

Geography Notes Part 14

Tamil Nadu

Tamil Nadu, a state in southern India, is bordered by Puducherry, Kerala, Karnataka and Andhra Pradesh. The state, lying on the southern tip of the Indian peninsula, is surrounded by the Bay of Bengal in the East, Indian Ocean in the south, Kerala in the West, Karnataka in the North West and Andhra Pradesh in the North. The native language spoken here is Tamil which has become the official language with effect from January 14, 1958. It is the sixth most populous state of India and a leading producer of both agricultural and industrial products.

The state extends latitudinally between $8^{\circ}4'$ North and $13^{\circ}35'$ North and longitudinally between $76^{\circ}18'$ East and $80^{\circ}20'$ East. The state of Tamil Nadu is a triangular landmass in shape. It is the eleventh largest state in India by area (about the size of Greece)

Tamil Nadu is one of the most urbanized states of India. It is a home to many natural resources, rare flora and fauna, cool hill stations, grand Hindu temples of Dravidian architecture, beach resorts, multi religious, pilgrimage sites and few **UNESCO** World Heritage sites. It is one of the foremost states in the country in terms of overall development.

Administrative Division

Total area of Tamil Nadu is about 1,30,058 sq.km., which is 4% of the total land area of India. For the purpose of administration, the state has been divided into 32 districts. The following table gives the list of the districts.

Table: Districts of Tamil Nadu

S.No	District	S.No	District
1)	Ariyalur	17)	Pudukkottai
2)	Chennai	18)	Ramanathapuram
3)	Coimbatore	19)	Salem
4)	Cuddalore	20)	Sivagangai

5)	Dharmapuri	21)	Thanjavur
6)	Dindigul	22)	Theni
7)	Erode	23)	Thiruchirappalli
8)	Kancheepuram	24)	Thirunelveli
9)	Kanyakumari	25)	Thiruvallur
10)	Karur	26)	Thiruvannamalai
11)	Krishnagiri	27)	Thiruvarur
12)	Madurai	28)	Thuthukudi
13)	Nagapattinam	29)	Triuppur
14)	Namakkal	30)	Vellore
15)	Nilgiris	31)	Villupuram
16)	Perambalur	32)	Virudhunagar

Know the facts



State Bird: Emerald Dove



State Flower: Gloriosa Lily



State Animal: Nilgiri Tahr



State Tree: Palm Tree

The southernmost point of the Indian Union – “**Indira Point**” got submerged under the sea water in 2004 during the Tsunami.

Table: Local bodies of Tamilnadu

City Corporations	12
Municipalities	124
Town Panchayats	528
District Panchayats	31
Panchayat Unions	385
Village Panchayats	12524

History of Tamil Nadu

Tamil Nadu has a very ancient history that goes back to 6000 years or so. Though the state is a home for Dravidian culture, it also acquired Aryan culture almost a thousand years ago. It is regarded as the cradle of Dravidian culture with its cultural gear speckled all across the state in the form of magnificent temples, gateways, intricate carvings, and the society steeped in tradition.

Sangam or the Institute for the growth of Tamil language existed in three phases. The first one was at Madurai devastated by the sea, the intermediary one was at Kapadapuram and the third one seated at Madurai. The Tamil language with its grammar Tholkappiyam belongs to the last sangam period. Classic works like Ettuthogai and Pathuppattu also belonged to the sangam period.

In his work Thirukkural, Thiruvalluvar has not mentioned any religion, country or people. It contains universally acceptable ideas and thoughts and is regarded as a renowned piece of world literature. Thiruvalluvar is often portrayed as a holy saint of Tamil Nadu. Tamil which has obtained the semmozhi status is now one of the eight classical languages of the world.

Tamil Nadu was once the home of four Tamil Kingdoms, namely, Chera, Chola, Pandya and Pallava. Their period was known as the golden age of Tamil Nadu during which art, music as well as trade and agriculture reached their peak.

The first Tamil printing press was established at Tarangambadi in Nagapattinam district by the Danish missionaries.

Geography Notes Part 15

Physiography of Tamil Nadu

Tamil Nadu has a unique physiography. The hills of the Eastern and Western Ghats surround Tamil Nadu to the Northwest and West, the Bay of Bengal is found to the East and the Indian Ocean to the South. In general, the physiography of Tamil Nadu is a high land which has uneroded, western ghats on the west and low lying coastal and river plains on the east.

Physiography of Tamil Nadu

Geographically Tamil Nadu may be divided into four physical divisions

- 1) The Hilly region (Western Ghats and Eastern Ghats)
- 2) The Plateau
- 3) The Plain and
- 4) The Coastline.

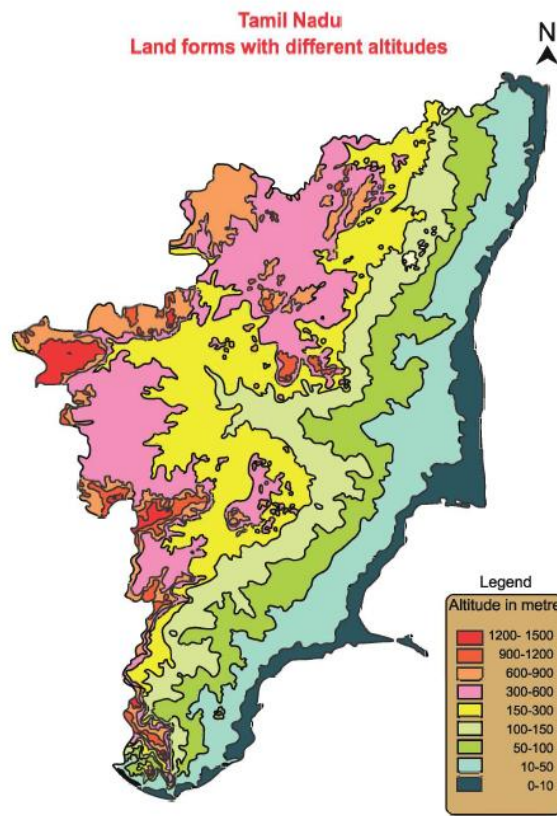
The Hilly regions of Tamil Nadu

The Western Ghats enters the state through the Nilgiris District and runs up to Kanyakumari district. The Western hilly region is much more complex than the Eastern Ghats. Its average height is from 1000 m to 1500m. the Western Ghats has mountain peaks namely **Doddabetta (2637m)** and **Mukuruthi(2540 m)**. In the north west of Western Ghats lies the Nilgiri highland region at an height of above 2500 m. In this region, there are few peaks found at a height ranging from 1800 m to 2400 m. The highest peak of Tamil Nadu is Doddabetta. Ooty, Queen of hill station is situated in Nilgiris. The Western Ghats and Eastern Ghats meet at the **Nilgiri hills**.

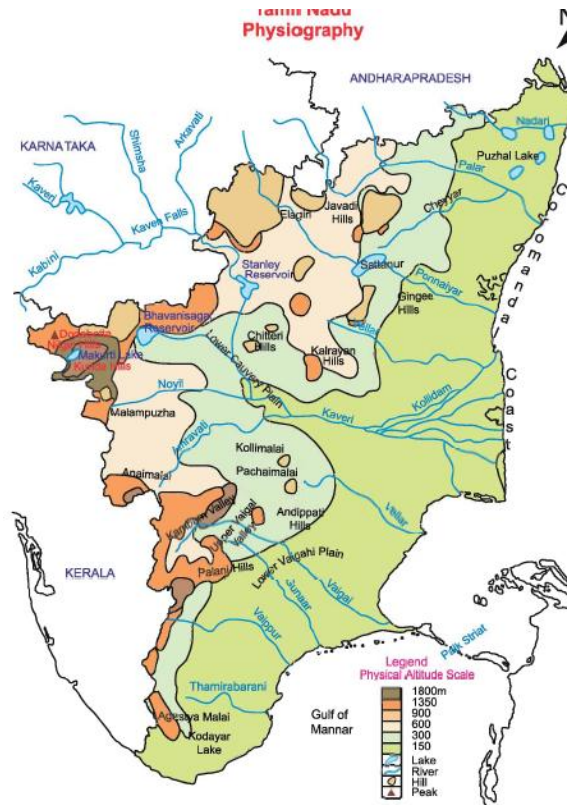
From the Nilgiris of Tamil Nadu and Anaimalai hills of Kerala, an offshoot runs at a height of 1500m to 2000 m in the east. These are called **Palani hills**. To the south of the Palani hills there are two other ranges namely, **Varshanadu** and **Andipatti** hills running parallel to the Cardamom hills. Though the Western Ghats is a continuous range, it has a gap of 25km at Palghat. To the south of Palghat gap, hills such as Andipatti, Elamalai and Agathiya malai are found. Kambam valley is between Thekkadi hills, Varshanadu hills and Kodaikanal hills. This Valley is considered as the green valley of Tamil Nadu. The gap in between Varshanadu hills and Agathiya malai is called the **Shenkottai pass**.

The Tamil Nadu hills separating, the plains and the plateaus have two well marked passes, namely, the **Attur pass** in the south and the **Chengam pass** in the north. This pass links the Cuddalore and Villupuram district in the plain with the Salem district on the plateau. The Plakkad gap and Shenkottai gap are the only breaks in the long chain of hills that border Tamil Nadu on the west. The Eastern Ghats are not continuous when compared to the Western Ghats. They are dissected into isolated hill ranges extending from northeast to southwest through the districts of Vellore, Dharmapuri and Erode. The average elevation ranges from 1100m to 1600m.

Tamil Nadu Land forms with different altitudes



Tamil Nadu Physiography



These hillocks are called by different names in different areas, such as;

- 1) Javadi Hills and Elagiri Hills in Vellore District;
- 2) Shervarayan in Salem District;
- 3) Kalvarayan in Villupuram District;
- 4) Pachaimalai in Thiruchirappalli District;
- 5) Kolli hills in Namakkal District; Chitteri hills are in both Dharmapuri and Salem Districts;
- 6) Gingee hills in Villupuram District;

The highest hills of Eastern Ghats – Shervarayan (1500- 1600m).

The highest hills of Western Ghats- Anaimalai (2700m)

Plateaus of Tamil Nadu

The Eastern and Western Ghats meet at Nilgiris plateau. Four km from this plateau, it slopes gently downwards to about 1,800 m towards Coimbatore. It extends from the Nilgiris to Dharmapuri plateau or Baramahal plateau and lies to the west of Shervaroy uplands. This plateau is found with extreme abruptness on all sides. The Baramahal plateau in Dharmapuri district is at

an elevation of 300 to 700m which merges with the Mysore plateau in the west. The elevation of the plateau increases from east (120m) to west (300 to 450m). Plateaus of Tamil Nadu can be grouped into two as Coimbatore plateau and Madurai plateau. In between the plateaus isolated hills are also seen. One such isolated hill is Chennimalai of Erode district.

Plains of Tamil Nadu

Plains of Tamil Nadu can be classified into two as coastal plains and rivers plains. The coastal plains of Tamil Nadu extend to a length of 1000 km from Pulicat lake in the North to Kanyakumari in the South and have an average height of 50 metres. The notable beaches found here are the Marina and Rameshwaram beach.

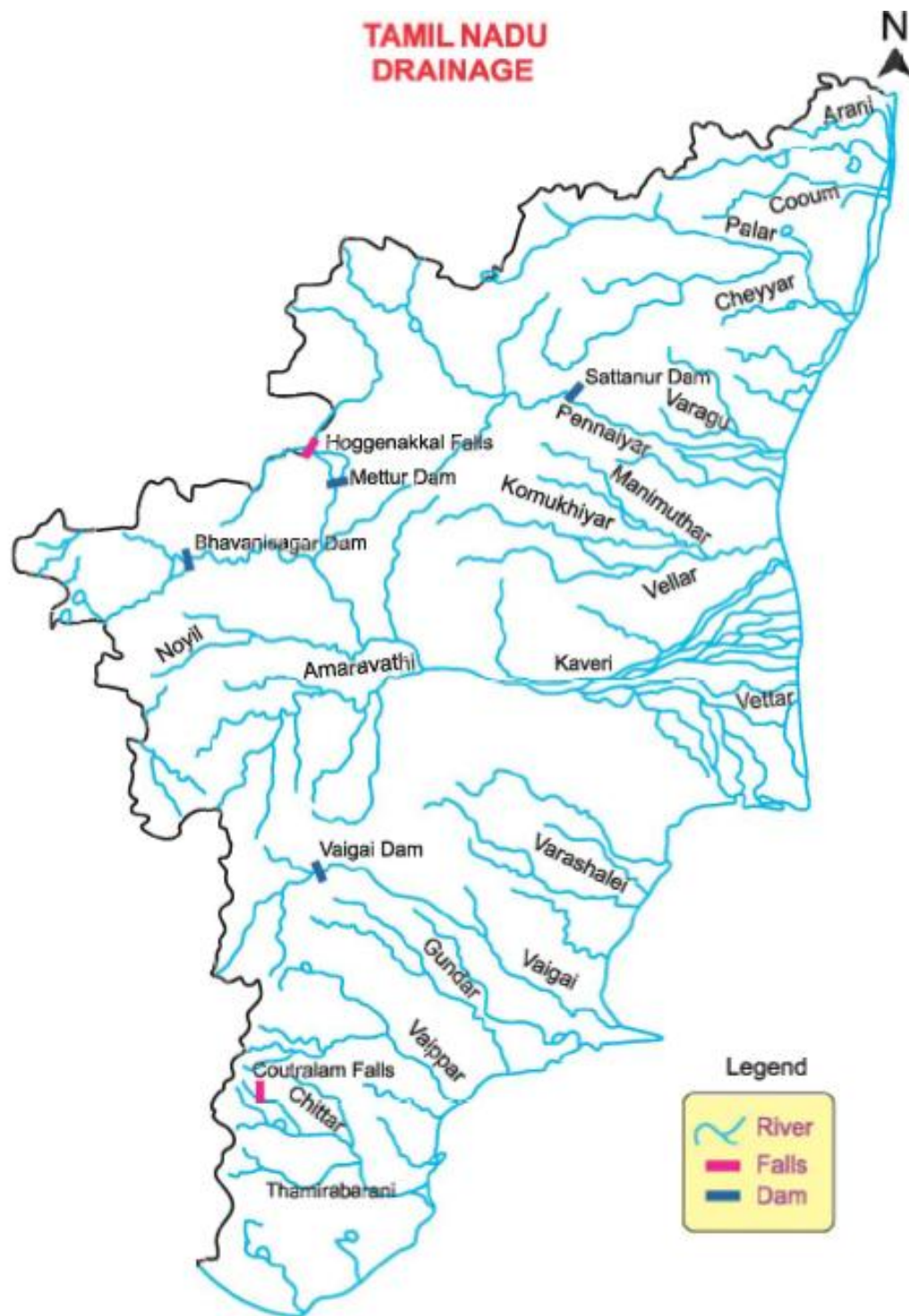
Marina Beach

Marina beach is the second longest beach in the world. It extends upto a distance of 13 km and it is one of the major tourist attractions of Chennai.

Rameswaram Beach

The beach of Ramswaram is famous for its beautiful coastal features. The sea waves rise to a maximum height of only 3 cm and the view looks like a very big river.

The coastal plains of Thiruvallur, Kancheepuram, Cuddalore and Villupuram are together known as the **Cholamandalam plains**.



The river plains in Tamil Nadu are formed by the rivers Palar, Cheyyar, Pennar and Vellar in the north; Kaveri and its tributaries in the central region, Vaigai, Vaippar and Thamirabarani in the south.

Rivers of Tamil Nadu

The Northern rivers of Tamil Nadu are Araniyar, Kotralaiyar, Palar, Cheyyar, Kedilam, Manimuthar and Thenpennar. Cheyyar and Agaram are two tributaries of Palar. The main river of the state is Kaveri which originates in Kodagu district of Karnataka. Kaveri and its tributaries in its lower course drain the districts of Nagapattinam, Thanjavur, Thiruvarur and Thirucharapalli. The Kaveri, the Kollidam and the Vellar jointly drain central part of the Tamil Nadu. Srirangam is located between Kaveri and its tributary Kollidam.

In the Kaveri delta, the distributaries such as Kollidam, Manniyar, Vennar, Vettar, Arasalar, Nattar, Mudikondan. Kudamuruti and Veera Cholanar have formed a alluvial plain in a quadrangke shape. Kaveri along with its tributaries, Bhavani, Noyyal, Moyar and Amaravathi is the most important source of canal irrigation. Towards the south of Tamil Nadu, there are few rivers like Vaigai(Madurai), Vaippar (Virudhunagar), Thamirabarani(Thirunelveli), Gundar (Thoothukudi, Ramanathapuram), Chittar (Thirunelveli) and Kothaiyar (Kanyakumari). Most of the soils of the plains of Tamil Nadu are alluvial, formed by these rivers flowing eat. In the southwest of Tamil Nadu is the Suruliyar river that drains a part of Madurai district.

Geography Notes Part 16

Climate of Tamil Nadu

Physiography, nearness to sea and geographical location determine the overall climatic conditions of any region.

Weather refers to the state of the atmosphere over an area at any particular point of time.

Climate refers to the average weather conditions and variations over a large area in a long period of time (more than thirty years).

The major climatic elements are: temperature, pressure, wind, humidity, clouds and precipitation.

Tamil Nadu has **tropical climate**. Two factors namely, the apparent position of the Sun and the monsoonal rain bearing winds influence the climatic conditions of Tamil Nadu. The vertical rays of the Sun fall on the state twice in a year.

Though Tamil Nadu lies in the tropical region, the local weather conditions such as temperature, humidity, clouds and wind direction along with the wind speed, change the climatic conditions to a greater extent. This is the region of climatic variation that exhibits the influence of the coastal and the interior locations.

The temperature of the state starts increasing in the second week of February and gradually increases in the months of March to June. The hottest part of the summer season is known as **Agni Nakshatram** (Star of Fire) or **Kathiri veyyil**. The decreases of temperature is from the second week of June to the first week of October. The month of October is the season for the retreating or northeast monsoon. From then, the temperature starts to decrease up to the month of February. In Tamil Nadu, May is the hottest and January is the coldest month. Though this is the general situation, the overall climatic condition varies among mountainous regions, plateaus, coastal and interior plains. The following table explains it clearly.

Table: Region-wise seasonal average temperature

S.No	Geographical Locations	Weather recording stations	Temperature in Celsius		
			Summer season	Winter season	Rainy season
1	Coastal regions	Chennai	40 ⁰ C	22 ⁰ C	25 ⁰ C
2	Interior Plains	Vellore	42 ⁰ C	21 ⁰ C	22 ⁰ C
3	Inland regions	Thiruchirappalli	42 ⁰ C	20 ⁰ C	23 ⁰ C
4	Hilly regions	Kodaikanal	11 ⁰ C	6 ⁰ C	14 ⁰ C
5	Plateau	Coimbatore	32 ⁰ C	26 ⁰ C	21 ⁰ C

The relative humidity in the state is found to be higher in winter when compared to summer. The average humidity of the air is about 68% in the month of May, whereas it is 82% in January. The rate of evaporation is higher during the summer than in the winter the state possesses thick rain bearing clouds in the months of October, November and December.

Table: Major Seasons of Tamil Nadu

Seasons	Tamil Name	Tamil Month
Summer (April to August)	Illavenil Muduvēnil	Chitirai, Vaikasi Aani, Aadi

Rainy (August to December)	Khar season Khulir	Avani, Puratasi Iypasi, Karthigai
Winter (December to April)	Mun Pani Pin pani	Markhazhi, Thai Masi and panguni

The rainy seasons of the state may be grouped into three

- 1) South West Monsoon
- 2) North East Monsoon
- 3) Cyclonic Rainfall

Southwest monsoon

The southwest monsoon occurs between June and September. The districts that are benefitted by this season are the Niligris, Kanyakumari, western parts of Coimbatore, Dharmapuri and Salem. As the South-west monsoon starts its downpour of rain in the Western Ghats, the western parts of Tamil Nadu receive about 150 cm of rainfall on an average. Most of the Eastern and Central parts of Tamil Nadu become rainshadow region in this season. This occurs due to the south westerly direction. In general the amount of rainfall of south west monsoon decreases from west to east. The Nilgiris district receives about 70% of its annual rainfall followed by the Salem and erode districts. Kanyakumari district also receives sufficient amount of rainfall from this season.

The word monsoon is derived from the Arabic word ‘mausim’ which literally means season. Monsoon refers to the seasonal reversal in the wind direction between seasons.

Northeast Monsoon

The Northeast Monsoon season occurs between October and December. The coastal and interior plains of Tamil Nadu are highly benefitted by this rainy season. Normally, the Northeast monsoon rain is associated with cyclonic formation. In this season, the amount of rainfall decreases from east to west. Except Kanyakumari, all other interior south and western parts of Tamil Nadu receive less rainfall. Coastal districts such as Chennai, Cuddalore, Thiruvallur,

kancheepuram, Villupuram, Nagapattinam, Thiruvavarur and Thirunelveli districts receive about 150 to 250 cm of rainfall. Trichirapalli, Salem and erode receives about 100 to 150 cm of rainfall.

Cyclonic Rainfall

November is the month of cyclonic rainfall. The low pressure formations in the southern part of the Bay of Bengal intensifies and forms the cyclonic rainfall. An equal amount of rainfall is received from both the Northeast Monsoon and the Cyclonic rainfall in the coastal districts of Tamil Nadu.

On the basis of annual rainfall received, the districts of Tamil Nadu can be grouped into 5 rainfall regions. From the table given below it is clear that the coastal districts along with Nilgris falls under the very heavy rainfall region with an annual rainfall of more than 1400 mm. Among the districts, Kanyakumari is fortunate enough to receive rain from all the rainy seasons. Very low amount of annual rainfall is received by the Coimbatore and Tiruppur districts.

