



AN ASSESSMENT OF FOREST TYPES AND DISTRIBUTION OF TAMIL NADU, INDIA.

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ABSTRACT :

The present study explains the forest cover, protected areas of forest, and distribution of the state forest of Tamil Nadu. The geographical application tools were used for the analysis. Emodis data was used to prepare a map algebra in the background of the programming language to compile the protected areas in allocation-based manner, other maps were prepared in GIS for the analysis of results. The Western Ghats and Eastern Ghats meet to form a large upland region the Nilgiris, its approximate extent is about 37,350 sq. km. The forest area of the state is classified as very dense forest, moderately dense forest, open forest, scrub, and protected forests (PF). The manuscript highlights the ecological and socio-economic relevance of Tamil Nadu, India's forest kinds and distribution, offering a thorough appraisal of them. In an effort to advance sustainable practices in the state and foster a better understanding of forest resources, it offers insights on the prospects, problems, and current state of sustainable forest management. The study highlights the importance of monitoring and managing forest resources in a region rich in biodiversity by examining changes in tree and forest cover over a specified timeframe.

Keywords: Forest, Western ghats, Eastern ghats and monsoon

1. INTRODUCTION:

The forest is a complex ecosystem consisting mainly of trees that buffer the earth and support a myriad of life forms. The trees help create a special environment which, in turn, affects the kinds of animals and plants that can exist in the forest. Trees are an important component of the environment. They clean the air, cool it on hot days, conserve heat at night, and act as excellent sound absorbers. (*Elmendorf, 2008*).

Plants provide a protective canopy that lessens the impact of raindrops on the soil, thereby reducing soil erosion. The layer of leaves that fall around the tree prevents runoff and allows the water to percolate into the soil. Roots help to hold the soil in place. Dead plants decompose to form humus, organic matter that holds the water and provides nutrients to the soil. Plants provide habitat to different types of organisms. Birds build their nests on the branches of trees, animals and birds live in the hollows, insects and other organisms live in various parts of the plant. They produce large quantities of oxygen and take in carbon dioxide. Transpiration from the forests affects the relative humidity and precipitation in a place. Forests can develop wherever the average temperature is greater than 10 °C in the warmest month and rainfall exceeds 200 mm annually. In any area having conditions above this range, there exists a variety of tree species grouped into a number of forest types that are determined by the specific conditions of the environment there, including the climate, soil, geology, geomorphology, and biotic activity. Whereas, Tamil Nadu, a southern Indian state, is known for its diverse landscapes, including coastal plains and Western and Eastern Ghats, and its diverse forest types. Assessing these types and their distribution is crucial for informed conservation and sustainable resource management in the state. (*Ramachandran et al, 2018*).

2.OBJECTIVES

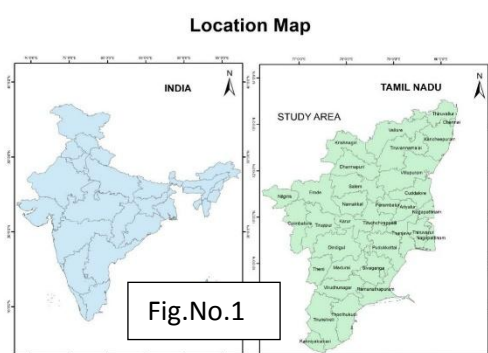
Assessments of forest cover change in Tamil Nadu with special perspectives on identify the forest types and their distribution.

3.METHODOLOGY :

This study was taken as revealing a forest cover and forest distribution, totally the projection was settled and overlaying tools of geographical application were used to the analysis. Emodis data was used to prepare a map algebra in the background of the programming language to compile the protected areas in alocation-based manner, In GIS, the

vector boundary layers of various administrative units up to the district level as provided by Survey of India along with digital open series topo sheets and also it used for other forest cover maps preparation. The biennial assessment of forest cover of the state using mid-resolution Satellite data is based on the interpretation of Linear Imaging Self-Scanning Sensor 3 (LISS-III) data from Indian Remote Sensing satellite data (Resourcesat-II) with a spatial resolution of 23.5 meters with a scale of interpretation 1:50,000 to monitor forest cover for State of Tamil Nadu.

