, Alwarthirunagari, Udangudi, Sathankulam, Kovilpatti, Kayathar, Vilathikulam & Pudur
III	Revenue vllage	:	480
IV	Village panchayats	:	408
V	Town panchayats	:	19

ii) Meteorological information (rainfall / climate details)

Its maximum temperature is 41°C and the minimum is 26°C. The climate is conducive for agricultural and horticultural crops. Thoothukudi comes under low rainfall region. The normal rainfall of the district is 662.2 mm. South West monsoon accounts for 9%, North East monsoon for 65%, winter being 9% and summer being 17% of total rainfall. Thoothukudi depends mainly on North East monsoon rains, which are brought by the troughs of low pressure developing in south Bay of Bengal between October and December.

2. Resources-availability

i) Land resources (soil types)

The major soil types found in the district include montmorillonitic, Vertisols, Alfisols, Inceptisols and kaolinitic. Deep fine, montmorillonitic, vertisols occupies a major area of 114817.11 ha.. The types of soil and the area are listed in Table, below.

Common soils types and locations in Thoothukudi district

Sl. No.	Type of Soil	Places in District
1.	Red loam	Udangudi, Kayatar, Sattankulam
2.	Lateritic soil	Srivaikundam, Tiruchendur
3.	Black soil	Kovilpatti, Kayatar, Vilathikulam, Thoothkudi, Ottapidaram
4.	Sandy coastal alluvium	Tiruchendur
5.	Red sandy soil	Udangudi, Sattankulam, Srivaikundam, Karungulam, Ottapidaram, Vembar

ii) Agriculture and horticulture (crops cultivated)

Agriculture is the main occupation on which 70% of the people depend on. The main food crop in this district is paddy. Out of the total area of 470724 ha., 178623 ha. are brought under the cultivation of different crops which is nearly 38% of total area of the district. The important food crops in the district are paddy, cholam, cumbu, ragi, varagu, samai and commercial crops like cotton, chilly, sugarcane and groundnut.

- a. Total Cultivated Area ha. : 183075
- b. Net area sown (ha.) : 178623
- c. Area sown more than once (ha.) : 4452
- d. Area and production of area (ha.)

2011- 2012 (season & crop report)

Production principal crops area (in '000' tonnes)

i. Paddy	20278	89.44
ii. Millets and other cereals	52850	187.19
iii. Pulses	62274	12.91
iv. Sugarcane (in terms of gur)		NA
v. Groundnut	1183	1.15
vi. Gingelly	1905	0.30

g. Agricultural Land Holdings (2010-11)

- i. Holdings : 195435
- ii. Area ha. : 233688.8
- iii. Average size of holdings (ha.) : 1.19

F. (a) Important agriculture crops: paddy, cumbu, blackgram, greengram chillies & banana

(b) Important non agriculture crops: chenna, cotton

iii) Forest resources (Reserved forest area / protected areas)

Total forest area of the district is 11010 ha..

A. Forest	Area (ha.)
a. Reserved forests :	7121
b. Unclassified forests :	NA
c. Reserved lands :	3889

Vallanadu Blackbuck Sanctuary is located in Vallanadu village of Srivaikundam taluk on Tirunelveli – Thoothukudi road at a distance of 18km. from Tirunelveli. The Vallanadu Blackbuck sanctuary is located in an isolated hillock with scrub forest.

Islands of Tuticorin region

Four of the 21 islands of Gulf of Mannar occur along Tuticorin coast. These islands are surrounded by a thick coral and seagrass cover. Erosion has been severe in these islands because of coral mining activities which happened before 2004 Indian Ocean tsunami.

Vaan island

Vaan island is locally called as Church Island. The island forms part of Keela Arasanadi village of Ottapidaram taluk (village no.322). The area of the island was 16 ha. and 56 acres but it has currently shrunk to 5.7 ha. according to the new reports. Moreover, island has split into two parts because of a narrow channel in between. The erosion in the island is attributed to rampant coral mining which happened in this region until 2004 tsunami. This island is situated at a distance of 6 km. from the shore.

Koswari island

It is also called as Karsuvar Island. It is located at a distance of 7 km from Tharuvaikulam village of Ottapidaram taluk. Its area is 19.5 ha. according to the 1986

report. It is included in Tharuvaikulam (village no.62,survey no.396) of Ottapidaram taluk.

Kariyachalli island

This island is located 10 km off the shore of Pattanamarudur village of Ottapidaram taluk. This island is the most diverse island among the four islands.

Vilanguchalli island

This is the farthest island from the shore in the district. It forms part of Pattanamarudur village and is located at the distance of 12 km off the shore of the village. This island got submerged under the water because of severe coral mining activities.

iv) Mineral resources (garnet etc.)

Rock types found in the area belong to the Khondalite and Charnockite groups and Migmatite Complex of Eastern Ghats Super group (Archaean Age), which are unconformably overlain by Tertiary and Quaternary sediments. Garnet-biotite-sillimanite gneiss, quartzite, calc-granulite and limestone of Khondalite Group with epidiorite, occurring as narrow linear bands. Charnockite Group is represented by acid variants. These rock types occur as xenoliths within the Migmatite Complex occupies a major part of the area, comprising medium grained hornblende-biotite gneiss and garnet-biotite gneiss. Grey and pink granite represent the last phase of granitic activity and occur as concordant intrusive bodies.

Find grained marine, calcareous sandstone and limestone and gritty sandstone intercalated with a pebble bed of Mio-Pliocene (Cuddalore sandstone) unconformably overlies the Archaean. The pebble bed generally marks the contact between the sandstone and gneiss. An interesting assemblage of fossils such as

lamellibranches, gastropods, corals and foraminifera is found in the sedimentary rocks. The beds are more or less horizontal or dip gently towards the east.

Quaternary sediments occur along the river valley and the east coast. They are grouped into fluvial-marine, Aeolian and marine. Calcareous sandstone and siliceous limestone of Quaternary age uncomfortably overlies the Tertiary sediments marked by a conglomerate. The calcareous sandstone is interbedded with limestone. The rocks are coarse grained, poorly consolidated and friable with recent marine shells of which *Ostrea sp.* is the most common. A conglomerate bed is noticed at the base of these sediments in contact with Archaeans. Kankar and tuffaceous occur in number of detached outcrops. The rocks occur as massive beds of sheet tufa resulting from segregation of lime bleached out of the underlying garnet gneiss. Thick alluvium occurs along the banks of Tamirabarani and Vaippar rivers and along the coast. Red 'teri' sands represent Aeolian deposits. They occur as small dunes and cappings. The general trend of the foliation in Archaean rocks is NNW-SSE to NNE-SSW with moderate to steep dips towards east. The foliation is the

result of the tight folding. The gneiss of Migmatite Complex is folded along NNW-SSE axis. rocks of Miocene age are nearly horizontal. Gypsum, limestone, beach sand, kankar and shell limestone are the economic minerals of the District.

Ilmenite-garnet sand

It occurs at the mouth of Vaippar and Kallar rivers. they extend over a length of 3.2 to 48 km and a width of 122m. Red garnet sands occur between the south of Ovari and Mavaladi. The proportion of garnet is 75% in the rich Kodambakkam tank, Tiruchendur taluk. Good purchase of ilmenite sand occurs at Thiruvaikunlam, which extend over 3.2km. The belt containing good concentrates varies from 1.5 to 30.5m in width.

Lime Shell

Lime shell with 50-55% CaO is known from the coastal tracks of Thoothukudi and Srivaikundam taluks.

Gypsum and Salt

Gypsum associated with Kankar has been reported from a few localities. Gypsum is a by-product in the salt pans, located along the east coast between Veppalodai and Ayyanapuram.



Salt pan

Mica

ENE of Kovilpatti, Pegmatite shows incidence of mica.

The limestone is available in the following areas:

1. Arasur, in Sattankulam taluk
2. Semma Pudur in Ettaiyapuram taluk
3. Usilankulam in Kovilpatti taluk
4. Sivalarpatti, Meenakshipuram, K.Kumara reddyarpuram in Vilathikulam taluk.
5. Kankar deposit is available in Maniyakkaranpatti, Vilathikulam taluk in Thoothukudi district.

16 limestone mining leases were granted in Thoothukudi district. M/S. India Cements Ltd., M/S. Madras Cements Ltd., are the two Major Lessees having limestone leases. The remaining leases belong to private persons. Three leases were granted for mining Garnet, ilmenite, & rutile in Thoothukudi district to the following lessees.

- (1) M/S. Indian Garnet Sand (P) Ltd.,
- (2) M/S.vl. Beach Minerals Sand Company, Kuttam
- (3) M/S. V.V.Mineral, Tisaiyanvilai

Minor minerals

Rough stone, jelly, sand, gravel, clay, earth and granite are the minor minerals and leases are granted for quarrying of the said minerals in Thoothukudi District. Rough stone, jelly is used for construction of buildings, road, etc. Clay and earth are used for manufacturing bricks and filling materials. Gravel is used to form the road and filling purpose.

v) Water resources (river / major lakes and estuaries)

Tamiraparani river which rises in Agasthiyamalai of the western ghats, flows through Srivaikundam and Thiruchendur taluks and joins the sea at Punnakayl in

Srivaikundam taluks. Pambayar and Manimuthar are the chief tributaries of Tamiraparani, which pass through the district. The malattar and Uppodai flowing in Kovilpatti taluk are drainage courses. Tamiraparani and Manimutharu are the catchment areas of river basins, which have their place of origin in the Pothigaimalai. The former has a length of 120 km and the latter has a length of 98 km. Pabanasam dam, Manimutharu dam and Eppodumvernarnam dam are built in the district.

vi) Fisheries production (fish landing details / aquaculture)

- a. Length of coastal line (km.) : 163.5
- b. No.of coastal blocks : 8
- c. No.of coastal centres : 24
- d. Marine fish production (Tonne) : 39170
- e. Inland fish production (Tonne) : 1276

The fishermen of Thoothukudi are mostly using gillnets and travel nets in the motorized country craft and travel boats, respectively. The trawling method of fishing over the years has led to the depletion of the fishing resources and destruction of the grounds. In Thoothukudi all FRP/wooden vallams and catamarans are motorized and totally there are about 4200 traditional crafts altogether. The fishing methods followed is mostly gill netting only. Thoothukudi being a major export hub consists of one major port and fishing harbour. The fish landings consists of important fishes like seer fish, lobsters, prawns, snappers, groupers etc., which are considered to be export varieties.

vii) Heritage resources (shore temples / churches)

Thiruchendur

Thiruchendur is one of the major pilgrim centres of South India. This Temple is situated at a distance of 40 km. from Thoothukkudi. The sea-shore temple dedicated to Lord Muruga is one of the six abodes of Lord Muruga. (Arupadi Veedu). The nine storied tier temple tower of 157 feet. belongs 17th century AD. Visiting Valli Cave, taking sea-bath, and bathing in Nazhikkinaru are treated as holy ones. It is well connected by bus service from all over

Tamilnadu and train services are there from Tirunelveli and Chennai.

Manapadu

Manapadu is a coastal village situated at a distance a distance of 70 km from Tirunelveli and 18 km south of Tiruchendur. This place was visited by St. Francis Xavier in 1542. The Holy Cross church built on a cliff attracts thousands of pilgrims throughout the year and during the month of festival (1st September to 14th September) number of tourists assemble here.



Manapadu village

Kulasekaranpattinam

Kulasekaranpattinam is situated on the way to Kanyakumari from Tiruchendur. It is 20 km from Tiruchendur and 65 km from Kanyakumari. This village is famous for the Mutharaman temple, which is located on the shore of Bay of Bengal. This temple is nearly 150 years old. The Dhasara Festival is celebrated in a grand scale every year during October. Folk dance artists from throughout Tamil Nadu perform variety of programmes.

Kazhugumalai

Kazhugumalai Jain temple is situated at a distance 60 km from Tirunelveli and 21Km. from Kovilpatti. In this temple we can see the images of Adinatha, Neminatha Mahaveera Parvanatha, Bahubali. There is also a monolithic temple called Vettuvan Kovil. This is the only one of the monolithic Pandya temple that still survives

Meignanapuram

It is 13km from Tiruchendur and is an ancient village. The Pari Pavlin church here was built in 1847. It is 110 ft. long, 55 ft. wide with steeple in the front soaring into the sky for a height of 192 feet.. This is one of the biggest churches with the tallest steeple in India.

Sinthalakkarai

Sinthalakkarai is a pilgrim centre where Goddess Sri Vetkaliasman of 42 ft. height blesses the devotees. It is situated on the road with four line on the Thoothukudi to Madurai. (3km from Ettayapuram). The statue of Mahavishnu of 72 ft. lenth with Rajasayanam on the snake in Thiruparkadal is also there.

Vanathirupathi

This temple is about 45km from Tirunelveli and around 20 km from Tiruchendur. The nearest railway station is Kachanavilai on the Tiruchendur to Tirunelveli section. Frequent buses are available. The temple is opened from 6.00 A.M to 8 P.M.

viii) Biodiversity (mangroves/corals/sea grass/important flora and fauna)

It is a historical fact that even before Christian era, the pearls and chanks obtained from Gulf of Mannar coast enjoyed a position among the important export commodities to various parts of the world. Since Tuticorin was famous for pearl fishing it is called Pearl City. The Gulf of Mannar Marine National Park area of Thoothukudi district includes estuaries, mudflats, beaches and forests of the near shore environment. It also includes marine components such as

coral reefs, seaweed communities, sea grasses, salt marshes and mangroves. Mangroves occur in Tuticorin mainland, Vaipar, Pazhayakayal and Punnakayal areas. Dugong, a vulnerable marine mammal is the flagship mammal of the park. 510 (23%) of the 2,200 fin fish species in Indian waters are found in the Gulf, making it the most highly diverse fish habitat in India. The diverse nature of ecosystems in the Gulf of Mannar supports a wide variety of significant species including 117 species of corals, 13 species of seagrasses, 641 species of crustaceans, 731 species of molluscs, 441 species of finfishes and 147 species of seaweeds apart from the seasonally migrating marine mammals like whales, dolphins, porpoises and turtles.

3. Impacts

i) Urbanization (municipal solid waste dumping / sewage etc)

Among the urban areas, Thoothukudi municipal town accounts for a greater share of urban population when compared to the other urban areas within the district. Surface water is the major source for protected water supply both in municipalities and in town panchayats. The estimated sewage generation is 155 lakh litres among municipalities and 84 lakh litres among town panchayats. The district does not have any organised disposal of sewage. The municipalities and the town panchayats have complete open drainage system. The solid waste generation of municipalities and town panchayats is to the tune of 35.10 tonnes and 23.45 tonnes respectively. The solid waste collection in municipalities and town panchayats is claimed to be 82.5%. It was observed that 10% of rubber and leather, 11% of plastics, 52% of compostable matter, 6% of wooden matter, 9% of glasses, 6% each metal and bricks & stones are the composition of municipal solid waste on wet basis in the district.

ii) Industrial development (effluent discharge / pollution – air water land etc.)