Table: Season wise percentage of annual rainfall

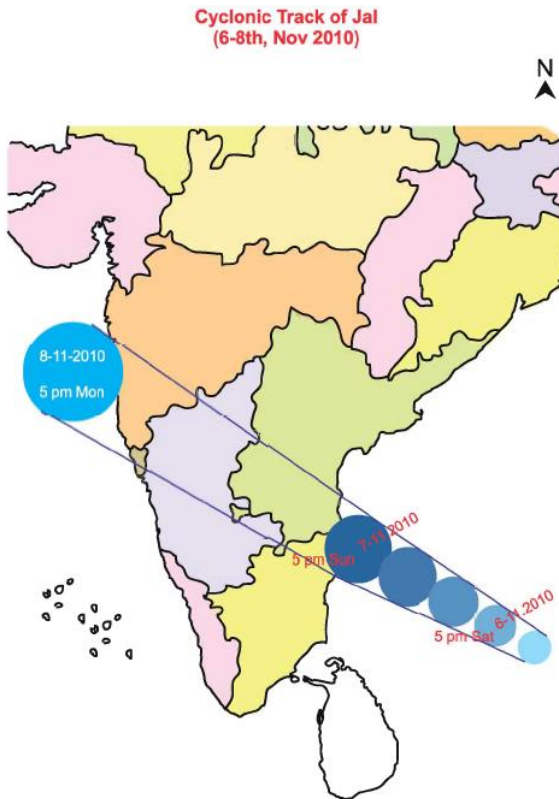
SI.No	Seasons	Annual Rainfall(%)
1	South west Monsoon	22
2	North East Monsoon	57
3	Cyclonic Rainfall	21

Table: rainfall Regions of Tamil Nadu Distribution of rainfall (2007-2008)

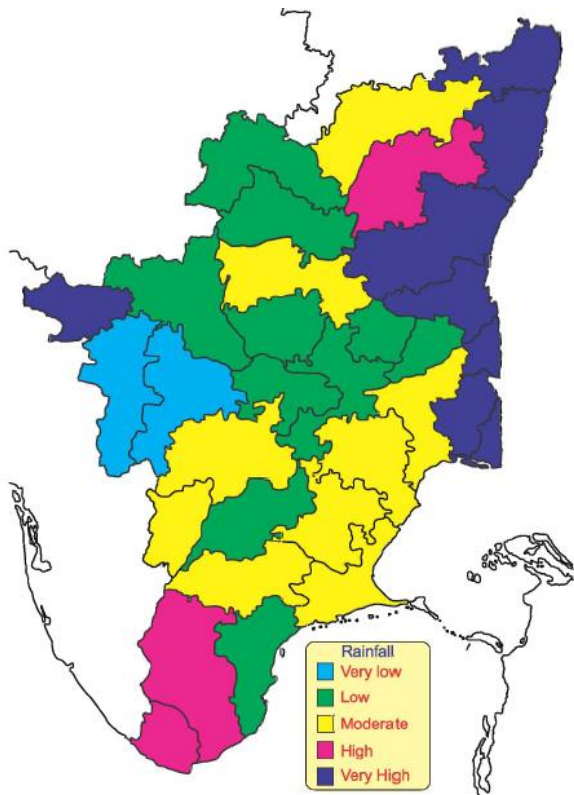
S.No	Distribution of Rainfall	Amount of Rainfall	District
1	Very low rainfall	Below 800mm	Coimbatore, Tiruppur.

2	Low rainfall	From 800 mm to 1000mm	Namakkal, Karur, Thuthukudi, Erode, Dharmapuri, Madurai, Thiruchirappalli, Perambalur, Krishnagiri.
3	Moderate rainfall	From 1000 mm to 1200mm	Pudukkottai, Viruthunagar, Sivagangai, Thanjavur, Salem, Ramanathapuram, Dindigul, Theni, Vellore.
4	High rainfall	From 1200 mm to 1400mm	Thirunelveli, Thiruvannamalai, Kanyakumari
5	Very High rainfall	Above 1400mm	Kancheepuram, Chennai, Villupuram, Thiruvallur, Thiruvarur, Cuddalore, Nagapattinam, Nilgiris.

Cyclonic Track of Jal (6-8th, Nov 2010)



Tamil Nadu District-wise Annual Rainfall(2007-2008)



Natural Vegetation

Vegetation that grows naturally without the effort of human beings is called **Natural vegetation**. Its growth depends upon the temperature, rainfall and type of soils.

According to the National Forest Policy, a region should have 33% of its land under forest. Unfortunately, Tamil Nadu has only 17% of its land under forest. In the state, forest are confined to the Western Ghats and the Hilly regions. Among the districts, the Nilgiris possesses the highest percentage of area under forest followed by Theni, Dharmapuri and Kanyakumari districts. In the coastal regions, the dry weather and poor soil allows only casuarinas tree to grow. Heavy rainfall regions show prominence of tropical evergreen forests. Javadi hills are noted for their fruit bearing trees and sandal wood.

Distribution of Forests

The distribution of forests among different districts of the state is very uneven. Concentration of forests is mostly on the hills of the western districts and in the Javadi group of hills in Vellore district. Dense forests are also seen in Salem district. More than half of the area in the Nilgiris is under forests. Other districts hold 1 to 5% of area under forests. Thanjavur being an alluvial plain is suitable for agriculture and it has less than 1% of forest cover.

The forests of Tamil Nadu have different types of trees. Most of the trees in the state shed their leaves in the dry season. Tamil Nadu has large areas of sandal wood plantations, about 5,88,000 hectares. Hard wood trees are available in the forests of Coimbatore, Nilgiris and Kanyakumari.

Trees that are used as fuel are found in Madurai, Coimbatore and Thirunelveli districts. Kanyakumari district has rubber plantations. In the Nilgiris, camphor and eucalyptus trees are grown under afforestation. In the foothills of the Western Ghats and parts of Thirunelveli and Virudhunagar districts, there are trees that are used for making matchsticks. The trees such as peepal, blue apples, jack fruit and gooseberries grow all over the state.

Types of Forests

The Natural Vegetation can be broadly divided into five different types.

They are:

- Tropical evergreen forests;

- Tropical deciduous forests;
- Thorny shrub forests;
- Mangrove forests and
- Hill forests.

Tropical evergreen forests

As the name implies forests are evergreen and they never shed their leaves in a particular season. Since the leaves are present always, they are known as the **evergreen forests**. Tropical evergreen forests are distributed in the regions of heavy rainfall (above 200 cm annual rainfall). These forests are found along the slopes of the Nilgris and Anamalai hills and the coastal areas of Tamil Nadu. The hard wood trees like **ebony, teak, rosewood** and **ironwood** are also found here. They grow to a height of 60m.

Tropical deciduous forests

These forests are found in the area having rainfall ranging between 100 and 200 cm per year. They are found on the eastern slopes of the Western Ghats. These are also called as **monsoon forests**. The trees of these forests shed their leaves to avoid the loss of moisture during dry season.

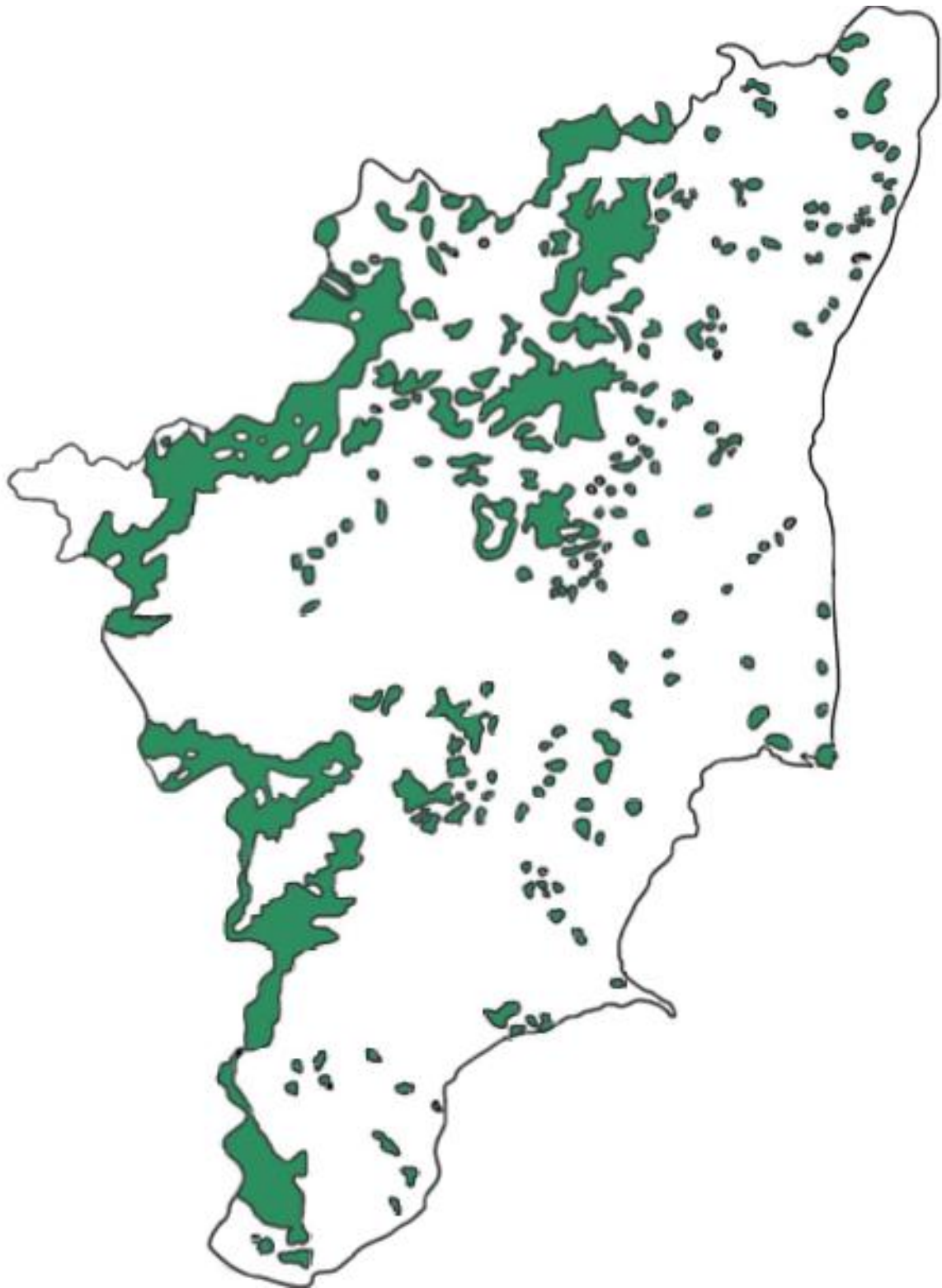
Trees of different varieties such as, tall and short, soft and hard woods are found in these forests. Some of them are **sal, sandal wood, teak, bamboo** and **paddock**.

Thorny shrub forests

Thorny shrub forests are found in the areas where there are long dry periods and low rainfall. This type of vegetation includes low, widely scattered trees and bushes. They are highly adaptive to dry conditions, with deep roots, thick stems and fleshy leaves.

Mangrove forests

Mangroves are found in the tropical and sub-tropical tidal areas, which have a high degree of salinity.



Mangrove trees grow along the estuaries and back waters. In Tamil Nadu, Pitchavaram, Kodikkarai and Vedaranyam, have mangrove or tidal forests. Pitchavaram has the largest swamp forest cover in the state. It is near the city of Chidambaram in Cuddalore district submerged under

the back waters of the Bay of Bengal. Here, thickly wooded islands of mangroves are found covering an area of about 1214 hectares. These forests also contain tropical evergreen trees and shrubs, belonging to the genus *Rhizophora*. In Pitchavaram mangrove forests are found in 25 km² and Kodikkarai the forests cover about 17km².

Hill forests

These forests are found along the hill slopes where the rainfall is heavy. In the hills of Anamalai and Niligris, different varieties of flora such as trees, shrubs, climbers and creepers are found, according to altitude.

Forest Product:

The forest products of Tamil Nadu may be divided into two: major and minor products.

Major products include timber and fuel wood. Timber is used for many purposes namely:

- Building construction;
- Making for furniture;
- Boat building;
- Plywood;
- Hard wood;
- Matches;
- Pulp;
- Paper industries;
- Packing boxes;
- Wooden toys;
- Pencils ; and
- Wood carving.

The minor products are bamboo canes, leaves, grasses, essential oils, medicinal plants, resins, gums, tanning materials, spices, dyes, beewax, honey, turpentine and lac. A large number of these products are used as raw materials for cottage industries while some serve as valuable articles of export.

Geography Notes Part 17

Resources of Tamil Nadu

Resources

The term 'resources' refers to the natural wealth available on the earth surface for the welfare of mankind. The surrounding environment contains many natural elements like rocks and minerals on and under the surface of the earth. Water is available in the form of lakes, rivers and seas. Living organisms like plants and animals are also present. These resources can be utilized for the betterment of a country's economy. Resources may be assessed on the basis of factors such as :

1. Types of resources; and
2. Characteristics of resources.

Resources have three main characteristics: utility, quantity (often in terms of availability), and consumption.

Natural resources

Natural resources are essential for our survival, to satisfy human wants and needs. It may be classified in different ways.

On the basis of origin, resources may be divided into two: **Biotic** and **Abiotic**.

Biotic Resources

Biotic resources are those obtained from the biosphere. Forests and their products, animals, birds and their products, fish and other marine organisms are examples of the biotic resources. Minerals such as coal and petroleum are also included in this category because they are formed from the decayed organic matter.

Abiotic Resources

Abiotic resources comprise of non-living things. Examples are land, water, air and minerals such as gold, iron, copper and silver.

On the basis of availability, resources are classified into two groups are **Renewable** and **Non-renewable resources**.

Renewable resources

Renewable resources are those which can be replenished or reproduces without getting depleted or exhausted. Examples of these resources are light, heat and energy from the sun; wind energy; water from lakes, rivers and seas and the soils from the earth's crust.

Non-renewable resources

Non-renewable resources are those which are formed over very long geological periods and are certain to be exhausted in course of time. Example: Coal, oil and other minerals.

Resources are finally divided on the basis of their origin. These include;

- Land resources;
- Soil resources;
- Mineral resources; and
- Water resources.

Land resources

Land is a basic resource as it satisfies the day-to-day requirements of human beings and animals that are obtained from the land. Human beings obtain their basic necessities of food by cultivating the land. Land is also used for a variety of purposes. It is mainly used for construction activities of houses, industries, roads and railway lines. Apart from this land is also under forests and grasslands. Forest provide valuable timber while grasslands provide fodder for animals. As far as the land resources of Tamil Nadu is concerned, its land resources are classified into 9 land use types and are presented in the diagram given below. Among the districts of Tamil Nadu, Erode holds the largest share (10%) of forests, followed by Krishnagiri(9.6%), Dharmapuri(7.7%), Thiruvannamalai(7.2%) and Vellore(7.1%).

Barren lands are more in the districts of Villupuram, Theni and Salem. Ninety percent of the land in Chennai is utilized for non-agricultural uses such as residential and industrial uses. Non-agricultural land use is also predominantly found in the districts of Thiruvallur, Kancheepuram, Villupuram and Pudukottai. Area under current fallow is more in Coimbatore and Erode districts whereas Thirunelveli district has more area under other fallow lands.

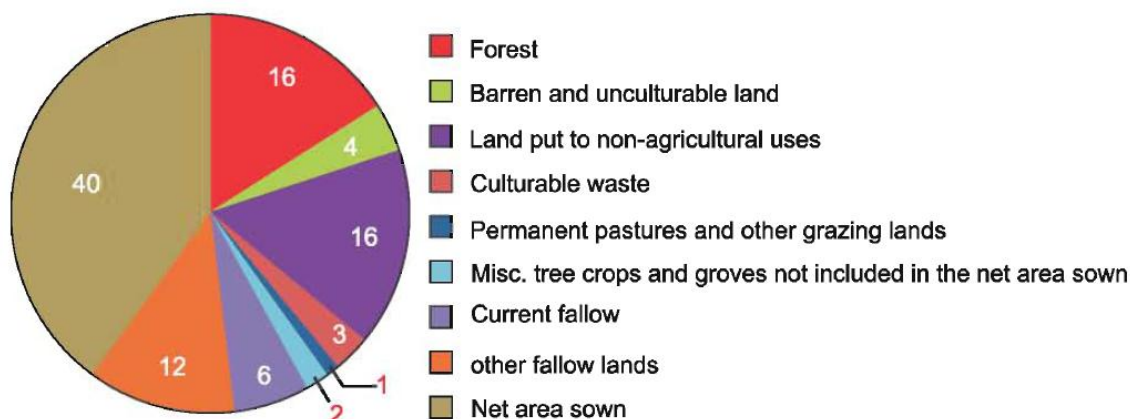


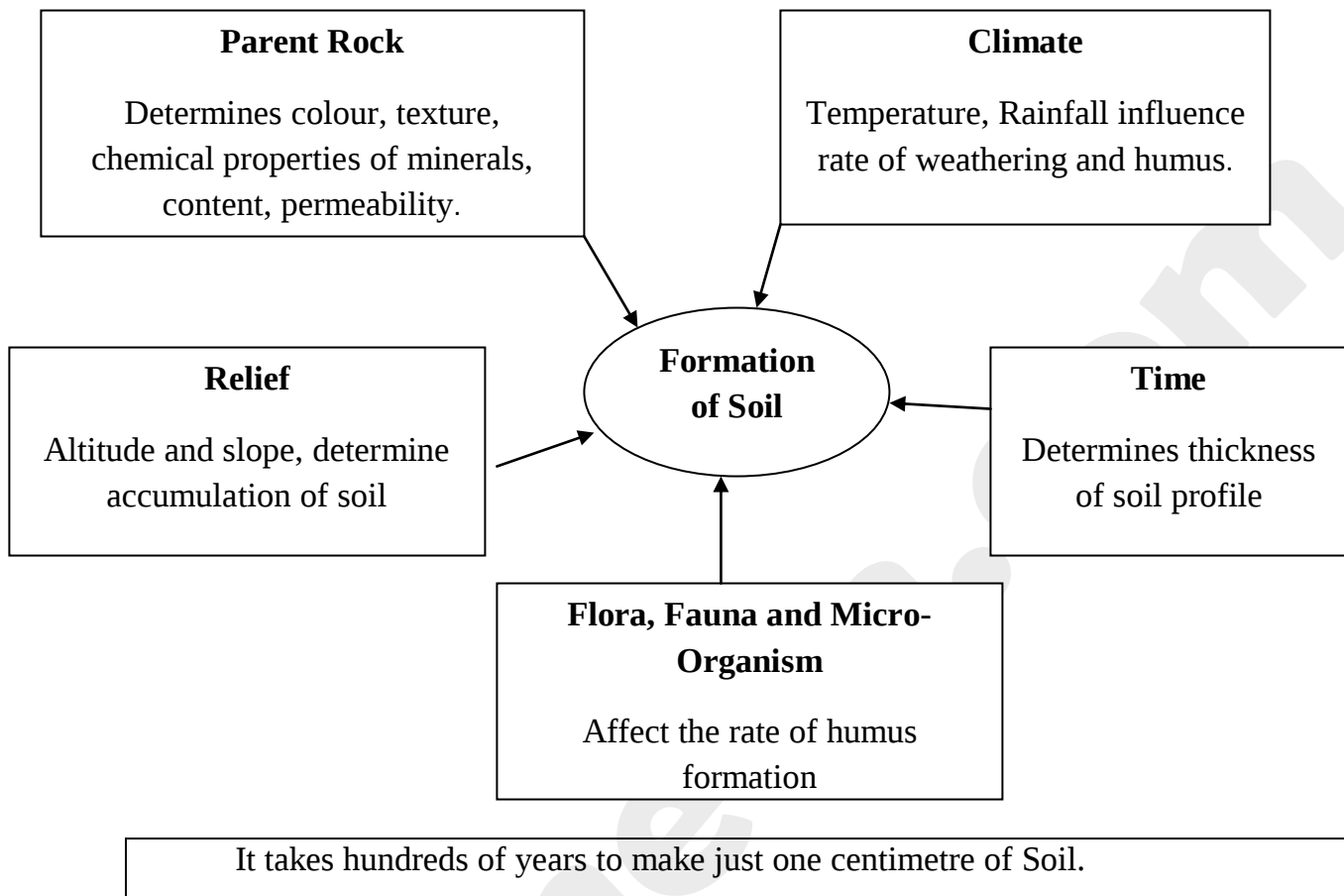
Table: Land use categories of Tamil Nadu

S.No	Category	Area	%
1	Forest	21,10,703	16.2
2	Barren and unculturable land	5,03,255	3.9
3	Land put to non-agricultural uses	21,38,679	16.4
4	Culturable waste	3,68,661	2.8
5	Permanent pastures and other grazing lands	1,10,309	0.8
6	Misc. tree crops and groves not includes in the net area sown	2,74,351	2.1
7	Current fallow	7,58,840	5.8
8	Other fallow lands	15,18,008	11.7
9	Net area sown	52,43,839	40.3
Geographical area		1,30,26,645	100.0

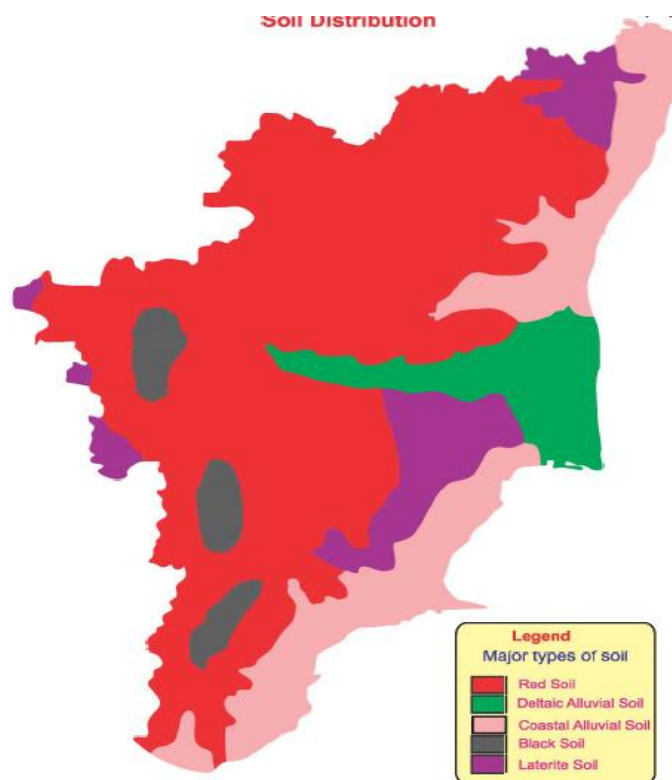
Soil Resources

Soil is the loose material which forms the upper most layer of the earth, consisting mainly of very small particles. It is an essential element for the development of agriculture, as it provides essential minerals or nutrients for the growth of vegetation. Soil forming processes are controlled by the factors such as parent rock, climate, relief, time factor, flora, fauna and micro organisms present in the soil.

Process of soil formation



Tamil Nadu Soil Distribution



Soils of Tamil Nadu

The soils of Tamil Nadu may be grouped into five types. They are classified according to their formation, size and colour. Their occurrence in the districts of Tamil Nadu is given below.

