

**RAPID RECONNAISSANCE SOIL & LAND DATABASE OF TAMIL NADU  
STATE**



सत्यमेव जयते

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## PREFACE

Soil is a key part of our natural environment and is a non-renewable resource. Soil loss due to erosion can have major implications not just for soils and the benefits they provide but also for air and water quality as well as our climate, biodiversity and economy. The acquisition of adequate information on soil and land characteristics is thus essential to formulate a viable strategy to check the degradation of soil and land resources. Proper consideration of soils through the planning system is needed to make sure that soils can deliver essential functions vital for the sustainability of Indian environment and economy.

Soil and Land Use survey of India (SLUSI), Department of Agriculture, Cooperation and Farmers' Welfare, Ministry of Agriculture and Farmers' Welfare carried out Rapid Reconnaissance Survey (RRS) to identify & demarcate the potential soil erosion in river catchment of different river basins using extensive ground truthing. The details on various facets of soil & land have been assessed to fix sub /micro watershed wise priority in catchments based on the assessed runoff using SYI/RPI index. The work for data acquisition on RRS has been completed by organization in 2010. Subsequently SLUSI took up a national initiative to digitize the RRS maps and data on soils of the country at 1:50, 000 in different states.

With a view to provide details to users in various states, SLUSI took up the initiative to seamlessly compile the digital soil & land character data base acquired on 1:50 scale during the decades. This state-level RRS guide contains agro-climatic sub-zone wise information on various soil parameters such as landscape, physiography, slope, depth, texture and erosion status.

The digital soil database can be vital input as considered in the National Disaster Management Plan and State Disaster Management plan of Tamil Nadu, which recognizes soil as a physical asset and highlight the need to manage our finite soil resource by maintaining and improving its condition.

The spatial database would play an effective role to support the decision makers to achieve the right development in the right place and identifies the need to consider the implications of development on soil quality as one of its guiding principles.

This enormous task is accomplished by officers and officials of Soil and Land Use Survey of India. I hope that the RRS guide may serve as a guiding tool for user's departments /agencies of the state.

Date:

Place: New Delhi

Rajni Taneja  
Chief Soil Survey Officer

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## OVERVIEW

### **1. Prelude**

The purpose of planning is to manage the development and use of land in long term public interest. Soil is a key part of our environment and is effectively a non-renewable resource. Soil loss due to erosion can have major implications not just for soils and the benefits they provide but also for air and water quality as well as our climate, biodiversity and economy. Proper consideration of soils through the planning system is needed to make sure that soils can deliver essential functions vital for the sustainability of Indian environment and economy.

The National disaster management plan (NPF) and Disaster Management plan of Tamil Nadu state recognize soil as a physical asset and highlight the need to manage our finite soil resource by maintaining and improving its condition.

The acquisition of adequate information on soil and land characteristics is thus essential to formulate a viable strategy to check the degradation of soil and land resources. To combat the situation development of spatial database would play an effective role to support the decision makers to achieve the right development in the right place and identifies the need to consider the implications of development on soil quality as one of its guiding principles.

### **2. Introduction**

Soil and Land are important natural resources on the surface of the earth. The biomass covers the surface and act as natural protector of soil in the area. But due to variety of reasons the vegetative cover distribution varies at various location in the state. The area in state suffers from a variety of problems of soil erosion, soil salinity, sodicity/ alkalinity, shallow depth, unfavorable texture responsible for increased land degradation. Tamil Nadu homes over 16% of countries population in an area, which is 3.96% of TGA of the country. Per Capita arable land in state is around 0.15 ha at present.

There is ever growing need to new Watersheds technology in an integrated watershed management-tool for climate smart solution in the entire river basin to treat the abiotic or physical component of a river basin including soil and water, and mineral deposits and other compounds bound up with them. Water is a dynamic resource variable in time and space from season to season in year, as the status of surface and ground water in a basin area follows a cyclic mode for replenishment and losses. But in contrast to water, soils formation and development –take place from the physical weathering of parent material (rocks) to chemical decomposition and biological transformation – is a drawn-out process that may take hundreds or thousands of years [Jenny, 1994]; and taking into account of time required in the soil development, once formed, soils may be fairly durable if not conserve it, once it protect from runoff due to precipitation and reduce the severity of related erosion. Thus, changes in a basin's water resource status is relatively fast and easily identified, while the soils those changes naturally slow and unnoticed with significant human activity in many ecosystems (example, in agro-ecosystems and urban ecosystems), and climate change phenomenon the complexity of human-technology-environment systems has increased manifold [Pahl-Wostl, 2006] resulted in drastic change in soil quality status that has under gone degradation drastically. Now a days many land degradation problems are being faced in our country such as salinity / alkalinity and waterlogging in command areas, severe erosion in catchments leading to siltation of reservoirs, decrease in productivity of crops etc. As both soil and water are operating in ecosystem synergistically to one another through many biotic and abiotic processes. Being thus interrelated, degradation of either soil or water has a concurrent effect on the other; hence neither can be considered in isolation

Therefore, in recent years' emphasis is laid on the information on the nature, extent, spatial distribution and magnitude of land degradation which plays a vital role in planning the strategies for reclamation /conservation of degrade soil and land characteristics.

Management of soil and water resources conservation under RVP/FPR catchments is completed by SLUSI to assess the priority sub/ micro watersheds / Hydrologic unit's area under various catchments of the state in last three decades on 1: 50,000 scale. In this context mapping of soil and land features as well as land use/cover information, adequate field visit/survey were carried out for mapping.

## 2.1 Objective

The basic objective of the Rapid reconnaissance mapping is to calculate the sediment yield of the catchment and determine the status of runoff and soil loss in the country on 1:50,000 scale. Generating priority hydrologic units (sub/micro) level spatial maps based on its assessed erosion through sediment yield potential and generating soil & land information with its spatial distribution components helps to check soil erosion using conservation measures.

## 2.2 Background

A national policy was adopted to use watersheds for the development of land and water resources for conservation in all possible river basins. The selection of watersheds in catchment areas of different river basin for development of water and soil resources was done on the basis vulnerability assessment of soils for erosion, demographic setting of the area by prioritizing on problem's severity. Each priority watershed was surveyed and studied morphologically and topographically to generate database. The development of Watersheds is applied not only to the geo-physical situation but also to the people's need.

Watersheds are natural hydrological entities that cover a specific areal expanse of land surface from which the rain fall runoff flows to a defined drain of channel, stream or river of any particular point. The size of watershed is governed by the size of the stream/river or the point of intersection on the stream/river like dam/barrage etc. A workable size of watershed is defined by aims and objectives of the development programs. The size of watersheds will also differ with the different stages between macro to micro level of planning and implementation of watershed programs. (AIS&LUS, 1990).

The concept of a watershed as the planning unit for the development of land and water resources has been available for long, but the watershed approach has gained importance since 1974.

The Soil and Land Use Survey of India (SLUSI erstwhile AIS&LUS) has initiated delineation and codification of hydrologic units in the country, since launching of Centrally Sponsored Scheme on Soil and Water Conservation in the catchments of River Valley Project during III Five-Year Plan. The delineation of a hydrologic unit is carried out following hierarchical system of rivers/streams based on drainage network. The codification of hydrologic unit is made to assign a unique code to all hydrologic units following Alfa-numeric Codification System. The drainage network helps in the delineation of a watershed for a particular river system.

In an attempt to acquire soil and land resource information at reconnaissance level survey, SLUSI (1991) has developed and published a methodology to map the potential soil erosion in different river catchment area using extensive ground truthing method. The organization has carried out Rapid Reconnaissance soil survey to map various facets of soil and land to assess sub /micro watershed wise priority in catchments of the states based on the assessed runoff using SYI/RPI index and plan to complete the work of data acquisition by 2012. Subsequently SLUSI (2010) took up a national initiative to digitize the RRS maps and data on soils of the country at 1:50, 000 in different states.

In recent times, SLUSI took up the initiative to seamlessly compile the digital national soil and land character data base acquired on 1:50 scale during last three decades. Mapping of natural resources has been an on-going activity for more than three decades.

## 2.3 Data Source

### 2.3.1 Acquisition of soil and land data

The work of mapping of areas in catchment areas was started in 1985 in the state. The initial mapping of soil and land characteristics was carried out using Survey of India topographic maps with extensive field ground truthing involving study of profile/ mini pits and auguring at regular interval.

The digitalization drive was undertaken by SLUSI in 2010 with NIC to place the soil and land character data on SLUSI geo portal with Universal Traverse Mercator 1 (UTM 43 and 44 N) projection. The final outputs were later converted Albers equal area with following parameters.

### **2.3.2 Specifications Table**

**Subject:** Geographic Information System (GIS), Soil Mapping

**Type of data:** Image Figure Digital maps (quantitative), Metadata (Attributes)

**How data were acquired:** GIS digitization, raster to vector conversion ESRI ArcGIS 10.3.1

**Data format:** Raw Vector shape files (.shp); Soil database, Raster images (Tiff, JPEG)

**Data Accessibility:** Only the static graphic maps are included in this article. The main digital data are hosted on <https://slusi.dacnet.nic.in>

**Projection:**

Universal Traverse Mercator Projection

Spheroid: WGS84

Datum: WGS1984

False\_Easting: 500000.0

False\_Easting: 0.0

Central Meridian: 81.0

Scale\_Factor: 0.9996

Linear Unit Meter (1.0 Legacy/ancillary data)

For mapping of soil and land characteristics on 1: 50,000 scale, land use/land cover, wetland and wastelands thematic information's taken from SOI toposheets was used as base map. Besides this, forest cover map generated by Forest Survey of India (FSI) was also referred.

The tabular distribution of area details of Geographic / landscape (parent material) and climate data acquired from district level state government records/ district gazetteer used as reference information while mapping. Apart from this, district boundary taken from Survey of India topographical maps, meteorological data use to assess the soil loss especially while mapping of water erosion categories.

### **2.4 Methodology**

The various steps followed in the methodology for mapping RRS on 1:50,000 scale. First of all, we select the area and estimate the erosion intensity mapping units for Hydrologic unit's delineation up to sub / micro watersheds and codification done using Survey of India toposheets. This information was converted to digital layer using DEM downloaded from BHUVAN. The steps includes were:

- Delineation of catchment areas / bigger hydrologic unit into small watersheds (hereinafter will be called as Sub watersheds) on 1:50,000 scale topographic maps of Survey of India.
- Codification of different stages of delineation by using Alpha-numeric symbolic code.
- Rapid Reconnaissance survey using 1:50,000 scale topo-maps, satellite imagery/aerial photographs and other basic material leading to the generation of a map indicating erosion intensity/ runoff potential mapping units.
- Assignment of weightage values to various Erosion Intensity Mapping Units (EIMU) or Run-off Potential Mapping Units (RPMU) based on their relative Sediment Yield/ Run-off Potential.

- Assignment of maximum delivery ratios to various Erosion Intensity Mapping Units and assessment of adjusted delivery ratio for different sub/micro watersheds.
- Computation of Sediment Yield Index / Run off potential Index for individual sub/micro watersheds.
- Grading of sub/micro watersheds into very high, high, medium, low and very low Priority categories.

(*Steps sourced from:* Methodology of Priority Delineation survey manual published by erstwhile AISLUS in 1991)

## 2.5 Output

SLUSI carried out detailed study of soils and generate soil database for watershed management and other developmental aspects in priority areas. The Rapid Reconnaissance survey helps in categorization of the areas in different classes on priority basis such as very high, high, medium, low and very low. The areas which comes under very high and high priority classes needs to check the runoff water through applying watershed approach.

SLUSI successfully completed development of state-wise Micro Watershed Atlas of India using 1:50 k scale drainage map. The organization has also developed Web-enabled Micro Watershed Information system which is in public domain since December, 2010 (<https://slusi.dacnet.nic.in>). It provides Micro watershed data & information in a national standardized format that allows users to search, access, and visualize data and information for planning development of water resource

The reconnaissance level maps at their original scale showing spatial distribution of site features such as land scape, physiography, slope, land use and soil characteristics namely colour, texture class, soil erosion status for indicating soil loss, surface conditions and management also provided as thematic service available on <https://slusi.dacnet.nic.in>

The Tamil Nadu soil attribute and priority survey maps provide useful background information on the types and properties of soils at regional scales. The more detailed Soil map of area can be accessed from detailed Soil Survey data.