The industries found in this district can be classified under three categories viz. household industries, small scale, and medium and large-scale industries. Safety matches, mat weaving & processing and manufacture of palm fibre and articles from palm trees are the main household industries. Safety matches are manufactured mainly in Kovilpatti taluk. Manufacture of articles from palm tree is mainly found in Thiruchendur, Srivaikundam and Sattankulam taluks where larger areas are covered by palmyrah trees. There are many small-scale industries in this district, which are mostly engaged in manufacturing of chemical products, and food products. The items produced by large-scale industries are salt, cotton yarn/textiles, chemical and chemical products. The spinning mills are located in Thoothukudi taluk. There are many major rice mills for production of rice from paddy. Salt manufacturing is one of the very important industries found in this district. There have been 17 Red category industries and 9 Orange category industries under large-scale industries in the district. However all the emission inventory industries of the district are found to be having the emission rates well under the set standards.

The industrial wastes / effluents allowed into the river courses cause water pollution in several areas. The following are the location of industries, which cause severe pollution of surface water or ground water: Major industries located in Thoothukudi in Kallar basin spoil marine eco-system. Sterlite industry causes air and water pollution in Kallar basin. Coasts viella and Sun paper mills in Tamiraparani basin pollute Tamiraparani.

Air pollution is the major component of atmospheric pollution, which instantaneously affects human health and thus is an environmental hazard. AVM building, Fisheries College and chemicals (SIPCOT) in Thoothukudi town, Arumuganeri, and Kovilpatti taluk are identified as air pollution stressed areas in Thoothukudi district. As far as the urban air quality status is concerned, the average SPM values and average NO_x values of commercial and industrial categories seem to be within the standards. However, the maximum value of these indicators is far beyond the set standards causing concern.

iii) Thermal power generation (hot water discharge)

There has been a marbeeninal improvement in the power generation sector. The demand for electricity has not met, owing to steady population growth and higher rate of consumption. Non conventional and renewable energy sources of utilisation are not very much identified. Thermal power station at 5 km. from Thoothukudi town and DCW Ltd and heavy water plant are the red category industries. Effluent discharge happens from these industries into the land and sea respectively. The effluents from thermal power stations located near the seacoast are allowed into the sea without treatment.

v) Natural hazards (erosion / accretion / sea level rise/ climate impact)

Erosion has been severe along the coastline of Thoothukudi district. The boundary of the sea keeps increasing and entering in to the shore land gradually. Sea level rise is a global problem as it occurs in the Thoothukudi coast of Gulf of Mannar. One of the four islands of Gulf of Mannar

has submerged because of the combined effect of rampant coral mining and sea level rise. Another island, Vaan, is also on the verge of submergence as it has decreased in area considerably and recently split into two parts by a narrow channel in between. Sea surface temperature is also increasing as a consequence of global climate change. Corals in the Gulf of Mannar are facing annual bleaching because of the elevated sea surface temperature.

vi) Rare earths mining (garnet etc)

No data available on the mining of garnet.

vii) Natural disaster prone areas (tsunami / cyclone / floods)

It has been ascertained from the available information that 3 taluks were

affected by flood during 1992 - 1993 years. No significant drought and cyclone in the district have been recorded in the recent years. The banks along the Thamiraparani river are prone to occasional floods. 2004 Indian Ocean tsunami did not make huge damage in Thoothukudi district as the coastal zone is protected by natural resources like corals and seagrasses. However, coastal belt of this district is always prone to tsunami as any other coastal belt.

4. Government initiatives

i) Initiatives to improve fisherfolk livelihood (schemes for education / health)

Consequent on the reorganization of Fisheries Department, the Government have sanctioned the following offices in Thoothukudi district

Sl. No.	Head of the Office	Office Address	Contact No.
1	Joint Director of Fisheries	Regional, North Beach Road, Thoothukudi	0461 – 2320673
2	Assistant Director of Fisheries	Marine, South Beach Road, Thoothukudi.	0461 – 2320458
3	Assistant Director of Fisheries	Fishing Harbour Management Wing, South Beach Road, Thoothukudi	0461 – 2329458
4	Assistant Director of Fisheries	Aquaculture, North Beach Road, Thoothukudi.	0461 – 2324288
5	Assistant Director of Fisheries	Research, North Beach Road, Thoothukudi.	--
6	Assistant Director of Fisheries	Extension and Training, North Beach Road, Thoothukudi.	0461 – 2320673

Schemes Implemented In Thoothukudi District

Assistant Director of fisheries (marine)

- National Savings- cum- relief scheme for marine fishermen
- Savings- cum- relief scheme for marine fisherwomen
- Enhanced Financial Assistance of Rs.2000/- to marine fishermen families during fishing ban period.
- Special allowance of Rs.4000/- for fishermen families during non-fishing period.
- Conversion / Upgradation of fishing crafts into tuna liners @ 25% subsidy.
- Group accident insurance scheme for fisher-folk.
- Fishermen personal accident insurance scheme.
- Motorisation of traditional crafts.
- Cash awards to 10th and +2 students belonging to fishermen community.
- Payment of daily relief to the missing fishermen family while conducting fishing into the sea.
- Fishermen welfare board schemes.
- Fishermen free housing scheme
- Scheme of creating employment opportunities to educated fishermen youth through up gradation of skills in Maritime Education and Nautical Sciences.

Assistant Director of Fisheries (fishing harbour management)

- Coordinating with the Thoothukkudi port trust for fishing harbour maintenance

- Registration of fishing vessels
- Renewal of licence
- Enforcement of marine fishing regulation act and rules
- Liaise with marine fishermen groups to maintain harmony and peace in fishing harbour premises and fishing zones
- Safety and rescue operations of marine fishermen.

Assistant Director of Fisheries (aquaculture)

- Guiding and assisting the shrimp farmers
- to register their farms with coastal
- Aquaculture Authority.
- Creating the resources to culture marine fish in brackish water farms.
- Carrying out extension activities such as inland fish culture activities at Thoothukudi district.
- Carrying out research Project on fish shrimp disease and control.
- Carrying out new project such as fresh water / brackish water fish culture technology to Self Help Group (SHG) to generate self employment.
- Stock enhancement of inshore fishery resources by sea ranching programme rearing of shrimp /fish seeds at Punnakayal Model farms and stocking at sea.
- Carrying out the activities of BFDA at Thoothukudi, Tirunelveli and Kanyakumari Districts.
- To uplift the socio-economic status of tsunami affected fishermen/ fisherwomen by organizing training programmes under Swarna Jayanthi Gram Swarozgar Yojana.
- IAMWARM project: Conducting training on fish culture at

Korampallam sub-basin with the assistance of World Bank fund

- Implementation of other line departments specialized fisheries schemes.

Assistant Director of Fisheries (extension and training)

- Conducting training courses to fishermen in the following discipline.
- Modern Fishing Course (duration – 10 months)
- Junior Mechanical Course (duration – 10 months)
- To uplift the socio-economic status of fisher folk by organizing programmes under Swarna Jayanthi Gram Swarozgar Yojana.
- Value added fish product preparation.
- Engine maintenance and net repair.
- Solar drying.
- Propaganda of fisheries schemes through extension activities.

Assistant Director of Fisheries (Research)

- Production of cost effective feed for Trout broodstock and selected ornamental fishes.
- Environmental Impact Assessment of Shrimp farm discharges.
- Study on the Lobster fishery resources.
- Study on the prevalence of shrimp diseases.
- To study on the aggregation of fish in the available artificial reef.

ii) Coastal protection initiatives (bio shields / sea walls etc)

Islands of the Tuticorin region act as bio shields in this village along with the coral and seagrass beds. The impact of tsunami was comparatively less in this district. Moreover, manual protection by

making sea walls has been done in several areas noticeably in Thirespuram.

iii) Awareness initiatives (tsunami / CRZ issues)

One day workshop was conducted on tsunami at Government Polytechnic on 19.07.06. Quality testing of various types of materials used in construction and practical sessions were conducted. Various awareness programs on coastal resources and conservation have been conducted by various government and private sectors. Coral miners stopped coral mining after 2004 Indian Ocean tsunami due to increased awareness.

iv) Bio diversity (coral, mangrove conservation and restoration)

Successful coral restoration has been done by Suganthi Devadason Marine Research Institute around Tuticorin group of islands and in mainland Punnakayal patch reef. Very good results were obtained. Artificial reefs have also been deployed in various areas along Tuticorin coast. Initiatives have been taken to do the seagrass restoration also. Mangrove restoration has been done by the forest department near Punnakayal and Pazhayakayal areas.

v) Other initiatives taken by private sector

No data available

5. Summary / Conclusion

- ✓ Thoothukudi district is situated in between latitude 08° and 45° and longitude 78° and 11° with an area of 4621 sq.km and it is a coastal district.
- ✓ The major soil types found in the district include montmorillonitic, vertisols, alfisols, inceptisols and kaolinitic. Deep fine, montmor-

illonic and vertisols occupy a major area of 114817.11 ha..

- ✓ Agriculture is the main occupation and 70% of the people depend on it .
- ✓ Out of the total area of 470724 ha., 178623 ha. are under the cultivation of different crops which is nearly 38% of total area of the district.
- ✓ The important food crops in the district are paddy, cholam, cumbu, ragi, varagu, samai and commercial crops like cotton, chilly, sugarcane and groundnut.
- ✓ Four of the 21 islands of Gulf of Mannar occur along Tuticorin coast. These islands are surrounded by a thick coral and seagrass cover which act as a bio shield.
- ✓ Erosion has been severe in these islands because of coral mining activities which happened before 2004 Indian Ocean tsunami along with sea level rise.
- ✓ Tamiraparani, the only river of the district. It originates from rises in Agasthiyamalai of the Western Ghats, flows through Srivaikundam and Thiruchendur taluks and joins the sea at Punnakayl in Srivaikundam taluk.
- ✓ The district has a wide coastal length of 163.5 km.
- ✓ The Gulf of Mannar Marine National Park area of Thoothukudi district

includes estuaries, mudflats, beaches and forests of the near shore environment.

- ✓ The industrial wastes and effluents allowed into the river courses cause water pollution in several areas.
- ✓ Coral restoration, seagrass restoration and mangrove restoration activities are carried out successfully in this district.

TIRUNELVELI DISTRICT

TIRUNELVELI DISTRICT

1. Introduction

i) Geographical location of the district

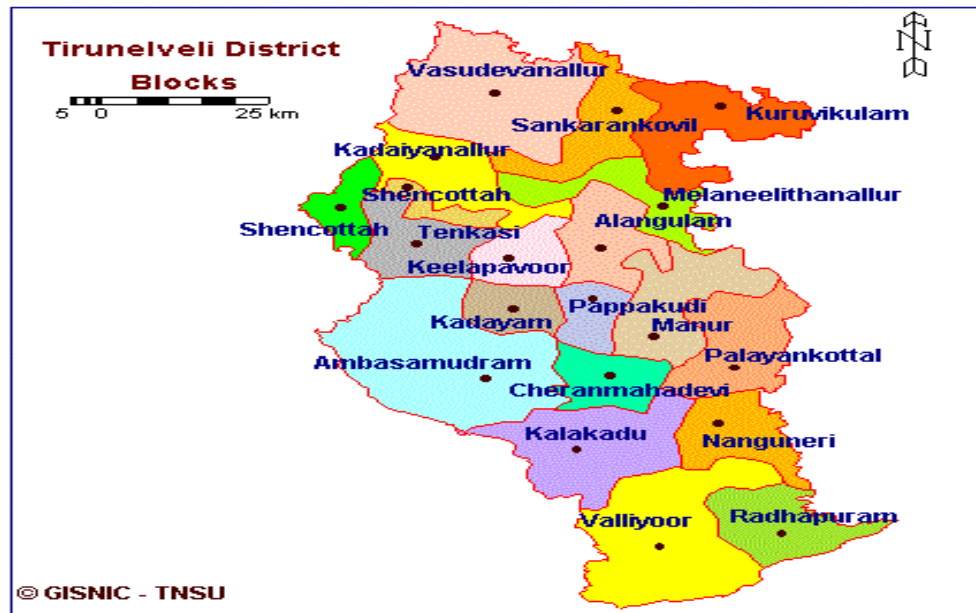
Tirunelveli district is having a geographical area of 6759 sq.km in the southeastern portion of Tamil Nadu and is triangular in shape. It lies between 8°.05' and 9°.30' of the Northern latitude and 77°.05' and 78°.25' of Eastern longitude. The district is located in the southern part of

Tamil Nadu and surrounded by Virudhunagar district on the north, Western Ghats on the west, Kanyakumari district on the south, Tuticorin district on the east. The lifeline of the district is Tamiraparani river which feeds the district and quenches the thirst of residents.

ii) Administrative profile (taluks / villages)

The following table shows the administrative profile of Tirunelveli district.

District Abstract						
1.	Area	:	6823 Sq.km			
2.	Population	:	3,072,880			
			Male	Female	Total	
			1578595	1554285	3072880	
3.	No.of Revenue divisions	:	3 - Tirunelveli, Cheranmadevi and Tenkasi			
4.	No.of taluks	:	11			
5.	No.of revenue villages	:	559			
6.	No.of panchayat unions	:	19			
7.	No.of village panchayats	:	450			
8.	No.of town panchayats	:	36			
9.	No.of municipalities	:	7			
10.	No.of corporation	:	1 - Tirunelveli			
11.	No.of parliamentary constituencies	:	2 - Tirunelveli and Tenkasi			
12.	No.of assembly constituencies	:	10 219-Sankarankoil (SC) AC , 220-Vasudevanallur (SC)AC, 221-Kadayanallur AC, 222-Tenkasi AC , 223-Alangulam AC, 224-Tirunelveli AC, 225-Ambasamuthiram AC, 226-Palayamkottai AC, 227-Nanguneri AC, 228-Radhapuram AC			
13.	No. of polling stations	:	2532			
14.	No. of Parts	:	2532			
15.	Voter as on 01.01.2013	:	Male	Female	Others	Total
			1109926	1111293	11	2221230



Tirunelveli District Map

iii) Meteorological information (rainfall / climate details)

Temperature

During the day time the coastal regions are cooler than the interior parts by about a degree in summer and southwest monsoon seasons and warmer by one to two degrees during the rest of the year. From about the middle of February, temperature increases steadily. In May which is usually the hottest month in the interior, the mean daily maximum temperature is 37.1 degree Celsius. The weather is quite hot in May and June and the maximum temperature some times reaches 45 degree Celsius. With the onset of the southwest monsoon by the end of May or beginning of June, there is some drop in temperature. By about the middle of October, both day and night temperatures decrease appreciably. The period from November to January is the coolest part of the year with the mean daily maximum temperature of about 30 to 31 degree Celsius in the interior parts. The mean daily

minimum in these months is about 22 to 23 degree Celsius in the district in general.