Table: Types of soils in Tamil Nadu and their distribution

Sl.No	Soil	District
1	Alluvial soils	Thanjavur, Thiruvarur and Nagapattinam, Villupuram, Cuddalore, Thirunelveli and Kanyakumari.
2	Regur or the black soils	Coimbatore, Madurai, Virudhunagar, Thuthukudi and Tirunelveli.
3	Red Loams	Sivagangai, Ramanathapuram.
4	Laterite soils	Kancheepuram, Thiruvallur, Thanjavur, hill tops of western ghats and eastern ghats.
5	Saline soils	Predominantly in Vedaranyam, Coromandal coast and for about 10 km in all the coastal districts of Tamil Nadu.

Forests Resources

Tamil Nadu's wealth of flora and fauna lies in the hilly and forest regions. Some of its major wildlife sanctuaries like Mudumalai and Anaimalai (Indira Gandhi Wild life sanctuary) are situated on the hills of the Western Ghats, which have habitats for elephants, tigers, bisons and a variety of monkeys and deer. Among the 3000 and more plant species found in Tamil Nadu, majority of them are found in the mixed deciduous forests. One of the most noteworthy flowers is the Kurinji of Kodaikanal hills which blooms once in 12 years. The state has recognised it with special status. Cinchona, a forest product, from which quinine-a drug for treating malaria is extracted. Eucalyptus which grows abundantly in the Nilgiris is also used as medicine for curing cold and as pain reliever.

Medicinal herbs are commonly found on the Palani hills and Courtallam. Palmyrah trees are grown abundantly in Thirunelveli district, as subsidiary activity to agriculture. Its products are used as raw materials for several cottage industries. Exotic varieties of sandalwood are grown in Javadhi hills of Vellore district. The forest areas of Thirvannamalai and Tirunelveli districts of the state are being regenerated and protected by the State Forest Department. These forests not only provide for the large economy of the state but also to the local livelihood.

'Vanamahotsava' is celebrated in October every year to highlight the importance of wild life.

World Wildlife Day	October 4
World Forest Day	March 21
World Water Day	March 22

Water Resources

Water resources comprising of surface water (river and lakes), ground water, marine and coastal waters, support all living things including human beings. Basically, man requires safe protected water supply for drinking, cooking, washing and bathing. In the agricultural sector, the growth of plants and yield of crops are directly related to the quality and quantity of water available. Underground water is also used for the purpose of irrigation and other utilities. All industries require water either for processing or for other utilities.

Table: Water resources in Tamil Nadu

Water Sources	Numbers
Rivers	17
Lakes	15
Tanks	40319
Ponds	21205
Canals	2395
Reservoirs	71
Wells	1908695

Rainwater harvesting is the process of collecting rainwater from roof tops and directing it to an appropriate location where it is stored for ground-water recharge. On an average, one spell of rain for two hours is enough to recharge 8000 litres of water.

Animal Resources

Apart from foodgrains meat, poultry and dairy products are also considered as dietary components. Animals which are domesticated yield wool, fur and skin that form the basic raw materials for specific clothing, shoes and other products. The animal resources contribute a lot to the development of the economy where they are reared commercially.

Table: Livestock in Tamil Nadu

Livestock	No of animals
Cattle	91,41,043
Buffaloes	16,50,343
Sheep	55,93,485
Goat	81,77,420

Glossary National Park

A natural area designated to protect the ecological balance of one or more ecosystems for the present and the future generations is referred to as a National Park.

Mineral Resources

A mineral is a substance or compound of organic or inorganic origin found on the earth's crust. Every mineral has a definite composition and distinct physical characteristics. Most of the minerals are crystalline in nature and occur widely in rocks. Rocks contain one or more minerals. Natural forms of minerals are called ores and minerals are processed from ores.

The salt used in cooking and graphite in your lead pencil is a mineral.

[illegible]

The major mineral resources of Tamil Nadu include Lignite, Vermiculite, Garnet, Zircon, Graphite, Ilmenite, Rutile, Monazite and Magnesite.

Classification of Minerals

Minerals are classified into three categories. They are

1. Metallic Minerals;
2. Non-Metallic Minerals; and
3. Mineral Fuels

Table: Metallic Minerals of Tamil Nadu

Minerals	District
Iron ore	Salem, Namakkal and Thiruvannamalai
Copper	Salem, Nilgiris, Coimbatore, Madurai
Bauxite	Salem, Nilgiris, Coimbatore, Vellore, Dharmapuri, Madurai and Villupuram
Chromite	Salem, Namakkal, Thiruchirappalli and Erode
Pyrite	Villupuram

Table: Non-Metallic Minerals of Tamil Nadu

Minerals	Districts
Lime stone	Virudhunagar, Thuthukudi, Thirunelveli, Thiruchirappalli, Kanchipuram and Salem
Mica	Thiruchirappalli, Coimbatore and Ramanathapuram
Magnesite	Salem, Namakkal, Coimbatore and Erode
Steatite	Vellore, Cuddalore, Coimbatore, Salem and Thiruchirappalli
Salt	Chennai, Thuthukudi, Cuddalore, Nagapattinam and Thiruvarur

Table: Mineral Fuels of Tamil Nadu

Minerals	District
Petroleum	Thiruvarur(Panamgudi), Narimanam(Kaveri Delta Region)
Lignite	Neyveli

Energy Resources

Resources from which energy can be obtained for heating and lighting are called energy resources.

The energy resources can be divided into two types. They are:

1. Conventional Power Resources; and
2. Non-conventional Power Resources.

Conventional Power Resources

Conventional source of energy are those which have been traditionally used by mankind for a long time. It usually includes fossil fuels like coal, natural gas, oil as well as nuclear power.

Types

The three major conventional energy sources are:

1. Thermal Power Resources;
2. Hydel Power Resources; and
3. Atomic Power Resources.

Thermal Power Resources

Power is generated from non-renewable energy sources such as coal, oil, Natural gas, is known as thermal power.

Thermal power is produced by heating the water. The steam thus formed spins the turbine to produce electricity.

Table: Thermal power plants of Tamil Nadu

Name of the Plant	District	Types of Fuel	Capacity in MW
Neyveli Lignite	Cuddalore	Coal	2490

Corporation			
North Chennai Thermal Power Unit-I	Thiruvallur	Coal	1200
Thuthukudi Thermal Power Plant	Thuthukudi	Coal	1000
Mettur Thermal Power Station	Salem	Coal	600

Hydropower Energy

Hydro power has been with humanity for a long time.. energy in a rushing river, is captured through a wheel as mechanical energy. Originally, these water wheels powered grain mills, spinning a grindstone directly. On the whole Tamil Nadu

Table: Hydropower plants of Tamil Nadu

S.No	Hydro Power Plant	Rivers	MW
1	Kundah I to V	Bhavani	500
2	Mettur Tunnel	Kaveri	840
3	Aliyar	Aliyar	60
4	Kodayar I and II	Kodayar	10
5	Sholaiyar I and II	Sholayar	95
6	Kadamparai	Kadamparai	400
7	Lower Mettur	Kaveri	120
8	Papanasam Hydro Electric Power	Papanasam	32
9	Pykara	Pykara	150
Total			2297

produces about 2,297 Mega Watts of hydro electric power by 2010 year.

Atomic Power Station

Atomic energy is the energy produced from the fusion of atoms. It results from a nuclear reaction, a process in which two nuclei or nuclear particles collide, to produce electrical energy by nuclear reactors.

The first Atomic Power Station of Tamil Nadu is located at **Kalpakkam** about 80 km south of Chennai. It has a comprehensive nuclear power production, fuel reprocessing, and waste treatment facility that includes plutonium fuel fabrication for fast breeder reactors(FBRs). It is also India's first fully indigenously constructed nuclear power station. It has two units which produce about 500MW of energy.

Another Nuclear Power Station is in Kudankulam of Thirunelveli district. It produces about 1000 MW electricity.

Non-conventional Power Resources

Non-conventional Power Resources are known as renewable resources. Sun is the biggest source of non-conventional energy. Energy is in the form of photos. India receives abundant sunlight for about 250-300 days in a year. Conversion of solar energy to electric energy and thermal energy takes place mainly by photovoltaic cells and through solar thermal pathways. The non-conventional energy resources are:

- Solar Energy
- Wind Energy
- Tidal wave Energy
- Geo-thermal Energy
- Bio-fuel Energy
- Energy from baggasse

Excluding tidal wave energy and geothermal energy, all other types have been harnessed in Tamil Nadu and their rate of utilization is discussed below.

Solar Energy

Solar power is generated from sunlight. This can be used as direct power with photovoltaic(PV) cells, or indirect with concentrating solar power (CSP), Sun's energy is focused to boil water which is then used to generate power.

Dindigul, Krishnagiri, Dharmapuri are the districts which extract energy from solar power units.

Wind Energy

Wind power is the conversion of wind energy into a useful form of energy. It is generated using wind turbines to make electricity for wind mills and wind pumps for pumping water or drainage and used to propel ships.

Advantages and Disadvantages of Wind Energy

Advantages	Disadvantages
Non-polluting source	Noise pollution
Low cost of production	Wind mills are very costly to setup
Safe and clean	Disturbs radio and T.V. reception.
Inexhaustible	Diffused source, so gets wasted.

The total amount of wind energy produced is about 5208 MW per year. The following table gives the regions of wind energy production and their generating capacity.

Table: Location and capacity of Wind Farms in Tamil Nadu

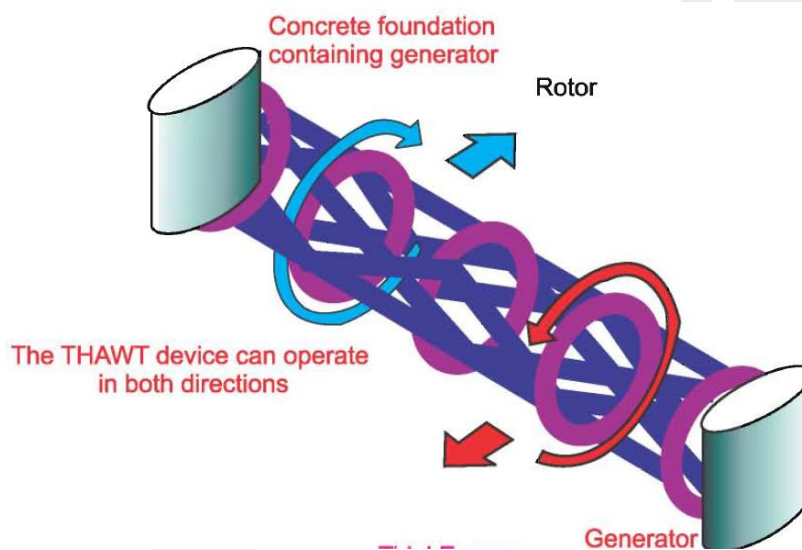
Sl.No	Location	Capacity MW
1	Aralvaimozhi Pass(Muppandal area) Kanyakumari/ Thirunelveli Districts.	1658
2	Shenkottai Pas (Kayathar area) Thirunelveli, Thuthukudi Districts	1105
3	Palghat Pass (Kethanur area) Coimbatore	1995
4	Coastal area near Chennai and Rameswaram in Ramanathapuram District and other ares(Theni, Palani areas)	450
Total		5208

Tidal Wave Energy

Energy generated from tides is called tidal energy. Tidal energy can be harnessed by building dams at narrow openings of the sea. During high tide the energy of the tides is used to turn the turbines installed in the dam to produce electricity.

Advantages and disadvantages of Wind Energy

Advantages	Disadvantages
Non-polluting	Destroys wildlife habitats
Inexhaustible	Difficult to harness



Tidal Energy

The first tidal energy station was built in France.

Advantages of Tidal Energy	Disadvantages of Tidal Energy
Clean, eco-friendly and always available	Located far away from cities and so costly to transport electricity.
Cheap compared to other energy sources	Can be generated only during windy days.

Geo-thermal Energy

Geo-thermal power utilizes the heat in the interior of the earth for generation of power. In areas where volcanoes exist, the rocks in contact with molten magma are quite hot. When rain water seeps into these rocks, it gets converted into steam and gushes out as a geyser. Hot springs may also occur in such areas. The steam generated can be used to generate power on a small scale.

Bio-fuel Energy

Bio-fuels are a wide range of fuels. The term covers solid biomass, liquid fuels and various biogases. Currently, 13 plants with a capacity of 130MW are operating in Tamil Nadu.

Table: Bio-fuel Plants in Tamil Nadu

S.No	District	No.of Plants
1	Sivakasi	2
2	Pudukottai	2
3	Tiruvannamalai	1
4	Dindigul	1
5	Theni	1
6	Thanjavur	1
7	Madurai	1
8	Virudunagar	1
9	Thiruvallur	1
10	Kancheepuram	1
11	Krishnagiri	1

Energy From Sugarcane Bagasse

Residual cane fibre(bagasse) is burned as fuel. In Tamil Nadu there are about 18 sugar mills producing energy of nearly 411 MW from bagasse. Table given below lists the sugar mill locations with their energy producing capacity

Tamil Nadu Energy Development

Table: List of Sugar Mills with Co-generation Plants in Tamil Nadu

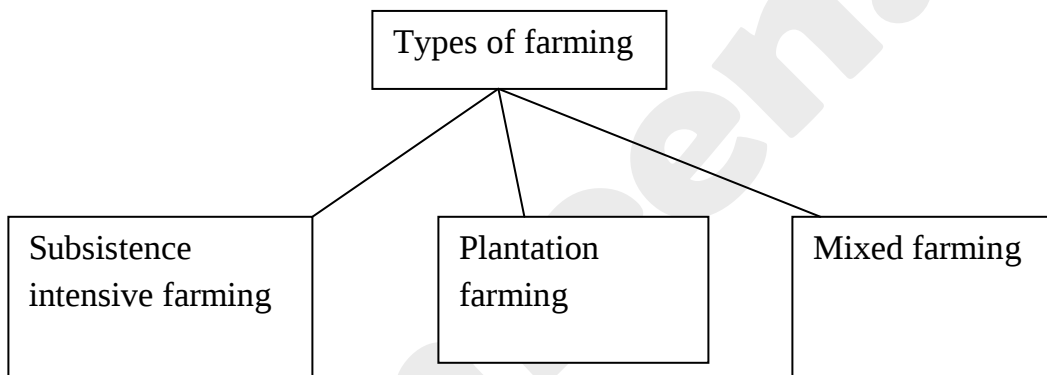
S.No	Sugar Mills	District	Capacity MW
1	MRK Co-operative Sugar Mills Ltd	Cuddalore	7.50
2	Cheyar Co-operative Sugar Mills	Thiruvannamalai	7.50
3	Dharani Sugars & Chemicals Ltd	Thirunelveli	15.00
4	Rajashree Sugars & Chemicals Ltd	Theni	12.00
5	Kothari Sugars & Chemicals Ltd	Theni	12.00
6	Terry Energy Ltd	Cuddalore	28.42
7	S.V. Sugar Mills Ltd	Kancheepuram	45.00
8	Subramania Siva Co-operative Mills Ltd	Dharmapuri	5.00
9	Terry Energy Ltd	Thanjavur	18.68
10	EID Parry India Ltd	Cuddalore	30.00
11	Sakthi Sugar Mills	Sivaganga	5.500
12	Arunachalam Sugar Mills Ltd	Thiruvannamalai	19.00
13	Bannari Amman Sugars Ltd	Erode	20.00
14	Auro Energy Ltd	Nagaipattinam	16.00
15	Sri Ambika Sugar Mills	Cuddalore	40.00
16	Sakthi Sugar Mills Pvt	Erode	32.00
17	Rajashree Sugars Chemicals Tld	Villupuram	22.00
18	EID Parry India Ltd.	Pudukottai	18.00
19	Kothari sugars and Chemicals	Ariyallur	22.00

Agriculture is the prime and traditional occupation for the people of Tamil Nadu. The practice of growing plants on a large scale for food and other purposes is known as agriculture. Agriculture includes not only cultivation of crops, but also rearing of animals, birds, forestry, fisheries, and other related activities.

About 56% of the people of Tamil Nadu are farmers. Agricultural sector supplies food and fodder to the people and cattle, respectively. It is the source of raw material for many of the industries.

Types of Farming

The methods of growing crops vary from region to region and can be classified as follows:



Subsistence intensive farming

Farming that is carried on small land holdings that produce food crops for local consumption and not for external trade is known as **subsistence intensive farming**. Most farmers in Tamil Nadu practice subsistence intensive farming. With the availability of water for cultivation, farming methods are classified into three types, namely:

1. Wet farming;
2. Dry farming (**maanavari**); and
3. Irrigation farming.

Wet farming	Dry farming
- Farming where water supply is available throughout the year both rainfall and irrigation is known as wet farming - Crops cultivated are rice and sugarcane. - Most river basins of Tamil Nadu practice this type of farming.	- Farming carried out only during rainy season without irrigation is known as dry farming. - Crops cultivated are ragi and other millets. - Drier regions of Vellore, Thiruvannamalai, Ramanathapuram and Thirunelveli practice this type of farming.

Irrigation farming

Irrigation farming is the practice of growing crops with supply of water through various sources of irrigation like wells, lakes, and canals. Rice, **cotton** and **sugarcane** are grown with irrigation farming in most part of Tamil Nadu.

Most of the farmers in Tamil Nadu practice subsistence intensive and irrigation farming. As the water requirement for each crop varies, irrigation plays a major role in the agricultural development of Tamil Nadu.

Plantation farming

Plantation farming is yet another type of farming where crops are grown on large farms or estates. Plants like Tea, coffee, rubber and pepper are grown as plantation crops on the hill slopes of Tamil Nadu.

Mixed farming

Mixed farming is one wherein land is allotted for more than one activity along with agriculture. The farmer grows two or three varieties of crops along with cattle rearing, poultry and

fishing on a large land holding. This method is profitable to the farmer as it provides regular and continuous income. This type of farming is prevalent in the Kaveri delta.

Market gardening

Market gardening includes horticulture and floriculture, (growing fruits, vegetables and flowers) in large scale for supply to the urban markets and also for export purposes. Districts such as Madurai, Nilgiris, Thiruvallur and Kancheepuram practice this type of farming.

Cropping seasons of Tamil Nadu

Farmers select particular crops to be cultivated in a season, to suit soil and availability of water in that season. Thus most farmers in Tamil Nadu cultivate crops in three different seasons as given below:

Sornavari(Kharif season) (Chitthirai pattam)

Sornavarai is otherwise known as Kharif season. The seeds are sown during May and harvested in October. As the month of May coincides with the Tamil month, **Chitthirai** it is also known as **Chitthirai pattam**.

Samba (Summer season) (Adipattam)

Samba is otherwise known as summer season. The seeds are sown in the month of July which coincides with the month Tamil month **Aadi** and harvested in January. This season is referred to as **Adipattam** in Tamil Nadu.

Navarai (Winter Season-Rabi) (Karthigai pattam)

The seeds are sown in the month of November and harvested in March. This season is known as **Karthigai pattam** in Tamil Nadu as the Tamil month Karthikgai coincides with the month of November.

Factors influencing agriculture

The factors influencing agriculture may be classified as physical, social and economic factors.

- Physical factors include soils, temperature, rainfall, humidity, climate and slope of land.
- The Social factors include traditional knowledge, belief and myths of farmers, farm size and holdings and farmer's acceptance towards innovation.
- Economic factors are market, loan assistance, Government subsidy and incentives.

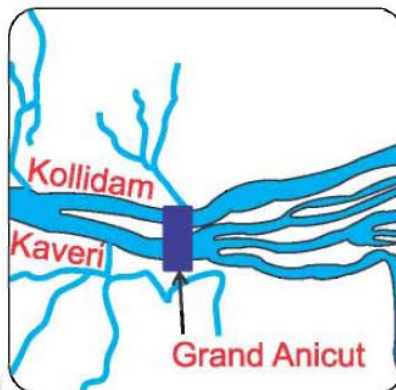
Sources of Irrigation in Tamil Nadu

The main sources of irrigation are canals, tanks and wells.

Canals are man-made channels of water taken from a perennial river, dam or lake to supply water to the agricultural fields. Canal irrigation is the most prominent type in the basins of Kaveri and Tamiravaruni. 27% of irrigated land in Tamil Nadu cultivates crops using canal irrigation.

Important canals of Tamil Nadu

Arrakankottai canal, Thadapalli canal and Kalingarayan canal are some of the noteworthy canals on river Bhavani a tributary of River Kaveri. Canals taken from Mettur dam provide irrigation for about 2.7 lakh hectares. The Grand Anicut built across the river Kaveri near Trichirappalli, diverts the water to the entire delta region through canals.



Grand Anicut on River Kaveri

River Thamiravaruni and its tributaries serve Thirunelveli district with many canals. River Tamiravaruni has nine anicuts from which the following channels, named as north and south Kodaimel Alagaim canal; Nathiyunni canal, Kannadian canal, Kodagan canal, Palayan canal, Tirunelveli canal and Marudhur canal. Apart from this, Pachaiyar has nine anicuts and Chittar has seventeen anicuts.

Canals used for irrigation have the oldest records of two millennia in Tamil Nadu. Kallanai, built around First century, by Karikalan is still in use and considered to be the oldest water-regulatory structure in the world.

The state of Tamil Nadu is pioneer in linking rivers of the state as recommended by Ministry of Water Resources.

Tanks

Lakes are natural water bodies. Lakes are converted into tanks by strengthening their bunds to store water for irrigation. Tank maintenance and management is a common practice associated with temples. There are about 40,319 tanks in Tamil Nadu which accounts for 19% of the irrigated area. Tanks are concentrated in the districts of Kancheepuram, Vellore, Thiruvannamalai, Pudukottai, Ramanathapuram and Thirunelveli. At present, Ramanathapuram has the maximum number of tanks. Tanks have to be desilted regularly for better storage and supply of water. In Tamil Nadu, tanks are classified as follows; They are system tanks and non-system tanks. System tanks are linked to river/canal system of the state, with water filled through supply channels. The non-system tanks, on the other hand, are dependent on rainfall of that region. Tanks are maintained by either PWD or Panchayat.