## HYDROLOGIC FRAMEWORK OF WATERSHED

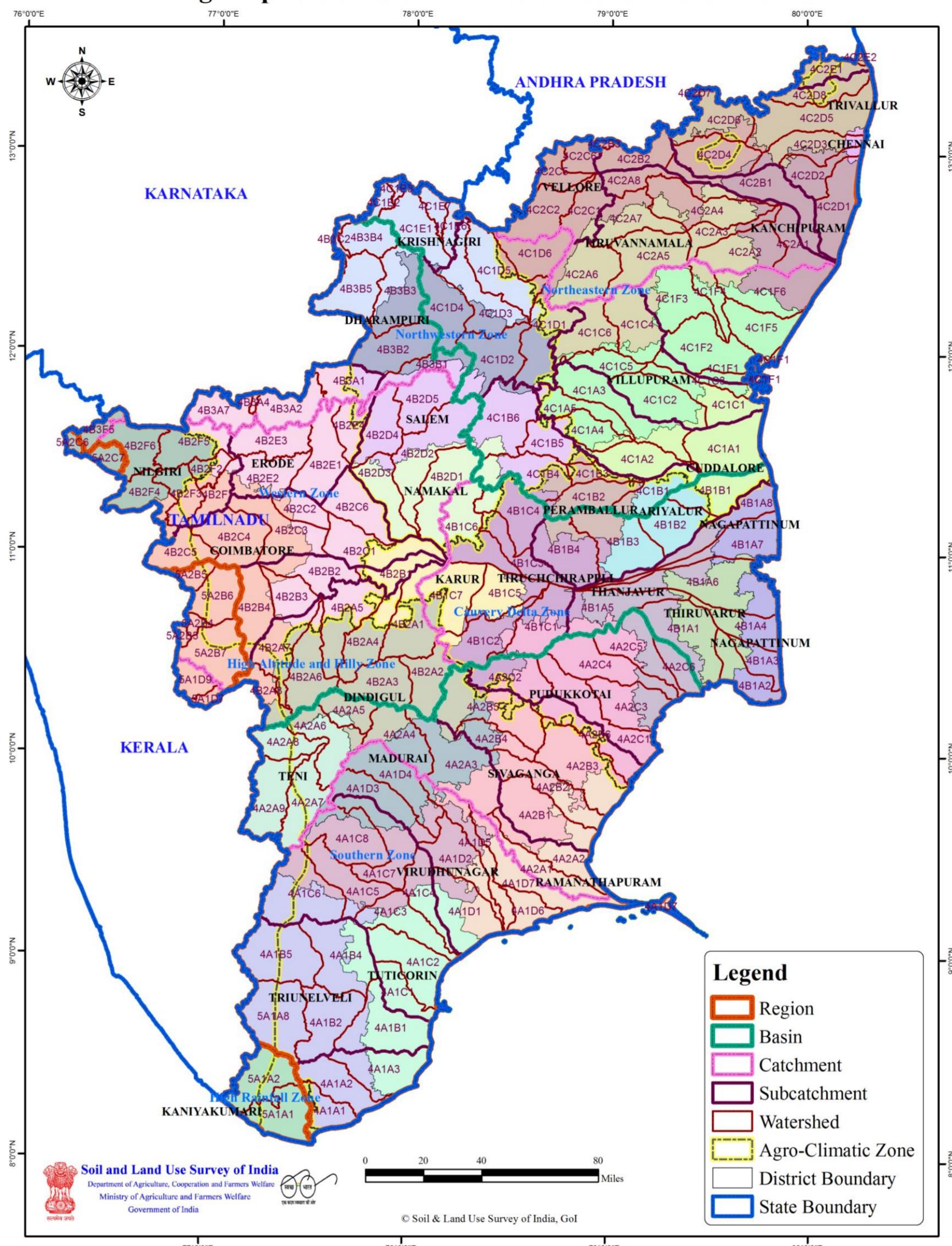
The digital spatial distribution land features such as landscape/parent material, physiography, slope, land use prevalent during the time mapped with soil morphological characteristics such as soil depth, texture, erosion are the most important physical health status indicators required in planning of area, hydrologically or district wise.

SLUSI has developed the model for fixing priority areas based on relative assessment of vulnerability of soils to erosion. This has been done on sub/micro watershed wise in different catchments of the state. The Region, Basin, Catchment and Sub-catchment wise distribution with number of Watersheds, Sub-watersheds and Micro-watersheds and their total area presented in table given below. Catchment wise area of Watershed is given below in the table and in thematic map as **figure no. 1**.

S.No.	Region	Basin	Catchment	Sub-catchment	Total No. of Watershed	Total No. of Sub-watershed	Total No. of Micro-watershed
1	4	4A	4A1	4A1A	3	25	145
				4A1B	5	73	369
				4A1C	8	72	449
				4A1D	7	62	365
			4A2	4A2A	9	84	477
				4A2B	6	77	399
				4A2C	6	65	340
				4B1A	8	80	488
		4B	4B1	4B1B	4	52	264
				4B1C	7	65	392
				4B2A	8	87	434
			4B2	4B2B	4	31	157
				4B2C	6	65	307
				4B2D	5	60	306
				4B2E	4	40	195
				4B2F	6	64	272
		4C	4B3	4B3A	7	43	178
				4B3B	5	56	249
				4B3C	1	6	18
				4B3F	2	10	32
			4C1	4C1A	5	52	281
				4C1B	6	54	301
		4C	4C2	4C1C	6	54	289
				4C1D	6	70	394
				4C1E	5	33	143
				4C1F	6	77	339
				4C2A	8	83	450
				4C2B	3	23	123
				4C2C	6	40	164
				4C2D	8	83	448
				4C2E	2	11	52
2	5	5A	5A1	5A1A	3	24	122
				5A1D	2	12	57
			5A2	5A2B	5	43	180
				5A2C	2	11	32
<b>Total</b>	<b>2</b>	<b>4</b>	<b>9</b>	<b>35</b>	<b>184</b>	<b>1787</b>	<b>9212</b>

The state comes under two water resource regions, i.e. Region no. 4 (All drainage flowing into Bay of Bengal) and Region no. 5 (All drainage flowing into Arabian sea). Further, the state comes under 04 basins, 09 Catchments, 35 Sub catchments, 184 Watersheds, 1,787 Sub watersheds and 9,212 Micro watersheds as depicted in the above table. Out of the total catchment area, maximum area comes under catchment 4C2 having 31,82,332 ha. followed by 4C1 (28,32,543 ha.), 4B2 (5,17,782 ha.), 4B3 (22,05,837 ha.), 4A1 (20,28,840 ha.), 4A2 (17,72,416 ha.), 4B1 (17,16,302 ha.), 5A1 (13,17,194 ha.) and 5A2 (10,17,440 ha.).

**Fig.1. Spatial Distribution of Watershed in Tamil Nadu**



## AGRO CLIMATIC SUB-ZONES OF TAMIL NADU

Out of 15 agro climatic zones of country identified by Planning commission of India, two namely ACZ 10-southern plateau and hill region and ACZ 11 east coast and hill region comes under Tamil Nadu state. The specific constraints in those 2 regions are poor water management, poor nutritional status of soils and saline lands. The state under National Agriculture Research Program subdivided under seven agro climatic sub- zone, i.e. Cauvery delta zone, high altitude and hilly zone, high rainfall zone, northeastern zone, northwestern zone, southern zone and western zone. The distribution of districtwise catchment shows the Cauvery delta area forms part of 4A2, 4B1, 4B2, 4C1 catchment area of rivers, covered under Trichirapalai, Perramballur, Ariyalur, Tanjavur, Puddukotai, Karur, Nagapattanam, Thiruvarur,

The major agro climatic features are:

### **I. Southern Plateau & Hills Region-X**

(1) Features:

- Large rainfed area;
- Large scale cultivation of low value cereals; and
- Tank led irrigation.

(2) Potential crops, fruits & Livestock:

(2.1) Agriculture crops: Rice, sweet sorghum, foxtail millet, maize, horse gram, green gram, sunflower, safflower, cotton & groundnut.

(2.2) Horticulture crops: Tapioca, gherkins, onion, okra, chilies, brinjal, tomato, flowers (Gomphrena, crossandra & Jasmine), garlic, ginger and medicinal & aromatic (Sandal wood, glory, Lilly, Senna, ashok, cinchona).

(2.3) Fruit crops: Mango, banana, grapes, guava, sapota, & citrus.

(2.4) Plantation crops: Rubber, coconut, mulberry, cashew nut, areca nut & cocoa.

(2.5) Livestock & others: Cattle, buffaloes, sheep, goat, poultry, piggery, fishery, beekeeping & Seri-culture.

(3) Farming systems:

- Rice and Coarse cereals based cropping systems;
- Piggery; and Marine fisheries.

(4) Cropping sequences:

(a) Rainfed Areas:

- Sweet sorghum – cotton - groundnut; and
- Sweet sorghum – green gram – fodder;

(b) Irrigated Areas:

- Rice – Rabi maize – green gram; and

Cotton – Rabi maize – fodder.

(5) Sub-region specific development related priorities (all the 6 sub-regions):

Creation additional irrigation potential to harness full potential of agriculture;

In-situ water harvesting/conservation through adoption of cultural practices like ridge and furrow planting, inter-cropping of legumes in uplands, planting against slope in undulating terrain/hilly tract;

Inter-culture in between rows to create soil mulch and vegetative/bio-mulching;

Reclamation of saline/alkaline/acidic/water logged/ill drained soils;

Productive use of barren and un-cultivated lands, cultivation of waste and permanent fallows through afforestation;

Diversification of crops to high value crops;

Diversification of sugarcane area by Cotton;

Adoption of Integrated farming system with a component of crops, livestock, silvipastoral system and agri-horticulture;

Promotion of Rice hybrids in conjunction with SRI method of cultivation;

Promotion of hybrids of maize, cotton, sorghum, sunflower; and f Adoption of improved rainfed farming system.

(6) Research priorities:

Development of salt tolerant varieties of rice;  
 Delineation & mapping of multi-nutrient deficiency;  
 Water harvesting and recycling; and  
 Soil & water salinity management.

## **II. East Coast Plains & Hills Region-XI**

### (1) Features:

Rich water resources with relatively unfertile land;  
 Fragile ecology due to water logging, soil salinity/acidity and soil erosion; and  
 Tank led irrigation.

### (2) Potential crops, fruits & Livestock:

(2.1) Agriculture crops: Rice, sweet sorghum, maize, sugarcane, black gram, green gram, groundnut, Niger, sunflower, cotton, Jute & Mesta.

(2.2) Horticulture crops: Black pepper, turmeric, brinjal, okra, tapioca, chilies, onion, sweet potato, flowers (Tube rose, Enthurium & Gompherina), medicinal & aromatics (Coleus & scented geranium).

(2.3) Fruit crops: Cashew nut, mango, sapota, banana, custard apple and pine- apple.

(2.4) Plantation crops: Cashew nut & coconut.

(2.5) Livestock & others: Cattle, buffalo, sheep, goat, poultry, duck & fishery.

### (3) Farming systems:

- Rice based cropping systems;
- Fish and Prawn culture;
- Piggery; and
- Poultry.

### (4) Cropping sequences:

#### (a) Rainfed Areas:

Sweet sorghum – cotton - groundnut; and

Sweet sorghum – green gram – fodder;

#### (b) Irrigated Areas:

Rice – groundnut - green gram;

Rice – green gram /black gram;

Cotton- green gram – green manure; and

Soybean – sunflower – green gram.

### (5) Sub-region specific development related priorities (all the 6 sub-regions):

Productive use of barren and uncultivated lands, cultivable waste and permanent fallows through afforestation;

Reclamation soil salinity/alkalinity through use of Gypsum/Pyrites;

Reclamation of acidic soil through liming/mills sludge;

In-situ water harvesting/conservation through adoption of cultural practices like bed furrow in deep black cotton, uplands and flat sowing and ridging later in red soils;

Diversification of the area of low value crops to high value crops;

Promotion of hybrid rice in conjunction with SRI method of cultivation; and

Development of Tribal agriculture.

### (6) Research priorities:

Development of salt tolerant cultivars of rice;

Delineation & mapping of multi-nutrient deficiency;

Farming systems and

Crop management in flood prone areas.

## OUTCOMES OF SOIL AND LAND DATABASE

The management of sub/micro watersheds on priority wise in phased manner have been taken up on the analysis of acquired soil and land parameters collected through Rapid Reconnaissance Soil Survey of the state. The outcomes such as Landscape/parent material, Soil erosion, Depth, Slope class, Land use and Soil texture brought out during the survey. These database can be used as a baseline for the development of soil and land quality in the state.

### I. Landscape/ Parent Material

The geological formation of India is diverse, ranges from oldest Archean rocks to the recent Alluvium. The major geological formation in the peninsula consists of Archean rocks comprising Gneiss, Schist, Igneous and Metamorphic rocks. Western and Central India are covered by lava flows of the Deccan trap. A close relation exists between soil and physiography, the diversities in physiography, climate and landscapes have enhanced the formation of widely diverse soils in India.

The tabular distribution of landscapes in the state are furnished gives account of landscape in different agro climatic sub zones. These are seven subzones and it is observed that the effect of these zones on the soil development having identical landscape is varying as every zone is having unique climatic features with respect to total rainfall, temperatures, and vegetation which directly governs the soil development. This grouping not only helps in identifying the natures of soil type in different zones under same landscape/parent material but its capacity to grow different crops/orchards etc.

Based on soil conditions, irrigation, cropping pattern, rainfall distribution and other ecological & social characteristics, the state is falling under 7 agro-climatic sub zones exhibiting different geological formations namely, Aeolian, Alluvium, Charnokite, Coastal Alluvium, Granite, Granite Gneiss, Laterite, Limestone and Sandstone. Out of these Seven (07) sub-zones, maximum area of 33,26,724 ha. is under Southern zone covering districts Dindigul, Kanyakumari, Madurai, Ramanathapuram, Sivaganga, Teni, Tirunelveli, Tuticorin and Virudhnagar followed by Northeastern zone with an area of 30,77,652 ha covering districts Cuddalore, Kanchipuram, Tiruvannamala, Vellore, Villupuram, Chennai and Trivallur. Third highest area is under Cauvery Delta zone with an area of 23,84,060 ha. covering districts Pudukkotai, Thanjavur, Tiruchirappalli, Ariyalur, Karur, Nagapattinum, Peramballur and Thiruvarur. Then under Northwestern zone having 18,30,759 ha area covering under Namakkal, Salem, Dharmapuri and Krishnagiri districts; Western zone with an area of 12,92,614 ha covering districts Coimbatore, Dindigul, Erode and Karur; High altitude and hilly zone with an area of 9,97,039 ha covering districts Kanyakumari, Madurai, Teni, Tirunelveli, Virudhnagar, Dindigul, Coimbatore, Nilgiri, Trivallur and Vellore. Least area of 1,08,495 ha is under high rainfall area covering only one district Kanyakumari.

Agro-climatic sub-zones/ district wise tabular distribution of area and thematic maps of geology shown in **table: 1** and **figure no. 2**.

