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GEOGRAPHICAL ANALYSIS OF LANDUSE IN CYCLONE PRONE SPS NELLORE DISTRICT

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ABSTRACT

The pattern of landuse is complex and dynamic and spatially, it is variable. The need of the hour is a careful planning of land resources for the future which must take the present and past trends into full consideration. Any landuse planning must accordingly be dynamic and static, flexible and not rigid, capable of being adapted to changing conditions, not for getting the changing habits of the people The pattern of landuse is complex and dynamic and spatially, it is variable. Agricultural landuse planning should not be considered merely as the ration use of land put to cultivation and bringing more land under plough making it viable for cultivation, but should include conservation of land from erosion, salinity, water logging, development of nutrients through multiple cropping system, improving the fertility of land, application of modern technology and lastly the impact of over exploitation of land. It is in this context that the agricultural landuse planning must be examined especially by the agricultural geographers and planners. Hence in this research paper an attempt is made to study the geographical analysis of landuse for two trienniums i.e., for 1987-90 and 2012-15 in Nellore District taking Mandal as unit. Changes in 25 years period also brought out in this endeavour.

KEYWORDS: *Geographical analysis, landuse categories, changes in landuse.*

INTRODUCTION

The Technical committee on co-ordination of Agricultural Statistics (T.C.C.A.S) in 1950 recommended standard classification and uniform definitions of landuse and the same to be adopted by the states all over India. Based on the uniform Indian landuse classification, the total land area geographically accessible for major uses is classified into nine broad categories. These categories are Forest land, Area under non- agricultural use, Barren lands, Permanent pastures and other grazing lands, Area under Miscellaneous tree crops, Cultivable waste land, Current fallows, other fallows and Net area sown.

STUDY AREA

Nellore District, the Southern most coastal district of Andhra Pradesh, is one of the worst cyclone hit districts of coastal Andhra. The district spreads over an area of 13,076 sq km and accounts for 4.75 per cent of the total geographical area of the state. It had a population of 29.64 lakhs (2011).

The district represents a coastal plain with almost a flat topography. The principal rivers which drain the district seasonally, are the Pennar and Swarnamukhi. Major soil groups found in this district are red, black and sandy soils.. The red soils occupy a major share of 43 per cent. Black soil (23 per cent) is confined to parts of Rapur, Atmakur, Venkatagiri, Nellore, Kovur and Kavali mandals.

Nellore District experiences hot climate with an average annual rainfall of 1080.5 mm. Most of the rainfall is received from North-East monsoon only and October and November are the rainiest months The eastern half of the district is enriched with fertile agricultural land and sufficient rainfall.

Paddy is the most dominant crop grown. The cultivation of other food crops is essentially for subsistence in character.

OBJECTIVES OF THE STUDY

To study the spatial patterns of landuse categories of Nellore district for two time periods i.e., 1987-90 and 2012-15 at Mandal level.

To study changes in landuse categories between 25 years period i.e., 1987-90 & 2012-15

DATA AND METHODOLOGY

Secondary data related to different landuse categories in Nellore district at Mandal level has been collected for two trienniums i.e., for 1987-90 and 2012-15 to bring out the spatial patterns of landuse and to bring out the changes that took place between 25 years period. Statistical techniques such as simple averages, percentages etc have been applied to standardize the data. Relevant tables have been prepared for

the data and Choropleth Maps have been drawn for the spatial distribution of landuse categories using GIS software.

DISCUSSIONS

Spatial patterns of Forest Land

The forest landuse in Nellore district is second significant landuse category next to agriculture. The forests in the hilly tract are of mixed deciduous type with high growth, small girth and low density. The forests in the plains tend to be evergreen scrubs associated with a sprinkling of dry deciduous species here and there in the upper storey. Towards the extreme south, especially in Sriharikota Island and along the coast in the southern mandals, dry evergreen forests make their appearance.The forests of Nellore district are not of great economic importance except as a principal source of firewood supply and for feeding of cattle.