Humidity

The relative humidity in general, during the year, is between 55 and 65 percent in the interior parts of the district, except during the northeast monsoon season, when it is over 65 per cent. The coastal parts are comparatively more humid.

Cloudiness

During the months of April and May, the skies become heavily clouded and threatening in the afternoons on many days when thunderstorms follow. In the southwest and northeast monsoon seasons, the sky is heavily clouded or overcast.

Winds

- Generally light to moderate in strength.
- Between May and September winds are mainly north westerly or westerly

- From October to February winds are mainly north easterly or northerly

Rainfall

Main rainy season is from October to the middle of January.

- During the southwest monsoon season the rainfall is more in the western parts of the district.
- November is generally the rainiest month.

- The heaviest rainfall in 24 hours recorded in the district was 371.5 mm at Sivagiri on 29/10/1929.
- The average rain fall in the district is 814.8 mm per annum.

2. Resources-availability

i) Land resources (soil types)

Land resources and utilization in Tirunelveli district are given in the table below.

Land Utilisation (area in ha.) during the year : 2011 – 2012

Sl.No.	Land classification	2011-12	2010 -11	Percentage of variation
1.	Forest	127758	127758	0
2	Barren and uncultivable waste	29682	29682	0
3.	Land put to non-agricultural uses	103136	103117	0.02
4.	Cultivable waste	36214	36456	-0.66
5.	Permanent pastures and other grazing land	5156	5156	0
6.	Land Under Miscellaneous Tree Crops and Groves not included in Net Area Sown	8595	8626	-0.36
7.	Current Fallow	35525	43067	-17.51
8.	Other Fallow Land	174126	176941	- 1.59
9.	Net Area Sown	155658	145047	7.32
10.	Geographical Area According to Village Papers	675850	675850	0
11.	Total Cropped Area	180925	171155	5.7
12.	Area sown more than once	25267	26108	- 3.22

ii) Agriculture and horticulture (crops cultivated)

Tirunelveli has fertile soils only in scattered regions. Less fertile red soils are found distributed over most of the region. The network of the irrigation system marks full use of the water resources, the natural deficiency has been overcome to a greater extent. The cropping pattern of the district is essentially of the type characterising dry regions. It normally varies from taluk to taluk. Wet cultivation is essentially paddy cultivation and the major share of the gross cropped area is under one crop. In dry regions, diversified cropping patterns exist and no single crop claims a large share of the gross cropped area. Dry cultivation which characterises these regions is also basically millet and cash crop cultivation. Even in dry regions wherever water is available, it is the

paddy crop that is sown by the farmers. Paddy occupies the largest area of cultivation, followed by cotton. Paddy is cultivated mainly in Tirunelveli, Palayamkottai, Tenkasi, Shencottai, Ambasamudram and Nanguneri taluks.

Other crops grown in the district are cumbu, ragi, pulses, groundnut, gingelly, coconut, chillies and indigo. Portions of Sankarankoil taluk have the rich, fertile black soil which are highly suitable for cotton cultivation. Factors such as type of soil, climatic conditions, irrigation facilities, etc., determine the cropping pattern in a region. Most of the rain fed areas are cultivated in both the seasons. Most of the crops are on the ground for three or four months except chillies and cotton which take more than five months.

Sl.No	Crop	Irrigated/ rainfed	Season	Area in ha.
I.	Paddy	Irrigated	June - September	28000
			Oct - February	72000
II.	Millets			
	Cholam	Irrigated	Dec - January	1000
			April - June	1000
		Rainfed	Sep - Nov	1600
			April - June	1500
	Cumbu	Irrigated	April - June	2000
		Rainfed	Sep - Nov	3000
	Ragi	Irrigated	June - October	4000
			Feb - May	4000
	Maize	Rainfed	Sep - Nov	2000
	Minor millets	Rainfed	Sep - Nov	1000
III.	Pulses			
	Blackgram,greengram,cowpea etc,	Irrigated	June - July	3000
		Rainfied	Sep - October	20000
IV.	Oilseeds			

	Groundnut	Irrigated	Dec - February	10000
		Rain fed	Sep - Nov , April - Jun	
	Sunflower	Rainfed	Nov - January	2000
	Gingelly	Rainfed	Nov - February	4000
	Coconut	--	--	10953
V.	Fibre cotton	Rainfed	Sep - February	8800
		Irrigated	Sep - February	12000
			Feb - June	
VI.	Other crops			
	Sugarcane	Irrigated	Jan - December	1500
	Chillies	Irrigated	March - July	

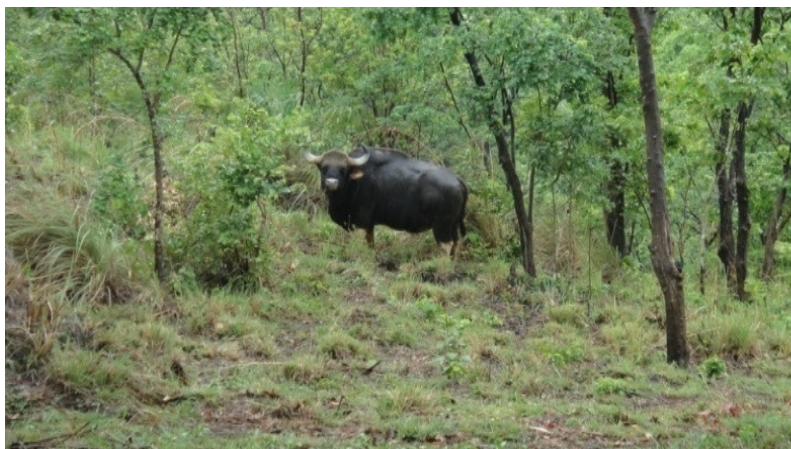


Paddy field

iii) Forest resources (reserved forest area / protected areas)

The total area of the forest of the district is 1,22,055 ha of which 81700 ha is set apart for Tiger reserve of Mundanthurai and Kalakadu. The entire forest of the district stretches along the Western ghats. Various types of forests from luxuriant tropical wet evergreen forests to southern

thorn scrub forests occur in the district. Owing to its diverse geographical factors, the forests in the district are technically classified as Southern hill top tropical evergreen forests, west coast tropical evergreen forests, Southern moist mixed deciduous forests, Ochlandra reed forests, Carnatic umbrella thorn forests, Southern *Euphorbia* scrub and Southern thorn scrub.



Western Ghats in Tirunelveli

iv) Mineral resources (garnet etc)

Limestone

It is available at several places in the district. The major part comes from the crystalline limestone deposit occurring near Ramayanpatti, Talaiyuthu and Padmaneri. A total reserve of 4.06 million tones of limestone up to a depth of 15.2 meter in Ramayanpatti band and 5.08 million tonnes up to a depth of 15.25 meter in Talaiyuthu band has been estimated. The limestone available here contain Calcium Oxide (Ca O) from 34.97 to 55.49 percent, Magnesium Oxide (Mg O) from 0.31 to 7.24 per cent.

The Padmaneri band consists of six limestone lenses with an aggregate strike length of about 800 meter. The average width is 4.75 meter and 0.199 million tonnes of cement grade limestone is estimated from this band. The Singikulam band extends over a strike length of 17 km. It contains seven limestone lenses with an aggregate strike length of about 6.4 km and average width of 13 meter. About 3.160 million tonnes of cement grade limestone is estimated from this band.

Six bands of good quality limestone occur near Pandapul and 4,34,000 tonnes of limestone suitable for the manufacture of

cement and chemical industries have been estimated.

Sulphides

Light traces of sulphides occur in and around Pattankadu and Munradaippu. This mineral is of no economic importance.

Ilmenite - garnet sands

Occurrence of red garnet sands in the beds of the river Nambiar and Uvari have been recorded. The proportion of garnet is 75 per cent in the rich deposits and 45 per cent in the surface sands. Local concentration of limenite sands are noticed near Vijayapatti and Kuttankuli.

v) Water resources (river / major lakes and estuaries)

Rivers

Tirunelveli district enjoys the benefit of the early showers of south west monsoon and of the later rains of the north-east monsoon. The district is chiefly irrigated by rivers rising in Western ghats. The dams and anaicuts constructed on Tamiraparani and Manimuthar rivers serve both agriculture and power generation. The total fall, though is light, averaging about 814.8 mm per annum,

is generally well distributed. The Tamiraparani river affords perennial irrigation to a fairly large area on which two crops are normally raised. Several tanks and wells form part of the other sources of irrigation.

The Tamiraparani is a symbol of Tamil culture and civilization and an identity of the far south of India. In Tamil and Sanskrit literature of earlier times, the Pandyas were referred to as the rulers of the land where the Tamaraparani flowed. Tamiraparani is the chief river of the district which has a large network of tributaries which include the Peyar, Ullar, Karaiyar, Servalar, Pampar, Manimuthar, Varahanathi, Ramanathi, Jambunathi, Gadanathi, Kallar, Karunaiyar, Pachaiyar, Chittar, Gundar, Aintharuvai, Hanumanathi, Karuppanathi and Aluthakanniar. The two rivers of the district which are not linked with Tamiraparani are the Nambiar and the Hanumanathi of Nanguneri taluk (there are two Hanumanathis in the district).

The Tamiraparani

Spelt differently as Tampraparani, Tamraparni, Tamiravaruni, etc., the river is mentioned as the Porunai nathi in Tamil poetic literature. It gets recognition and is referred to as the renowned one in Sanskrit literature references to which are as old as that of the Puranas and Epics.

The meaning and origin of the name Tamiraparani is reasoned out differently. Bishop R. Caldwell, in his book, A History of Tinnevely discussed the various interpretations of the word 'Tamiraparani' at length. According to him the meaning of the name Tamiraparani in itself is sufficiently clear, but its application in this connection is far from being self-evident. Tamara means, red, parani means parana, a tree which has leaves. Tamiraparani might, therefore mean

a tree with red leaves, but, this is a strange derivation for, the name of a river and the ideas naturally suggest itself that some events or legends capable of explaining the name lies beyond. He further discussed the similarity of the name Tamiraparani and of the old name of the present Sri Lanka which was called in olden days as Tambrabane and tried to find out the political, cultural and anthropological intercourse of the land of the river with that island. He concludes that it seems more natural that Tamiraparani, the tree with the red leaves should have been first the name of a tree, then of a town, then of a district and then of a river (it being not uncommon in India for villages to adopt their names from remarkable trees).

Some scholars interpret the name Tamiraparani as Tamiram (Copper) + Varuni (stream or river). They ascribe this origin as the bed of the river is of red soil and when the water flows on the red soil it gives a copper like appearance. The Greeks of the Ptolemy's time refer to this river as Solen.

Origin of Tamiraparani

The Tamiraparani originates from the peak of the Periya Pothigai hills of the Western Ghats above Papanasam in the Ambasamudram taluk. The great river like the Cauvery, but unlike most of the other Indian rivers, is fed by both the monsoons – the south west and the north-eastern and is seen in full spate twice a year if the monsoons do not fail.



Tamiraparani River

The Tirunelveli Sthalapurana associates the origin of the river with sage Agasthiyar. It states that when Agasthiyar was requested by Lord Siva to move to the South, Parvathi Devi, the divine consort of Siva filled the sage's font meant to hold water for poojas (kamandala) with the water from the Ganges and on his arrival at Pothigai, he released it and the water ran as Tamiraparani.

Prior to the bifurcation of the Tirunelveli district, the Tamiraparani was the only major river in Tamilnadu which had its source and end in the same district. After bifurcation, the river traverses two districts namely Tirunelveli and Tuticorin before joining the Gulf of Mannar of the Bay of Bengal at Punnaikayal in Tiruchendur taluk of Thoothukkudi district.

Course and tributaries

From the source to sea, the total length of the river is about 125 km of which its course in Tirunelveli district alone is about 75 km. Originating at an altitude of 1725 m above MSL at Periya Pothigai hill ranges and integral hill track of Western Ghats in Ambasamudram taluk, it passes through the taluks of Tirunelveli and Palayamkottai of Tirunelveli district and Srivaikundam and Tiruchendur taluks of Thoothukkudi district. In the ghats, the chief tributaries of the river are the Peyar, Ullar, Karaiyar, Servalar and the Pambar. These rivers join the Tamiraparani and enrich its course before it reaches the plains. The first tributary which enriches the water of the Tamiraparani in the plains on the right side is the Manimuthar. Then comes the Gadananathi, which joins the Tamiraparani at Tiruppudaimaruthur. Before the Gadananathi's entry into the Tamiraparani, the Gadananathi is joined by the rivers Kallar, Karunaiyar and Veeranathi or

Varahanathi which joins the river Gadananathi about 1.5 km. north-east of Kila Ambur. The river Pachaiyar is another tributary which join the Tamiraparani near Tharuvai village in Palayamkottai taluk. One of the important and affluent tributaries of the Tamiraparani is the Chithar or Chitranathi which arises in the Courtalam hills and receives supply from the rivers Gundar, Hanumanathi and Karuppanathi. The Chithar empties itself into the Tamiraparani in Sivalapperi Village.

The river drains with its tributaries an area of about 4400 sq. km. As most of its extensive catchments areas lay in the Western ghats, the river enjoys the full benefit of both the monsoons which make the river perennial. Since all its tributaries are arising from the Western ghats, the river is prone to heavy floods especially during the North East monsoon.

The Pachaiyar

The river Pachaiyar rises on the eastern slope of Western ghats about 11 km. north west of Kalakadu at an altitude of 1000 m. above MSL. It flows eastward upto Padmaneri village from where it changes its course towards north east. It is a tributary of Tamiraparani and makes its confluence with the river in the village Tharuvai. The total length of the river from its source to its confluence with the Tamiraparani is about 32 km. The river Pachaiyar has three tributaries which are Kavayan Odai, Anaikidangu Odai and Uppan Odai. These tributaries join the river Pachaiyar in the villages Araspattu, Vadagarai and Padmaneri respectively.

The Korayar

The river Korayar is a tributary of Tamiraparani. It originates in the eastern slopes of Western ghats, flows in the

northern direction and empties into the main river Tamiraparani near Vellanguli village in Ambasamudram taluk after crossing the Kannadian channel through and outlet. This river has no direct 'ayacuts' (irrigation area) but contributes a heavy flood of water to Tamiraparani during rainy season.

The Chittar

The Chittar meaning little river or Chitrathi meaning beautiful river is a nature's invaluable gift to the district as it is the river which causes a set of splendid cascades in Courtalam and its suburbs, and international cynosure often compared to the famous Spa falls of Belgium for its curative value. It is a major tributary of the river Tamiraparani. The river takes its origin in the eastern slopes of the Western Ghats in the Courtalam hills, called Tirikoodam in literature, at an altitude of 1750m above MSL. From its origin, the river climbs down for about six km. turns north and flows for about 16 km before turning towards the east. Its total length is about 80 km It joins the river Tamiraparani near Sivalapperi village of Tirunelveli Taluk.