**Table: 1 Agro-climatic sub-zone/ Catchment wise tabular distribution of area under different landscapes in districts of Tamil Nadu state**

Agro climatic sub-zone	Catchment	District	Landscape					Miscellaneous	Total Area
			Alluvium	Coastal Alluvium	Granite	Laterite	Limestone		
Cauvery Delta Zone	4A2	Pudukkotai	17253	7687	284806	22635		58586	390968
		Thanjavur	5573	10309	93236	9515		12080	130712
		Tiruchirappalli	78		34662			2658	37398
	<b>Total</b>		<b>22904</b>	<b>17996</b>	<b>412704</b>	<b>32149</b>		<b>73325</b>	<b>559077</b>
	4B1	Ariyalur	22011		102493	20973		10439	155917
		Karur	127		142642			7692	150461
		Nagapattinum	163104	49516				44010	256631
		Peramballur	1730		55791			3289	60810
		Pudukkotai	2105		48659	12787		10632	74183
		Thanjavur	117871	1900	39384	25206		26395	210757
		Thiruvarur	126793	54550	22022			8264	211629
		Tiruchirappalli	25342		320500	9034		42240	397116
	<b>Total</b>		<b>459084</b>	<b>105967</b>	<b>731490</b>	<b>68001</b>		<b>152961</b>	<b>1517503</b>
	4B2	Karur	1975		131267			7043	140285
		Tiruchirappalli	429		980			181	1591
		<b>Total</b>		<b>2404</b>		<b>132248</b>		<b>7224</b>	<b>141876</b>
	4C1	Ariyalur	616		19417	15925		2045	38003
		Peramballur	1515		106471		337	5537	113861
		Tiruchirappalli			13616			123	13740
		<b>Total</b>		<b>2131</b>		<b>139505</b>	<b>15925</b>	<b>337</b>	<b>7706</b>
<b>Grand Total</b>			<b>486523</b>	<b>123963</b>	<b>1415946</b>	<b>116075</b>	<b>337</b>	<b>241216</b>	<b>2384060</b>

**Sub-zone-I:- Cauvery Delta zone :** This zone accounts for 2384060 ha in state and five landscape classes such as Alluvium, Coastal Alluvium, Granite, Laterite and Limestone have been identified. Among the landscape mapped major part of

zone comes under Granite landscape (14,15,946 ha) followed by Alluvium landscape (4,86,523 ha) then Coastal alluvium, Laterite and Limestone having 1,23,963 ha, 1,16,075 ha and 337 ha area, respectively.

The depth is main characteristics of soils in this zone where majority of area having shallow to moderately deep soils followed by very shallow soil depth and good soil depth (moderately deep to deep), fine loamy to fine textured having medium to high moisture and nutrient holding capacity and suited for most of crops/orchards. The soils of coastal alluvium are of sandy to coarse textured subject to flooding.

Agro climatic sub-zone	Catchment	District	Landscape						Miscellaneous	Total Area	
			Alluvium	Charnokite	Granite	Granite Gneiss	Laterite	Limestone			
High Altitude and Hilly Zone	4A1	Kaniyakumari			333				21	354	
		Madurai			68	11				80	
		Teni				0				0	
		Triunelveli			140967				9960	150927	
		Virudhunagar			21865	17			620	22501	
	Total				163233	28			10601	173862	
	4A2	Dindigul			11	346				357	
		Madurai				33				33	
		Teni	6501		1569	143282			2621	153973	
		Virudhunagar			9	273			2	284	
	Total			6501	1589	143934			2622	154647	
	4B2	Coimbatore	1414	1132	94887	15970		731	5776	119910	
		Dindigul			16421	47			575	17043	
		Nilgiri		119335	36592	38677			4309	198913	
		Teni			74	24				98	
	Total			1414	120467	147974	54718	731	10660	335964	
	4B3	Nilgiri			35	359	23415			103	23912
	Total				35	359	23415			103	23912
	4C2	Trivallur	7187		5720		11802			3598	28307
		Vellore	892		21592					3615	26099
		Total			8078	27312		11802		7213	54405
	5A1	Coimbatore			42984					1495	44479
		Kaniyakumari	4714		52149					3084	59947
		Triunelveli			0						0
	Total			4714		95132				4580	104426
	5A2	Coimbatore			104368				4383	6383	115134
		Nilgiri		187	34373	62				65	34687
		Total			187	138741	62		4383	6448	149822
Grand Total			20708	120689	574341	222158	11802	5114	42227	997039	

#### **Sub-zone-II: -High Altitude and Hilly Zone:**

By and large this zone spreads out in Nilgiri and smaller extent in eastern ghat. The High Altitude and Hilly Zone covers 9,97,039 ha total geographical area of the Tamil Nadu state and six landscapes such as Alluvium, Charnokite, Granite, Granite Gneiss, Laterite and Limestone have been identified and mapped. Granite is the major landscape having 5,74,341 ha area followed by Granite gneiss (2,22,158 ha) then Charnokite (1,20,689 ha), Alluvium (20,708 ha), Laterite (11,802 ha) and Lime stone (5,114 ha).

Maximum area are under shallow to moderately deep soil depth followed by very shallow to shallow soil depth, moderately deep soil depth, shallow soil depth and deep soil depth with medium texture. The soils are distinctively different from that observed in rest of the state. Agriculture and forestry/plantation are the major land use/cover reported.

Agro climatic sub-zone	Catchment	District	Landscape				Miscellaneous	Total Area
			Aeolian	Alluvium	Coastal Alluvium	Granite		
High Rainfall Zone	4A1	Kaniyakumari	243		24	8181	1226	9675
		Total			24	8181	1226	9675
	5A1	Kaniyakumari		1482	5311	83573	8455	98820
		Total			5311	83573	8455	98820
Grand Total			243	1482	5335	91754	9681	108495

**Sub-zone-III: -High Rainfall Zone:** High Rainfall Zone covers 1,08,495 ha total geographical area of the state in which four landscapes have been identified such as Aeolian, Alluvium, Coastal Alluvium and Granite. Granite is the major landscape covering 91,754 ha area followed by Coastal Alluvium having 5,335 ha, Alluvium and Aeolian landscapes having 1,482 ha and 243 ha area, respectively.

These areas received rains from both south-west to lesser extent and northeast in winter season. These areas are mostly under orchard's plantation. The soils are having shallow to moderately deep soil depth area with medium water & nutrient holding capacity.

Agro climatic sub-zone	Catchment	District	Landscape					Miscellaneous	Total Area
			Alluvium	Coastal Alluvium	Granite	Laterite	Sandstone		
Northeastern Zone	4B1	Cuddalore	43772	1858	9379	880		6331	62220
		Total			9379	880		6331	62220
	4C1	Cuddalore	19277	20643	191992	45064		32553	309529
		Kanchipuram	683	1694	59093		4779	10403	76652
		Tiruvannamala	47		198450			16716	215213
		Vellore			87859			2372	90232
		Villupuram	19608	2435	602403	10944	2244	91526	729160
Total			39616	24771	1139797	56008	7023	153571	1420786

4C2	Chennai							17517	17517
	Kanchipuram	15129	20501	218844	13515			102946	370935
	Tiruvannamala	7777		348761				47353	403891
	Trivallur	24468	22009	155333	28022	734		80358	310925
	Vellore	23259		426188				41821	491268
	Villupuram			110					110
	Total	70633	42510	1149236	41537	734		289996	1594646
	Grand Total	154021	69139	2298412	98425	7758		449897	3077652

**Sub zone IV: -North eastern zone:** North eastern zone covers 30,77,652 ha area of the state which distributed in five landscapes such as Alluvium, Coastal alluvium, Granite, Laterite and Sandstone. Granite is the major landscape identified in the state having 22,98,412 ha area followed by Alluvium covering 1,54,021 ha area, Laterite landscape covering 98,425 ha area, Coastal alluvium and Sandstone having 69,139 ha and 7,758 ha area, respectively.

The soils are distinctively different from sub zone I and utilized for growing different plantation /forest etc. The major part of area is having shallow to moderately deep depth soils followed by very shallow to shallow depth soils, deep depth soils and moderately deep depth soils. The soils are fine loamy to coarse loamy texture, low to medium in nutrient and moisture holding capacity.

Agro climatic sub-zone	Catchment	District	Landscape			Miscellaneous	Total Area
			Alluvium	Granite	Limestone		
Northwestern Zone	4B1	Namakkal		77260		3440	80700
		Salem		1224		68	1292
		Total		78484		3508	81991
	4B2	Dharampuri		287		19	305
		Namakkal	4295	207193	3522	10546	225556
		Salem	1231	224678	2607	13916	242432
		Total	5527	432157	6129	24480	468293
	4B3	Dharampuri	2416	178540		7492	188448
		Krishnagiri		187429		3317	190746
		Salem	1531	46344		10188	58063
		Total	3946	412313		20997	437256
	4C1	Dharampuri	3834	248984	214	8376	261408
		Krishnagiri	955	305871	298	15829	322954
		Namakkal		35906		267	36172
		Salem	2532	213802		6350	222684
		Total	7321	804563	513	30822	843218
		Grand Total	16794	1727517	6642	79807	1830759

**Sub zone V: -North western zone:** North western zone covers 18,30,759 ha geographical area of the state. Three landscapes have been identified in the zone where Granite is the major landscape covering 17,25,517 ha area followed by Alluvium and Limestone which covering 16,794 ha and 6,642 ha area, respectively.

Major part of the area covered under shallow to moderately deep depth soils followed by very shallow depth soils and moderately deep depth soils.

Agro climatic sub-zone	Catchment	District	Landscape						Miscellaneous	Total Area
			Aeolian	Alluvium	Coastal Alluvium	Granite	Granite Gneiss	Laterite	Limestone	
Southern Zone	4A1	Dindigul			12					12
		Kaniyakumari			9					9
		Madurai	284		181368	193				18461
		Ramanathapuram	7497	27260	147949				11153	30275
		Sivaganga	1118		18278					3822
		Teni			229	3				232
		Triunelveli	5870	6111	297	461336		6367		50872
		Tuticorin	38657	14818	32263	336142		903	2992	37683
		Virudhunagar		18091		338840		13021		32511
		Total	44527	47919	59820	1484162	196	20292	14145	173624
		Dindigul	1406		157284					3579
		Madurai		12996	135541	3962				18462
		Ramanathapuram	26104		14205	125500				35324
		Sivaganga	18315		263740		42682			63139
		Teni	3782		62770	59040				7525
		Total	62602	14205	744835	63002	42682			128029
	4B1	Dindigul			18278					1055355
	Total			18278					787	
	4B2	Dindigul	6816		379768					19064
	Madurai			222					20793	
	Total	6816		379990					407598	
	5A1	Kaniyakumari			4					4
	Triunelveli			17					17	
	Total			21					21	
	Grand Total	44527	117337	74025	2627286	63198	42682	20292	14145	
									323234	
									3326724	

**Sub zone VI: -Southern zone:** Southern zone covers 33,26,724 ha geographical area of the state wherein eight landscape have been identified and mapped. Granite is the major landscape which covers 26,27,286 ha area followed by Alluvium landscape covering 1,17,337 ha area then Coastal-alluvium covering 74,025 ha area, Granite gneiss covers 63,198 ha area,

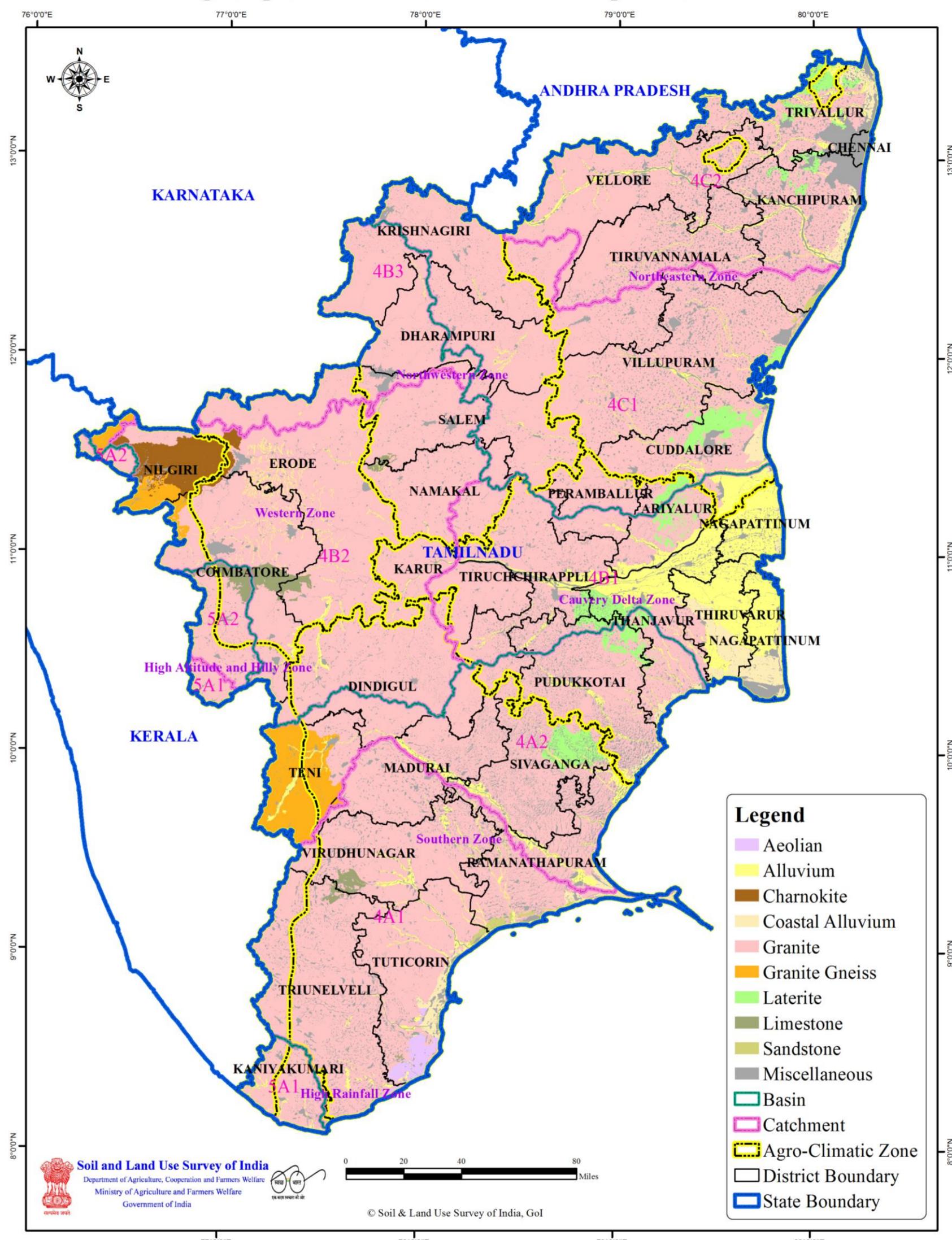
Aeolian covering 44,527 ha area, Laterite covering 42,682 ha area, Limestone covering 20,292 ha area and Sandstone covering 14,145 ha area of the state.