During the triennium 1987-90 the percentage of forest area to the total geographical area was 18.62 per cent is Nellore district. The maximum concentration of forests found in Udayagiri Mandal with 74.97 per cent, and the minimum concentration has been noticed in Kondapuram Mandal (0.57%). It is reported that in Kovur, Vidavalur, Indukurpet and Thotapalligudur mandals the forests are completely absent as these mandals are located in pennar delta region which are known for paddy cultivation.

During 2012-15, the total forest area in Nellore district is accounted as 20.80%. Maximum concentration is observed in Dakkili Mandal (60.30%) and the minimum percentage is noticed in Thotapalligudur Mandal (0.20%). In Vidavalur, Kovur and Indukurpet mandals the Forest Landuse is completely absent as they are rich cultivated lands. On the whole the interior parts of the district are having dense forest cover when compared to coastal plains. High (>50%) and moderate (25-50%) concentrations of forest area is confined to the entire western part of the district. Physiographically this part belongs to Veligondas of Eastern ghats (Fig-1).

Changes in Forest- Landuse

It is observed that during the 25years period, the concentration of forest area has been increased by 2.18% (18.62% to 20.80%) in the district. But at mandal level, the percentage of highest concentration has been decreased from 74.19% (Udayagiri mandal) during 1987-90 to 60.37% (Dakkili mandal) during 2012-15. It is also noticed that the number of mandals where forest landuse is completly absent were also decreased from 4 to 3 mandals in 25 years period (Table-1). In the other concentration zones meagre changes have been observed. The highest and lowest concentration mandals also changed both locationally and areally.

Spatial Patterns of Land under Non-Agricultural activities

Land put to non-agricultural use means it cover all lands occupied by settlements, roads and railways, beds of streams, ponds and canals. These are rendered sterile from the point of view of agriculture. During the period 1987-90, the land put to non-agricultural activities accounted for 14.9 per cent of the total geographical area of the district. The highest percentage of concentration is observed in Chillakur mandal (27.82 %***).*** It being one of the richest mica areas of the district, more area is under mining. The lowest percentage of this category of landuse is found in Kodavalur mandal (2.13%). During 2012-15 the area under non-agricultural activities has been reported as 23.50% in the district. Tada mandal (64.50%) is noticed with highest percentage of area under non-agricultural activities followed by Sullurupet mandal (61.70%). And the minimum concentration is observed in Marripadu mandal (5.60%). The high (>20%) and moderate (10-20%) concentration of non-agricultural land is reported mostly in the coastal plains of the district (Fig-1).

Changes in Land under Non-Agricultural activities

During 25 years of period the land under non- agricultural activities has been increased by 8.58% in the district from 14.92% to 23.50%. This increase may be attributed to the development of SEZ's and non-agricultural activities in the district. The number of mandals in high concentration category (<20%) have been increased from 12 (1987-90) to 29 (2012-15). In the medium (10-20%) and low (<10%) concentration zones shrinkage is observed in the number of mandals (Table-1). The maximum and minimum concentration mandals and their areal extent also changed during 25 years period.

Spatial patterns of Barren and Uncultivable land

The land which is bare rocky outcrops of hills, plateaus, mountains, deserts etc., is called as barren land. This land can not be cultivated at any circumstances except at a very high cost. In 1987-90, the percentage under barren and uncuitlvable land was 14.57 per cent to the total geographical area in Nellore district. The highest percentage of barren and uncultivable land is found in Tada (37.37%***)*** and the lowest percentage is noticed in Dakkili (0.56%) mandal (Fig-1). During 2012-15, the area under barren and uncultivable land is accounted for 6.3% in the district. Highest concentration is observed in Duttalur mandal (17.30%) followed by Chejarla (17.20%) and Doravarisatram (16.60%) mandals. The lowest percentage of this category is noticed in Venkatachalam mandal (0.30%).

Changes in Barren and Uncultivable land

During 25 years of period, more than half of the area (8.27%) has been decreased under this category in Nellore district (from 14.57% to 6.30%). The zone of high concentration (>30%) has been completely absent during 2012-15. This may be due to the development of Special Economic Zones in barren and uncultivable lands.