4.STUDY AREA:

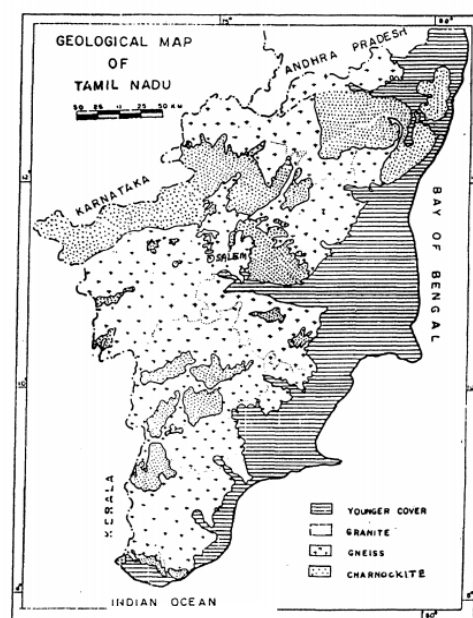


TamilNadu is the southernmost state of India. The total geographical area of TamilNadu is 1,30,058sq.kms, of which the recorded forest area is 22,877 sq.kms, which constitute 17.59% of the States geographical area its shown in fig. 1. The forest area of the State is classified as Reserved Forest, Reserved Land, and Unclassified forest. Reserved Forests (RF) Protected Forests (PF) and

Unclassified Forest (UF).

4.1. GEOLOGY OF TAMIL NADU

Geology of Tamil Nadu Tamil Nadu is situated in the southern part of Indian shield and contains a major part of the high-grade mobile belt terrain. It comprises a variety of lithological units ranging from the oldest known Sathyamangalam supra crystals to the younger sediments. The most ubiquitous rock types in Tamil Nadu are granulites (two pyroxene granulites and charnockites). Holland (1900) was the first to describe charnockitic rocks from hills around Pallavaram, Madras city. He proposed the term 'charnockite series' for the hypersthene bearing rocks of acid, intermediate, basic and ultrabasic compositions its shown in fig.2. (Subramanian and Selvan, 2001).



4.2.CLIMATE

Tamil Nadu is largely dependent on the monsoon rains, the failing of which sometimes leads to droughts in the country. Its climate varies from dry sub-humid to semi-arid. There are three distinct times of rainfall in Tamil Nadu, namely the southwest monsoon from the months of June to September characterized by heavy southwest winds; the northeast monsoons from the months of October to December, characterized by northeast winds; and the dry season from the months of January to May. The annual rainfall of the state is approximately 945 mm (37.2 in), of which 32% is the southwest monsoon and 48% is the northeast monsoon. The state can be divided into 7 agro-climatic zones: north-west, north-east, southern, west, high altitude hilly, high rainfall, and Cauvery Delta.(Bal et al, 2016).

4.3.GEOMORPHOLOGY :

Geomorphologically, three major units are recognized from west to east. The western part comprises the Western Ghats roughly trending N-S and marked by a continuous range of Hills, extending from Nagercoil in the south upto Nilgiri -Bilgiriangan Hills in the north and Geological Survey of India 3 further northwards through Karnataka. The elevation of these Hills ranges between 1275 m and 2637 m. Tamil Nadu is bestowed with a gamut of landforms ranging from uplands to Aeolian landforms scattered across its terrain. So naturally the eastern and southeastern portions of Tamil Nadu are dominated by coastal landforms while the western portion is dominated by uplands its shown in fig . 3. The central portion is dominated by rivers originated from the western uplands and thereby riverine land forms. The rain shadow regions in the south central region is having variants of dry lands. They are: Eastern Ghats, Eastern Ghats South, Laterite Land Form, Inland Plain, Kerala Plain, ,Western Ghats, Marine Land Form, Nilgiris, Reverain Land Form, South Sahyadri, and Tamilnadu Uplands. (Chandrasekaret al, 2011)