Major part of the area having shallow to moderately deep depth soils followed by very shallow depth soils, moderately deep depth soils and shallow soils depth soils.

Agro climatic sub-zone	Catchment	District	Landscape				Miscellaneous	Total Area
			Alluvium	Charnokite	Granite	Limestone		
Western Zone	4B2	Coimbatore	18187	7254	314919	25719	22117	388196
		Dindigul			21		21	42
		Erode	32245	16163	571096	11328	24483	655316
		Karur	256					256
	Total		50688	23417	886036	37048	46620	1043809
	4B3	Erode	289	50	164233		1994	166565
	Total		289	50	164233		1994	166565
	5A2	Coimbatore			53354	22314	6571	82239
	Total				53354	22314	6571	82239
Grand Total			50977	23467	1103623	59362	55185	1292614

**Sub zone VII:-Western Zone:** Western Zone covers 12,92,614 ha geographical area of the state in which four landscapes have been identified and mapped wherein Granite is the major land scape which covers 11,03,623 ha area followed by Limestone covering 59,362 ha area then Alluvium and Charnokite having 50,977 ha and 23,467 ha area, respectively. Major part of the zone is having shallow to moderately deep depth soils followed by very shallow soils depth soils and shallow depth soils.

**Fig.2. Spatial Distribution of Landscape in Tamil Nadu**



## **II. Soil Erosion**

Two types of erosion occur in nature which as follows. Most part of the state suffers from (i) water erosion, whereas (ii) wind erosion noticed in Coastal-Aeolian landscape. Water erosion on agricultural lands takes place through rain water. Intensity of rainfall by rain drops create a pressure and finally make an impact on the surface soil. Soil surface condition and water infiltration depends on the properties of soil surface, part of the water received as precipitation percolate into the soil and remaining water lost by runoff. Evidently surface runoff is negligible wherever water infiltration. On the basis of soil particles disintegration from soil surface water erosion classified as splash, sheet, rill and gully erosion.

The effects of water erosion which are interrelated are briefly as follows (i) loss of surface soil (ii) loss of rain water (iii) loss of soil nutrients and (iv) exposure of less fertile sub soil. A time period an extreme situation create ultimately soil become unproductive.

Wind Erosion is also a serious problem which adversely affect the soil productivity of agricultural lands. It is responsible for removal of the top fertile soil and depletion in the soil water content. There are three types which affect the soil movement viz. saltation surface creep and suspension. Thematic map of spatial distribution of soil erosion and their area shown in **figure no. 3** and **table. 2**.

**Table: 2 Agro climatic sub-zone/ Land use class wise tabular distribution of area under different erosion classes in Tamil Nadu state**

Agro climatic sub-zone	Land use	Erosion class						Total Area
		None to slight erosion	Slight to moderate erosion	Moderate erosion	Moderate to severe erosion	Severe erosion	Severe to very severe erosion	
Cauvery delta zone	Deciduous forest (10-40% canopy cover)	8088	4979	3731				16798
	Plantation-forest	2798	320	10538				13655
	Forest(teak,eucalyptus,casuarina,etc)	101		34208				34310
	Estates(tea,coffe,rubber,cashew)		38	39109				39147
	Orchards(coconut,citrus,mango,arecanut)		79					79
	Single crop cultivation (rf/single crop)	289467	193842	409875	869	2959		897012
	Multiple crop cultivation(ir/multi crop)	881420	1949					883369
	Terraced cultivation (ir/multiple crop)		1086					1086
	Grasslands/pasture (<10% canopy)	281	71678	105744	10404	2700		190809
	Unculturable wastelands	1135	199	124				1457
	Barren lands and scrub lands	18	30290	34447			155	64910
	Brick kilns/quarries			71		142		213
	Salt pan							9155
	Miscellaneous							232060
<b>total</b>		<b>1183308</b>	<b>304460</b>	<b>637847</b>	<b>11273</b>	<b>5801</b>	<b>155</b>	<b>2384060</b>

**Sub zone I: -Cauvery Delta Zone:** Erosion is the process that transforms soil into sediment and its deposited into coastal areas where lands of plain to nearly level slope class are dominant. The severity of erosion got reduced in these plain areas known as River Delta. In Cauvery delta zone, six erosion classes have identified in state. Majority of the area comes under none to slight sheet erosion followed by moderate intensity sheet and rill erosion. Whereas moderate to severe erosion, and severe rills and gully erosion noticed in stream and river banks affecting about 7 % area of zone. It is mainly ascribed to fact that speed of water flux is reduced due to reducing the slope in delta region which increase sediment deposition. The density of forest vegetation also affects the severity of erosion. In deciduous dense forest none to slight erosion covers maximum area followed by slight to moderate and moderate sheet & rill erosion.

Agro climatic sub-zone	Land use	Erosion Class							Total Area
		None to slight erosion	Slight to moderate erosion	Moderate erosion	Moderate to severe erosion	Severe erosion	Severe to Very severe erosion	Severe water erosion to Severe wind erosion	
High Altitude and Hilly Zone	Deciduous forest (10-40% canopy cover)	162547	69715	34493	13050	14546			294351
	Deciduous forest (>40% canopy cover)	55544	29760	16733	161		4245		106443
	Plantation-Forest	3756	585		4410				8752
	Forest(Teak,Eucalyptus,Casuarina,etc)	672		6717		970			8359
	Estates(Tea,Coffe,Rubber,Cashew)	42689	50545	25943	6917	1654			127748
	Orchards(Coconut,Citrus,Mango,Arecanut)	46893	20350	10383	1275				78901
	Single crop cultivation (RF/Single Crop)	39412	13614	27927	18000	1404	19		100376
	Multiple crop cultivation(IR/Multi Crop)	92018	5476	3526					101021
	Terraced cultivation (IR/Multiple Crop)	8631	10750	3664	5835	1538			30418
	Grasslands/Pasture (<10% canopy)	4324	18330	44866	14792	3721		669	86701
	Open scrub lands (when canopy is <10 %)	2833		869	1429		133		5264
	Unculturable wastelands	5368		756					6124
	Culturable wastelands			353					353
	Miscellaneous								42227
<b>Total</b>		<b>464688</b>	<b>219125</b>	<b>176231</b>	<b>65869</b>	<b>23833</b>	<b>4397</b>	<b>669</b>	<b>997039</b>

**Sub zone II: -High Altitude and hilly zone:** Seven erosion classes were found in the area in which none to slight sheet erosion class covers maximum area, followed by slight to moderate sheet and rills erosion, Moderate rills erosion, moderate to severe rills and gully erosion, severe gully erosion, severe to very severe gully and ravines erosion. The area also witnessed severe water erosion to severe wind erosion respectively. Altitude is directly associated with the slope, type of vegetation and depth of soils, if altitude is high the slope also increases and depth of the soil get reduced. This study confirms that deep to very deep soils covers largest area due to tropical climatic conditions. The temperature is very high and the range of annual temperature is minimum. These conditions enhance the weathering of rocks. Type and density of vegetation also controls soil erosion. In Tamil Nadu state mainly broad leaves forest vegetation are observed in the zone, which forms a dense cover on the soil surface and protect soils from erosion hazards. The vegetation reduces the intensity of gravitation force which creates by rain drops.

Agro climatic sub-zone	Land use	Erosion Class				Total Area
		None to slight erosion	Slight to moderate erosion	Moderate erosion	Moderate to severe erosion	
High Rainfall Zone	Deciduous forest (10-40% canopy cover)	4397			2755	7153
	Deciduous forest (>40% canopy cover)		2714	16194		18908
	Estates(Tea,Coffe,Rubber,Cashew)		129	4145		4275
	Orchards(Coconut,Citrus,Mango,Arecanut)	5335	24250	8336		37921
	Single crop cultivation (RF/Single Crop)	920	1296	914		3130
	Multiple crop cultivation(IR/Multi Crop)	1482	13446			14928
	Grasslands/Pasture (<10% canopy)		115	47		161
	Open scrub lands (when canopy cover is <10 %)				12338	12338
	Barren lands and Scrub lands			0		0
	Salt Pan					9
Miscellaneous						9672
<b>Total</b>		<b>12133</b>	<b>41951</b>	<b>29636</b>	<b>15094</b>	<b>108495</b>

**Sub zone III: -High rainfall zone:** Intensity and amount of rainfall directly affect to the soil erosion and vegetation, if intensity of rainfall is high the severity of erosion also high. The zone area experiencing high rainfall where amount & intensity of rainfall are more. But due to occurrence of high canopy vegetation and less (Shallow/very shallow) soil depth or thickness on sloping lands, moderate loss of soil through soil erosion reported in the zonal area. Four major erosion classes have been identified in high rainfall zone in which slight to moderate erosion class covers maximum area followed by moderate erosion, moderate to severe erosion and none to slight erosion classes.

Agro climatic sub-zone	Land use	Erosion Class						Total Area
		None to slight erosion	Slight to moderate erosion	Moderate erosion	Moderate to severe erosion	Severe erosion	Severe to Very severe erosion	
Northeastern Zone	Deciduous forest (10-40% canopy cover)	67100	16524	126953	7893			218470
	Deciduous forest (>40% canopy cover)	5893		14189				20081
	Plantation-Forest	23051	588	1180				24818
	Forest(Teak,Eucalyptus,Casuarina,etc)	15927		35971			357	52255
	Estates(Tea,Coffe,Rubber,Cashew)		11	85164				85175
	Orchards(Coconut,Citrus,Mango,Arecanut)	5133	977	22622				28733
	Single crop cultivation (RF/Single Crop)	23539	69007	311885	59606	12364	1186	477587
	Multiple crop cultivation(IR/Multi Crop)	1404823	30409	82				1435314
	Grasslands/Pasture (<10% canopy)	4429	71689	130566	20403	3074	3097	233259
	Open scrub lands (when canopy cover is <10 %)	2338		10378	4685		996	18398
	Culturable wastelands		2187	4217	1705			8110
	Unculturable wastelands	13702						13702
	Barren lands and Scrub lands			11311				11311
	Rock outcrop					543		543
	Salt Pan							1816
	Miscellaneous							448082
<b>Total</b>		<b>1565025</b>	<b>101302</b>	<b>754518</b>	<b>94292</b>	<b>15081</b>	<b>5636</b>	<b>3977652</b>

**Sub zone IV: -North-eastern Zone:** North Eastern zone of Tamil Nadu state are under five type of landscapes, these are Granite, Alluvium, Laterite, Coastal-alluvium and Sandstone. Among the different land uses, none to slight erosion covers major part of the zone whereas moderate erosion is second most dominant erosion class followed by slight to moderate erosion, moderate to severe erosion, severe erosion and severe to very severe erosion class.

Agro climatic sub-zone	Land use	Erosion Class						Total Area
		None to slight erosion	Slight to moderate erosion	Moderate erosion	Moderate to severe erosion	Severe erosion	Severe to Very severe erosion	
Northwestern Zone	Deciduous forest (10-40% canopy cover)	103540	5034	70864				179438
	Deciduous forest (>40% canopy cover)	33007		8153				41160
	Plantation-Forest		20					20
	Forest(Teak,Eucalyptus,Casuarina,etc)	6316		134398			71	140785
	Estates(Tea,Coffe,Rubber,Cashew)	3067	6794	1363	45			11269
	Orchards(Coconut,Citrus,Mango,Arecanut)		658	46447	602			47707
	Single crop cultivation (RF/Single Crop)	114484	108178	478816	32664	10357		744498
	Multiple crop cultivation(IR/Multi Crop)	367148	4885					372033
	Grasslands/Pasture (<10% canopy)		40512	152565	14787	239	457	208560
	Unculturable wastelands			204				204
	Barren lands and Scrub lands		1241	3446				4686
	Brick kilns/Quarries			245		347		591
	Miscellaneous							79807
	<b>Total</b>	<b>627562</b>	<b>167321</b>	<b>896500</b>	<b>48098</b>	<b>10943</b>	<b>528</b>	<b>1830759</b>

**Sub zone V: -North-western Zone:** Amongst the various landscapes, the erosion classes identified and mapped are slight erosion, slight to moderate erosion, moderate erosion, moderate to severe erosion, severe erosion and severe to very severe erosion. Moderate erosion covers maximum area of the zone where as none to slight erosion is second most dominant erosion class followed by slight to moderate erosion, moderate to severe erosion, severe erosion and severe to very severe erosion, respectively.