The number of mandals in high concentration zone (>30%) have been decreased to zero in 2012-15 from 3 mandals in 1987-90. The same trend of shrinkage has been reported in moderate concentration (15-30%) zone of barren and uncultivable land (Table-1). This shrinkage has been shifted to low concentration zone (<15%). The highest and lowest concentration mandals and their areal extent are changed during 25 years period.

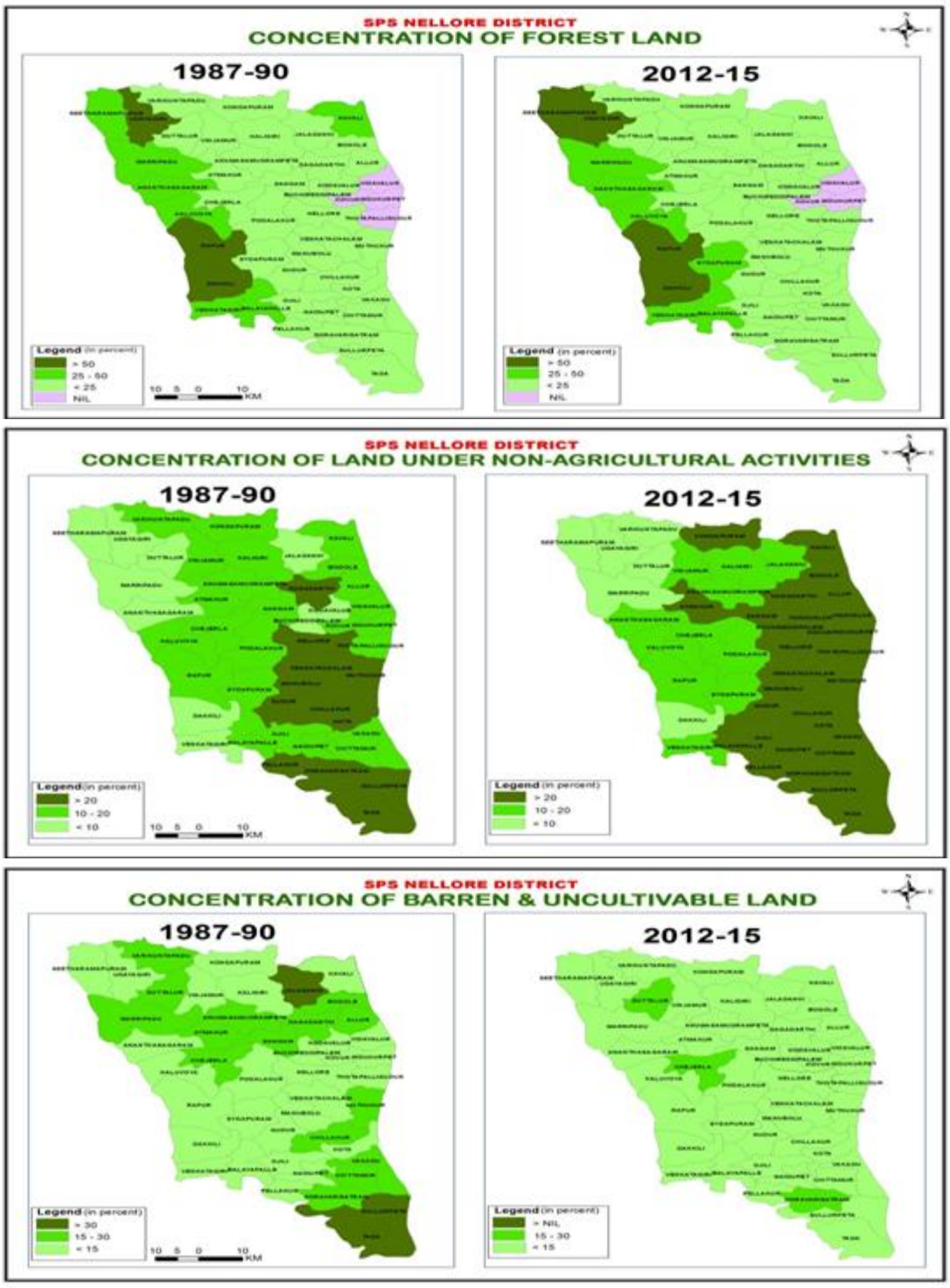


Table-1

CHANGES IN FOREST LAND – NELLORE DISTRICT

S.No	Concentration of Forest land	No. of Mandals		Changes in 25 years period
		1987-1990	2012-2015	
1	>50%	3	4	+1
2	25-50%	7	6	-1
3	<25%	32	33	+1
4	Nil	4	3	-1
5	Maximum	Udayagiri(74.19%)	Dakkli (60.30%)	Change occurred
6	Minimum	Kondapuram(0.57%)	Thotapalligudur (0.20%)	Change occurred
7	District total	18.62%	20.80%	+2.18%

CHANGES IN NON-AGRICULTURAL ACTIVITIES-NELLORE DISTRICT

S.No	Concentration of land under non-agricultural activities	No. of Mandals		Changes in 25 years period
		1987-90	2012-15	
1	>20%	12	29	+17
2	10-20%	24	11	-13
3	<10%	10	6	-4
4	Maximum	Chillakur (27.82%)	Tada (64.50%)	Change occurred
5	Minimum	Kodavalur (2.13%)	Marripadu (5.60%)	Change occurred
6	District total	14.92%	23.50%	+8.58

CHANGES IN BARREN AND UNCULTIVABLE LAND-NELLORE DISTRICT

S.No	Concentration of Barren and Uncultivable land	No. of Mandals		Changes in 25 years period
		1987-90	2012-15	
1	>30%	3	Nil	Nil
2	15-30%	15	3	-12
3	<15%	28	43	+15
4	Maximum	Tada (37.37%)	Duttalur (17.30%)	Change occurred
5	Minimum	Dakkili (0.56%)	Venkatachalam (0.30%)	Change occurred
6	District total	14.57%	6.3%	-8.27%

Spatial patterns of Land under permanent Pastures and Grasslands

In Nellore district land under permanent pastures and other grazing lands for the period 1987-90 accounts for 9.11 per cent to the total geographical area of the district. The highest percentage of this category of landuse is found in Nellore mandal (18.31%). The lowest percentage is noticed in Kovur (0.86%) mandal and completely absent in Kodavalur mandal (Fig-2).