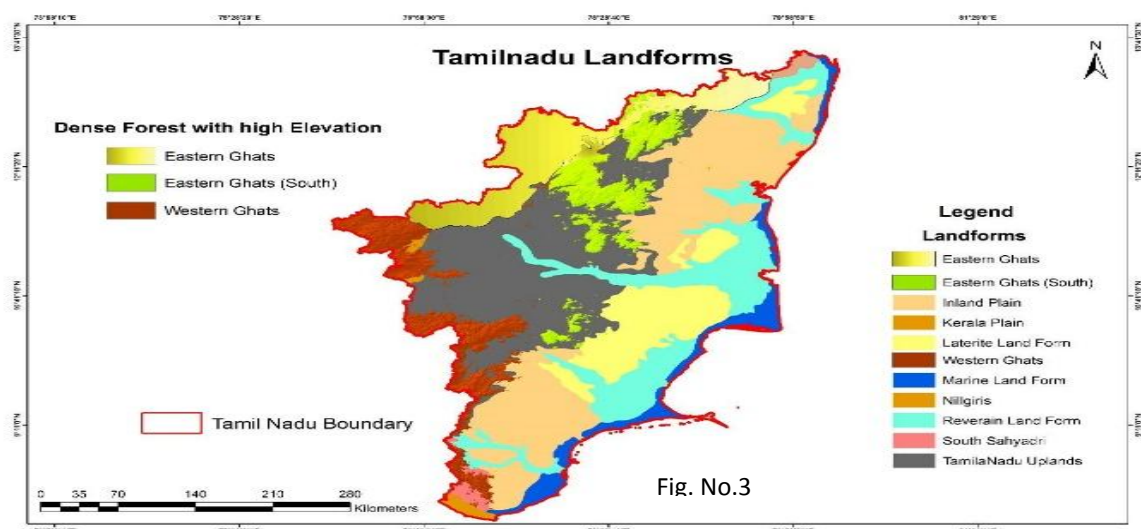


Fig. No.3

5.FOREST RESOURCES IN TAMIL NADU

TABLE . 1LAND USE PATTERN IN TAMIL NADU

Land Use	Area in '000 ha	Percentage
Total geographical area	13,006	-
Reporting area for land utilization	13,027	100.00
Forests	2,106	16.17
Not available for cultivation	2,665	20.46
Permanent pastures and other grazing lands	110	0.84
Land under misc. tree crops & groves	259	1.99
Culturable wasteland	333	2.56
Fallow lands other than current fallows	1,498	11.50
Current Fallows	1,013	7.77
Net area sown	5,043	38.71

6.FOREST COVER IN TAMIL NADU

The forest cover in the state, based on the interpretation of satellite data from October 2008-May 2009 is 23,625 km² which is 18.16% of the state's geographical area. In terms of forest canopy density classes, the state has 2,948 km² area under very dense forest, 10,321 km² areas under moderately dense forest, and 10,356 km² area under open forest. District-wise forest cover in the different canopies as compared to the 2009 Assessment are given in density classes, scrub areas, and the changes Table. 3 (Kaliraj *et al*, 2012).

7.TREE COVER OF THE STATE

Tree cover of the state has been estimated using TOF inventory data collected over a period of six years, i.e. 2004-10. The estimated tree cover in the state is 4,718 km² which is 3.63% of its geographical area its shown in the table. 2. Eight districts of the state (Coimbatore, Erode, Kancheepuram, Madurai, Namakkal, Salem, Thiruvarur, and Tirunelveli) have been inventoried.

TABLE: 2 TREE COVER OF THE STATE

Category	Area(Km ²)	% of Geographical Area
Tree Cover	4,718	3.63
Forest Cover	23,625	18.16
Forest & Tree Cover	28,343	21.79