Agro climatic sub-zone	Land use	Erosion Class					Total Area
		None to slight erosion	Slight to moderate erosion	Moderate erosion	Moderate to severe erosion	Severe erosion	
Southern Zone	Deciduous forest (10-40% canopy cover)	86181	90983	2578	15	5690	185447
	Deciduous forest (>40% canopy cover)		33	167			201
	Plantation-Forest	2726	87	12633			15446
	Forest(Teak,Eucalyptus,Casuarina,etc)	3266		1370		146	4782
	Estates(Tea,Coffe,Rubber,Cashew)	7660	26730	8483			42873
	Orchards(Coconut,Citrus,Mango,Arecanut)	11081	3211	7155	967		22415
	Single crop cultivation (RF/Single Crop)	1059177	230222	458497	8023	1759	1757677
	Multiple crop cultivation(IR/Multi Crop)	349892		66			349958
	Terraced cultivation (IR/Multiple Crop)	2986	8974		6796	1611	20368
	Grasslands/Pasture (<10% canopy)	71399	142344	223087	2963	941	440734
	Open scrub lands (when canopy cover is <10 %)				3		3
	Culturable wastelands		1205	2531	2346		6082
	Unculturable wastelands	1932	2685	887			5504
	Barren lands and Scrub lands	882	37868	111763			150513
	Brick kilns/Quarries			1488			1488
	Salt Pan						7474
	Miscellaneous						315760
<b>Total</b>		<b>1597182</b>	<b>544343</b>	<b>830706</b>	<b>21112</b>	<b>10148</b>	<b>3326724</b>

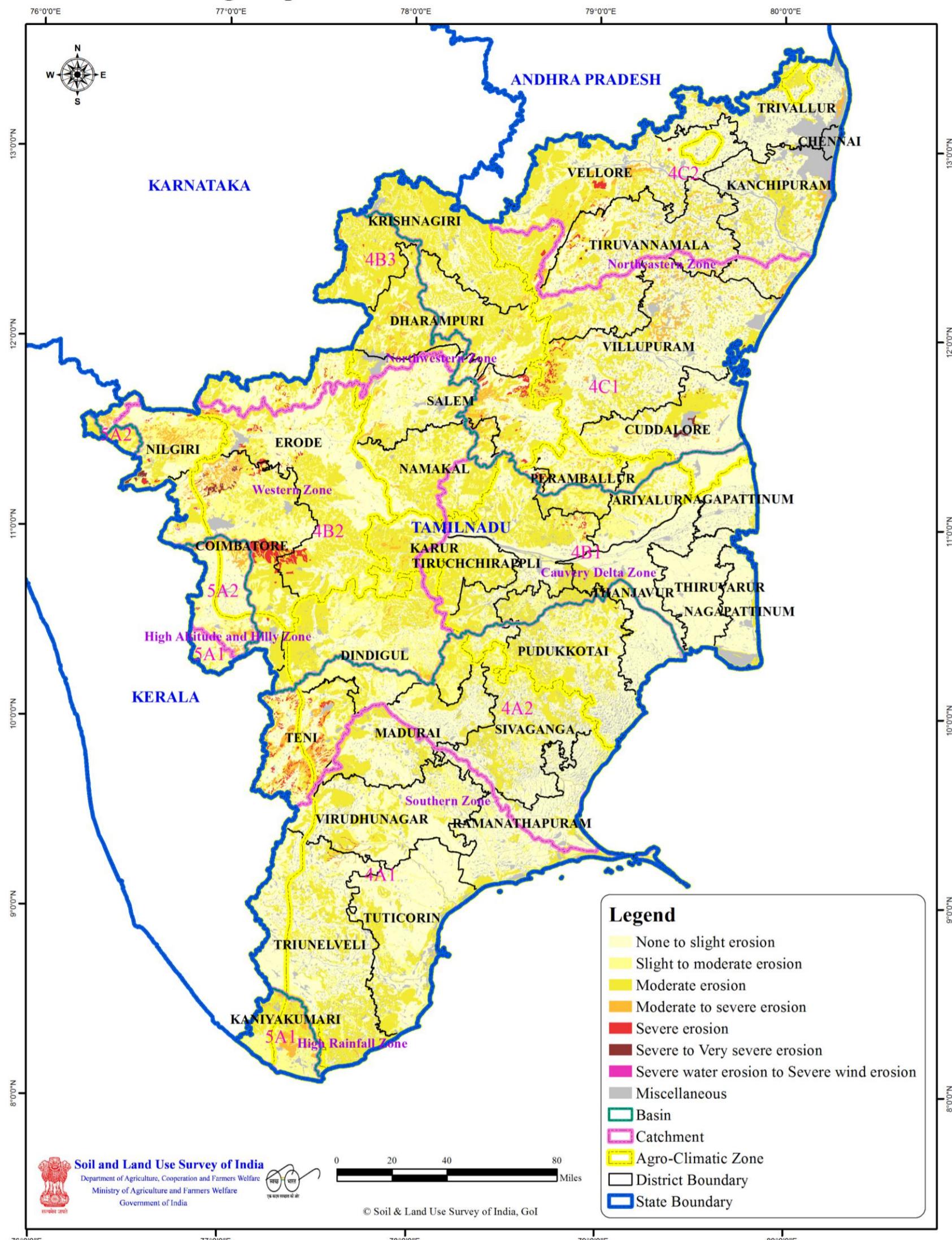
**Sub zone VI: -Southern Zone:** Southern zone have dominated by laterite landscape, whereas majority of soils comes under deep to very deep soil class followed by moderately deep soils which are moderately fine to moderately coarse in texture. The moderately coarse texture enhances the infiltration rate which reduces the overflow of surface water. Due to decreasing the overflow water flux intensity also slow which reduce the soil erosion. The southern zone affected by none to slight erosion which covers highest area followed by slight to moderate erosion, moderate erosion moderate to severe erosion and severe erosion.

Agro climatic sub-zone	Land use	Erosion Class						Total Area
		None to slight erosion	Slight to moderate erosion	Moderate erosion	Moderate to severe erosion	Severe erosion	Severe to Very severe erosion	
Western Zone	Deciduous forest (10-40% canopy cover)	94788	17546	30928	1514			144776
	Deciduous forest (>40% canopy cover)	16						16
	Plantation-Forest		3308					3308
	Forest(Teak,Eucalyptus,Casuarina,etc)	44646		983				45629
	Estates(Tea,Coffe,Rubber,Cashew)	9877	9983	16				19876
	Orchards(Coconut,Citrus,Mango,Arecanut)	24856	4895	92				29842
	Single crop cultivation (RF/Single Crop)	80799	167362	269720	28855	35065	4410	586211
	Multiple crop cultivation(IR/Multi Crop)	262037	1537					263575
	Grasslands/Pasture (<10% canopy)		49813	27758	9763	2522		132
	Culturable wastelands			1414				1414
	Unculturable wastelands	1193						1193
	Barren lands and Scrub lands			51601				51601
	Miscellaneous							55185
	<b>Total</b>	<b>518212</b>	<b>254444</b>	<b>382511</b>	<b>40133</b>	<b>37587</b>	<b>4410</b>	<b>132</b>
								<b>1292614</b>

**Sub zone VII: -Western Zone:** Six erosion classes have been identified and mapped in the zone. None to slight erosion class covers maximum area followed by slight to moderate erosion, moderate erosion, moderate to severe erosion, severe erosion, Severe to Very severe erosion and Severe water erosion to Severe wind erosion. Western zone of Tamil Nadu state has dominated by Granite landscape which is responsible for coarse textured soils and enhance the infiltration rate & reduce erosion hazards.

The agro-climatic zones are specific combinations of moisture availability zones and temperature zones. Agro-climatic zones show how climate variability shapes agricultural landscape of an area. The main factor that caused the changes in the agro climatic zones is soil erosion which was influenced by climatic factors, i.e. rainfall and temperature. It was observed that out of 7 zones, erosion severity is mainly in Western zone covering an area of 42,129 ha followed by high altitude & hilly zone covering an area of 28,899 ha, Northeastern zone covering an area of 21,618 ha and Northwestern zone covering an area of 11,471 ha. This might be attributed to excessive run-off of soil, higher slopes where vegetation cover is reduced, low soil organic matter. Based on the difference in characteristics of zonal variations, it is quite evident that maximum acreage of severe and very severe erosion is observed under western zone and high altitude & hilly zone. This might be due to the high altitude & rainfall along with rolling & undulating topographical formations. This is followed by northeastern zone, north western zone, southern zone and Cauvery delta zone.

**Fig.3. Spatial Distribution of Erosion in Tamil Nadu**



### III. Soil Depth

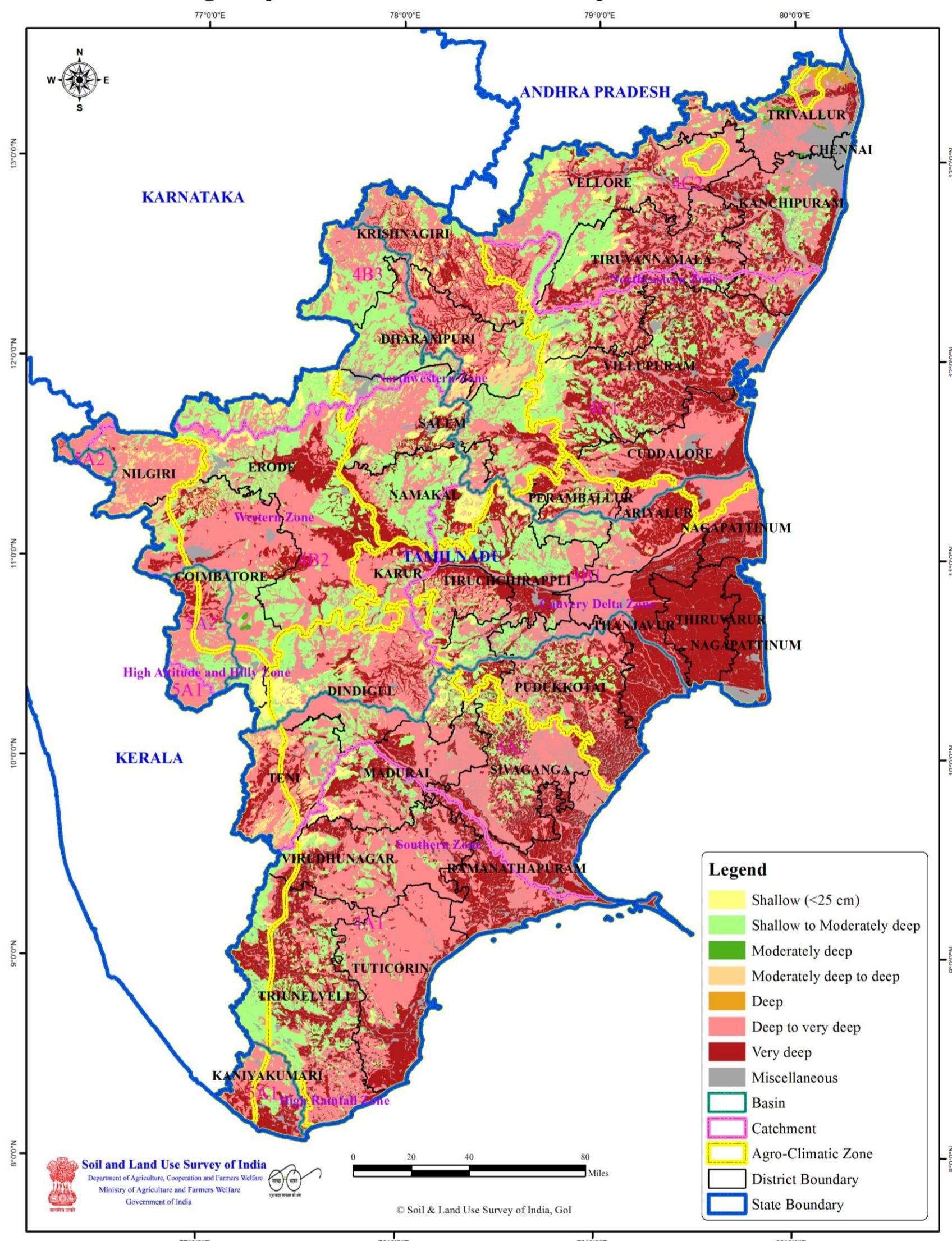
Weathering is a key part of the process of soil formation. Soil forms through accumulation and decay of organic matter and through the mechanical and chemical weathering processes. Soil slope affect to the depth & stability of soil by the way of erosion. In high slope, lands increases water erosion leading to loss of the fertile top soil and at places sub-surface soil expose by erosion the movement of soil and water in catchment area. The silting/ deposition of sediments are irreversible and particularly in the lower part of the catchment. In this way redistribution of soil in various depth categories and soil type takes place, where by some portions of the land losses the soil depth and other portion gain. Along with soil loss in the runoff from catchment area carries the plant nutrients. The quantity of soil particles of a given size lost in runoff varies the fifth power of runoff.

Out of the total area of the state, among different soil depth classes maximum area is reported under deep to very deep class covering an area of 83,66,520 ha. These are the soils that are 50-100 cm and >100 cm deep from the soil surface. Next to this class, an area of 28,36,378 ha is mapped under shallow to moderately deep soils followed by shallow soils covering an area of 4,53,163 ha that area < 25 cm from the soil surface, moderately deep to deep soils covering 1,39,203 ha area and deep soils covering 20,832 ha. Area of the soils under different identified geological formations, Granite and Alluvium shows maximum area under deep to very deep soils. Whereas, very shallow to shallow soils shows maximum acreage under Granite and Charnokite. Spatial distribution of soil depth class and their area are shown in **figure no. 4** and **table 3**.