The river Chittar has its own tributaries. They are, the Aintharuviar which join its main river near Gajamajorpuram, the Gundar or Govindar which join near Tenkasi town the Hanumanathi which mingles with its main river near Veerakeralampudur village and the Aluthakanniar which meets the main river in Kadapagothi village, all in Tenkasi taluk. The river Chittar makes many patches of, Tenkasi taluk fertile.

Aluthakanniar

It is a major tributary to the Chittar river. Arising in the eastern slopes of the western Ghats, it flows 10 km towards north east before joining its main river (Chithar)

near Kadapagothi village of Tenkasi taluk. The eight anaicuts that are built across this river are named as Thalai anaicut, anaicuts II, III, IV, Kandamangalam anaicut and anaicuts, VI, VII, and VIII.

Aintharuviar

The Aintharuviar is one of the tributaries of the river Chittar. It takes its origin from the eastern slopes of Eastern ghats and joins the Chittar river near Gajamajorpuram village. The river in its course causes a waterfall, popularly known as Aintharuvi. There are two anaicuts across the river and they are Aintharuvi anaicut and Ilanji-anaicut.

Jambunathi

It is a tributary of the Ramanathi. Like all the rivers of the district, it also originates from the eastern slopes of the Western ghats. The river confluences with the Ramanathi near Mokkadagam village. The only anaicut built across this river is Subramania thevar anaicut.

Ramanathi

Originating in the eastern slopes of Western ghats at an altitude of 1720 m above MSL in the north western corner of Ambasamudram taluk, the Ramanathi flows down the hills for about 6 km in the thickly wooded forest and reaches the plain in Melakadayam village from where it runs about 8 km and receives its tributary Jambunathi. The course of the Ramanathi after its merger with the Jambunathi is known as the Veeranathi or Varahanathi. This river joins the Gadanathi near the village Kila Ambur. The Ramanathi finally empties into the river Tamiraparani near Thirupudaimaruthur. The Ramanathi, the Jambunathi and the Gadanathi are both

direct and indirect tributaries of the prime river of the district. Ramanathi branches off into two, the Ramanathi Vadakal and the Ramanathi 'thenkal' and rejoins at the juncture of its confluence with the Jambunathi. The division of the river has totally eight reservoirs. The Northern branch has three anaicuts, viz., Kallakal anaicut, Suchimadayar anaicut and Savalakaran anaicut. The Southern branch has five anaicuts (i.e) Mannanai (Sand dam), Ottai anaicut, Alkolli anaicut, Pottalpudhur anaicut and Adachani anaicut.

Gadananathi

The Gadananathi or Karunaiyar, like the other rivers of the district, has its origin in the eastern slopes of Western ghats at an altitude of about 1700 m. in Ambasamudram taluk. It is a major tributary of the Tamiraparani.

The river after flowing about 8km receives the Pampar and on its course, two other rivulets, Kallar and Iluppaiyar, all these tributaries, join it at Sivasailam village. After the confluence, the river flows about 10km and merges with the Ramanathi in Kila Ambur village. The following are the anaicuts across the Gadananathi: Arasapattu anaicut, Alwarkurichi Thenkal anaicut, Manjapalli anaicut, Kakkavallur anaicut and Kangeyan anaicut.

Hanumanathi

It is a tributary of the Chittar river. It rises at an altitude of 1650m above Courtalam in Tenkasi taluk, traverses in the slopes about 10km. It receives Karuppanathi, its tributary, then it flows and merges with Chittar near Surandai village. The anaicuts built across the river, are Mettukal anaicut, Karisalkulam anaicut, Panpoli anaicut, Vallalkulam anaicut, Elathoor anaicut, Nainaragavan anaicut, Pungamkal anaicut and Kambli anaicut.

Karuppanathi

Arising adjacent to the Hanumanathi to the north of it at the same altitude, it constitutes the major tributary of the river Hanumanathi. The Karuppanathi flows in the slopes for about 9km, it reaches the plains in the village Visavankulam where Vembunathi, contributes its waters to the Karuppanathi as a tributary. Then it runs for 18km and joins the Hanumanathi below Urmelalagian anaicut built across the river Karuppanathi. From its source to its merger with the Hanumanathi, there are six anaicuts constructed over the river. They are Thalai anaicut, Pappalkal anaicut, Srivalankal anaicut, Open Head-Klangad Vadakkukal anaicut and lastly Urmelalagian anaicut.

Gundar

The river Gundar originates at Mundankoil mottai above Courtalam. Mottaiyar and few streams contribute to its water and it flows in Sengottai and Tenkasi taluks for 20 km. and combines with the Hariharanathi. The combined river runs for about 8 km. and joins its main river the Chithar. Three masonry and three temporary anaicuts have been raised across the river. They are Nelloorkal anaicut, Thottachi anaicut and Piranoor anaicut and Maravankal, Sambodaikal and Varahamadankal respectively.

Mottaiyar

Mottaiyar is a tributary of the Gundar. An anaicut called Mottai anaicut has been built across the river.

Manimuthar

The river Manimuthar is a major tributary of the Tamiraparani. It arises from the dense forest atop Senkutheri in Ambasamudram taluk at the height of about 1300 m from MSL. The tributaries of the

Manimuthar are the Keezha Manimuthar (lower or eastern Manimuthar) and the Varattar. The river runs from its source for a distance of 9 km and confluences with the Tamiraparani near Kallidaikurichi. In its 9km course, it makes minor cataracts. The river contributes a lot, as tributary, to enhance the water level of Tamiraparani as it is always in full spate and perennial. In the year 1957, Manimuthar anaicut was built across the river just 3 km above its confluence with Tamiraparani.

Nambiyar

The Nambiyar river is the water source to the Nanguneri taluk. It takes its origin in the western slopes of the Western ghats - 8 km west of Thirukurungudi village at an altitude of 1500 m above MSL. It runs eastwards and turns south east and confluences in the Gulf of Mannar at Tiruvambalapuram village. Its course of 45km is restricted entirely to Nanguneri taluk. The river has two tributaries, the Parattaiyar and the Thamaraiyar. The first tributary is a stream from Mahendragiri hills and the second tributary originates from the combination of two hill streams, Mombaiyar and Kodumudiyar. These tributaries join Nambiyar at the foot of the Mahendragiri hills. The river has nine anaicuts, Mailaimani anaicut, Dhalavaipuram anaicut, Rajakkamangalam anaicut, Mylapuram anaicut, Kannanthur anaicut, Vijayan anaicut, Kovankulam anaicut, Thittikulam anaicut and Pulimangulam anaicut.

Karunaiyar

The surplus waters of Vijayanarayanam tank in Nanguneri taluk together with the local drains flow as Karunaiyar or Karuvonniraiyar. This river runs for a distance of 30 km and meets the sea near Manappadu in Tiruchendur Taluk of Thoothukkudi district.

Vadamalaiyaru

Two rivulets, Virisidai-idiyaru and Kadaiyaru arising in the eastern slopes of the Western ghats above Sankarankoil taluk, combine and flow as Vadamalaiyaru which runs in the taluk and empties into the big tank of Malaiyadikurichi.

Kottamalaiyaru

This river also originates at an altitude of 1700 m above MSL in the Western ghats above Sankarankoil taluk. It merges with the small tank of Durgapuram. Apart from the above rivers, there are some more rivers also originating in this district Kothaiyaru, Rajasingiyaru and Mundhal Odai.

River systems

Tamirabarani river system

The important Irrigation channels branching off from both the banks of the river Tamiraparani are South Kodaimelalagian channel, North Kodaimelalagian channel (Kodaimelalagian anaicut), Nathiyunni channel (Nathiyunni anaicut), Kannadian channel (Kannadian anaicut), Kodagan channel (Ariyanayagipuram anaicut), Palayam (Palavur anaicut) channel, Tirunelveli channel (Suthamalli anaicut), Marudur Melakkal, Marudur Keelakkal (Marudur anaicut), South Main channel and North Main channel (Srivaikundam anaicut). Of these the first seven anaicuts were constructed during the period of ancient and medieval rulers and the last anaicut namely the Srivaikundam anaicut was constructed and completed by the British in 1869.

Sl.No	Name of anaicut	Regd. yacut (in ha.)	Name of channels
1.	Kodaimelaalagain anaicut	1281.67	1. South Kodaimelaalagain channel 2. North Kodaimelaalagain channel
2.	Nathiyunni anaicut	1049.37	Nathiyunni channel
3.	Kannadian anaicut	2266.69	Kannadian channel
4.	Ariyanayagipuram anaicut	4767.30	Kodagan channel
5.	Palavur anaicut	3557.26	Palayam channel
6.	Suthamalli anaicut	2559.69	Tirunelveli channel
7.	Marudur anaicut	7175.64	1.MarudurMelakkal 2. Marudur Keelakal

Pachaiyar river system

There are altogether nine anaicuts built across Pachaiyar river. The details of 9 anaicuts and its ayacuts area are as follows:

S.No.	Name of anaicut	Ayacut
1	Mud Korambu	41.02 acres
2	Madathu anaicut	141.33 acres
3	Palambathu anaicut	438.89 ha.

S.No.	Name of anaicut	Ayacut
4	Padmaneri anaicut	681.48 acres
5	Sambankualam anaicut	38.40 acres
6	Devanallur anaicut	610.70 ha.
7	Kattalaikaduveti anaicut	85.26 ha.
8	Subbukuti anaicut	2690.87 acres
9	Ponnakkudi anaicut	1383.51 acres

Chittar river system

There are 17 anaicuts or dams constructed across this river. The details of dams are as follows:

Sl.No.	Name of anaicut	Ayacut (acres)	
		Direct	Indirect
1	Thalai anaicut	590.06	1467.32
2	Adivattamparai anaicut	114.08	157.72
3	Valvilakudi anaicut	153.27	-
4	Puliyoor anaicut	381.00	911.48
5	Pavoor anaicut	488.00	3110.08
6	Thiruchittambalam anaicut	163.00	163.25
7	Marandai anaicut	1361.00	2543.04

8	Veeranam anaicut	231.15	2207.70
9	Manoor anaicut	821.75	2677.52
10	Mettur anaicut	500.10	1027.50
11	Pallicottai anaicut	249.81	2135.00
12	Ukkirancottai anaicut	421.00	47.18
13	Azhakiapandiapuram anaicut	-	440.48
14	Pillaiyarkulam anaicut	66.90	413.19
15	Shelianallur anaicut	67.81	372.71
16	Piranjari anaicut	344.39	409.40
17	Gangaikondan anaicut	216.28	779.80
	Total	9963.83	37062.19

vi) Fisheries production (fish landing details / aquaculture)

The fisheries sector of this district can broadly be categorized as Inland fisheries and marine fisheries.

Inland fisheries:

To develop inland fisheries on scientific lines with latest fish culture technology in Tirunelveli district, the Office of the Asst. Director of Fisheries (inland fisheries) was established on 01.07.2000 at Tirunelveli after the reorganization of the Fisheries Department . The various inland Fisheries Development Programmes implemented by this office are given below:

1. Reservoir fisheries

The Fishery rights of 5 reservoirs viz. Gundaru, Karuppanathi, Nambiaru, Kodumudiaru and Vadakku Pachayaru and two Rural Fishery Demonstration tanks viz. Ramanathi and Srimoolaperi are under the control of Fisheries Department. The fishery rights of Gadana reservoir hitherto looked after by the fisheries department have been leased out to the private entrepreneur with effect from February 2013. Quality seeds of Indian major carps viz. catla, rohu, mrigal and common carp are stocked in the above

reservoirs by the department every year. Fishing is conducted with the help of share fishermen from Inland Fishermen Co-op. Societies. The fish are sold to the public at the selling rates fixed by the department.

2. Gadana fish seed rearing centre.

A Fish Seed Farm is functioning at Gadana Dam. Fingerlings of Indian major carps viz., catla, rohu mrigal and common carp are reared and distributed for stocking in the Reservoirs and RFD tanks of Tirunelveli district viz. Gadana Gundaru, Karuppanathi, Simoolaperi, vadakku-acuaiyar, Kodumudiyar, Nambiyar and neighboring districts of Kanyakumari and Tuticorin. Remaining seeds are sold to fish farmers of Tirunelveli, Kanyakumari, Virudhunagar and Madurai districts at the rates fixed by the department.

3. Issuing of fishing license for fishing in hope lake

Licences are being issued for fishing in Hope lake (Papanasam – Upper Dam), the diversion weir (Lower Dam) and the section of the Thambaraparani river below the latter upto the Papanasam bridge near the temple and all streams emptying into any of these water bodies in Tirunelveli district.

Fishery production (2011 – 12)				
Name and address of fishing centres	Inland fish catch (tonne)	Marine fish catch (tonne)	Number of fisherman engaged	
			Inland	Marine
Tirunelveli district	1342.3	2750	2294	4000
Souce : Assistant, Director of Fisheries, Tirunelveli and Ramanathapuram.				

vii) Heritage resources (shore temples / churches)

Protected and conserved monuments:

Monuments founded in six villages located in the taluks of Ambasamudram, Nanguneri and Palayamkottai, Mottai Andavar and Siva temple 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 kalvetu in Seevalaperi village of Palamkottai taluk are maintained by department of Archaeology. Bakthavatchala temple at Cheranmahadevi and Thiruvalaisuram temple at Thiruvalaisuram are maintained by the ASI.

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.

viii) Biodiversity (mangroves/corals/sea grass/important flora and fauna)

Wild Life strictly means "the uncultivated flora and undomesticated fauna" which otherwise includes both "plants and animals". The faunal population both territorial and avifauna, 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 of 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 glimpses of such wild life now. 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 are 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.

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. The reason deserves investigation by naturalists especially in Kerala frontier in Vallam beat of Courtallam range.

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 are also available.

Dendrocitta vagabunda, Turdoides straitus, Chloropsis aurifrons, Pycnonotus cafer, Saxicoolpides, Copaychus saularis, Lanis excubitor, Dicrurus adsimillis, Pyirina socialis, Oriolus orioius, Sturnus pagodarum, Metacilla caspica Metacilla maderaspatensis, Cuculus varius, Pave cristatus, Terpsiphone paradisi, Pericrocotus peregrinus, Mereps orientalis, Coracina melonoptera and Egretta grasetta are other important birds of this district.

3. Impacts

i) Urbanization (municipal solid waste dumping / sewage etc)

An 8.88% increase in population was recorded during 2001. During 2001 urban versus rural population was 48/52%. The average of 399 persons/sq.km. was recorded

during 2001. Total number of family cards for rural was 443172 for 2011-12 and for urban it was 393438. The decadal growth rate indicated that there is considerable growth in the corporation, municipalities and town panchayats of the district. The trend in urbanisation indicated that both the percentage of urban population and the percentage of slum population to the total population have increased in Tirunelveli Corporation.