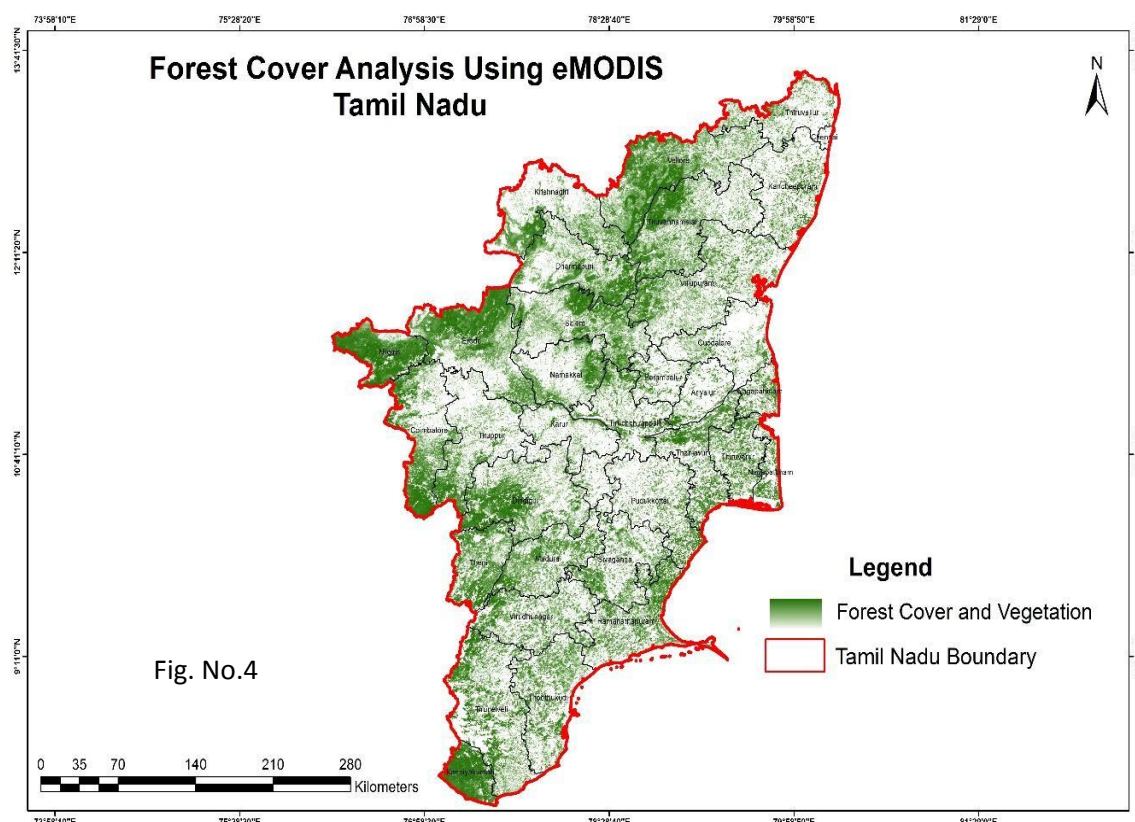


FIG.4 – FOREST AND VEGETATION DISTRIBUTION IN TAMIL NADU

The eMODIS suite of products includes either 7- or 10-day data composited data sets. Expedited (near real-time) production runs daily for the 7-day continental U.S. products and every five days for the 10-day products in other areas using the last interval of input. There is no expedited production over Alaska. Each data set delivers acquisition, quality and Normalized Difference Vegetation Index (NDVI) information at 250-meter (m) spatial resolution. Because each of the composites are created from a varying number of images, the eMODIS composites include acquisition files to identify which of the possible inputs were used to populate the final composite. The metadata accompanying the data files summarize geographic bounds, projection parameters and product contact information.

8.FOREST ANALYSIS FROM E-MODIS

The eMODIS collection is based on the Moderate Resolution Imaging Spectroradiometer (MODIS) data acquired by the National Aeronautics and Space Administration's (NASA) Earth Observing System (EOS). Even though MODIS data are beneficial in vegetation studies, there have been usability issues encountered with the

reprojection, file format and subsetting. Therefore, eMODIS was developed to specifically address these issues.

Moderate resolution remote sensing provides a means for operational monitoring communities to develop historical trend information and use near real-time deviations from temporal averages to identify areas of change. High-quality, consistent and well-calibrated satellite measurements are needed to detect and monitor changes and trends, especially in vegetation patterns useful for drought, crop yield, phenology, and fire potential studies fig no.5 shows the details of the protected areas of Tamil Nadu .