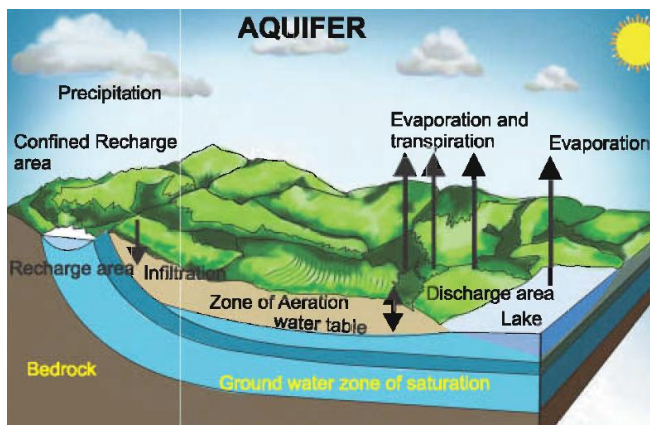
Kancheepuram is known as the land of 'thousand lakes'.
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Some important lakes of Tamil Nadu are found in Red Hills, Chembarambakkam, Veeranam, Madhurandhagam. Kolavai, Ambattur, Ooty and Kodaikanal.

Well

Well irrigation is most predominant irrigation system in Tamil Nadu which utilizes groundwater. Well irrigation covers 52% of irrigated area in the state. Wells may be classified as surface wells and tube wells.

Surface wells are also known as open wells and are dug to reach the water table lying within a few metres from the surfaces. Tube wells explore the aquifers of great depth with the help of electric motors. There are 1,62,11,391 surface wells and 2,87,304 tube wells in Tamil Nadu that are used for the purpose of irrigation.

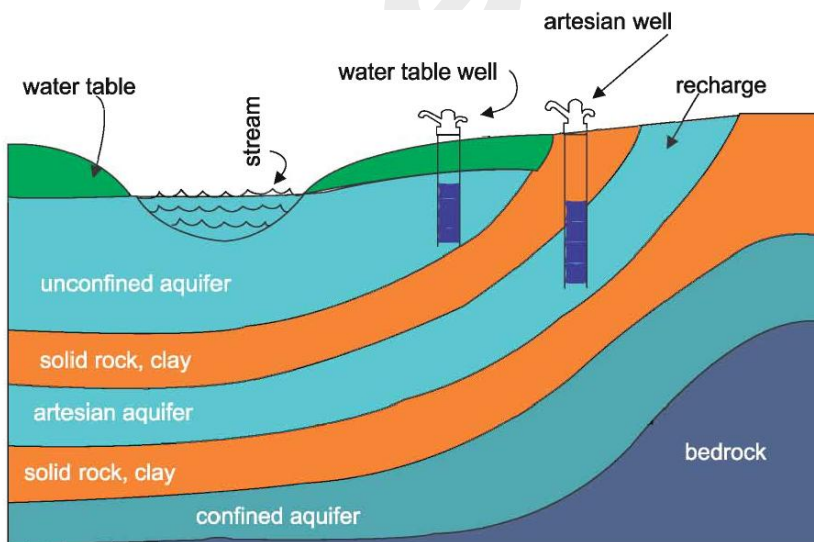


Aquifers are underground rock layers which store water and allow water to pass through them.

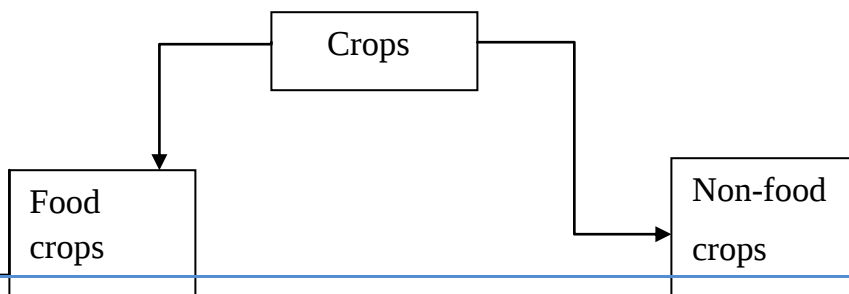
In Tamil Nadu a high potential artesian aquifer occurs in the Cuddalore, Chidambaram and Viruthachalam area. This aquifer named as Neyveli aquifer, pumps out water regularly from lignite mining area for irrigation and domestic supply.

There is considerable amount of spring irrigation in the Kaveri and Vaigai beds. Irrigation from these springs is practised in a few places of Erode district.

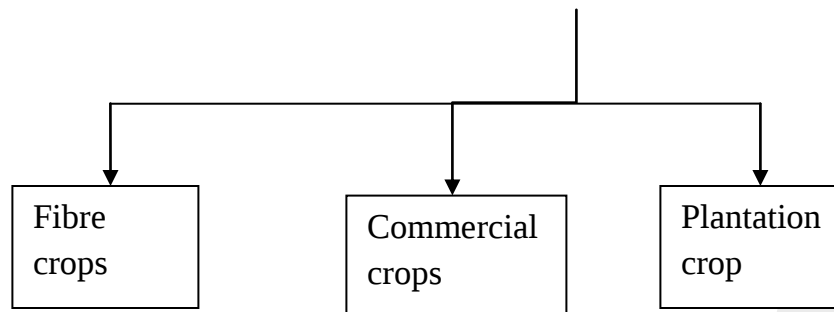
Aquifers at different depth



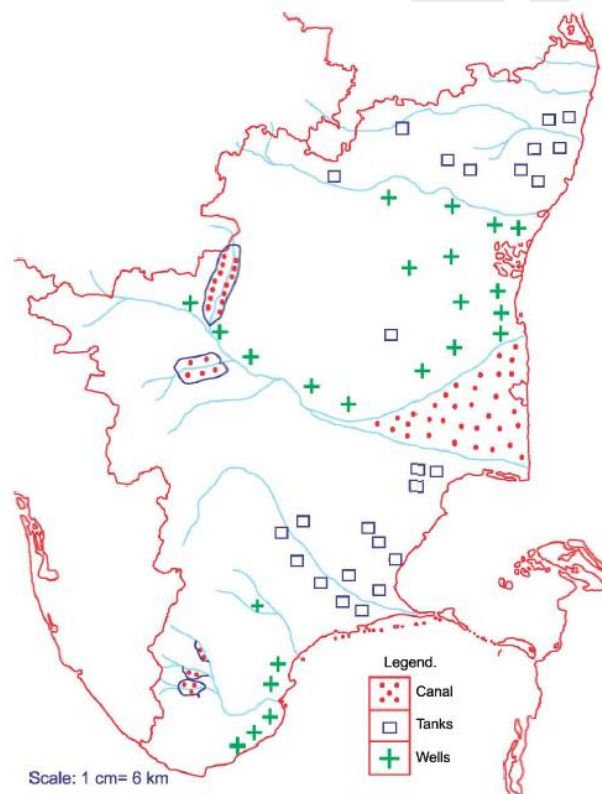
Major Crops of Tamil Nadu



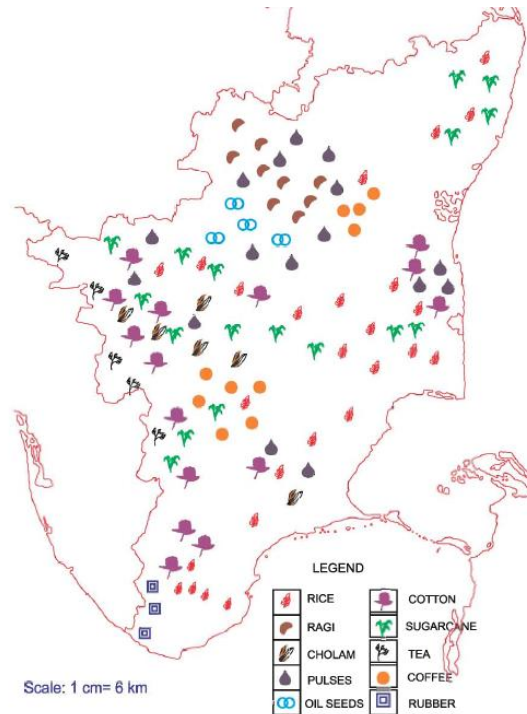
Cereals
Pulses
Millets



Sources of Irrigation



Tamil Nadu Major Crops



Distribution of crops in Tamil Nadu

Each crop requires specific climatic conditions for its growth. Tamil Nadu lies entirely in the tropical zone and therefore almost all tropical crops are grown here.

Food crops

Food crops include cereals, pulses, and millets. Among the food crops(cereals), paddy is the prime crop cultivated in all the districts of Tamil Nadu. Rice (Paddy) requires level land, high temperature and continuous supply of water for its growth. Ponni, and **Kichadi Samba**, are major varieties of paddy grown in Tamil Nadu. Jaya, IR 50 are high yielding varieties grown in Tamil Nadu. Among the districts. Thanjavur, Thiruvarur and Nagapattinam have maximum acreage as well as production of rice.

Thus Kaveri delta (especially the undivided Thanjavur district) is known as the Granary of South India. Normally Paddy is grown in Thanjavur district in four seasons during one agricultural year.

Tamil Nadu Rice research institute is in Aduthurai. TNRH 174, developed by the Tamil Nadu Agriculture University's Tiruvarur Rice Research Institute has

recorded the highest yield of 4500 kg per acre.

Pulses that are grown in Tamil Nadu include Bengal gram, red gram, green gram, black gram and horse gram.

Coimbatore leads in the production of Bengal gram, whereas Vellore and

Table: Millets of Tamil Nadu

Name of the millet	Leading districts
Cholam	Coimbatore, Dindigul and
Cumbu	Thiruchirappalli
Ragi	Villupuram and Thuthukudi
Maize	Krishnagiri, Dharmapuri and Salem
	Salem, Perambalur and Dindigul
Korra(thinai)	Salem and Namakkal

Table: Tamil Nadu-Principal food crops-area and production 2007-2008(in percentage)

Crops	Percentage of area	Percentage of Production
Paddy	57.8	76.6
Other food crops	22.6	20.6
Pulses	19.6	2.8
Total	100	100

Krishnagiri produce red gram. The districts of Tiruvarur, Nagapattinam and Thuthukudi stand first in production of green gram. Nagapattinam, Thiruvavur and Cuddalore are noted for black gram production. Horse gram cultivation is widely seen in Krishnagiri and Dharmapuri districts.

Millets are dry crops cultivated in areas having high temperature and less rainfall.

Non-food crops

Fibre crops

Fibre crops include cotton and jute. Cotton thrives well in black soil and it is the major fibre crop of Tamil Nadu cultivated on large scale in the districts of Coimbatore, Thirunelveli

Cuddalore and Villupuram. Mcu4, Mcu5, LRA5166 are major varieties of cotton cultivated in the state.

Commercial crops

Commercial crops include all those crops that are cultivated by the farmers to sell and not for their own consumption. Sugarcane, tobacco, oilseeds and spices like chillies, turmeric and coriander are examples of commercial crops.

Sugarcane is the dominant commercial crop cultivated in Tamil Nadu. It is a nine-month crop which requires fertile soil, high temperature, and stagnant water till the time of flowering. Coimbatore, Karur, Villupuram, Thiruvallur and Cuddalore district show predominance of this crop. Tobacco is yet another commercial crop of Tamil Nadu which is widely grown in Dindigul, Theni and Madurai district. Groundnuts, sunflower, safflower(Kusumbavrai), castor and linseed are the major oilseeds cultivated in Tamil Nadu.

Plantation crops

Tea, coffee, rubber, pepper and cashew are the main plantation crops of Tamil Nadu. Tamil Nadu ranks second in area and production of tea next to Assam. Tea estates are seen to be concentrated on the hill slopes of the Nilgris and Coimbatore districts. Tamil Nadu stands second in area and production of coffee next to Karnataka. Coffee is grown in the Western Ghats as well as Eastern Ghats. Hill slopes of the Nilgris, Theni, Madurai and Salem are the major regions of coffee cultivation. Andipatti, Sirumalai and Shervaroy hills also grown coffee. Rubber is grown in Kanyakumari district. Pepper is confined to the warm and wet slopes of Kanyakumari and Thirunelveli district of Tamil Nadu. Cashew are extensively cultivated in Cuddalore district.

Horticulture

Cultivating fruits and vegetables on large scale is a recent trend in Tamil Nadu. Fruits like mangoes, jackfruits, banana, guava and grapes are widely grown in groves. Krishnagiri leads in mango production, Coimbatore and Erode are known for banana production and Theni for grapes. Dharmapuri leads the other districts in acreage for horticulture. It also specializes in floriculture.

Animal husbandry

Rearing animals for the production of milk, meat and hide is known as Animal husbandry. Tamil Nadu Cooperative Milk Producers' Federation (Aavin) produces milk and dairy products

for the state. The federation handles million litres of milk per day, processes and supplies milk for the whole state through 7662 societies. The milk production was 55.86 million tons during 2007-08. Per capita milk consumption is 233g/day.

The poultry hub of Tamil Nadu is Namakkal, Erode, Coimbatore and Salem. Tamil Nadu produced 8394 million eggs during the year 2007-08. Per capita availability is 128 eggs/year.

Fisheries

Tamil Nadu ranks fourth in fishing among the states of India. Long coastline of 1076km the broad continental shelf favour coastal fishing in Tamil Nadu.

The coastline has 591 fishing villages which are spread over thirteen districts of the state. Pearl fishing is predominant in Gulf of Mannar region. Thuthukudi is the leading port in fish export. Two more major fishing harbours are Chennai, and Chinnamutthom in Kanyakumari district and four minor harbours are at Pazhayar, Valinokkam, Colachael and Nagapattinam. Thiruvavarur, Nagapattinam, Thanjavur and Ramanathapuram districts together contribute 40% of marine fish production in the state.

Marine Fishing	Inland Fishing
Fishing carried out in the Oceans and Seas.	Fishing carried out in Lakes, rivers, Ponds, estuaries, backwaters and swamps.
Large Mechanized boats are used for fish catching.	Catamaran (small wooden boats) Diesel Boats and floating net cages are used.
Fish varieties are Sharks, Flying Fish, Counc, Cat, fish, Silver bellies and Carbs.	Fish varieties are Catla, Rogue, mirkal, eel and calabaashu.

The estimated marine fish production for the year 2007-08 was 393,266 tonnes (Source: Commissioner of fisheries, Chennai-6)

The state has 370 hectares of inland water, 63,000 hectares of estuaries, backwaters and swamps. Oysters and prawns are cultured in organized nurseries at Ennore and Pulicat lake for

export. The estimated inland fish production for the year 2007-08 was 164,504 tonnes. Vellore district ranks first among the districts with 10% of inland fish production of the state. Cuddalore, Sivagangai and virudhunagar stands second with 9% of inland fish catch.

Tamil Nadu Fisheries Department has introduced several programmes for the betterment of fishing.

1. Aqua culture in farm ponds and irrigation tanks.
2. Fish seed bank
3. Fish seed rearing in cages
4. Ornamental fish culture and
5. Fish Farmers Development Agency

at Karaikal encourages farmers with a slogan *“to grow fish and grow with fish”*.

Agricultural Development

Before Independence, agriculture in Tamil Nadu followed traditional method of cultivation. After independence, there has been a steady development in all aspects of agriculture. Irrigation facilities were improved with the proper implementation of five year Plans in the state. Green revolution in terms of hybrid varieties and application of chemical fertilizers increased the production to a greater extent. Abolition of zamindari system, land tenuring, consolidation of farms, introduction of the land ceiling act and co-operative farming were the new agricultural reforms introduced after independence. Recently, globalization has influenced the agricultural production positively in Tamil Nadu.

Changing trends in agriculture

The traditional methods of agriculture is slowly being replaced by scientific and technical methods . As a result of this the merits of the traditional methods have vanished.

The Agriculture University in Coimbatore and the M.S. Swaminathan Research foundation are trying to fuse the traditional with the modern methods so as obtain maximum produce in the long run.

Some of the measures adopted are

- Micro- irrigation
- Integrated pest control management(IPM)

- Growing blue Algae and Azolla
- Precision farming through Remote sensing, geographical Information system and Global positioning system.

Increase in organic matter will increase the water holding capacity of the soil. This will support the microbial activity and hasten the nutrient absorption capacity of roots.

Efforts Taken by Government to Improve Agriculture

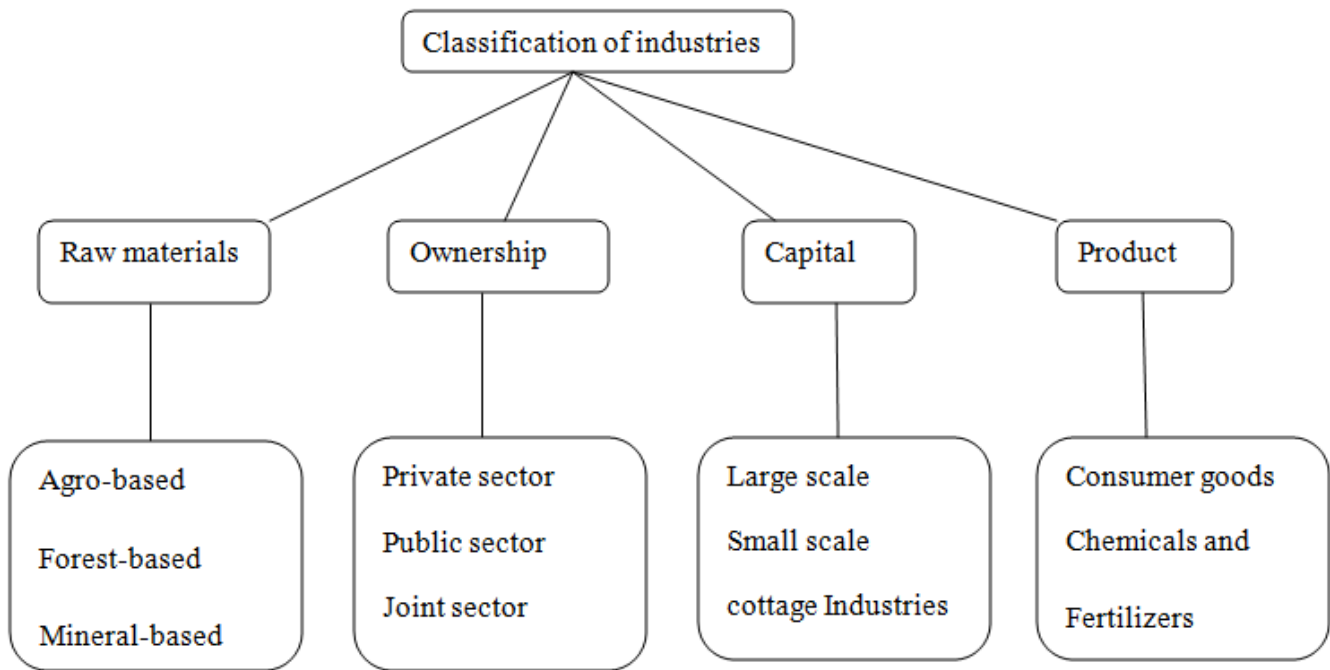
- The Government supplies quality and certified seeds to the farmers.
- Organic matter and micro nutrients are supplied at subsidised rate.
- Free electricity is provided to small and marginal farmers for about 6 to 8 hours a day.
- Government fixes the prices for agricultural products to safeguard farmers from financial crisis.
- Farmer's Market (**uzhavarsanthai**) enhances the farmers ability to get better share of prices and at the same time consumers to get agricultural produce at affordable prices.
- Crop insurance scheme has been introduced.
- Government has set up Agricultural Export Zones in Nilgris and Krishnagiri.

Geography Notes Part 19

Tamil Nadu – Manufacturing Industries

Industry refers to the secondary type of occupation. It is the booming sector of Tamil Nadu. Tamil Nadu is ranked as third industrial state next to Maharashtra and Gujarat. The act of converting the raw materials into finished and usable products is known as Manufacturing. A single manufacturing unit is termed as a Factory. Multiple units of same kind, which are spread over a larger area are termed as an Industry. Lakshmi Mills and Madura Coats are example of industrial units. About 34% of the state's income comes from the industrial sector.

Classification of Industries



Industries can be classified on the basis of:

- Raw materials
- Ownership
- Capital involved and
- Product

Classification on industries based on raw materials

An industry that uses agricultural products for manufacturing is termed Agro-based industry. Cotton textiles, sugar industry and food processing industries are Agro-based industries.

An industry that uses forest products as raw materials are known as Forest-based industry. Example: Paper and Pulp industry, Honey and Sandalwood product.

Industries using minerals for production are called as Minerals-based industry. Iron and steel industry, ceramics industry and cement industry are some of the mineral-based industries.

Classification of industries based on ownership

A Private industry is one which is owned by an individual or a group of people. TVS Motors is one of the notable private industries of Tamil Nadu.

All Government-owned industries come under the Public sector. Tamil Nadu Newsprint Paper Limited(TNPL) is state owned public sector industry.

Co-operative sector is one which is owned by a group of co-operative members who supply the raw materials for that industry. Most of the sugar factories in Tamil Nadu are in the co-operative sector.

When an industry is functioning under the partnership of two organizations it is said to be Joint sector. The nuclear power station at Kudangulam near Thirunelveli is a joint sector between Indian Government and the Russian Government.

Classification of industries based on investment

The industry which has huge investment in terms of capital and infrastructure, along with huge labour and production are known as large scale industries. Iron and steel industry is an example for a large scale industry. A medium-scale industry is one that runs with investment of Rs. 10 million(1-crore) to Rs. 100 million (10-crore). A small-scale industry has been defined as the unit that has investment up to Rs.10 million(1-crore).

Small scale industrial units are those which are engaged in the manufacturing, processing or preservation of goods. Goods such as clothes, toys, furniture, edible oils and leather goods are produced by small scale industries.

A Cottage industry is one wherein very little investment is involved. The family as a whole works without any paid labourers. Locally available raw materials are used to produce the handicrafts. Volume of production and cost of production are low. Mats from grasses, (Pattamadai mat) toys from wood, Palm leaf containers are unique examples of goods from cottage industries of Tamil Nadu.

Classification of industries based on products

Consumer goods are those goods, which reach the consumers straight from the production unit. All perishable goods like food products and dairy products are examples of consumer goods.

Intermediate goods are products that are produced by another manufacturer. For instance, fabrics produced from cotton is an intermediate good, the clothing made from the fabric is a consumer good.

Basic goods are those goods which are produced on a large scale both for export and local consumption. For example: Iron and steel industry, chemicals and textiles.

Factors determining the location of Industries in Tamil Nadu

Location of industries in a particular place normally has many reasons for its localization. These reasons are the factors influencing the location of industries and are listed below:

- Raw materials
- Energy
- Capital
- Transport and
- Market
- Labour

Natural resources like water, minerals and energy resources determine the location of an industry. Textile industry, leather industry and paper industry require large quantities of water and so are located close to water and so are located close to water sources. Industries like the cement industry, ceramic industry, and petro-chemical industry are located very near to the source of the raw materials. Aluminium industry highly relies on electricity and are located near the power stations or places with adequate supply of energy.