**Table: 3 Landscape/ Agro-climatic sub-zone wise tabular distribution of depth classes in Tamil Nadu state**

Landscape	Agro climatic sub-zone	Depth Class							Miscellaneous	Total Area
		Shallow (<25cm)	Shallow to Moderately deep	Moderately deep	Moderately deep to deep	Deep	Deep to very deep	Very deep		
Aeolian	High Rainfall Zone							243		243
	Southern Zone							44527		44527
	<b>Total</b>							<b>44771</b>		<b>44771</b>
Alluvium	Cauvery Delta Zone		8				143736	342779		486523
	High Altitude and Hilly Zone					5368	2540	12799		20708
	High Rainfall Zone							1482		1482
	Northeastern Zone					2282	124368	27370		154021
	Northwestern Zone						16146	648		16794
	Southern Zone						57813	59524		117337
	Western Zone						46178	4798		50977
	<b>Total</b>		<b>8</b>			<b>7650</b>	<b>390782</b>	<b>449400</b>		<b>847840</b>
Charnokite	High Altitude and Hilly Zone	18925	427		841		99845	651		120689
	Western Zone	3622	1613				18233			23467
	<b>Total</b>	<b>22547</b>	<b>2040</b>		<b>841</b>		<b>118078</b>	<b>651</b>		<b>144156</b>
Coastal Alluvium	Cauvery Delta Zone		89				83	123791		123963
	High Rainfall Zone							5335		5335
	Northeastern Zone					11419		57720		69139
	Southern Zone						1085	72940		74025
	<b>Total</b>		<b>89</b>			<b>11419</b>	<b>1168</b>	<b>259785</b>		<b>272461</b>
Granite	Cauvery Delta Zone	35884	393610	79	10532		418082	557760		1415946
	High Altitude and Hilly Zone	31212	175268		1729		277123	89009		574341
	High Rainfall Zone		19501				44274	27979		91754
	Northeastern Zone	68751	638808	1443	7048	1762	895012	685588		2298412
	Northwestern Zone	126485	637506	658	39861		679013	243994		1727517
	Southern Zone	97895	501697	3211	411		1368150	655922		2627286
	Western Zone	46902	377035	2285	16795		473967	186639		1103623
Granite Gneiss	<b>Total</b>	<b>407128</b>	<b>2743427</b>	<b>7676</b>	<b>76375</b>	<b>1762</b>	<b>4155620</b>	<b>2446891</b>		<b>9838879</b>
	High Altitude and Hilly Zone	16866	11279		47541		125156	21316		222158
	Southern Zone	4855	1363		13317		28214	15448		63198
Laterite	<b>Total</b>	<b>21722</b>	<b>12642</b>		<b>60858</b>		<b>153370</b>	<b>36764</b>		<b>285356</b>
	Cauvery Delta Zone		1843				113614	619		116075
	High Altitude and Hilly Zone		1864	869	133		8937			11802
	Northeastern Zone		4565	10378	996		82486			98425
	Southern Zone		986				41695			42682
Limestone	<b>Total</b>		<b>9257</b>	<b>11247</b>	<b>1129</b>		<b>246732</b>	<b>619</b>		<b>268985</b>
	Cauvery Delta Zone		266				71			337
	High Altitude and Hilly Zone	353	4453				308			5114
	Northwestern Zone		441				6200			6642
	Southern Zone		1886				18406			20292
Sandstone	Western Zone	1414	42211				15737			59362
	<b>Total</b>	<b>1767</b>	<b>49258</b>				<b>40722</b>			<b>91747</b>
	Northeastern Zone		734					7023		7758
Miscellaneous	Southern Zone						5446	8699		14145
	<b>Total</b>		<b>734</b>				<b>5446</b>	<b>15722</b>		<b>21903</b>
<b>Grand Total</b>		<b>453163</b>	<b>2817455</b>	<b>18923</b>	<b>139203</b>	<b>20832</b>	<b>5111917</b>	<b>3254603</b>	<b>1201246</b>	<b>13017343</b>

**Fig.4. Spatial Distribution of Soil Depth in Tamil Nadu**



#### IV. Soil Slope

Soil can only develop where the rate of soil formation is more than the rate of erosion. The formation of soils are based on the slope gradient & relief of land. Steeper slopes lands having excessive relief develops well drained soils with deep soil depth whereas plain slope having normal to sub-normal relief develops moderately well to well drained soils with very deep soil depth.

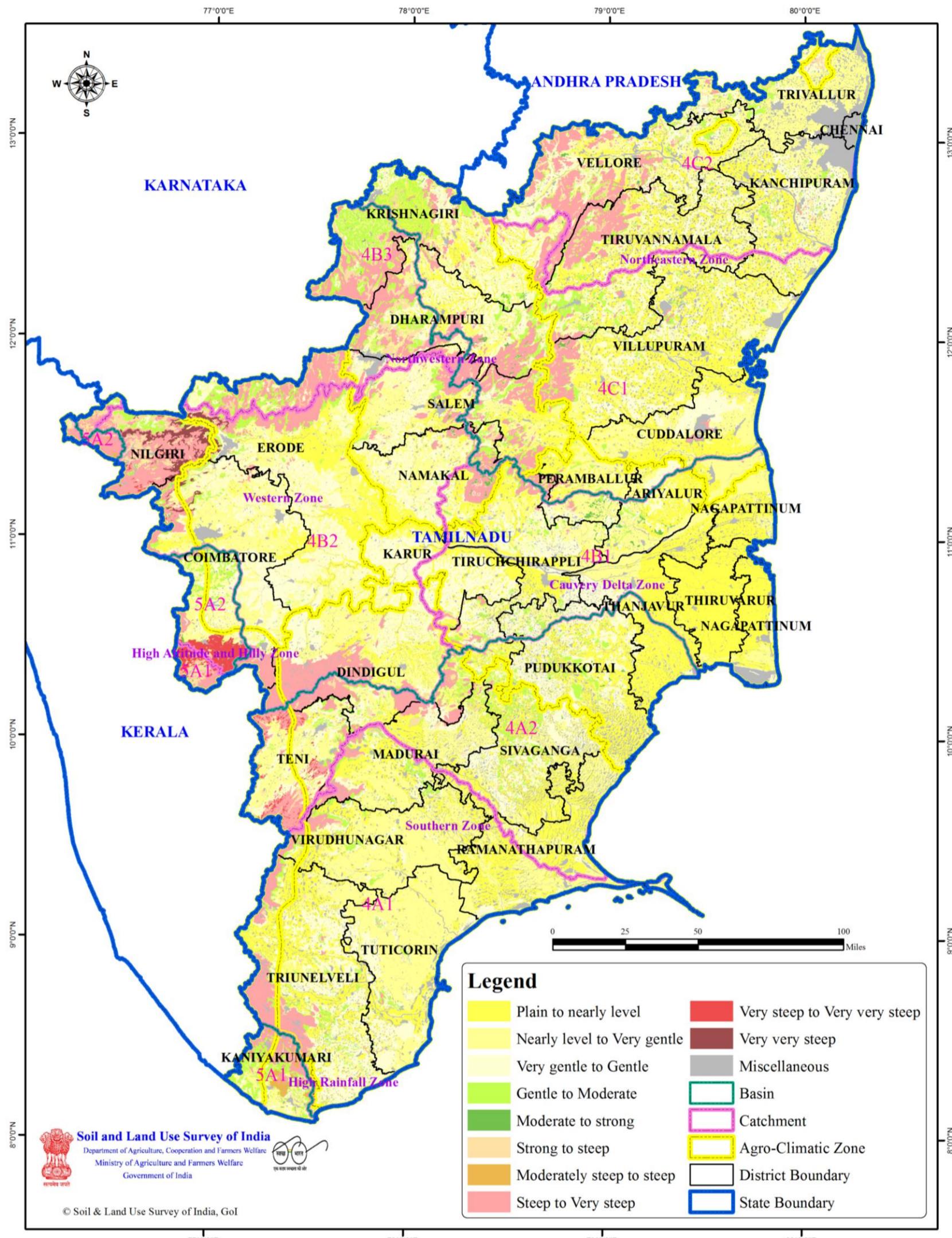
The factors that affect the nature & kind of soil and the rate of formation of soils include the slope of the surface. In the state different slope classes ranging from nearly level to very-very steep slope class identified & mapped in the area. From here, when related to soil depth class identified in the state it is quite evident that maximum area of 89,333,20 ha is mapped under plain-nearly level to gentle slope class having not more than 5% slope gradient.

Slope class between 5-15 % slope gradient, have an area of about 8,45,056 ha. is mapped. Whereas, >15 % slope gradient covering an area of 3,45,649 ha and under >30 % slope gradient area have an area of about 16,92,071 ha. Thematic map of spatial distribution of Slope classes and their area shown in **figure no. 5** and **table 4**.

**Table: 4 Landscape/ Agro-climatic sub-zone wise tabular distribution of slope classes in Tamil Nadu state**

Landscape	Agro climatic sub-zone	Slope Class										Miscellaneous	Total Area
		Plain to nearly level slope	Nearly level to Very gentle slope	Very gentle to Gentle slope	Gentle to Moderate slope	Moderate to strong slope	Strong to steep slope	Moderately steep to steep slope	Steep to Very steep slope	Very steep to Very very steep slope	Very very steep slope		
Aeolian	High Rainfall Zone		198	45									243
	Southern Zone		15510	29018									44527
	<b>Total</b>	<b>15708</b>	<b>29063</b>										<b>44771</b>
Alluvium	Cauvery Delta Zone	326869	152674	6867	114								486523
	High Altitude and Hilly Zone		20684	24									20708
	High Rainfall Zone		1482										1482
	Northeastern Zone	17000	136321	699									154021
	Northwestern Zone		16590	204									16794
	Southern Zone	31967	82998	2372									117337
	Western Zone		47669	3308									50977
	<b>Total</b>	<b>375836</b>	<b>458417</b>	<b>13473</b>	<b>114</b>								<b>847840</b>
Charnokite	High Altitude and Hilly Zone		2104		6016		21537		55673		35359		120689
	Western Zone		1		6203		3707		5586		7971		23467
	<b>Total</b>	<b>2105</b>		<b>12219</b>			<b>25243</b>		<b>61259</b>		<b>43330</b>		<b>144156</b>
Coastal Alluvium	Cauvery Delta Zone	82873	25681	15320	89								123963
	High Rainfall Zone		5335										5335
	Northeastern Zone	1787	66209	1142									69139
	Southern Zone	13485	50871	9668									74025
	<b>Total</b>	<b>98146</b>	<b>148096</b>	<b>26130</b>	<b>89</b>								<b>272461</b>
Granite	Cauvery Delta Zone	557521	264125	455583	74931	10532	10110		43146				1415946
	High Altitude and Hilly Zone	55051	79399	62219	62224	1477	42571	4262	211215	50905	5019		574341
	High Rainfall Zone	722	21526	7999	18940		3605	12338	26623				91754
	Northeastern Zone	670515	596960	539518	146751	4890	52918		286860				2298412
	Northwestern Zone	243835	248547	461479	264940	8759	93762		406194				1727517
	Southern Zone	649512	948786	580864	138420	411	45212	3	264077				2627286
	Western Zone	159423	317274	377570	72391	294	32049		137302	11	7308		1103623
	<b>Total</b>	<b>2336580</b>	<b>2476617</b>	<b>2485231</b>	<b>778598</b>	<b>26362</b>	<b>280228</b>	<b>16603</b>	<b>1375418</b>	<b>50916</b>	<b>12327</b>		<b>9838879</b>
Granite Gneiss	High Altitude and Hilly Zone		43342	26210	8848	836	13847		113179	15285	612		222158
	Southern Zone		23815	15422	2413		3737		13101	4294	415		63198
	<b>Total</b>	<b>67156</b>	<b>41633</b>	<b>11262</b>	<b>836</b>		<b>17584</b>		<b>126281</b>	<b>19579</b>	<b>1026</b>		<b>285356</b>
Laterite	Cauvery Delta Zone	619	7002	108238	217								116075
	High Altitude and Hilly Zone		1390	5786			4627						11802
	Northeastern Zone		20159	76862	39		1365						98425
	Southern Zone		20263	22419									42682
	<b>Total</b>	<b>619</b>	<b>48814</b>	<b>213304</b>	<b>256</b>		<b>5992</b>						<b>268985</b>
Limestone	Cauvery Delta Zone			337									337
	High Altitude and Hilly Zone			1057	2121				1935				5114
	Northwestern Zone		987	5655									6642
	Southern Zone		17762	1886	644								20292
	Western Zone		5243	42296	11822								59362
	<b>Total</b>	<b>23992</b>	<b>51232</b>	<b>14587</b>					<b>1935</b>				<b>91747</b>
Sandstone	Northeastern Zone		7023		734								7758
	Southern Zone		814	13331									14145
	<b>Total</b>	<b>7837</b>	<b>13331</b>	<b>734</b>									<b>21903</b>
Miscellaneous	Cauvery Delta Zone												241216
	High Altitude and Hilly Zone												42227
	High Rainfall Zone												9681
	Northeastern Zone												449897
	Northwestern Zone												79807
	Southern Zone												323234
	Western Zone												55185
	<b>Total</b>												<b>1201246</b>
	<b>Grand Total</b>	<b>2811180</b>	<b>3248742</b>	<b>2873398</b>	<b>817858</b>	<b>27197</b>	<b>329046</b>	<b>16603</b>	<b>1564893</b>	<b>70495</b>	<b>56684</b>	<b>1201246</b>	<b>13017343</b>