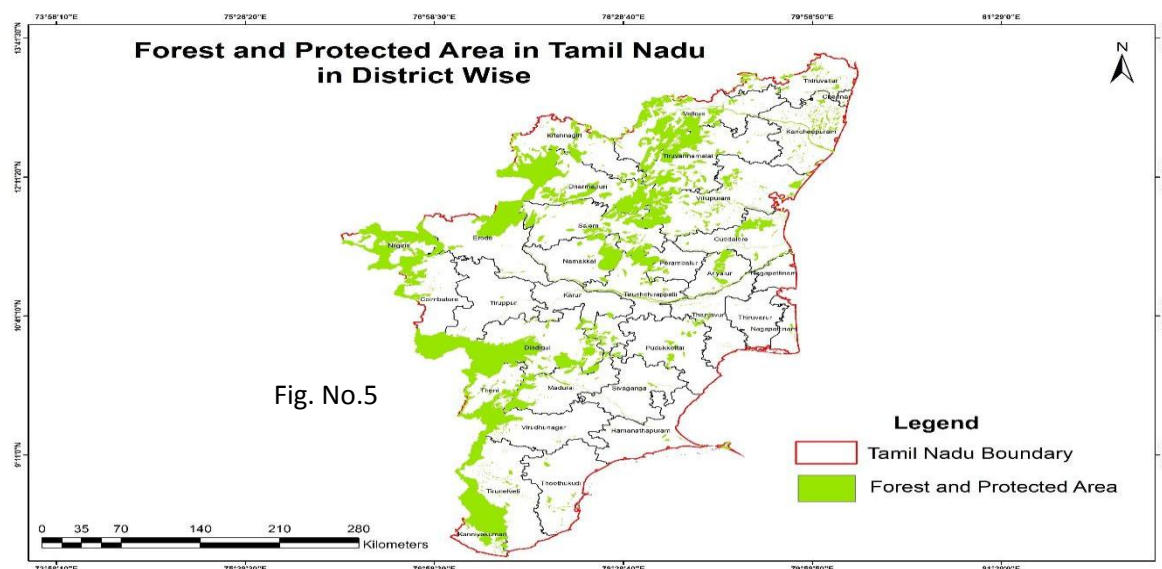


TABLE:3 DISTRICT WISE FOREST DISTRIBUTION IN TAMIL NADU

District	Geographic area	Assessment				Percent of G.A.	Change	Scrub
		Very Dense forest	Moderately Dense forest	Open forest	Total			
Ariyalur	1,947	0	65	253	318	16.33	3	3
Chennai	144	0	6	3	9	6.25	0	0
Coimbatore	7,469	381	922	527	1,830	24.50	3	18
Cuddalore	3,706	0	218	222	440	11.87	-2	10
Dharampuri	9,622	241	1,078	1,715	3,034	31.53	7	201
Dindigul	5,580	351	551	587	1,489	26.68	43	60
Erode	8,209	468	1,371	366	2,205	26.86	1	40
Kancheepuram	4,474	0	123	253	376	8.40	4	19
Kanniyakumari	1,684	40	417	195	652	38.72	0	31
Karur	2,901	0	27	61	88	3.03	1	6
Madurai	4,277	23	293	271	587	13.72	13	117
Nagapattinam	2,140	0	43	99	142	6.64	18	0
Namakkal	3,413	55	189	300	544	15.94	0	22
Perambalur	1,748	19	35	86	140	8.01	0	8
Pudukkottai	4,651	0	78	177	255	5.48	3	7
Ramanathapuram	4,232	0	80	205	285	6.73	0	4
Salem	5,235	139	422	669	1,230	23.50	13	68

Sivaganga	4,086	0	86	231	317	7.76	-15	17
Thanjavur	3,415	0	133	62	195	5.71	13	0
The Nilgiris	2,549	240	978	868	2,086	81.84	-8	0
Theni	2,764	199	491	271	961	34.77	-10	63
Thiruvallur	3,413	0	59	155	214	6.27	1	76
Thiruvarur	2,716	0	23	7	30	1.10	0	0
Tiruchchirapalli	4,511	74	145	188	407	9.02	-2	48
Tirunelveli	6,810	278	760	179	1,217	17.87	-3	44
Tiruvannamalai	6,191	169	523	695	1,387	22.40	0	57
Toothukudi	4,621	0	25	134	159	3.44	-5	22
Vellore	6,077	172	628	939	1,739	28.62	1	184
Villupuram	7,190	70	370	569	1,009	14.03	-2	21
Virudhunagar	4,283	29	182	69	280	6.54	-3	14
Total	130,058	2,948	10,321	10,356	23,625	18.16	74	1,160