Distribution of Major industries in Tamil Nadu

The Major industries of Tamil Nadu are Textile industries, Sugar industries, Paper industries, Leather industries, Cement industries, Electrical equipments, Automobiles, Information Technology, Tourism industry and soon.

Textile industry of Tamil Nadu

Tamil Nadu plays a major role in the Indian textile industry in terms of production and export of yarn, fabrics, knitwear and garments. Tamil Nadu contributes nearly 25% of India's share in the export of cotton, yarns and fabric. Tropical climate, availability of raw materials, demand for cotton in market, power supply from numerous power projects and abundant cheap labour are favourable factors for widespread distribution of textile industries in Tamil Nadu.

Coimbatore, Pollachi, Udumalpettai, Thiruppur, Karamadai, Erode, Bhavani, Dindigul, Thirumangalam, Madurai, Palayamkottai, Papanasam and Theni are important centres for textile industry. Maximum units are concentrated in and around Coimbatore region. This is why Coimbatore region is known as "the Manchester of South India".

Districts of Coimbatore, Thiruppur and Erode contribute much for the state's economy; therefore, they are referred to as 'Textile Valley of Tamil Nadu'. Thiruppur alone contributes 70% of export of knitwear of Tamil Nadu. Erode specializes in garments and bedspreads. The city of Karur is known as the textile Capital of Tamil Nadu.

Silk Textiles

Tamil Nadu occupies the fourth place in silk textile production in our country. Kancheepuram silk is unique in its quality and is known for its traditional value all over the world. Arani, Rasipuram and Thirubuvanam are other silk centres of Tamil Nadu. Sericulture Training Institute in Hosur trains farmers to adopt sericulture along with farm work to accelerate rural industrialisation. Mettur, Madurai, and Ramanathapuram are specialized areas for manufacturing synthetic clothes.

Sugar Industry

Tamil Nadu produces about 10% of total sugar in India. Suitable climate and soil, for high yielding varieties, continuous irrigation facility, good transport, marketing facility and regularized co-operative sector are favourable factors for the widespread sugar mills in the state. A majority of sugar units in Tamil Nadu are functioning under the co-operative sector. At present Tamil Nadu has 42 Sugar Mills, out of which 16 are under the co-operative sector, 3 owned by public sector and 23 as private mills.

Sugar factories are concentrated in Villupuram, Cuddalore, Vellore, Erode, Coimbatore, Thiruvannamalai, Thiruchirappalli, Thanjavur and Madurai districts. Jiggery, kandasari, and sugar

are products from the sugar industry. The by-product bagasse (the crushed stem of sugarcane after extracting juice) is used as a raw material for paper industry. Tamil Nadu government has set up new integrated sugar complexes with different options of co-ethanal production, tissue culture lab, soil testing lab, fuel energy and bio-composting. Names of such units are given in the table.

Table: Distribution of integrated sugar complexes

Name of the Mills	Taluk	District
Kothari-Sathamangalam	Ariyalur	Ariyalur
Rajashree – Semmedu	Gingee	Villupuram
Dharani – Kalaianallur	Sankarapuram	
Sakthi- Modakurichi	Erode	Erode
Empee Sugars – Idaikal	Ambasamudram	Thirunelveli
Shree Ambika – Manjini	Attur	Salem
Dhanalakshmi Srinivasn- Udumbiyam	Veppanthattai	Perambalur
Bannariamman – Kolunthampattu	Thandarampattu	Thiruvannamalai

Food and Beverage Industry

Food and Beverage based industry flourish well in Tamil Nadu. Mango pulp is processed and exported. Instant food varieties and ingredients for cooking are manufactured and marketed locally as well as exported. Snacks items and biscuits are marketed on a large scale. Tamil Nadu with its long coastline offers opportunities for industries based on marine products.

Paper industry

Tamil Nadu stands second next to Andhra Pradesh in paper production in our country. The state produces about 12% of the paper in our country. Bamboo, grass, and Bagasse from sugarcane are raw materials for paper industry Soda, sodash, chlorine, sulphur, woodpulp, and plenty of water are other requirements for setting up of paper industries.

Pukkathurai in Kancheepuram district, Bhavanisagar, Pallipalayam, Pugalur, Paramathi, Vellore, Coimbatore, Nillakkottai, and Cheranmadevi are centres of paper mills in Tamil Nadu.

Tamil Nadu Newsprint and Paper Limited(TNPL) was set up with aid of World Bank in 1979 in Kakithapuram near Pugalur in Karur district. It is the largest producers of Bagasse based paper in the world with the annual consumption of bagasse terms 1 million tonnes per annum. It caters to the need of newsprint papers throughout Tamil Nadu. It produces 600 tonnes of newsprint paper per day. Other than newsprint, papers for telephone directory, computers, offset printing papers, copier machines are also produced and marketed by the TNPL.

Leather industry

Tamil Nadu accounts for 70% of national tanning factories and 60% export of India. Leather industry occupies an important place because of its wide dispersal, sizeable employment and export potential. Leather industry depends on cattle wealth. It is concerned with the treatment of raw pelt of animals to make them suitable for the manufacture of various articles.

The pelt of large animals and cattle are known as 'hide' and those of smaller ones like sheep and goats are called 'skin'.

Tanning is a process of making leather, from the skins of animals, with the use of tannin, an acidic chemical compound. Tanning makes the skin become flexible, less water-soluble and more resistant to bacterial attack. Tannery is the term given to place where animal skins are processed.

If tanning is done with vegetative matter, it is known as vegetable tanning process. Vegetable tanned hide is flexible and is used for making furniture. If tanning is done with chemicals like chromium and fatty matter, it is known as mineral tanning process. Chrome tanning is faster than vegetable tanning and it produces stretchable leather which is excellent material for making handbags and garments.

Chennai, Vellore, Kancheepuram, Thiruvallur, Thiruchirapalli, Dindigul and Madurai districts have widespread centres for leather industry. Chennai, Vellore, Ambur, Ranipet, Vaniyambadi, Dindigul and Thiruchirappalli are the main centre's of leather industry.

Cement industry

Tamil Nadu stands fourth in cement production. It accounts for 10% of the country's cement production. Tamil Nadu Cements Corporation Limited(TANCEM) is wholly owned by

the Government of Tamil Nadu and manufactures Ordinary Portland Cement(OPC) and Super Star Cement exceeding the requirements prescribed under the Indian standards. The new materials required for cement production are limestone, dolomite, gypsum, clay and coal. All of these are mined in Tamil Nadu. Major centres of cement industry are Sankari, Madukarai, Puliur, Kunnam, Sendurai, Ariyalur, Dalmiapuram Manamadurai, Thulukapatti, Allankulam, Sankarnagar and Thazaiyuthu.

Automobile industry

Tamil Nadu earns 8% of its GDP from automobile industry. This industry contributes for about 21% of passenger cars, 33% of commercial vehicles produced in India. Chennai city is the base for 30% of India's automobile industry and 35% of its auto components. This industrial supremacy has resulted in Chennai being known as the "Detroit of Southern Asia".

Chemical industry

Chemical industry includes, production of chemicals, drugs, fertilizers, petrochemicals, soaps, detergents, cosmetics, medicines, synthetic rubber and plastics. Most of the chemical industries are clustered around Chennai(Manali), Cuddalore, Panangudi(Nagapattinam) and Thuthukudi. The notable chemical industries of Tamil Nadu are SPIC (Southern Petrochemical Industries Corporation Ltd) and Manali Petrochemicals Limited. SPIC is the largest producer of fertilizers in India and covers 12 states and caters to the customers through 4000 outlets. It produces around 2 million tons of fertilizers annually.

Pfizer pharmaceutical company and Dow Chemicals are important chemical units which have research and development facility in Chennai.

Electrical and Electronics Industry

Electronics is a growing industry in Tamil Nadu. Many major global telecommunications like the Nokia, Flextronics, Motorola, Sony-Ericsson, Foxcon, Samsung, Cisco, Moser Baer and Dell have chosen Chennai as their South Asian manufacturing hub. Products manufactured include circuit boards and cellular phone handsets.

Bharat Heavy Electricals Limited located at Thiruchirappalli is one among the six large units of India. It produces boilers generators and turbines used in the production of hydro-electricity.

Software Industry Infosys' campus at Mahindra World City near Chennai

Tamil Nadu is the second largest software exporter (by value) in India. It has the leading BPO sector in the country next to Karnataka. Major national and global IT companies such as Verizon, Hewlett-Packard, IBM, Accenture, Ramco systems, Computer Sciences Corporation, Cognizant Technology Solutions, Tata Consultancy Services, Infosys, Wipro, HCL, Tech Mahindra, Polaris, Aricent, Mphasis Acme Technology Pvt Ltd., Convansys, Ford Information Technology, Xansa, iSoft, iNautix, Electronic Data System, Bally and many others have established their branches in Chennai.

India's largest IT Park is in Chennai, jointly constructed and maintained by Ascendas India Ltd, a Singapore-based company engaged in providing business space solutions, with Tamil Nadu Industrial Development Corporation (TIDCO).

Other notable industries of Tamil Nadu

Perambur Integral Coach Factory (ICF) is the largest in Asia to produce railway coaches in Tamil Nadu. "Armoured Vehicles and Ammunition Depot of India" (Avadi) is about 23km northwest of Chennai. The Heavy Vehicles Factory produces battle tanks. Salem Steel Plant is a Public Sector company undertaken by the Government of India. Sivakasi is a big industrial centre in Virudhunagar district. It is world famous for its fireworks and safety match boxes. Sivakasi produces 90% of India's fireworks. It is also known for offset printing. Sivakasi is known as 'Little Japan'. Neyveli, apart from the production of thermal power, has a fertilizer unit and a ceramic unit attached to it. Thanjavur and Kumbakonam are specialized in the production of bronze statues and musical instruments.

"Tamil Nadu is the first State in the country to develop a well-defined Biotechnology Policy and to set up an All Women Biotechnology Park.

Chennai is second to Mumbai for its vibrant and innovative film industry.

Tourism industry

Tourism is considered as an industry because of its enormous potential in creating employment for a large number of people and for its substantial foreign exchange. Tamil Nadu's tourism industry is the second largest in India, with an annual growth rate of 16%. Presence of

ancient monuments, pilgrim centres, hill stations, a variety of natural landscapes, long coastline, along with rich culture and heritage makes Tamil Nadu the best destination for tour lovers.

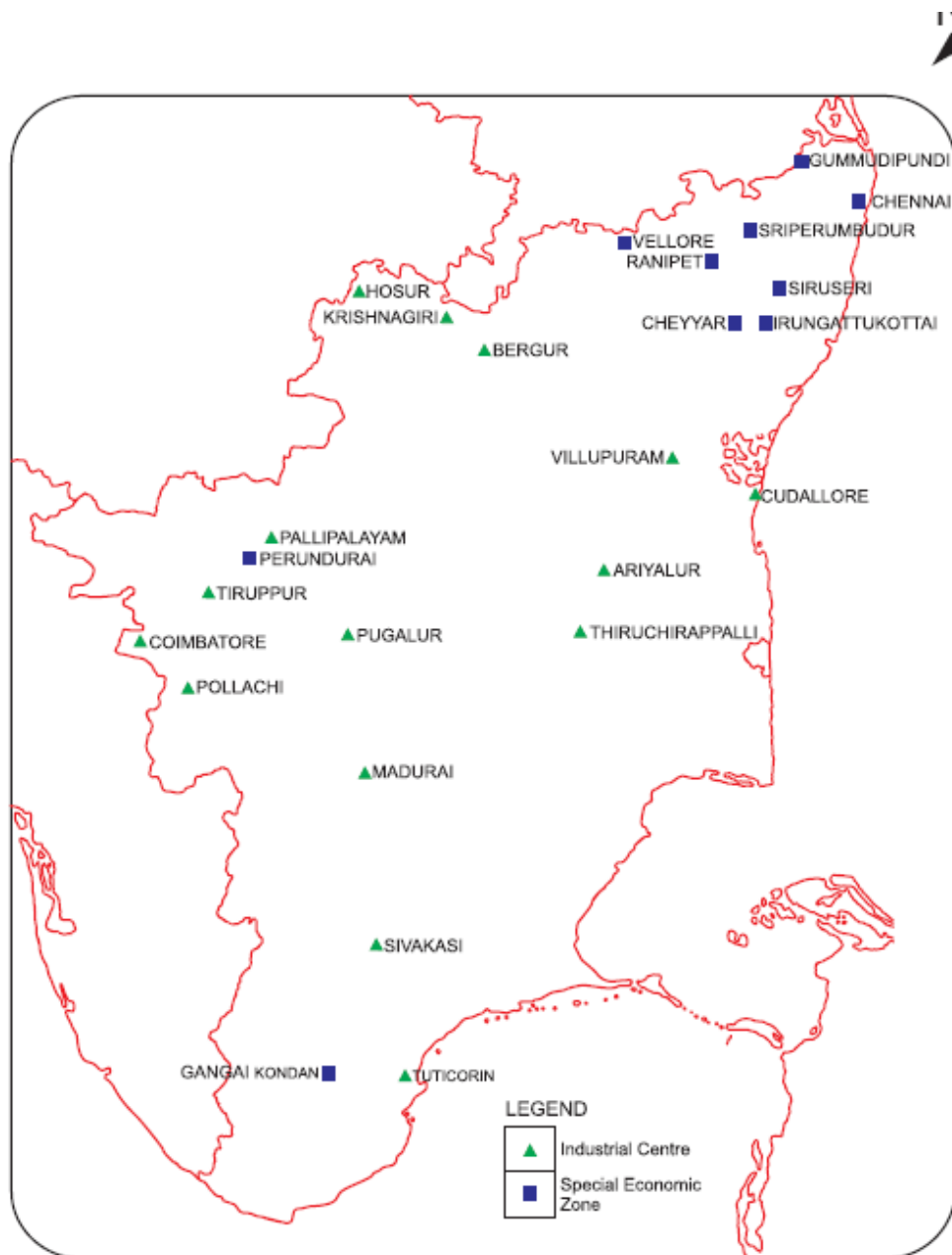
Tourism in Tamil Nadu is promoted by Tamil Nadu Tourism Development Corporation(TTDC), a Government of Tamil Nadu undertaking. Health/Medical tourism which is part of tourism industry is hosted by the leading health care centres in Chennai.

State Industries Promotion Corporation of Tamil Nadu(SIPCOT) Limited, a fully government owned premier institution, established in the year 1972, has been a catalyst in the development of small, medium and large scale industries in Tamil Nadu.



In order to promote an industrial base for export, the state government has setup special regions as Special Economic Zones(SEZ). These regions have ample facilities for manufacturing. They are capable of attracting foreign investor, and aim at promoting trade at the international level. Tamil Nadu has set up SEZ in the following places: Sriperumpudur Industrial Park, Irungattukottai Footwear SEZ and Orgadam Industrial Growth Centre in Kancheepuram district, Ranioet Leather Sector SEZ, Perundurai Engineering products SEZ, Cheyyar Automobile/Auto Ancillary SEZ, and Gangaikondan Transport Engineering Goods SEZ.

Tamil Nadu Major Industrial Centres and Special Economic zones



Geography Notes Part 20

Tamil Nadu

Transport and Communications

Transport and Communications play a vital role in the economic development of Tamil Nadu. Transport system helps with the easy movement of human beings and materials. It acts as

the arteries and veins of national development. The transport system is of four types. Roadways, Railways, Waterways and Airways.

Roadways

Of all the States of India, Tamil Nadu has a sound network of roads. All economic sectors of the State is inter connected and interlinked by roadways. The State Transport Corporations operate the public transport system along with private transport organizations. Compared to other States of India, Tamil Nadu State Transport Corporations operate bus services in a fullfledged, facilitating manner. Roadways may be classified into four types. They are:

- National Highways;
- State Highways;
- District roads; and
- Village Roads.

There are 24 National Highways covering a total distance of 4500km. Golden Quadrilateral Project. To meet the ever increasing demand from public, there are seven transport corporations functioning in the State. They are given below with their area of operation:

1. Metropolitan Transport Corporation-Chennai and sub urban areas – Chennai as head quarters.
2. Tamil Nadu State Transport Corporation-Villupuram(Cuddalore, Vellore, Tiruvannamalai, Kanchipuram and Tiruvallur districts with Villupuram as head quarters).
3. Tamil Nadu State Transport Corporation- Kumbakonnam(Thanjavur, Thiruvarur, Nagapattinam, Karaikkal(Puducherry) Thiruchirapalli, Karur, Perambalur, Sivagangai, Ramnad and Pudhukottai districts with Kumbakonam as head quarters).
4. Tamil Nadu State Transport Corporation-Salem(Salem, Dharmapuri, Namakkal and Krishnagiri districts with Salem as head quarters).
5. Tamil Nadu State Transport Corporation- Coimbatore(Coimbatore, Trippur, Erode and the Nilgiris districts with Coimbatore as head quarters).
6. Tamil Nadu State Transport Corporation – Madurai(Madurai, virudhunagar, Dindigul and Theni districts with Madurai as head quarters).

7. Tamil Nadu State Transport Corporation- Thirunelveli(Thirunelveli, Thuthukudi, Kanyakumari districts with Thirunelveli as head quarters).

Table: Length of roads in km

Length of roads	(in km.)
1. National Highways	4,500
2. State Highways	5,525
3. Corporation and Municipalities	17,161
4. Town Panchayat Roads	15,591
5. Village Oanchayat Roads	63,538
6. Panchayat Union roads	32,791
7. Forest Roads	3,930

Apart from these the State has vehicular transport in the form of two and three wheeler vehicles which constitute about 83.9%. The number of registered vehicle population in Tamil Nadu had increased to 10.064 million in 2007-08. There are 64 vehicular zones in the States. Among the Regional Transport Offices, Chennai is the largest one which has - 61 centres.

Tamil Nadu Roadways



Recent Developments in Road Transport

- Conversion of single lane of State Highways into double lane and multilane.
- The widening and improvement of road from Madhyakailash in Adyar to Siruseri on Old Mahabalipuram Road (OMR) for about 24 km was laid. This is referred to as IT Expressway and it serves as connectivity to all IT companies.
- The East Coast Road (ECR) that is built along the coast of the Bay of Bengal connects Chennai and Cuddalore via Pondicherry. It gives rise to spectacular scenic views with beaches and fishermen hamlets. Presently, the East Coast Road has been extended to Thuthukudi via Chidambaram, Nagapattinam and Ramanathapuram.
- The Golden Quadrilateral Project of the National Highway Development that runs for about 1,232 km in Tamil Nadu has been completed.
- Most of the mofussil traffic had been diverted on to the bypass roads to avoid traffic congestion.
- CMBT (Chennai Mofussil Bus Terminus), which is the largest modern bus terminus in Asia, Koyambedu, Chennai has been established.
- Bridges and flyovers have been constructed in many districts of Tamil Nadu along the National Highways. Some of the notable ones may be found in Chennai City-Chennai Airport Flyover, Perambur Flyover, Anna Flyover and Kathipara junction Flyover. In Vellore, Tindivanam and Ulundurpet flyovers have been constructed to ease vehicular traffic congestion.
- Ring roads that encircle urban areas to divert vehicular traffic to avoid traffic passing through the centre have been implemented.
- SETC operates a variety of buses, namely, semi-deluxe, super-deluxe, video coach, ultra-deluxe, Volvo-deluxe and air suspension buses within Tamil Nadu and adjacent States.

Railways

Tamil Nadu is well served with a good network of railways as part of the southern Railways with headquarters at Chennai. Rail tracks are classified into:

- Broad gauge;
- Metre gauge;

- Narrow gauge; and
- Suburban Railway.

In Tamil Nadu the total length of railway tracks is about 5,952 km and total number of railway stations is 532 to connect all the major cities of Tamil Nadu.

Tamil Nadu Railways



The Southern Railways zones have been demarcated into six divisions, namely, Chennai, Madurai, Salem, Palakkad, Thiruvananthapuram and Thiruchirappalli. Main rail junctions in the State are:

Chennai, Erode, Coimbatore, Thirunelveli, Madurai, Thiruchirappalli and Salem.

Chennai has a well established suburban railway network, with three different lines connecting Chennai with Arakkonam, Gummidipoondi and Chengalpattu, MRTDS Railway line connects Chennai Beach to Velachery.

Recent developments in railways

The metre gauge rails are being converted into broad gauge of which 26% of the length had been electrified.

Gauge conversion project has also been taken up from Chennai Beach to Tambaram, Chengalpattu and other suburban areas.

Waterways

Waterways are the cheapest means of transport. It may be divided into inland waterways and seaways. The State has 1000 km of coastline. The three major ports of Tamil Nadu are Chennai, Thuthukudi and Ennore. They play a crucial role in the provision of infrastructural support in the State. Minor Ports are anchorage ports where cargo is transhipped from the vessel to the shore. Some of the minor ports are Cuddalore, Nagapattinam, Kolachal and Rameswaram.

Cargo handled by major ports	
	(in million tonnes)
1. Chennai	57.15
2. Tuticorin	21.62
3. Ennore	11.56

Projects Under Progress Sethusamudram Shipping Canal Project(SSCP)

It aims at creating a navigation channel from the Indian ocean to the Bay of Bengal through Gulf of Mannar, Adam's Bridge, Palk Bay and Palk Strait within the Indian Border. This project is of strategic importance as it connects the neighbouring Continents and countries. It also acts as a catalyst for industrial development, super

Tamil Nadu
Major Seaports and Airports



trade and commerce advance coastal shipping and generate employment.

1. Buckingham canal that once connected Marakkanam in villupuram with Vijayawada in Andhra Pradesh has lost its importance.
2. Vedaranyam canal that connects Vedaranyam and Nagapattinam and has also lost its importance.

Airways

Airways is the fastest and costliest means of transport which can carry passengers, freight and mail. They connect local, regional, national and international cities. Tamil Nadu has a major international airport, which is named as Anna international Airport. It is connected to 19 countries and operating more than 169 direct flights every week. This is currently the third largest airport in India after Mumbai and Delhi.

Chennai has direct air services to Sri Lanka, Dubai, Germany, Indonesia, Malaysia, England, Maldives, Saudi Arabia and Singapore. The air services that operate between Chennai and Coimbatore through Salem promote the industrial development of Salem and Mettur.