Surface water and ground water are the major sources for protected water supply system corporation and town panchayats. 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 solid waste generation of corporations, municipalities and town panchayats are 48 tonnes, 49.75 tonnes and 66 tones respectively. The solid waste collection of Tirunelveli corporation, municipalities and town panchayats are 38 tonnes 36.5 tonnes and 27 tonnes respectively. 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. It is observed that 73.6% of the waste are compositable matter and 26.4% of the waste being rags, plastics, bricks and stones etc.

ii) Industrial development (effluent discharge / pollution – air water land etc.)

Though the main occupation of the people is cultivation, in recent years industries and services are also competing

with this ancient occupation. There have been 24 red categories, 52 orange categories and 8 green category industries, which are classified, based on the nature of hazardness by TNPCB. Red category industries are mostly chemicals, textiles and pharmaceutical industries. Talaiyattu and Sivagiri are the air pollution stressed areas with major air pollutant being particulate pollutant and odour.

The ground water in this district is generally good. But surface water quality in the areas around Cheranmadevi, Ambasamudram and Papanasam is affected by the discharges from textiles and paper industries. The groundwater in the towns of Tirunelveli-Palayamkottai, to some extent is contaminated by the municipal and industrial discharges. Effluents from the mills are also being let out in to the Thamiraparani River. The public sector companies located in Tirunelveli, Papanasam and Tenkasi also discharge the effluents into the Thamiraparani and Chitaru rivers.

iii) Thermal power generation (Hot water discharge)

Power generation is mainly through hydro power in this district and there is no data available on hot water discharge. Total consumption of electricity for 2011-12 was 1199 mw. Domestic usage accounts for 49.84% followed by miscellaneous usage with 25.6%; industries 6.8%; public lighting and public works 6.49%. Tirunelveli district has achieved 100% electrification even prior to 1986.

v) Natural hazards (erosion / accretion / sea level rise/ climate impact)

No data available regarding the natural hazards in the coastal areas of this district. However, it is obvious that erosion, accretion, sea level rise and the impacts of

climate change are no different from other districts.

vi) Rare earths mining (garnet etc.)

Occurrence of red garnet sands in the beds of the river Nambiar and Uvari has been recorded. The proportion of garnet is 75 per cent in the rich deposits and 45 per cent in the surface sands. A total of 53 garnite mining units is in Radhapuram taluk.

vii) Natural disaster prone areas (tsunami / cyclone / floods)

Seasonal and flash floods have become very common in Tirunelveli district. Few blocks are affected by cyclone in the district. Coastal area along the district is always prone to tsunami as a significant damage was experienced during 2004 Indian Ocean tsunami.

4. Government initiatives

i) Initiatives to improve fisherfolk livelihood (schemes for education / health)

The Fisheries sector, which started only as a subsistence livelihood activity during the early plan period is now emerging as a vital sector, contributing to employment generation, food production and foreign exchange earning significantly.

The major objectives are :

- To conserve the fishery wealth of the state and manage the resources for sustainable fish production.
- To encourage fishers to take up diversified fishing methods to exploit under-utilized fishery resources and to reduce fishing pressure in the inshore areas.
- To strengthen the infrastructure facilities for fish landing, processing and marketing.

- To uplift the socio-economic status of the fishers.
- To promote sustainable, eco-friendly aquaculture practices.
- To generate direct and indirect employment opportunities in fisheries and allied activities.
- To promote exports and thereby increase foreign exchange earnings.
- The Fish Farmers Development Agency (F.F.D.A.,) Tirunelveli started functioning from 10.12.1980 (vide G.O.Ms. No. 1545 Forests and Fisheries Department dated 27.11.1979). The area of operation of the Agency covers the entire area of Tirunelveli and Tuticorin districts. This agency is functioning under the chairmanship of respective district Collector.

Objectives:

- To arrange for leasing of water bodies owned by panchayat, revenue and public works departments and HR&CE to fish farmers through Fish Farmers Development Agency (FFDA)
- To reclaim all cultivable water bodies with the assistance of institutional finance.
- To create a new cadre of fish farmers by imparting necessary training, offering technical guidance and supplying quality seeds and other inputs and
- To popularize the new avocation and provide employment opportunities to rural people and serve as a nucleus for further spread.

In recent years as in the past, most of the tanks were leased out by the revenue department, PWD etc., themselves. Now FFDA has taken only 3 tanks for fish culture and allotted to 2 fish farmers. Subsidy

assistance of Rs 2,18,824 was given to two farmers for construction of fish pond in an area of 2.5 acres and as input subsidy for first year.

The World Bank funded TNIAMWARM project is being implemented in 5 sub basins in Tirunelveli district viz. Kalingalaru, Nishabanathi, Deviaru, Hanumanathi and Karumeniaru. The main objective of this project is to enhance unit productivity of water thereby to help the farmers to get additional income. The following activities are being implemented under this scheme.

- Aqua culture in farm ponds
- Aquaculture in irrigation tank
- Fish seed rearing in cages
- Construction of earthen fish seed rearing center
- Establishment of ornamental fish culture unit
- Setting up of fish kiosk for fish marketing.
- Information, education, communication (IEC)/capacity building (CB)

Fish seed production units

A maximum of 50% cost towards the construction and operation of fish seed production centre can be availed as subsidy subject to maximum of Rs. 5.00 lakh per centre. The unit cost for establishment of fish production centre with 8 to 10 million early production capacity per annum is worked out to be Rs. 10.00 lakh.

Fish seed rearing units

A maximum of 50% cost towards the construction and operation of fish seed rearing centre can be availed as subsidy subject to maximum of Rs.1.5 lakh per centre. The unit cost for establishment of fish seed rearing centre with 5 lakh advanced

fingerlings production is worked out to be Rs. 3.00 lakh.

Input subsidy assistance (50%) to earthen fish seed rearing farms.

To encourage private fish farmers who own and operate fish seed rearing centers, it has been proposed to provide one time input subsidy (fish seed and feed) @50% to small fish farmers having rearing space upto 2 ha.

- Unit cost Rs. 1.00 per/ha
- 50% subsidy assistance is subject to a maximum of Rs. 50,000 per/ha.
- The subsidy amount is paid to the beneficiary to produce only advance fingerlings.

Fish culture activities in multipurpose farm ponds

Fish culture in multipurpose farm ponds with a size of approximately 2500 sq m

- Multipurpose farm ponds excavated under MNREGS have to be taken up by the fisheries department to carryout fish culture activities.
- 25 beneficiary per district
- Size of pond 2500 sq. mt.
- Expected total input cost Rs. 46,000/-
- Subsidy @ 50% Rs.23,000/-
- Culture duration 6-8 months
- Expected yield 1000 kg.
- Expected revenue Rs.75,000/-

Green house scheme for fishermen co operative members

All the marine or inland fisherman/fisherwomen being a member of fishermen/fisherwomen cooperative societies living below poverty line in rural areas and having no own house will be eligible for

chief Minister Solar Powered Green Houses constructed through the rural development department.

- Area 300 sq ft.
- Unit cost 1.80 lakh
- Fisher folk only with patas for their land be will eligible under this scheme
- Beneficiaries should not own any pucca concrete house in the village or elsewhere.
- Should not have benefited under any housing scheme.

Tamil Nadu Fishermen Welfare Board

It was established with a view to provide social security and for ensuring welfare to fishermen and laborers engaged in fishing and allied activities.

Marine fisheries

The welfare activities in Tirunelveli district and implementation of Marine Fisheries Regulation Act Tirunelveli District are carried out by the office of the Asst. Director of Fisheries (Extension & Training) Radhapuram. The 7 marine fishing villages of Tirunelveli district are Kooduthalai, Kootapanai, Uvari, Kuthenkuly, Idinthakarai, Perumanal and Kootapuly.

Coastal length : 48 kms
Fishermen population : 22,900

There are 12 fishermen / fisherwomen Co-operative societies with 9,000 members. The following schemes are being undertaken by this office.

1. Issuing registration certificate and licensing for fishing crafts
2. Issuing bio-metric identity cards to active fishermen

Lean period assistance

During lean period of fishing, Rs. 4000/- per fishing family is disbursed annually to 4500 fishermen families in Tirunelveli district.

Fishing ban period assistance

During Fishing ban period an amount of Rs.2000/- per fishing family is disbursed annually to 4000 fishermen families.

National fisherman/fisherwomen savings relief scheme

An amount of Rs. 1800/- per member is disbursed under national fisherman /fisherwomen savings relief scheme annually. Besides group accident scheme and personal accidental relief scheme are also undertaken by this office through fishermen / fisherwomen Co-Operative societies.

Subsidized kerosene

Subsidized kerosene at the rate of Rs. 25 per litre with a total quantity of 200 litre per fishing boat is supplied by this office. Also fishing equipments such as outboard motor , inboard engine with a maximum subsidy of Rs. 30,000/- per engine are supplied by this office through Co-operative Societies.

ii) Coastal protection initiatives (bio shields / sea walls etc)

In Kootupuli, the presence of the rocky outcrops offers considerable attenuation to the waves. In this stretch of the coast, the shoreline oscillates as per monsoon and the net effect is a stable shore line. Hence, no protection is necessary at present. In Perumanal, the coastal stretch is located at the confluence point of the river Hanumanadi. The beach is said to be more

or less stable with seasonal oscillations. Damages due to tsunami were very less compared to other stretches of the Tamilnadu coast. No intervention is necessary at present, except for plantations. In Idinthakarai, there is a penetration of the shoreline into the land forming a bay like feature. Just south of this area, the presence of outcrops act as barriers for the propagating waves on to the land.

A long groin of about 200 m upto a water depth of 5 m on the south and two small groins on the northern side is recommended. In Koothankuli, it is learnt that there is a long pending request for a groin. A pair of groins is recommended for protecting the coast and one of the groins, i.e, the southern groin her to be slightly to be bent. This pair of groins will not only serve for the coastal protection but also help the local fishermen to park their boats.

iii) Awareness initiatives (tsunami / CRZ issues)

One day training program was organized by the Government of Tamilnadu about tsunami on 29.11.06. Quality testing of various types of materials used in construction vide clippings of earth quake that occurred in Bhuj was shown.

iv) Bio diversity (coral, mangrove conservation and restoration)

Corals have been recorded for the first time by Suganthi Devadason Marine Research Institute during 2010 near Idindhakarai area. The rare phenomenon of coral spawning was also witnessed near Kudankulam area. Not only corals, but gorgonians, soft corals, seagrasses, sponges and other important flora and fauna were recorded. But there is no restoration measure

taken so far. Mangroves were not recorded though.

v) Other initiatives taken by private sector

No data available on initiatives taken by the private sector.

5. Summary / Conclusion

- Tirunelveli district is having a geographical area of 6759 sq.km in the southeastern portion of Tamil Nadu and is triangular in shape.
- Tirunelveli has fertile soils only in scattered regions. Less fertile red soils are found distributed over most of the region.
- Paddy occupies the largest area of cultivation, followed by cotton. Paddy is cultivated mainly in Tirunelveli, Palayamkottai, Tenkasi, Shencottai, Ambasamudram and Nanguneri taluks.
- The total area of the forest of the district is 1,22,055 ha of which 81700 ha is set apart for Tiger reserve at Mundanthurai and Kalakadu.
- Tirunelveli district enjoys the benefit of the early showers of south west monsoon and of the later rains of the north-east monsoon.
- The district is chiefly irrigated by rivers rising in western ghats.
- The faunal population both territorial and avifauna, of this division is also varied and fascinating like its varied floral composition.
- The decadal growth rate indicates that there is a considerable growth in the corporation, municipalities and town panchayats of the district.
- Though the main occupation of the people is cultivation, in recent years industries and services are also competing with this traditional occupation.
- Total coastal length of the district is 48 km with 22,900 fishermen population.
- Corals, seagrasses, soft corals, sponges and other resources have been recorded here.

KANYAKUMARI DISTRICT

KANYAKUMARI DISTRICT

1. Introduction

i) Geographical location of the district

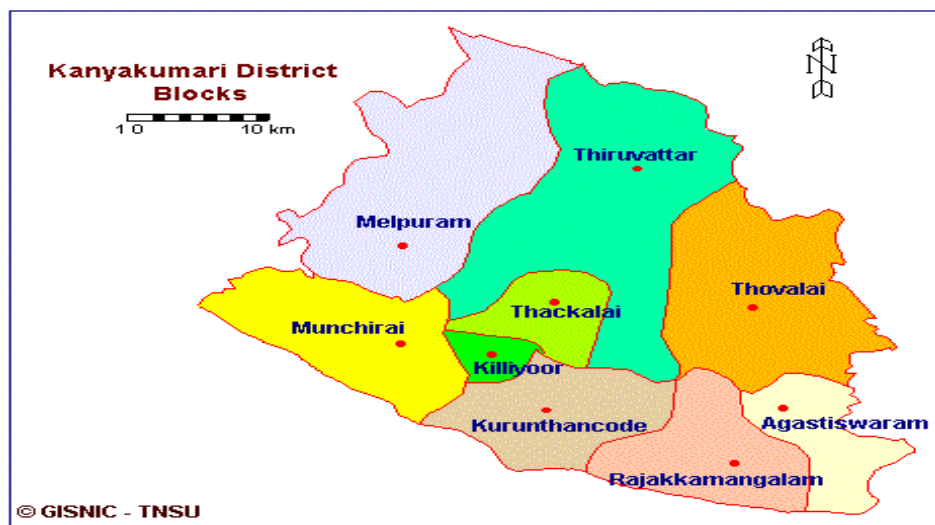
Kanyakumari is the Southernmost district of Tamil Nadu. The district lies between $77^{\circ} 15'$ and $77^{\circ} 36'$ of the Eastern Longitudes and $8^{\circ} 03'$ and $8^{\circ} 35'$ of the Northern Latitudes. The district is bound by Tirunelveli district on the north and the east. The south eastern boundary is the Gulf of Mannar. On the south and the south west, the boundaries are the Indian Ocean and the Arabian sea. On the west and north

west it is bound by Kerala. With an area of 1672 sq.km. it occupies 1.29% of the total extent of Tamil Nadu. It ranks first in literacy among the districts in Tamil Nadu.

ii) Administrative profile (taluks / villages)

The administrative profile of Kanyakumari district is given in the below table.