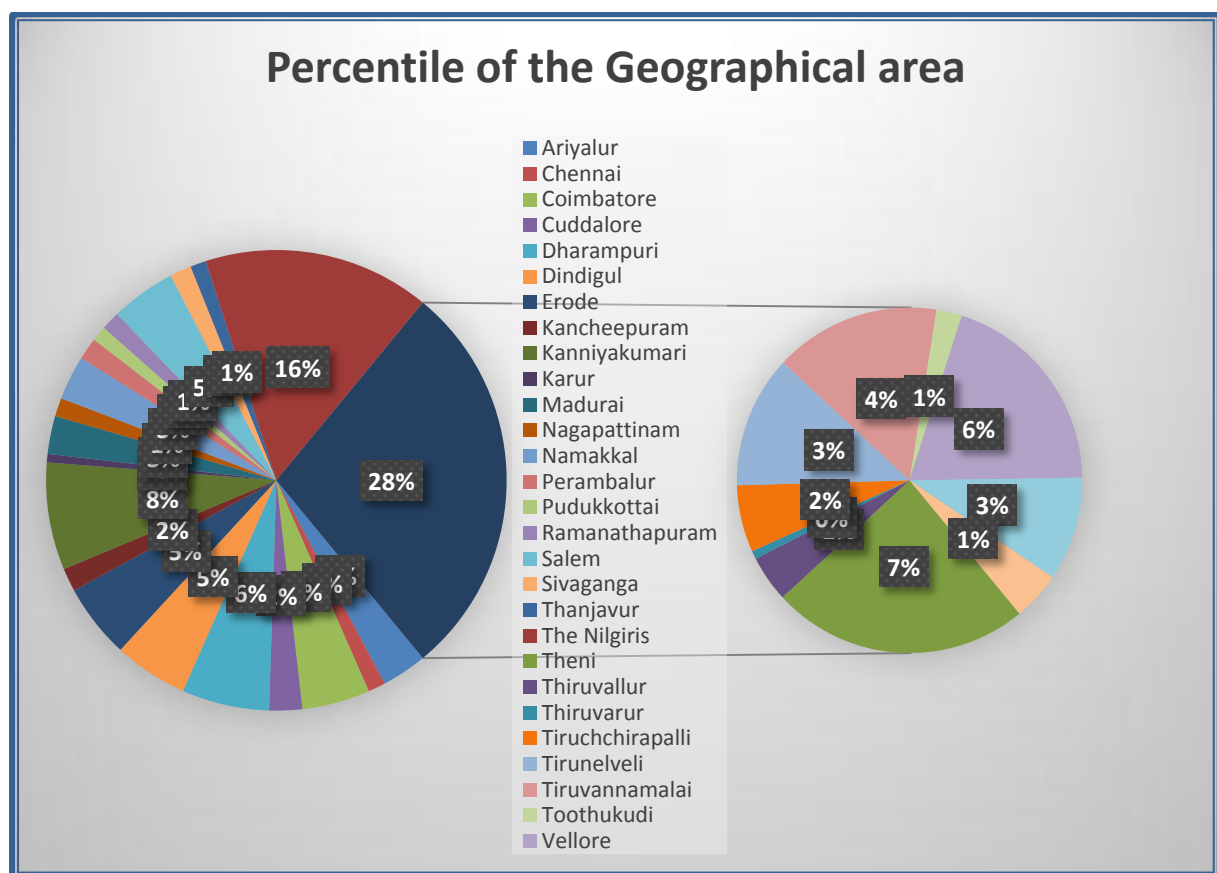


FIG.6 - FOREST DISTRIBUTION IN TAMIL NADU

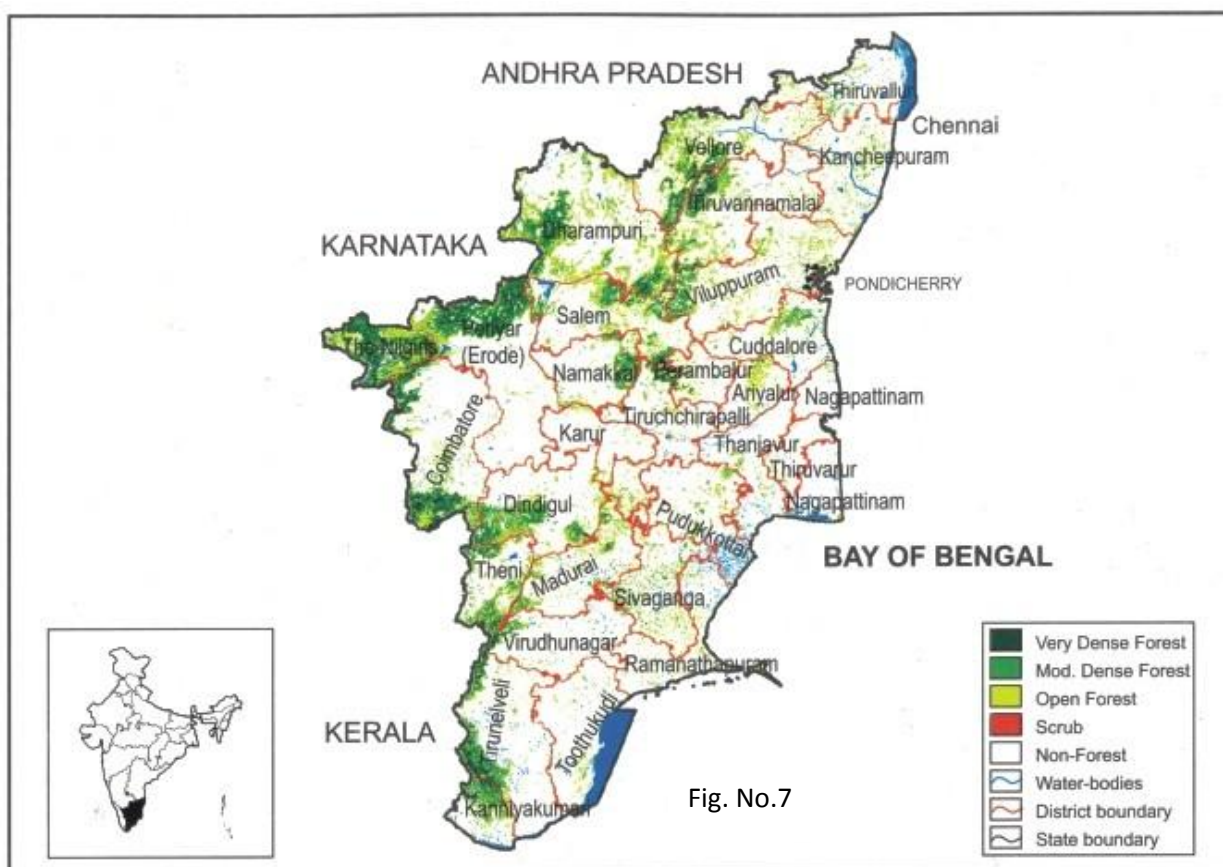