International Airports

1. Chennai(Anna)
2. Coimbatore
3. Thirucirappalli

Domestic Airports

1. Chennai(Kamarajar)
2. Madurai
3. Salem
4. Tuticorin

Airports	Cargo handled (in tonnes)
1. Anna International (Chennai)	2,27,704
2. Kamarajar Domestic(Chennai)	42,905
3. Coimbatore	1,858
4. Madurai	375
5. Thiruchirappalli	238

Communications

The means through which ideas and information are exchanged are called “called of Communication”. They are Personal Communication and Mass Communication Networks Personal Communication includes Postal Services, Telegram, Telephone, Internets, E-mail and Fax Mass Communication Network is carried on by the Government agencies. They are:

Print Media (books, Journals, magazines and newspapers) and Electronic Media (Radio, Television, Telecommunications, Mobile phone, E-mails, E-commerce and Teleprinter).

Postal Network and Telegraph

Tamil Nadu has four postal districts, namely:

Zone/ Districts	Headquarters
Chennai	Chennai
Western	Coimbatore
Central	Thiruchirappalli
Southern	Madurai

The postal Department has allocated the Postal Index Number (PIN) to facilitate faster delivery of letters in the form of Air Mail Service, Railway Mail Service and Speed Post.

Postal and Telegraph offices in Tamil Nadu

Number of Post Offices alone: 12,115 Number of Post and telegraph offices : 3,504.

In India the BSNL is a major service provider. Direct calls can be made across the country and the world with STD(Subscriber Trunk Dialing), PCO(Public call office) and ISD (International Subscriber Dialing) facilities respectively. Today, Tamil Nadu has :

Telephone exchanges- 2,408

Telephone subscribers – 33,46,906

There is no Telegram service at present.

The private basic telecom services are provided by Bharati Infotel, TATA, Reliance, Airtel, Aircel, Vodafone, Uninor.



Telecommunications

Telecom growth has intimate relationship with the IT sector. The State has witnessed a boom in the number of PCOs and the landline segment. Rapid expansion in the telecom sector is accompanied by simultaneous significant technological changes. Cell phones are one such advancement in the field of technology. Even the internet can be accessed using cell phones. The world is shrinking with increasing spread of the communication network. The following are the services provided by the BSNL:

Cellular Subscribers (Cumulative in Lakhs)

Year	Tamil Nadu	All India	Percentage share to All India
2002-03	6.15	126.88	4.85
2003-04	16.28	261.5	6.2
2004-05	33.53	410.2	8.17
The total number of cellular phones in use in Tamil Nadu: 3337087			

Internet is provided to subscribers in the name of Data One Broadband.

Both post-paid and prepaid cell phone services are offered through public as well as private service providers,

All India Radio (AIR)

Indian radio broadcasting, which was started in 1927, became All India Radio(AIR) in 1936. AIR has 15 Radio Stations in Tamil Nadu. Private Broadcasters have set up FM Radio Stations and broadcast a variety of programmes on education, agriculture and entertainment.

Doordharshan

It is one of the largest terrestrial networks in the world. All the major live telecasts of national and international programmes bring the viewers under one roof. It transmits education all programmes for Schools and Universities through “Edusat”.

Internet and Intranet

The present world is networked with the World Wide Web, known simply as the internet and Intranet. Of the two, internet plays an important role in the field of education and transfer on knowledge. Internet can be accessed by any individual from any part of the world.

An Internet is a private computer network. Intranets are websites that can only be accessed within a company through their internal network.



Satellite

It is the latest means of communication which has brought revolution in communication all over the world. India's communication network is operated through two satellites, namely, Indian National Satellite (INSAT) and Indian Remote Sensing Satellite (IRS). These two, apart from communications, assist in the prediction of meteorological events and natural resources management.

Print Media

It is another powerful medium to convey information through various news agencies of India that are operating under the umbrella-Press Trust of India, United News of India and Press Information Bureau.

Communication Technology and its advantages

It plays a vital part not only in personal life but also important role in business and education through satellites.'

People can send and receive mails using e-mail to get information on job vacancies, admission to Universities and to obtain birth and death certificates.

Shopping via internet(e-commerce) is a trend now-a-days.

Telemedicine makes it possible for people in remote areas to get correct treatment at appropriate times.

Online payment of phone bills, electricity bills and online ticket booking can also be made.

D-Mat form of shares for share broking and video conferencing using video chat through webcam are also done using internet.

Communication technology has developed to such an extent that even remote villages are connected to any part of the world, making the world a global village. GPRS (General Packet Radio Service) is a way of sending data through radio waves which is currently being used to transmit voice. GPS (Global Positioning System) looks like a Mobile phone which captures signals from multiple satellites and provides information on the location of a place.

Disaster Management

The Earth we live is a dynamic self regulatory system. In the modern world with the best available communication facilities we are informed of extreme events that occur in any part of the world. In many circumstances events like the volcanic eruption, the earthquake and flood become harmful to human society.

Hazard is a dangerous event, natural or human induced that cause injury, loss of life and damage to property.

A Disaster is an event which causes enormous physical damage to property, huge loss of life and drastic change in the environment. The economic, social and cultural life of the people is affected and they need external help for food, shelter, medicine, financial and social support to overcome the disaster. Disaster is classified according to the origin as natural and man-made Disaster.

Forces Responsible for Disaster

Type of Disaster	Forces	Events
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Geophysical disaster.	Earth's internal force.	Earthquakes, landslides, tsunami and volcano.
Hydrological disaster.	Surface water/glacier flow.	Avalanches, flood.
Climatological disaster .	Atmospheric events, Interaction of atmosphere and ocean.	Extreme temperature, drought, wild fires, Cyclones, storms, surges, waves.
Man-made disaster.	Human negligence.	Industrial accidents, pollution, acid rain, road accidents, leakage of toxic waste, war.

Disaster Management:

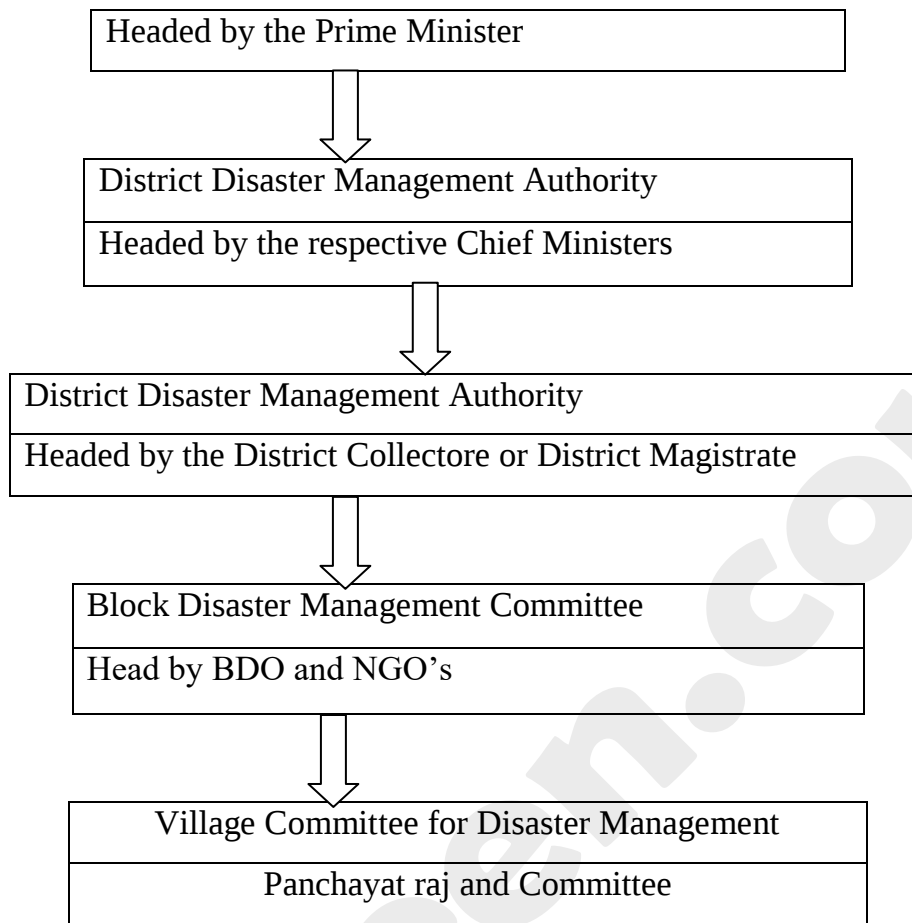
Disaster Management involves a continuous process of planning, organizing, coordinating and implementing measures to avoid loss of life and property. The role of the authority is to frame safe disaster management methods to protect people and property. Disaster Management cycle includes four stages namely preparation, response, recovery and mitigation.

Disaster Management cycle



Hierarchy of Disaster Management in India

National Disaster Management Authority.(NDMA)



The Tsunami of 2004 occurred in the Indian Ocean and the earthquake, China 2008 are the examples of the disaster.

The Bopal Gas(Methyl Isocyanate) tragedy of 1984 in a Carbide plant is also an instance of disaster.

India is prone to natural disasters due to its geological set up. The Indo-Australian plate is still moving at an average of 2 cm every year toward Eurasia, still pushing Tibet upwards. Thus Himalayan zone is vulnerable for earthquakes and landslide. Apart from this, floods and avalanches are also common here. The northern plains are affected by devastating floods during monsoon due to flat terrain and torrential rainfall. On the other hand North western part of India and central part of Deccan are mostly affected by drought, famine, at times flash floods and

desertification.

The coastal regions of course are affected by cyclones, storm surge and rarely tsunami.

Preparation

1. First step is to strengthen the basic information about the area like landform, slope, climatic features, population, etc.,
2. To list out the types of disaster the area is prone to like earthquake affecting zone, cyclone affecting area and so on.
3. To identify the local area which is most vulnerable to such disaster, for instance, the either side of Adyar river and Velachery are flood prone area within Chennai city.
4. Prepare schemes to deal with the disaster. Example
 - a) Identify safe place for the people to be shifted to in case of disaster.
 - b) Form a volunteer group involving local people with their contact number to coordinate at the time of emergency.
 - c) Have a list of phone numbers of the nearest Police station, Fire service and Government hospital for immediate correspondence

Response

1. Alert people before the occurrence of disaster.
2. Respond to the grave situation at the time of disaster, example, search, rescue and evacuate all the people from the site of incidence.
3. Arrange the essential items for the people; example food, shelter, medicine and others.
4. Assess the severity of disaster.

Recovery

1. Providing temporary housing facility, medical care, counselling, reuniting people with their kin and kith, financial support, etc.,
2. Rehabilitation and reconstruction of the damaged property.

Mitigation

1. All activities that reduce the impact of the event is said to be mitigation.

Warning systems in India

The Department of Ocean Development in association with Department of Science and Technology(DST), Department of Space(DOS) and CSIR Laboratories, has set up an Early Warning System for Tsunami and Storm Surges in the Indian Ocean. Generation of disaster warning is a multi-institutional effort.

The table gives the Departments responsible for warning the public of the disaster through proper media.

The following are the agencies of disaster management:

Agencies- Disaster Management

Disaster	Agency
Heat wave/ Cold wave/ Cyclone / Earthquake	Indian Meteorological Department (IMD)
Tsunami	Indian National Centre for Oceanic Information System(INCOIS)
Land slides	Geological Survey of India(GSI)
Flood	Central Water Commission(CWC)
Avalanches	Defence Research and Development Organization(DRDO)

Warning systems in Tamil Nadu

Hotline between Indian Meteorological Department and the State Emergency Operation Centre(EOC) is established. Dissemination to the districts is done through telephone and fax. IP phones are also available, which connect the State with the district headquarters, taluks and blocks of the State. Wireless radio network; both high Frequency and very high frequency and very high frequency are available in the State.

Flood:

Sudden overflow of large amount of water caused by heavy rainfall, cyclones, melting of ice, tsunami, etc., is called as flood. Low lying flood plains, coastal plains and river confluences are prone to flood.

Effects of flood:

1. Loss of life and property.
2. Displacement of people.
3. Spread of contagious diseases such as cholera, malaria, etc.,

From 14 to 17 June 2103, the Indian state of Uttarakhand and adjoining areas received about 375% more than the normal rainfall during a normal monsoon. This caused the melting of Chorabari Glacier at the height of 3800 metres, and overflow of the Mandakini River which led to heavy floods near Gobindghat, Kedar Dome, Rudraprayag district, Uttarakhand. The heavy rains resulted in large flash floods and massive landslide. Unscientific development activities undertaken in recent decades have resulted in high level of loss of property and lives. Roads constructed in haphazard style, new resorts and hotels built on fragile river banks and more than 70 hydroelectric projects in the watersheds of the state led to this disaster.

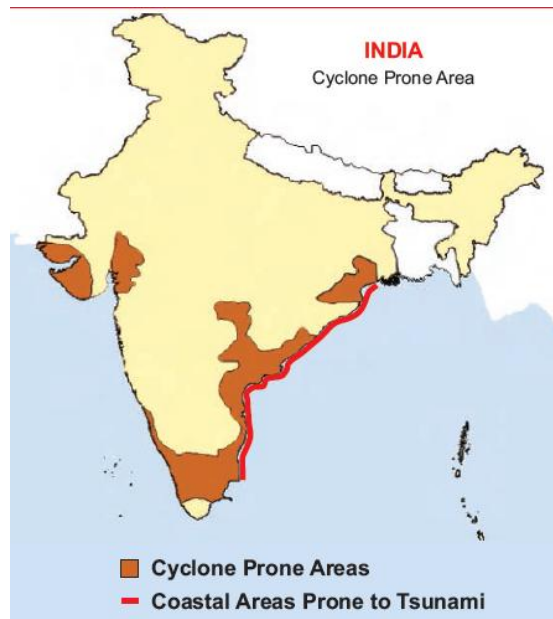
Cyclone

Areas of low pressure surrounded by high pressure is called as cyclone. It is anticlockwise in Northern hemisphere and clockwise in Southern hemisphere.

- ❖ The centre of the cyclone called the eye of the storm is calm and clear without clouds.
- ❖ The condensation of vapour releases more latent heat and that gives the energy for the cyclones to enhance further evaporation and formation of clouds.

India with a coast line of 7516 km is affected by 10% of world tropical cyclone. 13 coastal districts of our state are prone to cyclones. Cyclones occur in the month of May – June and in

October – November. Cyclones are associated with strong squall, torrential rain, flood and storm surge. The damage by cyclones can be mitigated by growing shelter belts and restoring the mangrove forests where ever possible.



Drought

Long period of rainless weather condition is termed as drought. The severity of the drought depends upon the degree of moisture deficiency, the duration, and the size and location of the affected area.

IMD has taken initiatives to cover all blocks in Tamil Nadu with Automatic Weather Stations Network.

Techniques of conservation of water like sprinkle irrigation, fertigation, pot hole irrigation, precise farming, and selection of suitable variety of crop that can with stand drought are some of the remedies that may reduce the impact of drought.

Earthquake

An earthquake is a sudden vibration or shake of the earth's crust. It is caused by the circulation of the convection cells and the plate movements.

An earth quake may cause the landslide, avalanche, fire, soil liquefaction and Tsunami.

The place of the origin of an earthquake is called “**FOCUS**”. The deepest earthquake may have its focus at a depth of even 700km below the ground surface. The place on the ground surface which is perpendicular to the ‘focus’ is called ‘**EPICENTRE**’. The seismic waves move away from the source of the earthquake in the form of Primary waves(P Waves) Secondary waves (S Waves) and Long waves or surface waves (L waves).

Effects of Earth Quake:

1. Changes in the shape of the earth's surface.
2. Loss of life and property.

Seismic Zones of Tamil Nadu

India is divided into four seismic zones, namely II, III, IV and V; Zone V is the high risk zone. Tamil Nadu falls under moderate and low risk zones.(Zone III and II).

The districts of Nilgiris, Coimbatore, Kanyakumari, Vellore, Thiruvallur, Chennai, Kancheepuram, Thiruvannamalai, Dharmapuri districts are classified as moderate risk Zone III. The rest of the districts in Tamil Nadu comes under low risk zones II.



Tsunami:

An extremely large wave in the sea caused by the earthquake occurring under the ocean floor. Apart from huge loss of life and property the environmental impact of tsunami is

tremendous. It affects the quality of fresh water in the coastal aquifers. The salt is deposited on the arable land by sea water and it takes long time to restore the quality of soil.

Facts about tsunami

- ❖ An underwater earthquake, a volcano eruption or a landslide mostly causes a tsunami.
- ❖ Tsunami can travel as fast as miles per hour, without being noticed and can cross the entire ocean in less than a day.
- ❖ When stuck in Tsunami, it is recommended to grab a floating object and allow the current to carry you.
- ❖ The tsunami that occurred in December in the Indian Ocean is known to be the most powerful tsunami that has occurred till date.
- ❖ Scientists can estimate an almost accurate time as to when and which part is tsunami most likely to occur.

Man Made Disaster

Fire, industrial, technological, transportation, nuclear accidents, biological disaster and war are all man-made disasters.

Fire

Fire is a disaster caused due to electrical short circuit, accidents in chemical factory, match and crackers factory, handling fire by the side of inflammable materials and near gas cylinders are also causing fire. Forest wild fires are a major disaster all over the world.

The environmental impact of forest fire includes emission of large amount of carbon dioxide leading to global warming, loss of bio diversity, affecting hydrological cycle, reducing photo synthetic activity, and health hazards to human beings. Safeguarding life and property from fire and forest fire involves three basic aspects:

1. Prevention
2. Detection and
3. Extinguishing

Public awareness of what to do before fire, during fire and after fire is of critical importance.

Industrial and Technological disasters'

These disasters result from accidents, failures, mishap or misuse of some kind of technology.

The industrial Disaster:

The storage and transportation of various hazardous materials used in industries may result in industrial hazard accidents. Recently, major disaster threats have emerged in the chemical and nuclear industries.

Chemical industry faces multiple risks involved with its production, transportation, storage, usage and disposal off the effluents containing residual chemicals.

Chernobyl nuclear disaster 1986 (former USSR) and Japan, 2011 had experienced the most hazardous nuclear disaster.

General survival techniques

- During flood forecast it is important to stock up on first aid items, non-perishable foods, 3 gallons of water per person for 3 days, battery operated radio for weather reports, extra batteries, personal hygiene necessities. Secure the cattle's in an elevated place and store their fodder and potable water. Listen to the local Radio/ TV for instructions. Cut off all the electrical supply during flood and earthquake.
- During drought period arrange fodder and drinking water for cattle in drought regions. Form hazard and risk management service groups and function effectively as per the advice of scientific community in each village.
- During the earthquake be under the table, chair, kneel to the floor and protect yourself. Go near a sturdy wall, sit on the floor and hold the floor strongly and protect yourself. Use only torch lights, avoid candles and oil lamps because of fire risk, where earthquake occurred. Wear sandals while walking on rubbles.
- In case of fire accident Call the nearby police station, (No. 100) or the fire service(No.101) as soon as the firebreak. If caught in a fire or smoke, escape by crawling low to the floor. If clothes are on fire, "Don't Run; Stop, Drop and Roll".

- In case of Industrial hazards previous knowledge of every aspect of the chemical involved will help us to act promptly to mitigate the disaster. Know the safety measures and follow the rules strictly. Handle the chemicals with care,
- Road accidents can be avoided if only legal licensed person above 18 is allowed to drive. Learn, preach, and practise safety rules during driving and walking along the road.
- At railway crossings pay attention to signal and the swing barrier. In case of unmanned crossing, get down from the vehicle and look at both the sides of the track before crossing the track. Don't touch objects which are suspicious. Never jump from a moving train.
- On boarding the aircraft pay attention to the flight crew safety demonstration. Carefully read the safety briefing card available in the seat pocket.

Source:

1. Disaster Management And Disaster Mitigation Department Chennai – 600 005. Tamil Nadu
2. Central Board of Secondary School Education.
Together, Towards a Safer India-I.

Geography Notes Part 21**Tamil Nadu – Trade**

Trade is an important phenomenon that decides the economic growth of a country. The types of goods and services that a country exports and imports provide a mirror image of the economic structure. Trade may be defined as “an exchange of goods and commodities either within the country or between countries”. In simple terms, buying and selling of commodities is called trade and it may be local, regional, national and international. The primitive method of trade was known as the **barter system** where goods were exchanged for goods. Later on, money was introduced as a medium of exchange in buying and selling of goods.

Exports refer to goods and services sold for foreign currency. A country which increases its export transactions is said to accumulate foreign exchange reserves.

Major Exports of Tamil Nadu

1. Textile goods
2. Drugs and pharmaceuticals
3. Chemicals
4. Leather and leather goods
5. Engineering goods
6. Ores and minerals
7. Software and electronics

Imports are goods and services bought from overseas producers. Almost every country of the world will try to pay for their imports through exports. Trade is not a mere exchange of goods; but it also includes exchange of service.

Major imports of Tamil Nadu

1. Minerals fuel and mineral oil
2. Electrical machinery equipment and spare parts.
3. Iron and steel and articles of iron and steel
4. Natural and cultured pearls
5. Organic chemicals
6. Plastics and articles
7. Vegetable fats and oil products

Trade is of two types: 1. Internal Trade and 2. International Trade

Internal trade

Trade carried on within the domestic territory of a country is termed as internal trade. Roadways and railways play an important role in the internal trade. In this type of trade, the national currency is involved to carry on the trade.

International Trade

Trade between two or more than two countries is termed as international trade. If the trade is between two countries, it is bilateral. There is also multi-lateral trade which occurs among more than two countries. Multinational currencies are used to carry on this type of trade. Ports and harbours play an important role in international trade.

Trade in Tamil Nadu

As Tamil Nadu has well developed roadways and railways, domestic trade is efficiently handled among the districts of Tamil Nadu.

For marketing the commodities, in the state, there are several Market Committees and regulated markets, functioning in all the districts of Tamil Nadu. Market Committees are formed by the nominated members of the beneficiaries and the Chairperson for the committee is selected by the members. There are about 21 market Committees to handle the marketing of agricultural goods and to fix a genuine prices for the commodity. At present there are about 303 **Agricultural Produce Marketing Centres (APMC)** distributed all over the districts of Tamil Nadu. The APMC is further classified into Primary, Secondary marketing centers and non-regulated marketing centers (Agmarknet statistics 2010). The largest number of 34 Marketing centers are found in Erode district followed by Coimbatore and Thanjavur with 21 centers.