Sl. No.	Name of the division	Name of taluk		No. of firka	No. of revenue villages
1	Nagercoil	1	Agastheeswaram	4	43
		2	Thovalai	3	24
2	Padmanabhapuram	3	Kalkulam	6	66
		4	Vilavancode	5	55
		Total		18	188



Kanyakumari District Map

ii) Meteorological information (rainfall / climate details)

Based on the agro-climatic and topographic conditions, the district can be divided into three regions, namely: The uplands, the middle and the low lands, which are suitable for growing a number of crops. The proximity of equator, its topography and other climate factors favour the growth of various crops. Minimum temperature prevailing is 24°C and maximum temperature is 34°C. Unlike other district in Tamil Nadu, it has a rainfall both during the South West and the North East monsoons. The South West monsoon period starts from the month of June and ends in September, The North East monsoon period starts from October and ends in the middle of December. The average rainfall of the district is 1456.8 mm per annum. From 2005 onwards the annual rainfall is estimated to be 1006 mm. Unlike other districts in Tamil Nadu, Kanyakumari receives a fairly good rainfall from both southwest and northeast monsoons. Southwest monsoon accounts for 32.6%, Northeast monsoon being 42.5%, winter being 3.3% and summer being 21.6% of total rainfall.

2. Resources availability

i) Land resources (soil types)

Soil in the district is mostly of the red loam variety. However on the sea coasts, the sandy type of soil prevails and, near the mountain ranges, gravelly soil is generally seen. In low lands there is neither white sand nor sandy lam, while in the midlands and high lands there prevails fairly fertile soil of the fine type. The valley in the midland has loamy clay soil with high sand content. In the midlands, in general, the soil is clay-loam of laterite origin with an admixture of gravel and sand. Laterite soils found at

Thiruvattar, Killiyoor, Munchirai, Rajakamanagalam, Thuckalay blocks. Red and alluvial soil are found at Agastheeswaram and Thovalai blocks.

ii) Agriculture and horticulture (crops cultivated)

Based on the agro-climatic and topographic conditions, the district can be divided into three regions, namely:-

1. The uplands : comprising of hills and hill bases suitable for growing crops like rubber, cloves, nutmeg, pepper, and pineapple etc.

2. The Middle: comprising of plains and valleys fit for growing crops like paddy, tapioca, banana, coconut etc.

3. The low lands: comprising the coastal belt ideal for growing coconut, cashew etc.

This district produces paddy, tapioca and oilseeds such as groundnut and coconut besides commercial crops like Cashew, rubber, fruits and spices. The important feature of this district is the production of off season mangoes.

Paddy is the main crop of this district. It is grown in two seasons. First crop is sown in the month of April – June (kannipoo) and second crop is raised in the month of September – October (kumba poo). Tapioca is raised as a subsidiary food crop in this district. The main planting season is April-May. In some pockets, September – October planting is also done as second season crop. It is purely raised as rainfed crop in Kalkulam and Vilvancode taluks and as irrigated crop in some area of Agastheeswaram taluk of this district. Coconut is an important cash crop of this

district. The main planting season is May to July.

Pulses are raised in rice-fallow and as intercrop in tapioca. The important pulses are blackgram, greengram, horsegram, cowpea and redgram. In the months of April – May and September – October pulses are grown as intercrop with tapioca. In the months of February – March pulses are raised as pure crop in rice-fallows. Vegetables are cultivated during January – February and July – August.

Vegetable is also grown as 3rd crop after the harvest of 2nd crop paddy in some pockets of this district.

Banana is cultivated mainly during March – May and September - October. Groundnut is raised during March – April and October – November as rainfed crop in small extent. In addition, pepper, cloves, arecanut, betelvine, cocoa, gingelly, ginger, turmeric, arrowroot etc. is also grown in this district.

Area and production of major crops (2006-07)

Sl. No.	Crops	Area (ha.)	Production (L.M.T.)	Productivity Kg/ha.	% to the total area
A.	Cereals and millets				
1	Paddy	21158	0.9990	4721	26.67
2	Pulses	1761	0.1267	600	2.22
B.	Oilseeds				
	Coconut	24200	27.5 Crore nuts	11375 nuts/ha.	30.5
C.	Other crops	42562	--	--	40.61

iii) Forest resources (reserved forest area / protected areas)

The forests in Kanyakumari District is verdant and virgin forests and said to be of 75 million years old. Of the total district area of 167130 ha government forests occupy an area of 50486 ha. which comes to about 30.2 % the total district geographic area.

The forests of Kanyakumari District was transferred from Kerala to Tamil Nadu on 1st November 1956 as a result of the reorganization of states. The forests of this divisions (Part) i.e Boothapandy Mahendragiri R.F. etc. were previously managed by the District Forest Officer, Tirunelveli South

Division with Head quarters at Tirunelveli. Consequent on the formation of Kalakad and

Mundathurari sanctuary, Kanyakumari division was formed exclusively to manage the forests of Kanyakumari district with headquarters at Nagercoil from 01.04.1977 as per G.O.Ms.No. 261 dated 26.03.1977.

Forest in Kanyakumari division: 14 types of forests from luxuriant tropical wet evergreen to tropical thorn forests occur in this district because of diverse locality factors; (according to Champion and Seths classification). Rainfall varies from 103 cm to 310 cm. Elevation from sea level is 1829 m. The forest area is 30.2 % of total district geographical area which is next to Nilgiris district with 59 % and Dharmapuri

district with 38 % in the State. The district is having 52% of its forests as dense forests coming only second to Dharmapuri district with 58%.

The forests consist of soaring and lofty trees of *Mesua ferrea*, *Bischofia Javanica*, *Vitex altissima* to smaller trees of Dillini a species festooning climber, shrubs valuable herbs, variety of orchids, 2 types canes many indigenous palms and cycas. The important timbers are teak, rosewood, vengai and aini and this district is worth mentioning here for the easy availability and quality of the above timbers. Various types of forest produces like bamboos, reeds, canes soft wood, tamarind, lemon grass, rubber, coconut, arecanut, kadukai, cinna momum bark, nelli, cardamom, mango and many medicinal plants of high value are harvested in this district. The maruthuvalmalai located among green paddy fields and fluttering coconut palms is famous for valuable medicinal plants. This is the only district in Tamil Nadu, where rubber and clove plantations have been raised in reserve forests in an area of 4785.70 ha. and 110 ha. respectively. The district is rich in wildlife with at least 25 types of mammals, about 60 species of birds including 14 species of migratory birds and many species of fishes, reptiles and amphibians listed. In short, these forests are a veritable trove of biological diversion.

From tourism angle, the forests are highly enhancing with pleasant sholas hill top forests, beautiful grass lands, panoramic valleys, top hillocks, singing streams, vast stretches of rubber plantations valuable teak plantations and excellent climate. Nobody should miss seeing Mahendragiri, Maramalai, Sea field and Balamore estate area, Ecology farm, Kalikesam, Pechiparai dam, Perunchani dam, Upper Kodayar, Maruthamparai and Mukkudal areas for their

scenic beauty. All areas in forests are worth seeing in Kanyakumari district only.

Reserve Forests and the Area

The following are the reserve forests in this division:

Sl.No	Reserve forests	Area in Ha
1	Therkumalai East and West	1741
2	Thadagaimalai	797
3	Poigaimalai	1243
4	Mahendragiri	4360
5	Veerapuli	28109
6	Velimalai	1126
7	Old kulasekaram	694
8	Kilamalai	8106
9	Asambu	4310
	Total	50486

Areas Leased for other activities

A	Area leased to Arasu Rubber Corporation Ltd for raising Rubber	4785.00
B	Area leased to Arasu Rubber Corporation Ltd for raising Clove	110.00
C	Area leased for Space Research work to I.S.R.O.	1199.20
D	Kodayar Hydro Electric Project T.N.E.B	133.24

Medicinal plants

Medicinal Plants Conservation Area Scheme is being implemented in this division with the assistance of Foundation for Revitalisation of Local Health Traditions, Bangalore (FRLHT) from the year 1993 - 94 onwards.

iv) Mineral resources (garnet etc)

Garnet sand, illmenite sands, salt and gypsum are the main minerals resources of this coast. In manavalakuruchi heavy minerals like illmenite, garnet, zircon and rutile occur and are mined. Sand dunes and teri soil occur along the coast and away from the coast of Kanyakumari. The southern part of the coast is sandy beaches with beach sands containing heavy minerals on the eastern and western sides of Kanyakumari. The sand dunes rise up to 67m. The general relief goes over to 15m above MSL. This stretch comprises mainly of archaean, quaternary and recent geological formations. Calcareous shell limestone of sub recent origin is seen near Kanyakumari. The area between Kanyakumari and Kuzhithura is mainly covered by thick laterite soil dotted with few rock outcrops.

The following coastal geomorphic features are observed along the coast of Kanyakumari district:

- Beach
- Beach ridges
- Clifed coast
- Sand dunes
- Beach terraces

The marine landforms along the Kanyakumari district are restricted to the width of less than 1km due to high relief of inland areas which represented the slope of the Western Ghats when compared to the Eastern Coast.

v) Water resources (river / major lakes and estuaries)

The major river in the district is Thamirabarani River locally known as Kuzhithurai. This river has two major tributaries with the Pechiparai dam and

Perunchani dam respectively built across them, Kodayar and Paralayar. There are many tributaries for the Kodayar river of which Chittar river I and Chittar II, with their dams, are the major ones. The origin of Thamirabarani River is in the Western Ghats and the river confluences with Arabian Sea near Thengapattanam, about 56 km west of Kanyakumari town.

Valliar, another small river and its tributary Thoovalar, originate from the Velimalai hills, collect the drainage from P.P. Channel and its branches, ayacuts (irrigated area under a tank) and confluence with the Arabian sea near Manavalakurichi. The Pazhayar river, another small river, starts at Shorlacode, a place about 18 km north-west of Nagercoil. This is mainly a drainage river, mostly collecting the drainage of Thovalai, Ananthanar and N.P. Channels.

The Pahrli river also flows through the district. The Mathur Hanging Trough, the highest and longest aqueduct in Asia, was built over it near Mathur.

vi) Fisheries production (fish landing details / aquaculture)

The coastal ecosystem of this District comprises 68 km in length and is studded with 44 coastal fishing villages. Since this district is situated at the extreme south of the Indian subcontinent, the coastline is formed nearly by three seas, namely, Arabian sea, Indian ocean and Bay of Bengal. But the main part of the coast faces the Arabian Sea. According to a report, 1, 18,387 fisher-folks are distributed in the 44 villages of Kanyakumari coast which constitute about 26 percent of the total fishermen of Tamil Nadu. Fisher folks do not own land but put their hut on the seashore on unsurveyed land. Most of the villages are having tiled and thatched roofs.

In each village a few houses have concrete roofing; the owners of these houses are working in some other countries as drivers, crane operators, etc. A few educated fishermen settled down in the inland are doing teaching and other office jobs. Still, the economy of the coastal villages is not satisfactory. The marine capture fisheries sector has an important place in the district's economy. It is sad to note that, among the fisherman population, only 44 percent is fully employed, 52 percent occasionally and 4 percent partially. The fishing job may not be secure during lean season particularly during the June. At the time of fishing season i.e. during August to November many species of fishes are caught.

The mechanised boats can catch 15,000 to 25,000 kg. of fish per day. But during non-seasonal months the catch per boat will be 700-8000 kg /day. It has been recorded that in seasonal landings in Kanyakumari fishing village nearly 81,000 kg. per month was obtained. Most if the mechanised boats used longlines with baited hooks and also trawl nets.

Important species of fish captured in this coastal belt are listed below:

<i>Mesoprion Malabaricus</i>	Vela meen
<i>Cybiium guttatum</i>	Naimeen
<i>Engraulis indicus</i>	Anchoy, Nethile
<i>Trichiurus savala</i>	Savalai meen
<i>Trichiurus haumela</i>	Vaalai meen
<i>Lactarius delicatulus</i>	Kuthippu meen
<i>Clupea longiceps</i>	Kuthippu meen
<i>Triacanthus brevirostus</i>	Mulluklathi
<i>Scoliodon sorakowa</i>	Pillachurrah
<i>Scoliodn acutus</i>	Pal Chruuah
<i>Panaeus indicus</i>	Prawn
<i>Panaeus monodon</i>	Prawn
Lobsters	Kalral
Crabs	Nandu
Mussels	Chippi
Squids	Kanavai meen

vii) Heritage resources (shore temples / churches)

Fountain at Kanyakumari

Kanyakumari district, which lies in the Southern most tip of Peninsular India, is famous for its majestic hills, virgin beaches, pristine rivers and meandering rivulets. The district has a fragrance of architecture , culture and customs of neighbouring Kerala mixed with the rich deep traditions, culture and architecture of Tamil Nadu. However, for want of promotional campaign and lack of basic amenities most of the tourists coming to this district return back after seeing just Kanyakumari and Padmanabhapuram Palace. It was at this juncture that the district administration decided to take up tourism promotion initiatives in a major way. Attempt has been made to put up basic amenities at the virgin beautiful spots so as to facilitate the inflow of the tourists.

Mahatma Gandhi Memorial

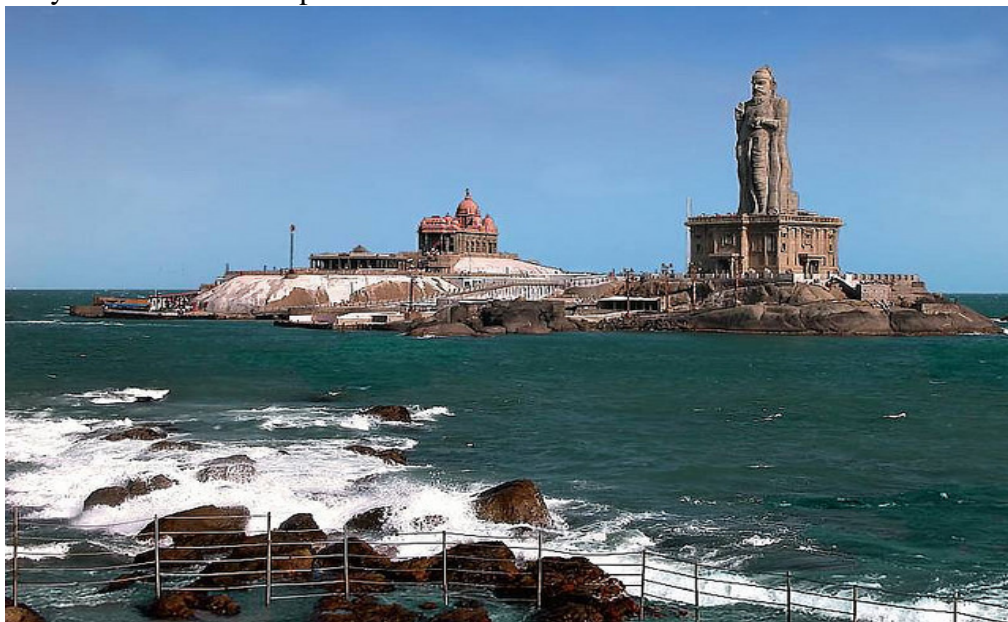
The place has been associated with great men like Swami Vivekananda and Mahatma Gandhi in whose names memorials have been here. They are very beautiful and add to the attraction of this place. The beautiful Gandhi Memorial completed in 1956, is situated as a memorial to the Father of the Nation. An urn of Mahatma Gandhi was kept here for public to pay homage before immersion. Mahatma Gandhi visited Kanyakumari twice in 1925 and 1937. Mahatma Gandhi visited Kanyakumari in January 1937. In 1948 his ashes were immersed in the sea waters in Kanyakumari. In commemoration of this event a beautiful monument has been constructed here. Its central shape is 79 ft. high representing the age of the Mahatma It has been constructed in such way the sun at Mid day on 2nd

October would fall on the peedam through a hole in the roof. The memorial was transferred to the administrative control of the Public (Information and Public Relations) Department from Public Works Department of Government of Tamil Nadu in the year 1978.