FIG. 7 - DISTRICWISE FOREST DISTRIBUTION IN TAMIL NADU

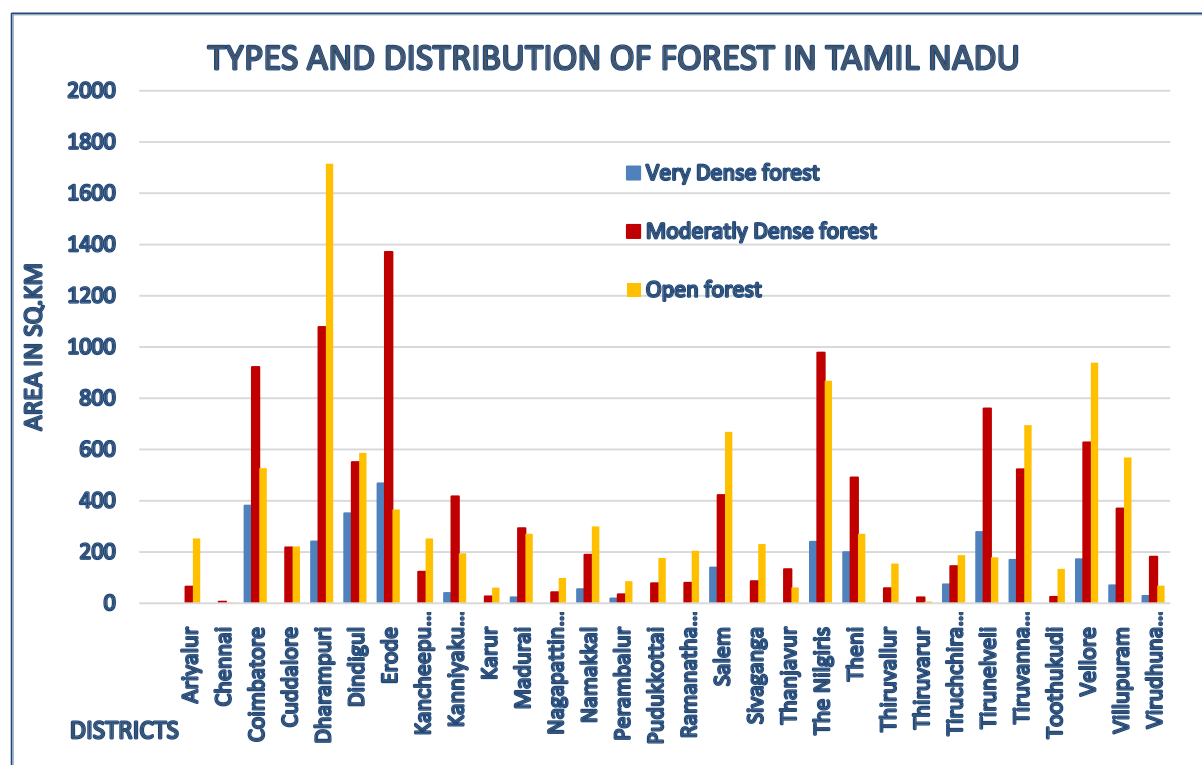
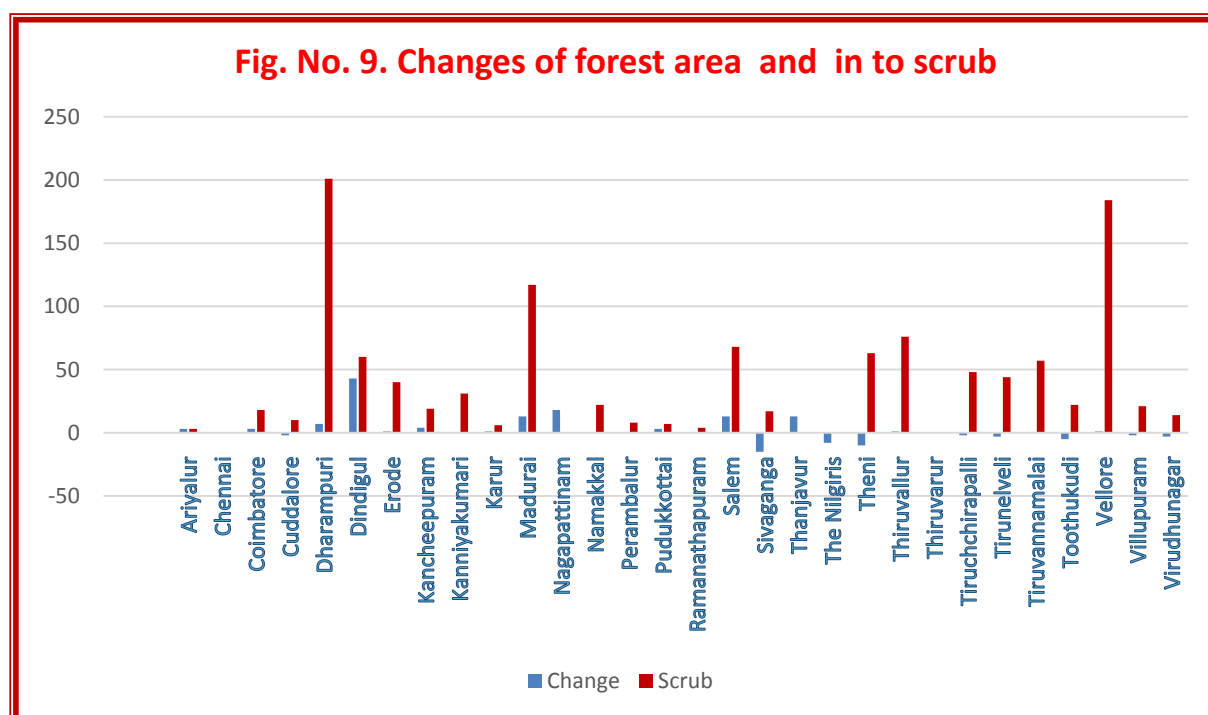