Uzhavar Sandhai scheme was initiated for direct selling of fruits & vegetables at a fair price by the farmers to the consumers without any intermediaries. The 1st Uzhavar Sandhai was started at Madurai in 1999 and there are about 103 such Uzhavar Sandhais in the state. Every day on an average 1609 MT of fruits and vegetables worth of Rs.191.77 lakhs are sold by 7526 farmers 2,71,685 consumers were benefited through Uzhavar Sandhais during the year 2008-2009.

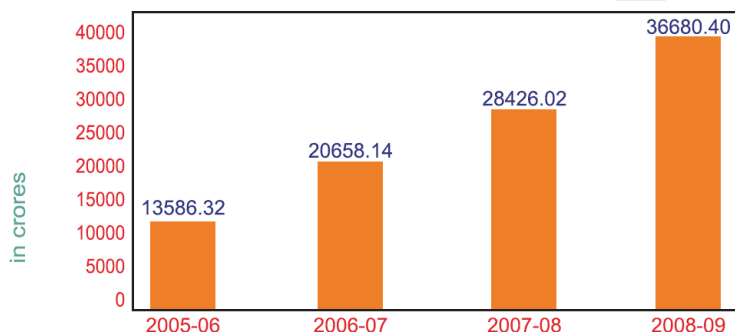
Market Complexes with storage facility are available all over the state.

Tamil Nadu Co-operative Silk Producers Federation, TANSILK an apex co-operative body, with Headquarters at Kancheepuram, purchases raw silk and supplies them to Handloom Weavers Co-operative Societies and other weaving sectors.

Industrial Co-operatives, a wing of the Department of Industries and Commerce, Government of Tamil Nadu in arranging to the market the products of rural artisans through Handicrafts Co-operative Societies. State Industries Promotion Corporation of Tamil Nadu(SIPCOT) focuses on developing, marketing and maintaining industrial complexes/ parks within the state.

The exports of Tamil Nadu has been increasing at faster rate than the overall exports of the country. The significant rise information Technology (IT) companies in Tamil Nadu has promoted the value of software export in recent years. The following are the value of software products sent abroad.

Tamil Nadu- Major Exports 2005-2009 value in Rupees



Year	Exports (Rs. in million)
2007/08	284,260
2009/09	366,800
Foreign Trade(Rs. in million)	
Export	
By Sea	602,600
By air	74,990
Import	
By sea	1,285,400
By air	304,950

Importance of Trade

Trade is called an engine of growth because:

1. It helps in the increase of foreign currency reserve.
2. It makes available all kinds of goods anywhere.
3. Trade increases technology transfer from one country to another.
4. It improves the welfare of the workers.
5. It helps to increase the total production of an country.

Geography Notes Part 22**Tamil Nadu – Population**

People of a country are the greatest assets for development. People living in an area together are known as population. The study of population is known as demography. People are considered as resources because of their ability to change available natural resources into value added products. Human potential, knowledge and energy are used for the betterment of individuals, the society and the nation. Every individual contributes to the nation's development. Therefore, the size of population and its individual capacity in terms of education, health and work force decides the pace of national development. For this reason, people of the country should be nurtured in proper manner to maintain the quality and quantity.

Population of Tamil Nadu

As per 2011 Census, the population of Tamil Nadu was about 7,21,38,958 of which 3,61,58,871 was males and 3,59,80,087 was females. Tamil Nadu as a whole has 5.96% of the total national population(India).

The Census of India, a central governmental organization, is engaged in collecting, tabulating and publishing all statistics related to population, once in ten years.

Demography indices

The **crude birth rate** – the annual number of live births per 1,000 people.

The **crude death rate** – the annual number of deaths per 1,000 people.

The **infant mortality rate** – the annual number of deaths of children less than 1 year old per 1,000 live births.

The **sex ratio**-the number of females per 1,000 of males.

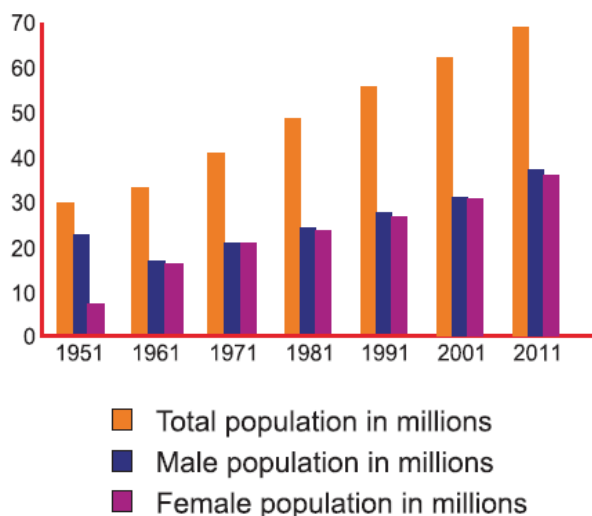
Life expectancy –the number of years an individual at a given age would be expected to live at present mortality levels.

Total fertility rate represents the numbers of children that would be born to a woman if she were to live to the end of her childbearing years and bear children in accordance with current age-specific fertility rates. The Total Fertility Rate of Tamil Nadu.

Birth and death rates for Tamil Nadu for the year 2006 is 15.9 and 7.6 per thousand population, respectively. Infant mortality rate has reached 37 to 1,000 live births by 2006.

Growth of population

From the bar diagram given, may be inferred that the population of Tamil Nadu has doubled over a period of 60 years from 1951 to 2011.



The difference between birth and death rates gives the natural increase of population of regions. When expressed in percentage it is known as the growth rate. The annual growth rate is 1.1%, which is lower than that of India.

When birth rate is continuously high, a nation has to provide education and health facilities for more number of children. Other environmental problems also increase with high population. Tamil Nadu has shown a considerable rate of reduction in growth rate in recent years.

Distribution of population

Chennai possesses the largest share of 6.4% of the total population of Tamil Nadu. This is followed by Coimbatore, Vellore and Salem districts. Perambalur has the least population of (0.078%).

Factors influencing the distribution of population

- Generally, plains with suitable climate support a huge population.
- Coastal plains with mild temperatures and good opportunities for economic activities support huge population.
- Job opportunities in large towns and cities attract both literates as well as illiterates.
- Dry regions generally support a small population.
- Mountainous regions with steep slopes and forest cover support a small population as well.

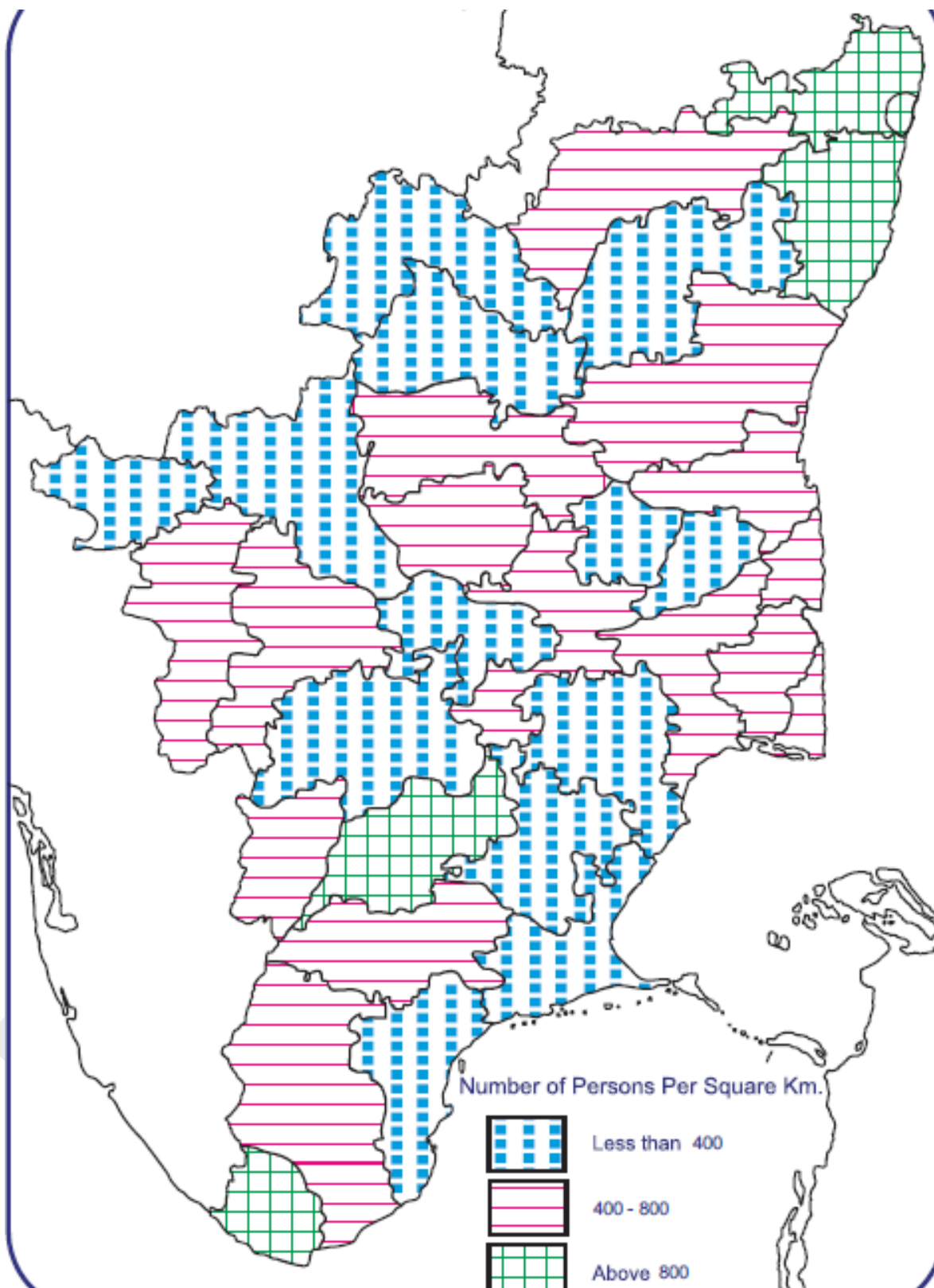
In general, the variations in population among different regions are identified by **population density**. Density of population is a means of finding out the number of persons living in one unit area, which is generally expressed as persons per square kilometer. It gives an idea of how crowded a region is. The following table gives the density of population in Tamil Nadu, by districts of the states.

Table: Tamil Nadu: District wise density of population

Number of persons per square km	Density	Districts (density is given in brackets)
Less than 400	Low	Nilgiris(288), Ramanathapuram(320), Perambalur(323), Sivagangai(324), Dharmapuri(332), Pudukkottai(348), Dindigul(357), Krishnagiri(370), Karur(371), Thuthukkudi(378), Ariyalur(317), Erode(397), Thiruvannamalai(399)
400 – 800	Medium	Theni (433), Virudhunagar(454), Tirunelveli(458), Tiruppur(476), Villupuram(482), Namakkal(506), Thiruvarur(533), Tiruchirappalli(602), Vellore(646), Salem(663), Nagapattinam(668), Thanjavur(691), Cuddalore(702), Coimbatore(748).
Above 800	High	Madurai(823), Kancheepuram(927), Thiruvallur(1049), Kanniyakumari(1106), Chennai(26903).

From the table, it may be understood that eight districts exhibited high population density. Seventeen districts have medium densities and five districts fall under low population density. Chennai, the capital city, a centre for administration, education, industry, trade, commerce and recreation, has the highest density of population. Sivagangai has the lowest density of population.

Tamil Nadu Population Density



Composition of Population in Tamil Nadu

As per 2011 census, 37% of population in Tamil Nadu is below 20 years, 54% is between 20 and 60 years, and 9% is above 60 years.

Percentage of Schedule Castes and Schedule Tribes is 20% and 1.1% respectively.

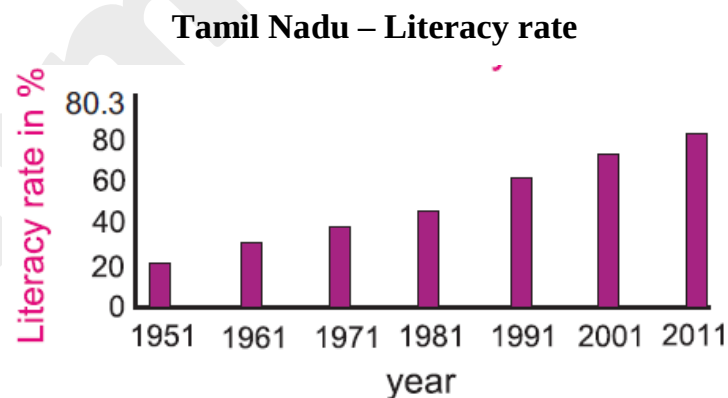
In Tamil Nadu there are about 88% Hindus, 5.5% Muslims, 6% Christians and the rest are of religions such as Sikhs, Buddhist and Jains.

The state has a sex ratio of 996 women for 1000 men. The highest sex ratio is in Thuthukodi(1042) and the least is in Dharmapuri(946). Fifteen districts record more females than males.

In Tamil Nadu, 51.55% of the people live in rural areas and 48.45% of the population live in urban centres.

Literacy

The literacy in Tamil Nadu has greatly increased in the period 1951 to 2011. The overall literacy of Tamil Nadu is 80.09% Among the districts, Dharmapuri has the least literacy of 68.5% . Kanyakumari has the highest 91.75% of literates. Chennai, Thuthukudi and the Nilgris have 80% literates. Among the Schedule Castes and Schedule Tribes 55% and 35% of them are literates.



The state has considerably reduced the school dropouts. Education for all is the prime ambition of the government. Among men, 726 out of every 1000 are literates. Likewise among women 571 out of every 1000 are literates. Among the districts, Kanyakumari has the highest literacy rate with 803 for every thousand men and 758 for every thousand women.

Occupation

According to 2011 Census, the total number of workers in Tamil Nadu account for 44.67%; non-workers accounts for 55.33%. Among the workers, 41.5% work in the primary sector, followed by 27.7% in the secondary sector and 30.8% in the tertiary sector.

Classification of workers

It may be noticed from the table that agricultural workers are seen to, be reducing in number. Construction workers and tertiary workers are increasing year after year which indicates the trend of increasing urbanization in Tamil Nadu. In the year 2000, the unemployment rate for the state was 2.4%.

Tamil Nadu workers and Non-workers

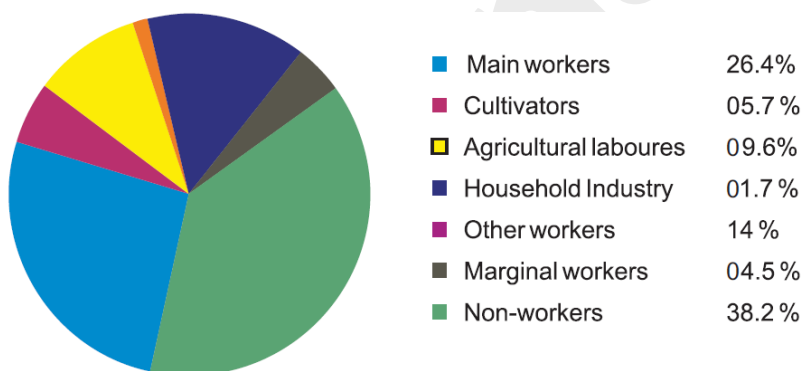


Table: Classification of Workers and Distribution

Workers	1961 (in%)	1991(in %)	2001(in %)
Cultivators	42.0	25.0	18.4
Agricultural labourers	18.4	36.0	31.1
Household, Industry, Manufacturing	13.4	03.6	05.3
Other workers	26.2	35.0	45.2

Source: Tamil Nadu Human Development Report.

Women Development and their contribution to Economy

The potential of women should be realized and recognized for the well- being of any society and development of the nation. Tamil Nadu is a pioneer state which has encouraged the empowerment of women.

Former UN Secretary General Kofi Annan has stated: “Gender equality is more than a goal in itself. It is a precondition for meeting the challenge of reducing poverty, promoting sustainable development and building good governance”.



Women empowerment includes:

- Women’s sense of self-worth
- Right to seek and decide upon choices;
- Right to have access to opportunities and resources; and
- Right to have control on their lives both within and outside of their homes.

Strategies Adopted by Government of Tamil Nadu for Women Empowerment

Tamil Nadu Government has implemented several welfare schemes for women empowerment.

In order to empower women, the Science City has been organizing Entrepreneurship Development Programme(EDP) and Entrepreneurship Awareness Programme(EAP) to bring out the talents of women and to make them prove their potential.

A Self – Help Group(SHG) is a group of women, organized for eradication of poverty. They agree to save regularly and convert their savings into a common fund known as the Group Corpus. The members of the group use this common fund through a common management. In Tamil Nadu the SHGs were started in 1989 in Dharmapuri district. At present 1,40,000 groups are

functioning with 2.383 million members. Tamil Nadu Corporation for Development of Women Ltd arranges credit assistance for the successful groups through various schemes implemented by State as well as Central Government. Tamil Nadu ranks first in witnessing economic well-being of the people involved in such SHGs.



Human resource management

Since human resources are the most valuable of the resources of the earth, the people must be carefully managed so that everyone on the earth live peacefully. Human resource management aims at developing personal qualities in an individual so that he or she may contribute in a healthier manner for the national and world peace.

Geography Notes Part 23

Environmental Issues

Man and Environment

Development and environment are the two sides of a coin. Development highly essential for economic growth of a country but not at the cost of the environment. Man has lived continuously in harmony with nature. Man has transformed the environment by scientific and technological revolution. In recent years human intervention in the natural process has created ecological imbalance and environmental damages. Environment is the surrounding in which living organisms live and interact. Human beings are dependant on the environment for their basic needs. Needs multiply with the increase of population. To meet these needs, all natural

resources in the environment are being used at a rapid rate which leads to long term adverse effect. These adverse effects become environmental issues of the entire surrounding in which human beings live.

Major environmental issues are:

- ❖ Urbanization
- ❖ Deforestation
- ❖ Environmental pollution and
- ❖ Global warming

Urbanization

It refers to increasing inhabitants of people with non-agricultural occupation with a higher population density than the surrounding regions. The factors influencing urbanization are, industrialization, commercialization, dense network of transport and communication. The level of urbanization in Tamil Nadu is about 44% as per census of 2001. It is the second highest urbanized State in the country. In Tamil Nadu, Sriperumpudur, Kancheepuram and Arakonam are being urbanized due to rapid industrialization and nearness to the Chennai City and due to this they face higher rate of environmental deterioration.

Unorganized encroachment and uncontrolled growth of slums that spring up on all available chunks of vacant lands, river margins and road margins have created an adverse impact on urban environment. The Tamil Nadu Slum Clearance Board has already taken steps and constructed nearly 3000 shelter units to replace the existing slums.

Table: Slum families along Major Waterways

Name of the river	No of slum families
Coovum River	8266
Buckingham Canal	18423
Adyar River	6624

Source: Census 2001

Notable impacts of urbanization

- Large areas of agricultural and pastoral lands around the City are getting converted into residential and industrial areas.
- Increase in traffic and traffic congestion cause environmental pollution.
- Clearance of trees and bushes to meet the fuel and construction needs has reduced the green cover which in turn reduces the amount of rainfall.
- Loss of habitats of animals and birds and depletion of greenery has made the urban air polluted with less oxygen content.
- A rapid increase in the urban population has resulted in the breaking down of sanitary facilities and other infrastructures in cities and towns.
- Land value increases and rent becomes high due to stiff competition for land.

Deforestation

Deforestation is simply the cutting down of trees. It has seriously affected the quality of the environment by increasing the temperature, decreasing rainfall, top soil erosion, loss of bio-diversity and causes flash floods. Trees play an important role in maintaining the environmental balance.

Long term effects of Deforestation

- The long term effects are climate change and loss of bio-diversity. Climate change occurs due to an increase of greenhouse gases such as carbon dioxide. An increase in carbon dioxide will increase the temperature of the earth and will therefore alter the weather.

Deforestation ruins the habitat of the animals and plants causing them to die. Destruction of forest affects the beauty of an area and directly exerts an impact on tourism.

Short term effects of Deforestation

Fast depletion of forests urges rural people to use inferior quality firewood and make them spend more time on fuel collection. Shortage of forests also forces the villagers to use more commercial fertilizers in the place of organic manures. Fodder for grazing cattle diminishes

resulting in decreasing number of live stock. Loss of green cover leads to soil erosion. Landslides occur due to indiscriminate cutting of trees(Ooty and Coonoor).

Bio Diversity

A wide variety of living organisms including plants, animals and micro organisms are collectively referred to as bio diversity.

Today, human beings are largely to be blamed for irrational activities that cause bio diversity losses.

Loss of Bio Diversity

Extinction of plants and animals due to natural causes or human activities is called loss of bio diversity. It leads to an ecological imbalance.

Major threats to biodiversity in Tamil Nadu are:

- Uncontrolled commercial exploitation of natural resources like forest, coastal areas, wetlands and habitat destruction.
- Conversion of rich bio diversity sites for human settlements and industrial development.

To protect the biosphere, biosphere reserves have been set up in the Nilgiris and Gulf of Mannar.

The main objectives of the reserves are:

1. To conserve the genetic diversity of species and to restore degraded ecosystems to their natural and original conditions.
2. These natural reserves are alternatives for the sustainable growth of species.

Common household items derived from killing animals:

1. Paint brush – from wild boar and mongoose
2. To produce 100 gm of silk – about 1500 silkworms are boiled to death
3. Silver foil – Ox-gut is used (intestine)

4. Lac – To produce 1 kg. of lac 300,000 insects are killed.

Global Warming

Global Warming may be defined as an increase in the atmospheric temperature near the earth surface due to rise in carbon dioxide levels and the greenhouse effect.

Causes of Global Warming

The main causes of Global Warming are,

- Emission of greenhouse gases like carbon di-oxide, methane, nitrus oxide and choloro fluro carbon.
- Burning of fossil fuels(coal and petro;eum) and aggravated deforestation.

Effects of Global Warming

1. Heat waves and fluctuating weather cause diseases and warming up of Antarctic and Arctic oceans.
2. Sea level rise and coastal flooding due to glaciers' melting.
3. Coral reef bleaching due to to change in ecosystem.
4. Frequent drought, fire and heavy snowfall.

Control of Global Warming

A few controlling measures are:

- Switching over from non-renewable energy sources to renewable energy.
- Stopping the emission of greenhouse gases.
- Afforestation and encouraging people to use public transport.

Role of man in protecting the deteriorating environment

It is now the duty of every citizen of the world to conserve all the resources and aim at sustainable development. Human beings need to change their lifestyle and realize that they should

take special responsibility towards protection of the environment. The following are the steps to be taken for protecting our green earth from degradation.