**Fig.5. Spatial Distribution of Slope in Tamil Nadu**



## **V. Land Use**

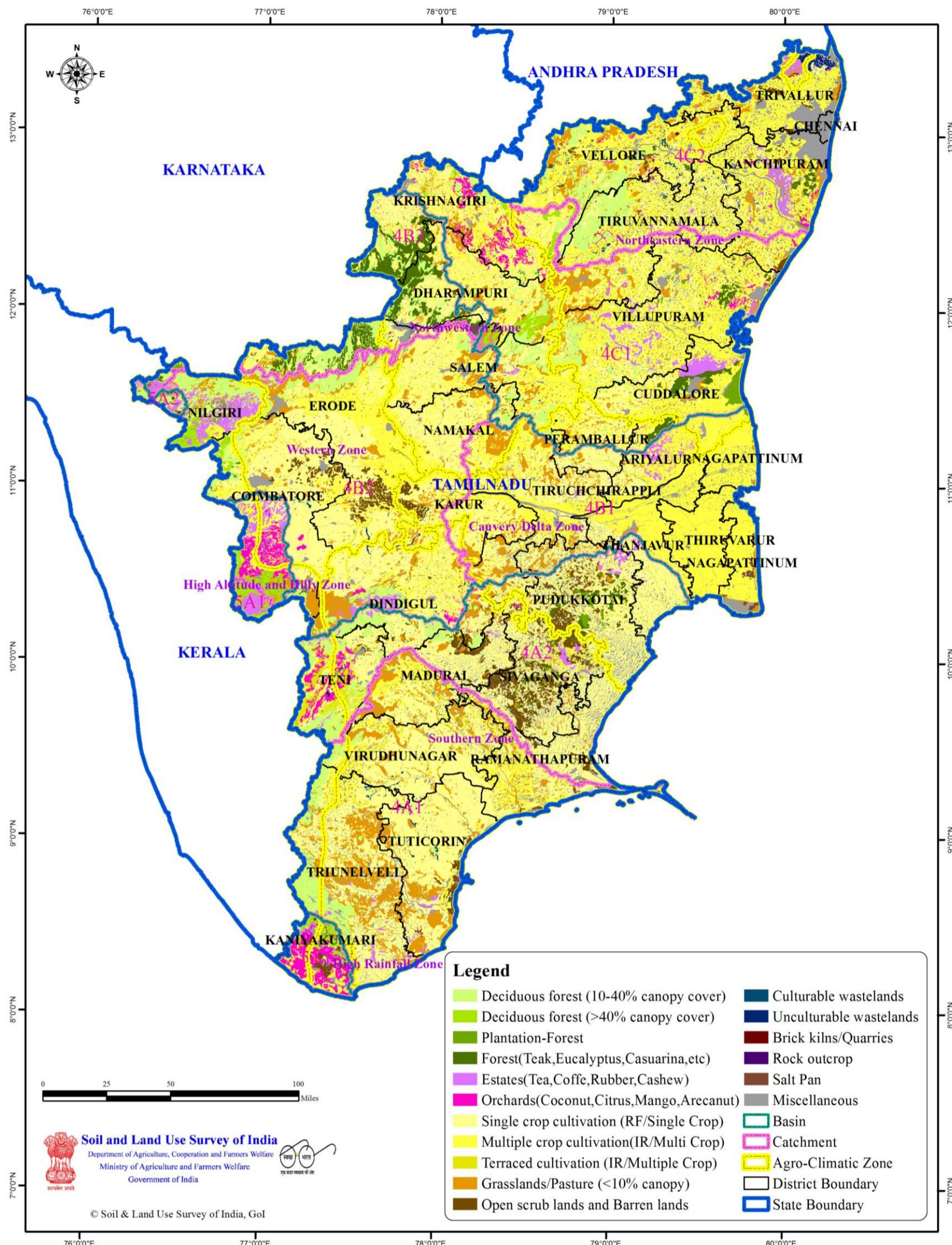
Land use affects to the depth of soils if soil develop under forest vegetation the litter fall is high it affects the temperature and enhance microbial activity and form few acids which enhance the process of weathering. Out of total surveyed area (1,30,17,343 ha.) under different land use classes observed in the state, maximum area is covered under cultivation (single crop/multiple crop) having an area 79,86,667 ha. followed by 12,50,166 ha area is under grassland/pasture having <10% canopy cover. This may be contributed to land degradation and reduce available area under crop production. Next to this is an area of 6,36,905 ha and 4,09,527 ha covered under forest lands, i.e. having 10-20% canopy cover and 20-40% canopy cover, respectively. An area of 3,30,409 ha. is mapped under estate, i.e. tea, coffee, rubber, cashew etc. this depends on the climatic conditions of agro-climatic zone which falling in the state and soil type varies on climatic conditions. Red lateritic slightly acidic soil type is best suited for its production, therefore, Tamil Nadu state is one of the largest cultivator & producer of plantation crops like coffee, tea, rubber etc. whereas 2,86,120.03 Area comes under forest tree plantation like Teak, Eucalyptus, etc. followed by an area of 2,81,236 ha. under barren lands. An area of 1,65,440 ha. is under orchard cultivation like coconut, Mango, Areca nut whereas, an area of 1,38,690 ha is under deciduous forest type having >50 % canopy cover. Remaining area is mapped under cultural/ uncultivable wastelands and scrub lands. Spatial distribution of Land Use classes and their area shown in **figure no. 6** and **table 5**.

**Table: 5 Landscape/ Agro-climatic sub-zone wise tabular distribution of land use classes in Tamil Nadu state**

Landscape	Agro climatic sub-zone	Land Use														Misc	Total Area						
		Barren lands	Barren lands and Scrub lands	Brick kilns/Quarries	Culturable wastelands	Deciduous forest (Double Storey Veg)				F2 (10-20% canopy cover)	F3 (20-40% canopy cover)	F4 (40-60% canopy cover)	F5 (>60% canopy cover)	Estates(Tea, Coffe, Rubber, Cashew)	Forest (Teak, Eucalyptus, Casuarina etc)	Grasslands/Pasture (<10% canopy)	Multiple crop cultivation (IR/Multi Crop)	(when canopy	Orchards(Coconu	Plantation-Forest	Rock outcrop	Single crop cultivation (RF/Single Crop)	cultivation (IR/Multi
Aeolian	High Rainfall Zone													45				198				243	
	Southern Zone													29018				15510				44527	
Alluvium	Cauvery Delta Zone					4608				741				4723	457739			426	16952			1334	486523
	High Altitude and Hilly Zone													151	11951			193		484		5368	18147
	High Rainfall Zone													1482								1482	
	Northeastern Zone													682	150680				377			2282	154021
	Northwestern Zone													444	12516				3630			204	16794
	Southern Zone	2745			2663				8071		13493	13074		637		11	75699			943		117337	
	Western Zone										298	11829				3308	34349			1193		50977	
		2745			7271				8812		19790	659270		637	193	3745	131492			11323		845280	
Charnokite	High Altitude and Hilly Zone				24829	25091			50155		10349	2104				4410	3750					120689	
	Western Zone				9564	7054			2248		4599	1										23467	
	Total				34393	32146			52403		14948	2105				4410	3750					144156	
Coastal Alluvium	Cauvery Delta Zone	1303			1683						13966	87562				2490	16834			124		123963	
	High Altitude and Hilly Zone															2557						2557	
	High Rainfall Zone	0														5335						5335	
	Northeastern Zone	383			813						9897	16871		5133		22188	2437			11419		69141	
	Southern Zone	22568									3490	10346				33948			3674		74026		
	Total	24254			813	1683					27353	114779		5133	7892	24678	53219			15217		275022	
Granite	Cauvery Delta Zone	61745		142		7679	2828			1036	20560	164274	337038		79		10739	808740	1086			1415946	
	High Altitude and Hilly Zone				136318	33170	29010	45581	48408	4751	70074	75565	4262	22823	30568		73810					574341	
	High Rainfall Zone				4397	2755	18908		4275		116	13446	12338		32587		2932					91754	
	Northeastern Zone	9174	1779		7258	76713	141757		20081	51003	31251	215593	1251908		23600		2631	543	465123			2298412	
	Northwestern	4686		347		39010	140428		41160	11316	140785	208070	359518		47707		20		734471			1727517	

	Zone																						
Southern Zone	113919			6082	162170	1123	201		25882	4636	393642	306138	3	10367		15359		1587353	381		31	2627286	
Western Zone	51601			74774	53384		16	8671	45629	85091	250207		20925	8917		504408					1103623		
<b>Total</b>	<b>241125</b>	<b>1779</b>	<b>489</b>	<b>13340</b>	<b>501062</b>	<b>375445</b>	<b>48119</b>	<b>106838</b>	<b>150590</b>	<b>247612</b>	<b>1136860</b>	<b>2593820</b>	<b>16603</b>	<b>125501</b>	<b>72071</b>	<b>28749</b>	<b>543</b>	<b>4176836</b>	<b>1467</b>		<b>31</b>	<b>9838879</b>	
<b>Granite Gneiss</b>	High Altitude and Hilly Zone			72396	610		31852	22387	3608	3207	10011		22757		4341		19814	30418	756		222158		
	Southern Zone			19047	444			494	146	1092	137		11411		76		9477	19986	887		63198		
	<b>Total</b>			<b>91443</b>	<b>1054</b>		<b>31852</b>	<b>22881</b>	<b>3754</b>	<b>4299</b>	<b>10148</b>		<b>34168</b>		<b>4417</b>		<b>29291</b>	<b>50405</b>	<b>1643</b>		<b>285356</b>		
<b>Laterite</b>	Cauvery Delta Zone	1861						37370	13750	7845	1030						54219				116075		
	High Altitude and Hilly Zone							6491		2920	1390	1002										11802	
	Northeastern Zone			39				34172	21004	7087	15855	11375					8893				98425		
	Southern Zone	11250						8426			20263						2743				42682		
	<b>Total</b>	<b>13112</b>		<b>39</b>				<b>86459</b>	<b>34753</b>	<b>17852</b>	<b>38537</b>	<b>12376</b>					<b>65855</b>				<b>268985</b>		
<b>Limestone</b>	Cauvery Delta Zone		71														266				337		
	High Altitude and Hilly Zone		353	1053	882			308									2518				5114		
	Northwestern Zone		245														6397				6642		
	Southern Zone		1488														18803				20292		
	Western Zone		1414					8957		1537							47455				59362		
	<b>Total</b>		<b>1804</b>	<b>1767</b>	<b>1053</b>	<b>882</b>		<b>9264</b>		<b>1537</b>							<b>75439</b>				<b>91747</b>		
<b>Sandstone</b>	Northeastern Zone												7024				734				7758		
	Southern Zone																14145				14145		
	<b>Total</b>												<b>7024</b>				<b>14879</b>				<b>21903</b>		
<b>Misc</b>	Cauvery Delta Zone																			241216	241216		
	High Altitude and Hilly Zone																			42227	42227		
	High Rainfall Zone																			9681	9681		
	Northeastern Zone																			449900	449900		
	Northwestern Zone																			79807	79807		
	Southern Zone																			323231	323231		
	Western Zone																			55185	55185		
	<b>Total</b>																			<b>1201246</b>	<b>1201246</b>		
	<b>Grand Total</b>	<b>281236</b>	<b>1779</b>	<b>2292</b>	<b>15959</b>	<b>636905</b>	<b>409527</b>	<b>48119</b>	<b>138691</b>	<b>330409</b>	<b>286120</b>	<b>1250166</b>	<b>3420197</b>	<b>36003</b>	<b>165440</b>	<b>80156</b>	<b>65999</b>	<b>543</b>	<b>4566469</b>	<b>51872</b>	<b>28183</b>	<b>1201276</b>	<b>13017343</b>

**Fig.6. Spatial Distribution of Land Use in Tamil Nadu**



## VI. Soil Texture

Soil parent materials can include all different types of bedrock and any type of unconsolidated sediments. Soils developed on parent material that are coarse grained and composed of minerals resistant to weathering most likely exhibit coarse grain texture. Fine grain soil develops where the parent materials are composed of unstable minerals that readily weather. The severity of erosion and runoff depends on soil texture it influences the rate of percolation of water through the soil and enhance the stability of soil.

It was observed that more area of the state is showing textural class towards more accumulation of clay content in the soils, i.e. fine to fine loamy having 18 to >35 % clay covering an area of 47,50,518 ha under varied landscapes predominantly in Granite and Alluvium.

An area of about 859 ha is also observed under very fine textural class having >60% clay. This clearly indicates that clays area the predominant soils in the state and apart from the rich alluvial soil of the river deltas, Granite is dominant in the area.

An area of 46,10,597 ha is mapped under coarse loamy to fine loamy textural class having clay content ranging between <18% to 35%. An area of 59,439 ha is mapped under sandy to coarse loamy textural class.

Based on the per cent gravels, i.e. 15-25% observed in the soil profile during the survey, the textural class is further categories into gravelly textural classes like gravelly fine to gravelly fine loamy covering an area of 13,92,233 ha and gravelly coarse loamy to gravelly coarse loamy covering an area of 9,40,650 ha.

For gravels percent more than 35 %, textural class like sandy skeletal to loamy skeletal textural class is mapped covering an area of 61,801 ha.