FIG. 8 - DISTRICWISE FOREST AREA CHANGES AND SCRUB



9. RESULT AND DISCUSSION:

The importance of remote sensing technology in monitoring and managing forest ecosystems is highlighted by the study on the types and distribution of forests in Tamil Nadu using E-MODIS data. It helps with climate change research, supports the government, local government agencies, and environmental organizations in creating successful plans, and facilitates informed decision-making for conservation and sustainable management. The recorded forest area is 22,877 km², which constitutes 17.59 % of the geographic area of the state. Reserved Forests comprise 84.75 %, Protected forests, 9.54 % and Unclassed Forests, 5.71 %. Major forest types occurring in the State are Tropical Wet Evergreen, Tropical Semi-Evergreen, Tropical Moist Deciduous, Littoral and Swamp, Tropical Dry Deciduous, Tropical Thorn, Sub-Tropical Broadleaved and Montane Wet Temperate forests. Forests represent all actually forested area on the lands classed or administered as forest under any legal enactment dealing with forest, whether state owned or private. The forest area of the state during 05-06 is 21,34000 ha accounting for 16.43% of the total geographical area of the state. Erode district with an extent of 2,28,749 ha under forest is the highest among districts in their contribution to the forest area of the state. This works out to 10.8% of the state's total forest area. This is followed by Krishnagiri district with 2,02,409 ha (9.6%) and Dharmapuri with 1,64,177 ha (7.8%).

The unique feature of the Nilgiris district is that about 56% of the total area of the district is under forests followed by Krishnagiri with 39.4%, Dharmapuri with 36.5%, Kanyakumari with 32.4% and Theni with 32.0%. Erode, Krishnagiri, Dharmapuri, Vellore, Coimbatore, Thiruvannamalai, The Nilgiris, Dindigul, Salem, Thirunelveli and Theni Districts together accounted for 80.1% of the total forest area of the state.

The forest area of the State is classified as very dense forest, moderately dense forest, and open forest. The dense forest high in Erode, Coimbatore, Dindigul, The Nilgiris, Thirunelveli, Vellore, and Salem is shown in the map and fig no. 7, 8 and 9. The moderately dense forest noted in high areas of total forest in Tamil Nadu Erode, Dharmapuri, Coimbatore, the Nilgiris, Thirunelveli, Vellore, Kanyakumari and Salem is shown in map and fig. no. 7, 8 and 9, the open forest high in Dharmapuri, Vellore, The Nilgiri, Thiruvannamalai, Salem and Vilupuram districts. The forest changes are seen in Dindigul, Nagapattinam, and Madurai. It is shown in table no. 3, Fig. 7., 8 and 9.

10. CONCLUSION

The forests of Tamil Nadu are essential to the ecology and economy of the state because they protect biodiversity, control the climate, and benefit local communities. Preserving these resources for future generations requires thorough evaluation, sensible regulations, and community engagement. The state's rich ecological diversity is highlighted by the assessment of forest types and distribution, which is essential for preserving ecological balance and sustaining local livelihoods. Sustainable management and conservation are vital to the welfare of the people of Tamil Nadu. Policymakers, scholars, and environmentalists can learn a lot from this manuscript about the importance of these forests and how to support sustainable forest management techniques. Analyzing E-MODIS data provides important insights into the state of the ecosystem and supports conservation efforts by assisting in the identification of dominant forest types and changes in forest cover over time.

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