Thiruvalluvar Statue

Thiruvalluvar is the immortal poet of Tamil Nadu and has given to the world Thirukkural. The memorial statue of Thiruvalluvar is in Kanyakumari. The pedestal of the statue is of 38 ft. height and the statue over it is 95 ft. tall with a grand total of 133 ft. for the entire sculpture. The 3 tier pedestal known as Atharapeedam is surrounded by an artistic Mandapa known as

Alankara Mandapam with 38 ft. height. Surrounding the Alankara Mandapa stand 10 elephant statues signifying 8 directions with earth and space down. The father of Sri. Rama, the hero of Ramayana was called Dasaratha as he was able to charioteer in ten directions. To help the tourists to worship the holy feet. of Thiruvalluvar 140 steps are constructed inside the Mandapa. The pedestal with a height of 38 ft. represents the 38 chapters in the Book of Aram in Thirukural and the statue of 95 ft. on the pedestal represents the total chapters in Porul (70 chapters) and Inbam (25 Chapters). Thus the statue symbolically, and artistically signifies that the theme of Porul and Inbam are based on Aram.



Thiruvalluvar Statue and Vivekananda Rock Memorial

Kamarajar Manimandapam

Another monument Kamarajar Manimandapam was raised and dedicated to Late Sri Kamarajar, the freedom fighter, Former Chief minister of Tamil Nadu, and the President of Indian National Congress. He was popularly known as Black Gandhi among the masses and king maker during

congress regime. This monument was constructed where his ashes were kept here for public to pay homage before immersion into the sea. Visting Hours 07 AM To 07 PM.

Vivekananda Rock Memorial

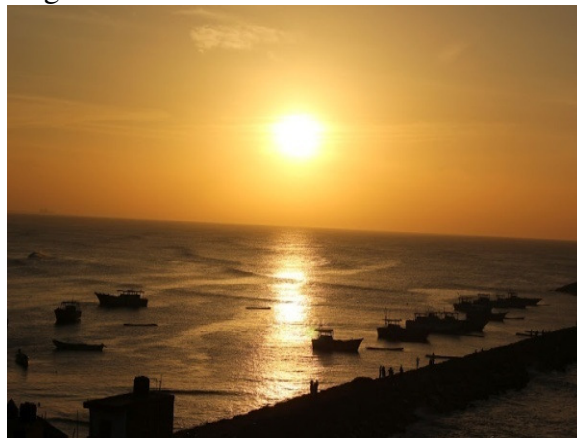
Vivekananda Rock Memorial is another place in Kanyakumari which attracts large number of tourists. As its name implies, it is essentially a sacred monument, built by the Vivekananda Rock Memorial Committee to commemorate the visit of Swamy Vivekananda to “Shripada Parai” during 24th, 25th and 26th December 1892 for deep meditation and enlightenment. From very ancient times, the rock has been regarded as sacred place. In Puranic tradition, it has been known as “Sripada Parai: meaning the rock, that has been blessed by the touch of Shripada feet. of the Goddess. On the rock, is a projection similar in form to a human foot and a little brownish in complexion, which has traditionally, been revered as a symbol of Shripadam. According to legend, it was on this rock that Goddess Kanyakumari did Tapas. The memorial consists of two main structures, viz (i) Vivekananda Mandapam and (ii) Shripada Mandapam.

Vivekananda Mandapam:- This 180’-11’ X 56’ Mandapam consists of (1) Dhyana Mandapam, i.e., Meditation Hall with six adjacent rooms (2) Sabha Mandapam or the Assembly Hall including Pralima Mandapam (statue section) two rooms, a corridor and an open Prakaram round the Sabha Mandapam (30 Mukha Mandapam (Portion) and (4) the Front Entrance steps with two rooms and a corridor below the steps.

Shripada Mandapam:- This square hall consists of (1) Garbha Grahm i.e., (Sanctum Sanctorum) (2) the Inner Prakaram (3) the Outer Prakaram and (4) the Outer Platform all around. Both the Mandapams are so designed that the vision of Swamiji in the statue would be seen direct towards the Shripadam.

Sunrise and sunset

Sunrise can be seen in Kanyakumari throughout the year at Bay of Bengal. Sunset can be seen from View Tower throughout the year except the months of June, July and August.



Sunrise and Sunset in Kanyakumari



View Tower and Telescope house

Panoramic view of landscape, seashore, Vivekananda Rock Memorial, Thiruvalluvar Statue etc., can be seen at View Tower and through Telescope.

Government museum

The Government Museum, situated on the Beach Road offers a good collection of sculptured artifacts and crafts of South Indian Temples and is one of the “Must See” places in Kanyakumari.

Guganathaswamy Temple

This is a 1000 year old temple and is said to have been built by the King Raja Raja Chola. The architectural style of the Cholas is quiet apparent in this temple. It is located near Railway Station. There are 16 inscriptions found in this temple that date back to the years 1038 A.D., 1044 A.D., 1045 .A.D.

Kumari - Hall of history

It is located south side of Kanyakumari Railway Station exhibits the pictures of historical wonders and also rare photographs of Kamarajar, Gandhiji and other freedom fighters.

Suchindrum

Suchindrum is a small village about 12 km from Kanyakumari and 7km. from Nagercoil. This holy place is located on the bank of the river Pazhayar, adjoining fertile fields and coconut groves and the temple is dedicated to Sri Sthanumalayan. The word denotes Siva, Vishnu and Brahma as Sthanu represents Siva, Mal represents Vishnu while Ayan represents Brahma i.e. Siva, Vishnu and Brahma in "One Form".

Suchindrum means the place where Indra attained 'Suchi' i.e., purification. The Sthalapurana has it that Indra suffered a curse from sage Gowthama, when he stealthily cast amorous glances at Ahalya the wife of Gowthama. Not able to suffer the mortification brought about by the curse. Indra had to seek immediate redemption. He came to 'Gnana Aranya' as this place was then called and offered worship to Lord Shiva. Relieving Indra of his curse, Lord Shiva granted him of his wish that the place where he attained purification should henceforth be called 'Suchindrum'.

Another story goes to say that the Trimurthys i.e. Brahma, Vishnu and Shiva, cajoled by their divine consorts came down to the earth to test the chastity of Anusuya, wife of sage Athri at Gnana Aranya. The Gods for this misadventure had to suffer a curse from the Rishipatni and to undergo the purification process, before they could be restored to their former glory.

It is said that Thanumalaya Swamy temple is the only shrine dedicated to the Trinity in India. The present structure of the temple is the work of a number of persons spread over a number of centuries. It is a complex of many beautiful structures constructed at various times and is one of the best specimens and a store house of the dravidian style of art and architecture.

Kanyakumari Bagavathiamman temple

Kanyakumari derives its name from from Goddess Kanyakumari Amman, the presiding deity of the area. The most prominent temple, the Kumari Amman, is dedicated to the goddess Parvathi as a virgin. The temple situated at the edge of the ocean for Goddess Kanyakumari has the legendary account that once Banusura, the demon king got supremacy over Devas and meted out cruel punishment to them. The Devas performed a Yagna pleading to annihilate the evils. Goddess Parasakthi came to Kumari in the form of a virgin girl and began her penance. Meanwhile Lord Shiva fell in love with her and arrangements for the marriage were made in the midnight a particular day. Now the Devine sage Narada realised that their marriage would destroy the chances of annihilating Banusura because he could be killed only by a virgin. When Lord Shiva was on his way to Kanyakumari from Suchindrum at Valukkamparai 5 km south of Suchindram, Sage Narada assumed the form of a cock and crowed falsely heralding the

break of dawn. Thinking that the auspicious time for the marriage was past, Lord Shiva returned disappointed. The Goddess too decided to remain virgin after that. Then, when Banusura attempted to win the Goddess by force, she killed him with her Chakragudha, and relieved the suffering s of Devas. Then she resumed her penance and remained virgin.

Udayagiri fort

The fort was rebuilt in the reign of Marthandavarma, the Venad King, during 1741-44 under the supervision of De Lannoy, the Belgian General, who served as the Chief of the Travancore army; East India Company's troops were stationed there till the middle of the 19th century. Foundry for the manufacture of guns, mortars and cannon balls were also established within the fort under the supervision of the General.

In the early days, the fort was of strategic importance. Prisoners captured in the campaign against Tippu were confined in this fort for some time. It is further said that a brass gun 16 ft. long bored as a 22 ponder, found in the fort could not be removed even for a few yards by a large number of people, even with the help of 16 elephants.

A village has come up in front of the fort. The people who live here, are mostly agriculturists. A few of them are engaged in trade. Pottery making is the chief industry among a section of the people. Now, the district administration, with the help of forest department has set up a Biodiversity Park over here. Tourists can see deer, ducks, fountains, birds and over 100 varieties of trees inside the fort.

Mathoor Hanging Bridge

The Mathoor Hanging Trough is the tallest as well as the longest trough bridge in Asia, having a height of 115 ft. and a length of one kilometre. Constructed in 1966, this bridge has become a place of tourist importance and hundreds of tourists visit this place. This is situated in Mathoor, hamlet of Aruvikkarai revenue village in Thiruvattar Panchayat Union.



Mathoor Hanging Bridge

The bridge has been constructed at Mathoor across the river Parazhiyar at a cost of Rs. 12.90/- lakhs and the trough canal (Pattanamkal canal) on the bridge carries water for irrigation from one side of a hill to the other side of a hill. The trough has a height of seven feet. with a width of seven feet. six inches. The canal is being shouldered by 28 huge pillars. By the unrelented efforts of late Thiru. K. Kamaraj, the former Chief Minister of Tamil Nadu, this canal was constructed as a drought relief measure and for the development of agriculture in Vilavancode and Kalkulam taluks. The district administration has recently put up a staircase from top to the bottom of the bridge and also built a

children's park and bathing platforms over here.

St. Xavier church

St. Xavier an outstanding and dedicated priest visited the coastal areas of Tamil Nadu from Goa. He never missed the opportunity of visiting Kottar in Kanyakumari district which was a celebrated commercial centre at that time. During his stay at Kottar, he used to worship St. Mary in the small temple. He was popularly known as “Valiya Pandaram” among the people of Kottar. While he was at Kottar, he averted the invasion of Padagas on the people of Venad which was appreciated by the king, who became closer to the Priest. In recognition of Xavier’s services, the king allotted a land to him for the purpose of constructing a catholic church at Kottar. There was already a church in 1544 in the same place, where the St. Xavier’s church stands now.

The church records show that the church was built in the year 1600 A.D. In the year 1865, the Church was enlarged and the shrine of our lady was also renovated and vaulted over. In 1930, the church was raised to the status of a Cathedral. In 1942, in commemoration of the fourth centenary of the arrival of St.Xavier in India, a beautiful tower to the saint, a grotto to Our Blessed Mother and a small shrine to St.Ignatius who sent him to India were constructed in the Cathedral premises. In 1955, the church was further extended and the chapel of Our Lady was incorporated into the enlarged church. The Church of St. Xavier enjoys a great fame as a place of miracles from early times. The annual festival is celebrated during the month of November- December lasting for 10 days.

Padmanabhapuram palace

The ancient historical town Padmanabhapuram is one of the four municipalities in the district is 55 km (south) from Trivandrum, about situated at a distance 2 km. east of Thuckalay and 35 km from Kanyakumari on the Trivandrum-Cape Comerin road. This town is surrounded by a fort with an area of 187 acres. The ancient capital of Travancore might be constructed before AD 1601. The palace with an area of seven acres, is situated in the very centre on the Padmanabhapuram Fort, amidst hills, dales and rivers. The palace which is situated in Kanyakumari district is under the control of a Curator of the Archaeological Department of Kerala Government. The fort which was built with mud originally was dismantled and reconstructed with granite by Maharaja Marthanda Varma. The height of the walls varies from 15’ to 24’ according to the inclination of the ground.

Pechiparai dam

About 43 km. from Nagercoil this dam has been constructed. This dam in Kalkulam Taluk, was built during the days of the Maharaja Sri Moolam Thirunal across the river Kodayar. The construction of the dam was designed on the pattern of the Periyar dam in the Madurai district. The length of the dam is 425.1 mts. It has a catchment area of 204.8 sq.km There is a camp shed provided at the dam side for the visitors. The weather is very pleasant and hence attracts a large number of tourists. The reservoir is surrounded by dense forests which are famous for their valuable trees and rich wild life such as tiger, elephants, deer etc. A hill tribe, small in number known as ‘Kanikars’ dwell in the dense forests around the lake.

Peer Mohammed Durha

There is a durha named 'Peer Mohamed Oliyullah Durha' at Thuckalay named after the great philosopher Mohamed Appa, who was born in Tenkasi of Tirunelveli district. After spending sometime in spiritual pursuits in Peermedu of Kerala State he came and stayed at Thuckalay. Being a Tamil poet of great eminence, he wrote many books on philosophy. He had intimate relationship with the Kings of Chera dynasty. It is said that he laid foundation stone for the Padmanabhapuram Granite Fort. The Anniversary of the great philosopher poet is celebrated every year on a grand scale during the full moon day in the month of Rajap. Both the people of Kerala and Tamil Nadu attend the celebrations in large numbers irrespective of their caste, creed and religion.

Tirparappu Water Falls

The Kodayar makes its descend at Tirparappu and the water fall at this place is about 13km from Pechiparai dam. The river bed is rocky and about 300 feet. in length. The water falls from a height of nearly 50 feet. and the water flows for about seven months in a year. The whole bed above the falls is one rocky mass which extends up to a distance of about quarter of a kilometer upstream where the famous Thirparappu weir has been constructed for supplying water to the paddy fields. On the left bank of the river in between the waterfalls and the weir, there is a temple dedicated to Siva enclosed by strong fortification. The district administration has recently constructed a swimming pool for children over here which is very popular among the children.