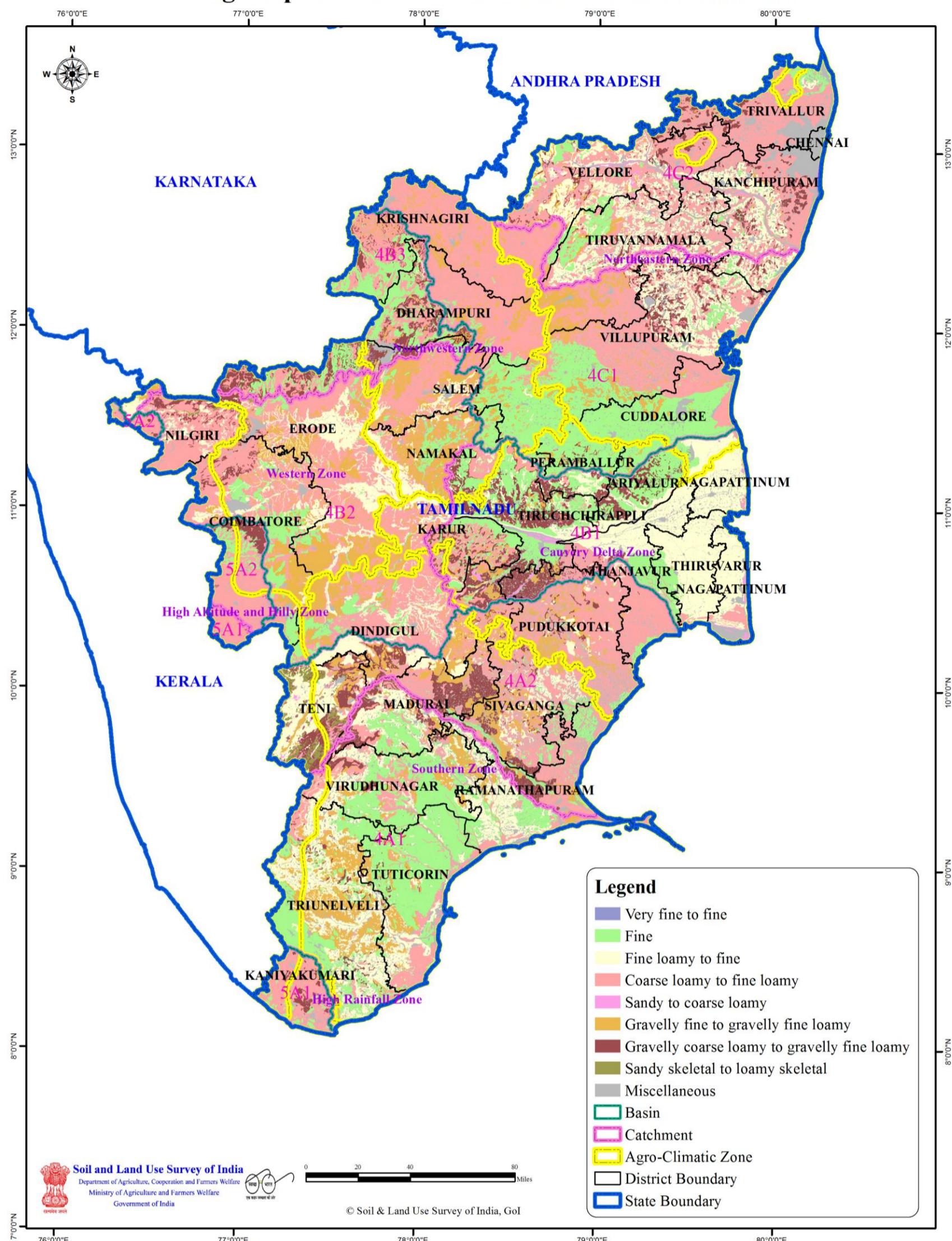
Spatial distribution of textural classes and their area shown in **figure no. 7** and **table 6**.

**Table: 6 Landscape/ Agro-climatic sub-zone wise tabular distribution of textural classes in Tamil Nadu state**

Landscape	Agro climatic sub-zone	Textural Class								Miscellaneous	Total Area
		Very fine to fine	Fine	Fine loamy to fine	Coarse loamy to fine loamy	Sandy to coarse loamy	Gravelly fine to gravelly fine loamy	Gravelly coarse loamy to gravelly fine loamy	Sandy skeletal to loamy skeletal		
Aeolian	High Rainfall Zone				243						243
	Southern Zone				44527						44527
	<b>Total</b>				<b>44771</b>						<b>44771</b>
Alluvium	Cauvery Delta Zone	4676	446201	25061	9702	39	844				486523
	High Altitude and Hilly Zone	6819	1740	5997		6151					20708
	High Rainfall Zone			1482							1482
	Northeastern Zone	32721	42265	72065	6969						154021
	Northwestern Zone	2532	5917	7697	648						16794
	Southern Zone	17347	12403	79470	11	3080	4388	637			117337
	Western Zone	1193	45889	289	3606						50977
	<b>Total</b>	<b>65288</b>	<b>554416</b>	<b>192060</b>	<b>20937</b>	<b>9270</b>	<b>5232</b>	<b>637</b>			<b>847840</b>
Charnokite	High Altitude and Hilly Zone		26440	79129		785	10110	4225			120689
	Western Zone		3682	12948		2491	635	3711			23467
	<b>Total</b>		<b>30121</b>	<b>92076</b>		<b>3277</b>	<b>10745</b>	<b>7936</b>			<b>144156</b>
Coastal Alluvium	Cauvery Delta Zone	18284	64626	26350	14614	89					123963
	High Rainfall Zone			5335							5335
	Northeastern Zone	13338	997	54804							69139
	Southern Zone	12558	3884	57583							74025
	<b>Total</b>	<b>44180</b>	<b>69506</b>	<b>144072</b>	<b>14614</b>	<b>89</b>					<b>272461</b>
Granite	Cauvery Delta Zone	452915	98584	484360	3414	147657	229016				1415946
	High Altitude and Hilly Zone	106090	61568	345839		31301	29543				574341
	High Rainfall Zone	11742	1389	64978		1296	12349				91754
	Northeastern Zone	389992	527494	1053317	9160	162240	156209				2298412
	Northwestern Zone	859	417534	75086	821319	86	316990	95643			1727517
	Southern Zone	704904	620293	590670	31	492101	219286				2627286
	Western Zone	129330	162646	522041		214828	74777				1103623

	Total	859	2212508	1547060	3882525	12690	1366413	816823			9838879
Granite Gneiss	High Altitude and Hilly Zone		88	76661	57856	5989	7546	35333	38686		222158
	Southern Zone		199	25025	4954	5208		13269	14542		63198
	<b>Total</b>	<b>286</b>	<b>101686</b>	<b>62810</b>	<b>11198</b>	<b>7546</b>	<b>48602</b>	<b>53228</b>			<b>285356</b>
Laterite	Cauvery Delta Zone		16222	7901	60926			31027			116075
	High Altitude and Hilly Zone		133		11670						11802
	Northeastern Zone		24241	3127	66332		2381	2343			98425
	Southern Zone			21249	21432						42682
	<b>Total</b>	<b>40596</b>	<b>32277</b>	<b>160360</b>		<b>2381</b>	<b>33370</b>				<b>268985</b>
Limestone	Cauvery Delta Zone		266		71						337
	High Altitude and Hilly Zone		397				353	4364			5114
	Northwestern Zone		987		5655						6642
	Southern Zone		18803				1488				20292
	Western Zone		31326		5843		1414	20779			59362
	<b>Total</b>	<b>51779</b>		<b>11569</b>		<b>3255</b>	<b>25143</b>				<b>91747</b>
Sandstone	Northeastern Zone			7023				734			7758
	Southern Zone		814		13331						14145
	<b>Total</b>	<b>814</b>		<b>20355</b>			<b>734</b>				<b>21903</b>
Miscellaneous	<b>Total</b>									<b>1201246</b>	<b>1201246</b>
	<b>Grand Total</b>	<b>859</b>	<b>2415451</b>	<b>2335068</b>	<b>4610597</b>	<b>59439</b>	<b>1392233</b>	<b>940650</b>	<b>61801</b>	<b>1201246</b>	<b>13017343</b>

**Fig.7. Spatial Distribution of Texture in Tamil Nadu**



## DISTRICT-WISE CATEGORIZATION OF PRIORITY CLASS

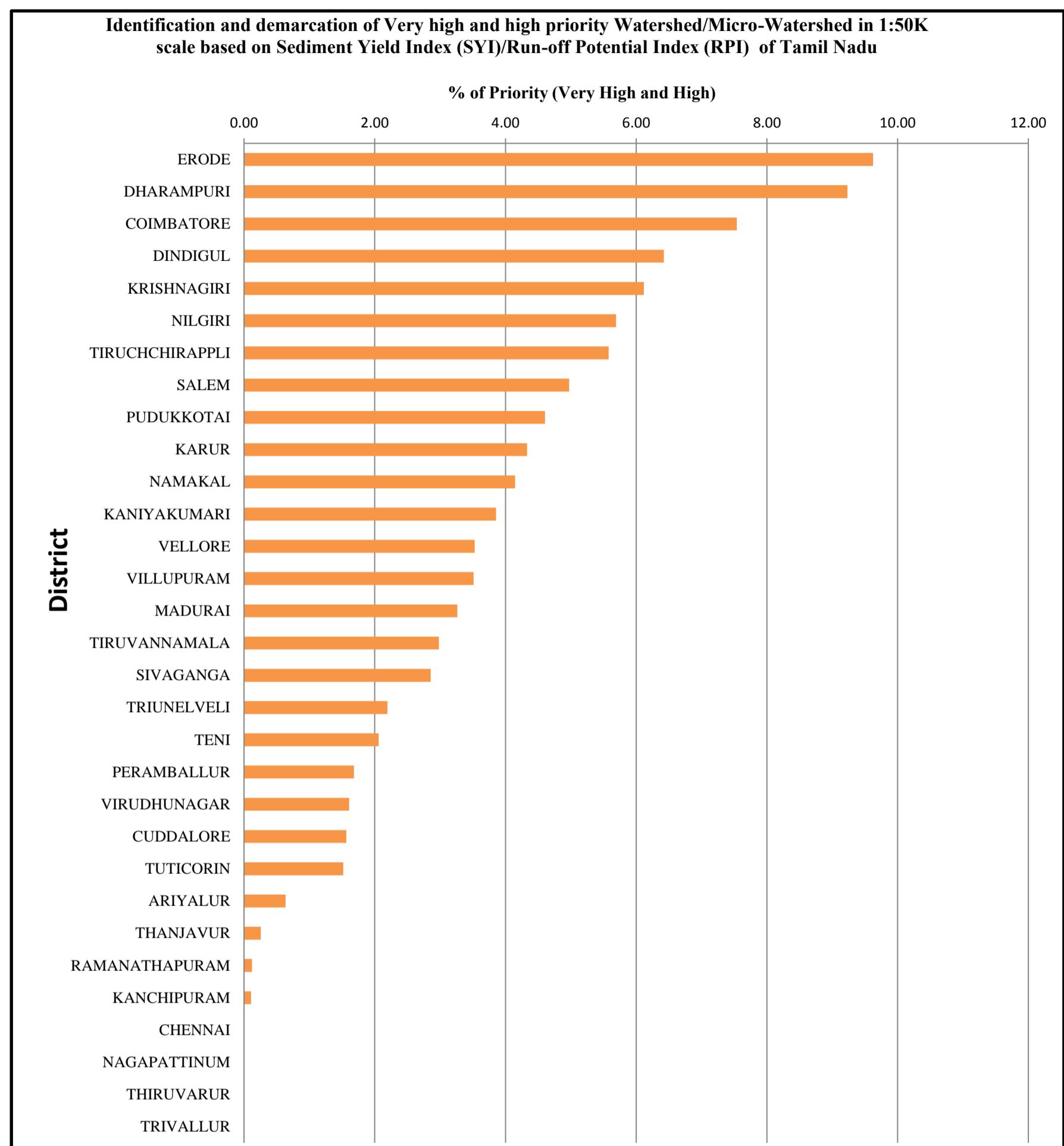
Identification and demarcation of priority area is based on the assessed Sedimentary Yield Index (SYI) and Runoff Potential Index (RPI) values of hydrologic units have been carried out in state. The state area has been divided into five priority classes, i.e. very high, high, medium, low and very low. SLUSI has identified areas of higher runoff and sediment load mostly covering hills/ forests/ scrub lands.

Based on the priority assessment, it was observed that about 5 % of state's total geographical area is identified under very high priority and about 10 % is identified under high priority areas. These areas showing degradation due to active soil erosion and can be taken up for conservation measures. Whereas, about 17 % is identified under medium priority area that needs to be protected from further soil loss and requires conservation measures.

Spatial distribution of priority categorization of watersheds and district-wise area are shown in **figure no. 8** and **table 7**. District-wise area covered under very high and high priority area is highlighted in the form of bar-diagram.

**Table: 7 District wise tabular distribution of priority classes in Tamil Nadu state**

District	Priority					Total Area (ha)
	Very Low	Low	Medium	High	Very High	
Ariyalur	124188	43134	14093	12493	12	193920
Chennai	17518					17518
Coimbatore	268117	143504	189876	95944	52518	749959
Cuddalore	294157	21927	24884	21790	8989	371747
Dharmapuri	62580	85865	119941	103970	77805	450161
Dindigul	165214	214598	99870	99064	27417	606164
Erode	295175	164660	172802	133418	56090	822144
Kanchipuram	394241	38221	13018	2108		447588
Kaniyakumari	140	55846	36928	60326	15565	168805
Karur	59955	56224	89271	80601	4695	290746
Krishnagiri	60297	166581	166343	59475	61004	513699
Madurai	101045	114690	91601	45662	18603	371602
Nagapattinum	256631					256631
Namakkal	59836	72551	128400	62973	18668	342428
Nilgiri	85599	29539	30325	39005	73045	257513
Peramballur	69448	42299	29842	27951	5131	174671
Pudukkotai	219242	62902	92375	68032	22608	465158
Ramanathapuram	275122	132130	15587	1169	1255	425263
Salem	179977	147604	98946	51498	46446	524470
Sivaganga	203210	95855	55793	31328	24907	411093
Teni	138908	46849	61069	32315	8272	287414
Thanjavur	298772	14668	23009	5017		341466
Thiruvarur	211631					211631
Tiruchirappalli	122695	96538	120782	85918	23912	449844
Tiruvannamala	338242	157694	64466	28521	30181	619103
Trichy	109027	301410	228143	43021	197	681797
Trivallur	335322	1882	2029			339233
Tuticorin	85196	286644	61743	29872		463456
Vellore	306281	112722	119123	40271	29201	607598
Villupuram	522248	92337	45527	19499	49659	729271
Virudhunagar	59596	259438	74563	31651		425249
<b>Grand Total</b>	<b>5719612</b>	<b>3058312</b>	<b>2270351</b>	<b>1312892</b>	<b>656177</b>	<b>13017343</b>



**Fig.8 Distribution of Priority Watersheds in Tamil Nadu**