- Maintaining harmony with the nature and protecting the environment
- Eco-development eco-efficiency and eco-friendly technology for the protection of natural resources.
- Switching off the unused lights and electrical equipment at home and save fuel in transport.
- Stabilizing the population growth, control of overconsumption of natural resources and preservation of bio-diversity.

Pollution

Substances released into an environment that cause harm to living organisms and built up structures are called pollution. Any substance that causes pollution is called pollutant. Pollutants are of two types: chemical and biotic. Our planet is getting choked with poisonous gases released from industries and vehicles. The problem is worse in crowded metropolitan cities. On the basis of sources, they are classified as

- 1) Air pollution;
- 2) Water pollution; and
- 3) Noise pollution

Air pollution

Air is polluted by the harmful gases released from industries and vehicles. Pollutants such as CO_2 , CO which cause air to be polluted.

Air pollution causes health hazards like respiratory infection and lung cancer.

Chief sources of air pollution

1. Industrial wastes;
2. Automobiles;

3. Domestic wastes;
4. Thermo-nuclear wastes;
5. Volcanic wastes and forest fires.

In Tamil Nadu air pollution is heavy and widespread in urban areas due to vehicular growth, higher concentration of industries along with thermal power plants and indiscriminate burning of garbage and reuse.

Effects of air pollution

- 1) Global warming;
- 2) Acid rain;
- 3) Ozone depletion;
- 4) Smog; and
- 5) Health problems

Water Pollution**Contamination of water is due to pollutants released from**

1. Sewage and domestic wastes.
2. Pesticides and agricultural run offs;
3. Industrial wastes;
4. Nuclear wastes;
5. Oil spills

Harmful effects of water pollution

- 1) It destroys microorganisms in water and affects aquatic life.
- 2) It causes water borne diseases such as cholera, jaundice, dysentery and typhoid.
- 3) Damages crops, decreases agricultural production due to deterioration of soil quality and fertility.
- 4) Oil spill results in death of sea organisms.

River Pollution in Tamil Nadu

Most of the rivers of Tamil Nadu are non-perennial in nature. Due to irregular supply of water the rivers are mostly used to carry effluents of tanneries, textile bleaching, dyeing and hospital wastes.

The indiscriminate discharge of effluents from textile bleaching and dyeing units in and around Tiruppur, Erode and Karur areas have caused pollution in the river system of Noyyal and Amaravathi. Effluents from tanneries is the main reason for land quality deterioration in the Palar river basin of Vellore district. Most towns located along the banks of four major rivers cause sewage pollution. The Kaveri river receives sewage from 11 towns, Palar from 6 towns, Vaigai from 5 towns and Tamiravaruni from 3 towns.

The Government imposed a total ban on setting close to important water sources such as the Kaveri and its tributaries, Ponnaiyar, Palar, Vaigai and Tamiravaruni. Tamil Nadu Pollution Control Board (TNPCB) has set up a special monitoring of the highly polluting industries. Ooty, Kodaikkana; and Yercaud lakes are monitored by GEMS (Global Environment Monitoring System). Chennai City River Conservation Project has taken up Cooum River, Buckingham Canal, Adyar River, Otteri Nallah and Mambalam Canal for cleaning up.

Soil and land pollution

Land pollution is the contamination of land by solid wastes. Any substance that reduces the productivity of the soil and lessens the quality is known as a soil pollutant and the process is known as soil pollution.

Sources of soil and land pollution

Land pollution is caused due to dumping and accumulation of solid wastes from agricultural, industrial and urban sources.

The excessive use of artificial fertilizers and pesticides greatly reduce the quality and fertility of the soils.

Table: Solid wastes generated in major cities of Tamil Nadu

City	Tons/Day
Chennai	3500
Madurai	711
Coimbatore	710
Trichy	408
Salem	330
Tirunelveli	210

Effects of soil pollution

Harmful chemicals enter food chain and cause harmful diseases. Pesticides affect the central nervous system, liver and damage reproductive organs.

Noise pollution

Noise can be defined as the unwanted and undesirable sound. Noise pollution is severe in the industrialized, urbanized and thickly populated regions of Tamil Nadu. Ambient noise level in Chennai is about 75-80 decibels, Coimbatore 80-85 decibels and Madurai 70-75 decibels.

Harmful effects of noise pollution

- 1) It causes loss of hearing, headache, mental disorder, anxiety and stress.
- 2) Excessive noise causes vibration in buildings.
- 3) Disturbs sleep which leads to irritability and nervous disorder.
- 4) The fertility of living organisms gets reduced considerably due to noise pollution.

Measures taken by the Government to protect and preserve the environment

- 1) Rehabilitation and reclamation of forest resources through afforestation.
- 2) National Green Crops: it is mainly to strengthen environmental awareness among school children. The programme was launched in 29 district. Under the scheme, the Government of India provides the grant of Rs. 1000 to every school annually. Nearly 3 lakh children are participating in this programme.

- 3) Environmental awareness camps, competition and eco-celebration.

Special days like World Environment Day(June 5), Earth Day(April 22),

Ozone Day(September 16) are celebrated every year.

- 4) Segregating solid wastes into different types on the basis of degradation through waste management.

- 5) Electronic Waste Management

The increasing pace of IT and Electronic industries generate 70% of e-wastes and should be disposed through the authorized recyclers as approved by the TNPCB.

- 6) In order to control the emission from goods transport vehicles, vehicle emission monitoring stations are set up in Chennai by the TNPCB at Alandur, Madhavaram and Ambattur areas and in the other districts at Nilgris, Dindigul, Palani and Chengalpet. Three monitoring stations have been established at guindy, Vyasarpadi and Thirumangalam in Chennai to check vehicular emission. There are 46 air pollution monitoring stations in the city of Chennai.
- 7) To create Singara Chennai, parks, flyovers, bridges, modernization of beaches and relaying of footpaths and roads, besides clearing encroachments have been undertaken.

House Sparrows are not found now-a-days to electromagnetic waves from mobile towers.

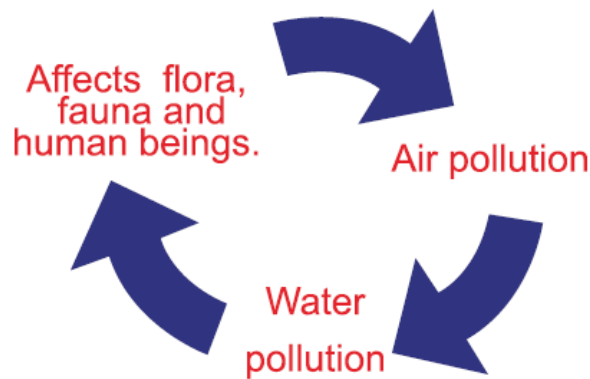
Tiger population is going down rapidly due to poaching.

Geography Notes Part 24

Conservation of Resources and Sustainable Development

Nature is generous in providing a variety of resources to the people. Humans in modern civilization, with advanced development in science and technology, utilize these resources beyond permissible limits. It has lead to environmental degradation. In response to it, humans have been forced to think of conservation and preservation of all kinds of resources.

Resources are valuable and are mandatory for life. The existence and purity of one resource reflects the status of the other and finally the human beings. Therefore proper management techniques should be adopted for retaining the uniqueness of these natural resources.



Chain reaction of pollution

Conservation of resources means a judicious and planned use of natural resources so that the different resources are also left over to the benefit of the future generations. Preservation is to protect the resources not exploiting excessively.

Conservation of land resources

Soil is the most important land resource as it provides room for all human activities. In Tamil Nadu soil erosion by wind is very common in Kambam valley, parts of Thirunelveli, Thuthukudi and Ramanathapuram. Soil erosion by river flow and deforestation occur along the hill slopes of the Western Ghats. Several soil erosion control schemes have been successfully implemented by the Tamil Nadu government. Tamil Nadu Agricultural Department has set up soil testing laboratories at the village level to help farmers with the scientific assessment of soil quality and treating method. Every district has a soil research station to help the farmers in assessing the fertility of the soils. Soil conservation is done in two ways: namely restoring soil fertility and preventing soil erosion.

A Soil health card is issued to the farmers to monitor the soil status. There are also 16 mobile soil testing laboratories to serve the villages in Tamil Nadu.

Conservation	Preservation
1) Afforestation is one of the method to conserve forests. 2) Drip irrigation is one method to conserve water. 3) Seasonal shearing of fur of animals is one of the methods of conservation. 4) Protecting animals in their habitats is also conservation.	1) Declaring an area as a reserve forest is preservation. 2) Percolation tank is a technique for preserving underground water. 3) Reproduction of endangered animals in captivity is preservation. 4) Delimiting an area for biosphere reserve is preservation.

Types of soil erosion and conservation methods



Sheet erosion



Gully erosion



Wind erosion



Inter cropping

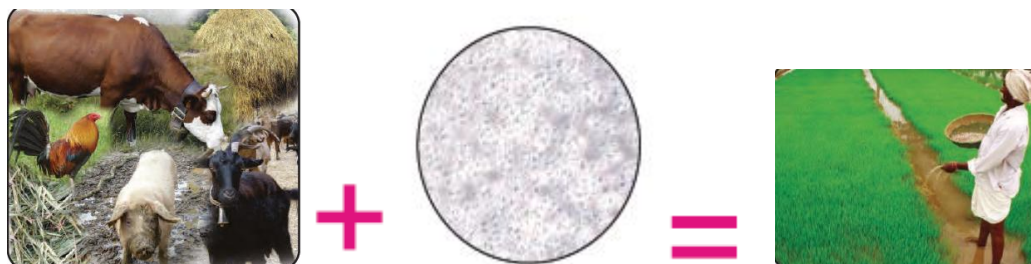


Contour ploughing



Terrace farming

Restoring soil fertility



Conservation Forests and Wildlife in Tamil Nadu

Tamil Nadu has 17 % of its land area under forest cover. Forests are rain harvesters, recharges of soil moisture, reservoirs for underground water, habitats for varieties of fauna and flora, and stabilizers of environment. For constant supply of forest products in a region at least one-third of the area should be under forests.

Many afforestation programmes are carried out in Tamil Nadu by both are carried out in Tamil Nadu by both governmental and non-governmental organizations. The trees are planted along the road sides, railway tracks, river banks, and catchment areas under social forestry schemes. The vacant lands available in villages are brought under community forest schemes. A comprehensive programme to retain the ecological balance and maintain the bio-diversity has been undertaken as Peoples' Participatory Programme in selected aeras. There are 12 Bird Sanctuaries 5 National Parks 10 wildlife Sanctuaries and 3 Biosphere reserves in Tamil Nadu. Birds from Arctic region visit the sanctuaries in Tamil Nadu every year during the winter season for breeding. Like the Project Tiger, Project Elephant has been launched by the Government to save elephant from extinction.

Table: Bird Sanctuaries and Wildlife Sanctuaries of Tamil Nadu

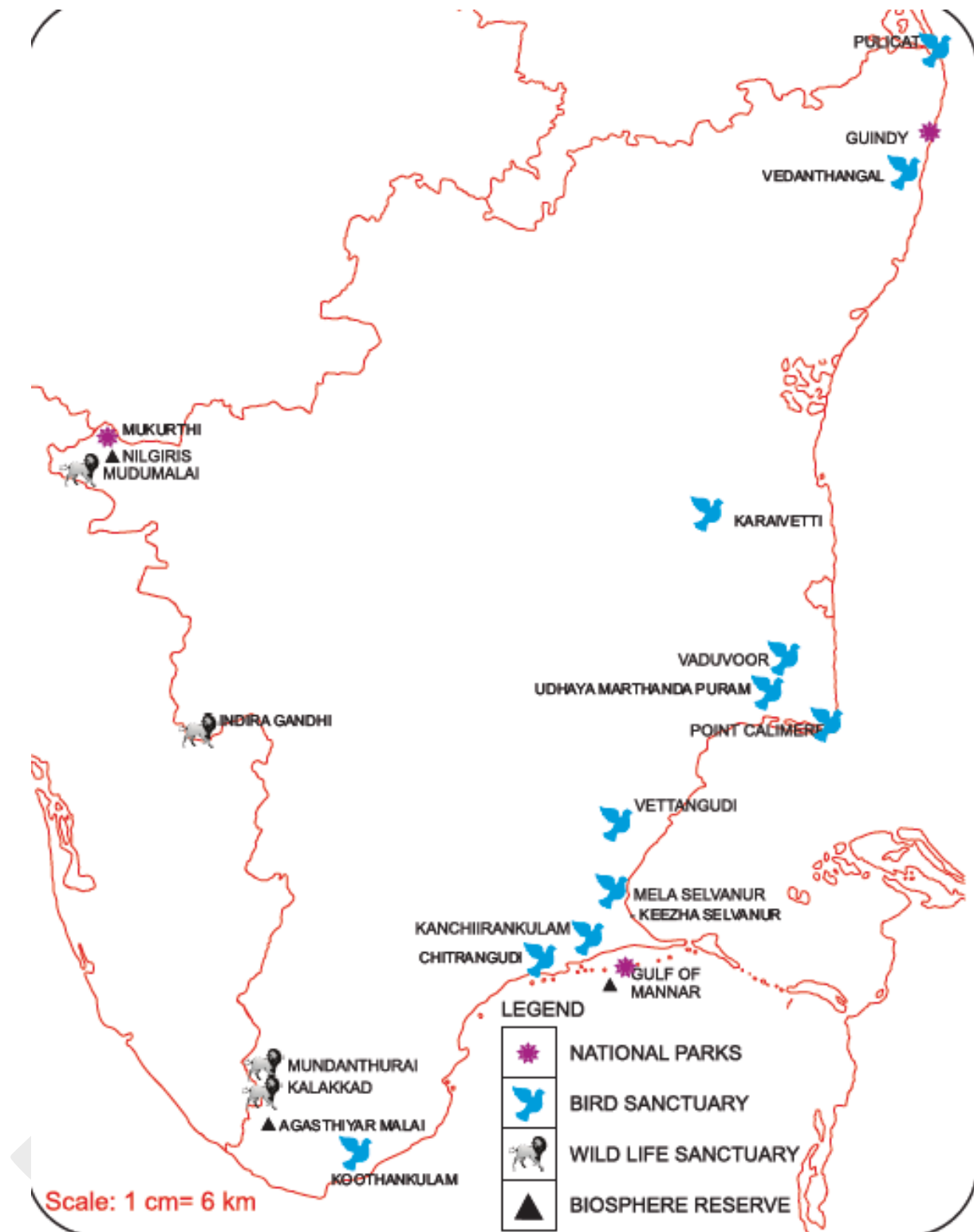
Name	District
I. Bird Sanctuaries	1. Thiruvallur
1. Pulicat lake	2. Kancheepuram
2. Vedanthangal	3. Erode
3. Vellode	4. Perambalur
4. Karaivetti	5. Thiruvarur

5. Udhaya marthanda puram 6. Vaduvur 7. Chitrangudi 8. Koonthankulam 9. Point calimere 10. Mela selvanur – Keezha Selvanur 11. Kanchirankulam 12. Vettankudi	6. Thiruvarur 7. Ramanathapuram 8. Thirunelveli 9. Nagapattinam 10. Ramanathapuram 11. Ramanathapuram 12. Sivagangai
II. National parks 1. Indira Gandhi 2. Mudumalai 3. Mukurthi 4. Guindy 5. Gulf of Mannar marine	1. Coimbatore 2. Nilgiris 3. Nilgiris 4. Chennai 5. Ramanathapuram
III. Wildlife sanctuaries 1. Indira Gandhi 2. Mudumalai 3. Point calimere 4. Srivilliputhur grizzled squirrel 5. Vallanadu black buck 6. Kanyakumari 7. Kalakkad 8. Mundanthurai 9. Kaveri north 10. Gangaikondan spotted deer	1. Coimbatore 2. Nilgiris 3. Nagapattinam 4. Virudhunagar 5. Thuthukudi 6. Kanyakumari 7. Thirunelveli 8. Kanyakumari 9. Dharmapuri 10. Thiruvarur
IV. Biosphere Reserves 1. Gulf of Mannar marine 2. Nilgiris 3. Agasthiyar malai	1. Ramanathapuram 2. Nilgiris 3. Thirunelveli- Kanyakumari

Tamil Nadu

National Parks and Wild life Sanctuaries

winmeen.com



Birds of Tamil Nadu

The following are the list of birds that are native to Tamil Nadu.

Spot-billed Pelicans, Cormorants, Egrets, Grey heron, Stork, White Ibis Common Spoonbills Flamingos Teals, Gulls, Terns, Plovers and Stilts Little Cormorant, Darter, Indian Reef Heron, White necked stork, Black-headed Munia, White-breasted Kingfisher, Spotted Dove, Pintail Ducks, Darter Asian Openbill Stork and Night Herons. Apart from these, migratory birds such as Garganey, Teals, Shovallers also can be seen in the state.

Animals of Tamil Nadu

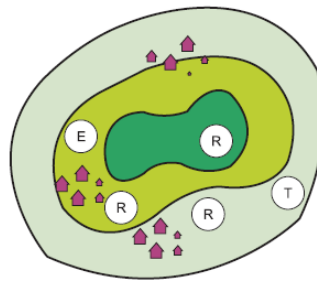
Tiger, elephant, Nilgiri tahr hare, squirrel, dugong, sea turtles dolphin, chital black buckj, grizzled giant squirrel, flying squirrel, tree shrew, panther, sloth bear, wild boar, dhole, Nilgiri langur, and lion-tailed Macaque are the common animals of Tamil Nadu.

Appiko movement synonymous to chipko movement, started in Karnataka and spread over forests of Eastern Ghats in Tamil Nadu. This is a comprehensive people's participatory movement. It aims at saving the remains of tropical wet evergreen forests in the Western Ghats. It is initiated to restore the denuded forest areas, to propagate the rational use of forest products and to relieve the pressure created on forest resources. The popular slogan for this movement is **“to save, to grow, and to use rationally”** Alternative energy sources have been popularized among the villages which have reduced firewood consumption to nearly 40% in Southern India.

The UNESCO's Man and the Biosphere Programme(MAB) was established in 1977 to promote an interdisciplinary approach in research, training and communications in ecosystem conservation and rational use of natural resources. This resulted in forming 553 biosphere reserves in 107 countries of the world.

Biosphere Reserves

Biosphere are a series of protected areas linked through a global network, intended to demonstrate the relationship between conservation and development. It consists of;



Model of biosphere reserve

- Core Area
- Buffer Area
- Transition Area
- Human Settlement
- (R) Research
- (E) Education / Training
- (T) Tourism

- a) An inner core area which is well protects.
- b) A buffer zone with facilities for education training and research.
- c) An outer transition area for tourism and recreation.

Tamil Nadu has three such Biospheres in Nilgiris, Gulf of Mannar and Agastiyamalai.

The notable governmental and non-governmental organizations that are actively engaged in conserving medicinal plants of Tamil Nadu are

- 1) FRLHT(Foundation for Revitalization of Local Health and Traditions)
- 2) Tamil Nadu Forest Department
- 3) DANIDA(Danish International Development Agency).

Tamil Nadu Forest Department has initiated two methods to conserve medicinal plants in the forests with the help of non-governmental organizations. As a part of it, Medicinal Plants Conservation Areas(MPCA) have been identified to protect the endangered species of plants. There are 11 MPCAs in Tamil Nadu in the following places:

- 1) Alagarkoil
- 2) Kodaikanal
- 3) Kolli Hills

- 4) Kurumbaram
- 5) Kuttralam
- 6) Mundanthurai
- 7) Ambasamudhram
- 8) Pechiparai
- 9) Thaniparai
- 10) Thenmalai and
- 11) Top Slip

Medicinal Plants Development Area(MPDA)is yet another method which aims at restoring degraded forests by raising the native plants with community participation.

There are eight such MPDAs in Tamil Nadu. They are at:

- 1) Attur
- 2) Chengalpattu
- 3) Coimbatore
- 4) Dharmapuri
- 5) Doddabetta
- 6) Madurai
- 7) Salem and
- 8) Vellore

Wetland conservation

Areas of marshy land not exceeding m depth with or without permanent water, is classified as **wetlands**. A wetland has a prominent role in groundwater recharge. A wetland area directly or indirectly support many people and is a salient caretaker of the entire region. Tamil Nadu has such wetland areas in the following places: Point Calimere, Kazhuveli in Villupuram, Pallikaranai in Chennai, Muthupet, and Pichavaram and in a few pockets of Ramanathapuram district. Government has taken steps to restore these regions, realizing the immense benefit they provide for the entire surroundings.

Conservation of water

Water is the basis for life. It is essential to conserve water and to protect water from being polluted. Watershed management is the comprehensive method to conserve water not only during heavy rains when rivers and tanks are over-flowing but also during dry season when they are devoid of water. Linking rivers in deficit areas is a wise suggestion to manage the twin problems of flood and drought.

Common practices of conservation of water

- 1) Wastage of water should be avoided.
- 2) Rainwater harvesting methods and construction of small check dams to arrest water runoff and to store water for ground water recharge.
- 3) Recycling of water wherever possible.
- 4) grow more trees. Trees act as sponge in absorbing excess water and recharge the underground water reserve.

Conservation of Energy

Energy produced by conventional resources is definite to be exhausted in future. Therefore, every country is trying to trap energy from renewable resources like energy from winds, waves, bio-gases, and bio-fuels. Under the scheme Bio-Gas Development Programme Tamil Nadu has installed 1,285 Bio-Gas plants up to March 2008. Tamil Nadu Government is a pioneer in bio-fuel production. It is one among the nine states to use 5% ethanol blended fuels for vehicles since 2003.

The state Forest Department, Government of Tamil Nadu has established Karanja based biodiesel esterification plants at three locations. These plants are based on the TNAU model developed at Hosur and Thuthukudi Forest Division.

Esterification is the general name for a chemical reaction in which two reactants form an ester as the reaction product. Ester is used in fragrance and flavor industry for their pleasant, fruity odour.

Seeds of Jatropha plant is used in the production of bio-fuel. Other seeds used in the production of biofuels are neem, karani and pungam.

Any developmental programme aiming at development of a place should meet the needs of the present generation without compromising the right of the future generations to do so. This is known as Sustainable Development.

Conservation and preservation are not only for natural regions and resources but also for the large built-up areas in cities. Eco-friendly building materials and techniques are emerging in the market in order to conserve and preserve our natural resources without sacrificing our comforts.

It is very important to realize that the nature's gift, in the form of resources should go the hands of next generation with minimum damage.