Thirparappu water falls

Maruthuva malai

The Maruthuva malai also known as the Marunthu Vazhum Malai the abode of medicinal herbs, forms part of the western ghats. According to tradition, the Maruthuva malai is a fragment of the Sanjeevi mountain, a piece of which fell down here, and it was carried by Hanuman from Mahendragiri to Sri Lanka for healing the fatal wounds of Lakshmana, the brother of Rama, the epic hero. It stretches for more than a km reaching a height of 800 feet. at the highest point. It is about 11km from Nagercoil.

Chitharal

Chitharal is a small village situated at a distance of 7k m from Marthandam and 45 km from Kanyakumari. It is famous for the rock-cut temple. Hillock at Chitharal has a cave containing Rock-cut sculptures of Thirthankaras and attendant deities carved inside and outside dating back to 9th Century A.D. It was converted into Bagavathy Temple in the 13th Century A.D. Cars and Vans can go upto the foot of the hill. One has to walk for about 10 minutes to reach the temple. The Jain images have been preserved by Central Archeological Survey of India

Muttom beach

The famous beach at Muttom is located about 16 km from Nagercoil and 32 km from Kanyakumari. Muttom is famous for its beautiful landscaping and high rocks dipping into the sea at the beach-side. The sun set view point at Muttom is one of the most Panoramic view points in the district. Another attraction of Muttom is the century old light-house built by the British. However so far this beautiful beach has always been

unsafe for the tourists since the rocks on which tourists go to see the sea view are slippery and a number of fatal accidents have occurred over the past few years. The district administration, decided to put protective stainless steel fencing across the entire dangerous areas and also to put up small open huts at the rock tops for the tourists to sit and watch the massive sea waves leisurely with protection from sun and rain. The fencing work and the small huts have already been completed to the delight of the tourists who mob the beach in hundreds during week ends. Sitting benches have also been constructed in a circle for the elders to chit-chat, relax and enjoy the sun set. Seeing the response of the tourists, the district administration has sanctioned for the construction of a toilet complex, a small shopping complex and a children's park at a cost of Rs.11.60 lakhs and there are plans to undertake sculpture - works across the rocks to add to the ambience of the area.

Sanguthurai beach

Sanguthurai is a beautiful beach resort and is very convenient for the local population of Nagercoil. It is only about 10 km from the town. Unfortunately no infrastructure facilities were available in this beach. The district administration has now sanctioned a project for putting up a children's park, seating facility, open huts (Kudils) with Terracotta roofs and lighting facility at the beach at a cost of Rs.6.00 lakhs. The entire work has been completed. It is also proposed to put up a few shops for Women Self Help Groups at the site, which can provide eatables to the tourists at the beach side.



Sanguthurai beach

Vattakottai (circular fort)

Vattakottai, a granite fort 6km north-east of Kanyakumari cape, forms the terminal of a line of ramparts known as the South Travancore lines built by Marthanda Varma to serve as defence for Nanjil Nadu. It is rectangular in shape and covers an area of about three and a half acres. The fort is enclosed by walls of 25 to 26 feet. high, including the parapet, 29 feet. thick at the front, 18 feet. at the corners and 6 ft. at the rear. The portion running into the area is the most strongly built under the orders of De Lannoy during the reign of Mathandavarma (1729-58). About 1810 A.D. the British forces under the command of St. Leger marched into Nanjilnad through the Aramboly pass and demolished the defence lines. The small river by the side of the fort, and the green vegetation all around add to the scenery of the fort and has now become a holiday resort and picnic centre.

It is said that there is a subway or tunnel about four feet. width, supposed to connect the Padmanabhapuram palace. Now the tunnel has been closed. On the northern side of the fort is found a slop to bring the canon from the lower to the upper part of the parapet of the fort. There is well of about 6'

diameter. The whole wall around the fort is repaired and fresh mortar has being applied. Literary or epigraphical evidences are not in store to know much about Vattakottai. However, from the evidence left by the fort itself, it may be presumed that this fort was the military base to protect the Kumari port which was a rich pearl harbour. Since the emblem of the Pandya Kings was 'Fish' and we find this emblem in some of the places of the fort, it can be safely concluded that the Pandya Kings had control over this fort for some time.

Next to Vattakottai, we can see the traces of a light house in Leepuram being called so after Colonel Lee who has destroyed most of the Kadukkarai Kanyakumari Fort in 1806. This is a picnic spot; the sea is calm and suitable for bathing.

Chothavilai beach

This beach situated at about 10 km from Kanyakumari, is one of the best natural beaches of the district. The beach has shallow water and high sand dunes on the back ground. The district administration has through its own funds and through the funds of MPLAD scheme, put up rest shelters, kudils and a view tower over here for the benefit of tourists. The tourists can reach the beach through the newly laid coastal road

which is a very beautiful drive along the sea-coast.

Ulakkai aruvi

Ulakkai aruvi is a natural waterfall situated in Azhagiapandipuram village of Thovalai taluk. Water is available in this water fall in the summer season. Many tourists come here for bathing and to enjoy the nature. The pathway to this waterfall lies in the reserve forest.

Mukkadal

This is a natural dam constructed by T. Chitirai Maharaja. It supplies water to Nagercoil municipality and it is also proposed to get water from here for Suchindrum and Kanyakumari. It is a very picturesque spot and ideal for picnics by groups.

viii) Biodiversity (mangroves/corals/sea grass/important flora and fauna)

Manakudy estuary is formed by the confluence of river Pazhayar in between east and west Manakudy village. There is a well established mangrove forest in one of the mud flats of the Manakudi estuary. Three important small – scale industries are well established on the banks of this estuary.

3. Impacts

i) Urbanization (municipal solid waste dumping / sewage etc)

No information available.

ii) Industrial development (effluent discharge / pollution – air water land etc)

No information available.

iii) Thermal power generation (hot water discharge)

No information available.

iv) Natural hazards (erosion / accretion / sea level rise/ climate impact)

No data available regarding the natural hazards in the coastal areas of this district. However, it is obvious that erosion, accretion, sea level rise and the impacts of climate change are no different from other districts.

v) Rare earths mining (garnet etc.)

No information available.

vi) Natural disaster prone areas (tsunami / cyclone / floods)

Kanyakumari district was one of the worst affected districts in India during the tsunami that ravaged the coasts of various countries in South and South East Asia, on 26 December 2004. There were nearly 900 deaths and several hundreds missing and injured. Social organizations from several countries and the Government have since been working on rehabilitating the affected people and property.

1. Government initiatives

i) Initiatives to improve fisher folk livelihood (schemes for education / health)

Under the fisherman free housing scheme, Tamil Nadu government has allotted 2487 houses in different coastal villages of Kanyakumari district. When detailed analysis was made from previous records (of census report from Director of Fisheries) it was evident that in housing, an improvement could be noted. During 1982 there were only 184 terraced houses with sanitary facilities in nine villages (Periavilai,

Azhikkal, Maramadi, Kodimunai, Kurumbanai, Kadiapattinam, Melakurumbanai and Eraviputhenthurai).

Now in these villages additional 470-terraced houses have been built. This indicates awareness among fisher-folks of having better living places. Another survey in Kovalam village shows that concrete houses have gone upto 56% of the total houses of the village. But in this village the fisher-folk have had no government help.

ii) Coastal protection initiatives (bio shields / sea walls etc.)

Neerodi

This stretch of the coast from Neerodi colony to Erayamunthurai, is situated in the west coast of Tamil Nadu state. A number of dwelling units just close to the coast are facing threat of erosion. The width of the beach along this stretch of the coast is about 30 m and gets washed away during the South-West (SW) monsoon leading to the entry of seawater occasionally into the dwelling units. It is observed that the beach slope in this stretch is quite steep. An existing sea wall for a length 1km is in a collapsing stage.

Marthanduthurai

The stretch of the coast from Neerodi colony to Erayumanthurai covering a total distance of about 8 km has already been protected by a seawall which has sunk.

Chinnathurai

The seawall constructed by PWD based on the design of IIT Madras, is found to be intact with the beach width of about 15 m in front of the seawall. The top of the seawall is found to be effectively used by fishing community for drying fish.

Erayumanthurai

This hamlet is located on the eastern side of the confluence point of the river Kulithuraiaar. Here it is recommended that the existing seawall should be stabilized or replenished, in particular Poothurai and Erayumanthurai which got affected due to tsunami. Also, it is further recommended to fill the gaps between the seawalls as it is reported by the local public that these gaps allowed the water during tsunami to enter into the land which caused damage. It is to be recalled that the existing depleted seawall has to be rehabilitated including the raising of the top level to +5.35 m above MSL similar to that in Vallavalai.

Enayam

The beach formed on the eastern side is being used for parking the boats. The western side of this groin has a number of dwelling units very close to the shoreline facing a constant threat due to the progressive ocean waves. The seawall constructed is not effective in protecting the coast. The groin under construction, as per the local people, has saved the village on its lee side during tsunami. Because of the presence of this groin, the propagation of tsunami on its western side must have been attenuated, and hence there was no damage to dwelling units adjacent to the shoreline. A distance of 1 km on the west of this groin has to be protected by groin field consisting of 6 short transition groins with an average length of 75 m.

Vaniyakudi

The PWD has already completed two groins as per the suggestions of HTM. It is to be mentioned that the six groins constructed by PWD in this stretch of the coast is not only serving as an effective protection measure, but also created a wider beach. In addition, it has acted as a great relief against tsunami saving about four villages. During a

number of site visits IITM has suggested to connect a few outcrops in between the groins G5- G6 and G7-G so as to serve as an additional groin. It is still pending with the PWD.

Colachel Jetty

The beach is found to be very flat on either side of the jetty. The beach can be used for plantations. A pair of groins with a crest elevation of about 6.0 m from MSL locally called as thoondil valaivu can serve as a protective measure against severe waves particularly during cyclones and natural hazards. This proposal will also serve as a landing facility for boats and catamarans. The existing jetty can more effectively be used if the above proposal is implemented. The length of the coast that should be covered under this proposal will be about 1km.

Kottilpadu Colachel

This is one of the worst affected villages in Kanyakumari district during tsunami of and has resulted in a number of casualties about 200. About 4 rows of houses collapsed.

The local public have reported that the canal, which is running parallel to the shoreline has acted as a death trap, as the people trying to escape from the attack of the tsunami should have got drowned as the number of bridges or escape routes available are less. This area needs to be protected against wave run-up during cyclone and tsunami. Local people are strongly recommended to move on to the landward side of the canal. This has to be treated as the most urgent strategy.

Kadiapattinam

This stretch of the coast lies at the confluence point of the river Valliar. It is proposed to construct two groins as training walls for this river mouth. The existence of

natural outcrops if supplemented by rock fill to serve as groin should be considered.

Keezhamuttam

Plantations are recommended on the east of Muttam stretch consisting of Pillathopputhurai, Melathurai and Alikkal. The crest of the seawall and land along this stretch is at same elevation. During monsoon, overtopping is reported by the local people.

Stretch from Pozhikarai to Mezhamanakudithurai

A distance of about 9 km from Pozhikarai to the western tip of Palayar river should be protected by 8 groins with an average length of about 200 m each of which would extend upto a water depth of 1.5 to 3 m. The groin on the western and eastern tip of this river mouth will have groins extending up to a water depth of 5 m in order to avoid siltation near the mouth of river Palayar.

Pallanthurai

The beach which is formed, where the catamarans are parked is temporary in nature, as it gets eroded during the monsoon months. It is found that the land is at a lower elevation. It is recommended to raise the crest elevation of the seawall by 2 m. Further, two groins are recommended. The average length of the groins will be about 300 m. These two groins will act as protective measure only for the Pallanthurai stretch against erosion. Also, it is recommended to immediately stop the sand quarrying at this stretch.

Mezhamanakudithurai

Plantations are recommended for this stretch for upto a distance of 2 km.

Palayar river mouth

This village was badly affected during the tsunami. The existing seawall, near the mouth of river Palayar is not stable as there is considerable erosion at the tip of the seawall. As damages to property and life are quite severe in this village, it is suggested that all arrangements should be made to relocate the dwelling units. Failing to do so, the groin field which is recommended in the next section should be associated with strengthening of the existing seawall with its crest elevation raised to + 5.35 m from MSL. Also the gaps in between the existing seawalls should be filled up.

Keezhamanakudithurai

This village is located on the eastern side of the river Palayar. The existing seawall is completely disturbed. A number of dwelling units and churches got damaged. Hence, a groin field for upto distance of 1.5 km is recommended. Further, it is also recommended to raise the crest elevation of the existing seawall by 2 m. Western side of the Palayar river will be protected with groins and the eastern side of this river with 3 groins with a total average length of 200 m excluding the training walls.

Ratchagan street

This site is already protected by a series of 7 short groins. In order to achieve the required tranquility, it is proposed to extend the groins G1 and G5. Necessary rehabilitation to the existing groins which are disturbed due to tsunami is recommended.

Vaavuthurai

This is located on the western side of the Ratchagan street. This stretch is characterised by the presence of fishing hamlets. Hence, in order to protect the dwelling units along this stretch a seawall is recommended.

iii) Awareness initiatives (tsunami / CRZ issues)

Various awareness creation activities have been made among the fisher folk about tsunami and CRZ issues by different Government and Non Government organizations. Attempts have been made to develop bioshields, rebuild livelihoods, and reclaim soil in the tsunami affected agricultural fields in Kanyakumari district.

iv) Biodiversity (coral, mangrove conservation and restoration)

No information available.

v) Other initiatives taken by private sector

No information available.

5. Summary / Conclusion

- Kanyakumari is the southern most district of Tamil Nadu is bound by Tirunelveli district on the North and the east. The south eastern boundary is the Gulf of Mannar. On the south and the south west, the boundaries are the Indian Ocean and the Arabian sea. On the west and north west it is bound by Kerala.
- With an area of 1672 sq.km. it occupies 1.29% of the total extent of Tamil Nadu.
- The administrative profile of Kanyakumari district comprises 4 taluks, 18 firkas and 188 villages.
- Unlike other district in Tamil Nadu, it has a rainfall both during the south west and the north east monsoons.
- Soil in the district is mostly of the red loam variety. However on the sea coasts, the sandy type of soil prevails and, near the mountain ranges, gravelly soil is generally seen.
- This district produces paddy, tapioca and oilseeds such as groundnut and

coconut besides commercial crops like cashew, rubber, fruits and spices.

- The Forests in Kanyakumari district is verdant and virgin forests are said to be of 75 million years old.
- Of the total district area of 167130 ha. government forests occupy an area of 50486 ha. which comes to about 30.2 % the total District geographic area.
- Garnet sand, illmenite sands, salt and gypsum are the main minerals resources of this coast
- The major river in the district is Thamirabarani river locally known as Kuzhithuraiar. This river has two major tributaries with the Pechiparai dam and Perunchani
- The coast lengths of this district is 68 km. in length and is studded with 44 coastal fishing villages.
- Manakudy estuary is formed by the confluence of river Pazhayar in between east and west Manakudy village. There is a well established mangrove forest in one of the mud flats of the Manakudi estuary.