During 2012-15 the area under permanent pastures and other grasslands is accounted as 2.70% to the total geographical area of the district. The highest percentage is observed in Varikuntapadu mandal (10.70%) and the lowest percentage is reported in Bogole mandal (0.10%).

Changes in Land under permanent Pastures and Grasslands

During 25 years of period the area under permanent pastures and grasslands in Nellore district has been decreased by 6.41% from 9.11% (1987-90) to 2.70% (2012-15). The zone of high concentration (>15%) is completly absent during 2012-15. The changes in this land category may be attributed to development of Special Economic Zones and other Urban activities in the district (Table-2).

The same trend of decrease has been observed in the moderate concentration zone (10-15%). Consequently, the number of mandals have been increased in low concentration zone (<10%) and zero concentration zone (Table-2). Change is also observed both locationally and areally regarding to maximum and minimum concentration.

Spatial patterns of Land under Miscellaneous Tree crops

As per 1987-90, the distribution of miscellaneous crops to the total geographical area in the district is only 1.32 per cent. The highest percentage of this landuse is found in Kondapuram mandal (5.48%) and lowest in Dakkili mandal (0.11%). This category of landuse is completely absent in three mandals namely Kodavalur, Allur and Vidavalur. In about more than 2/3^{rds} of the mandals the concentration of miscellaneous tree crops is below 2.5 per cent.

In Nellore district the percentage of miscellaneous trees to the total geographical area during 2012-15 is estimated as 0.60%. Chejerla mandal is reported as highest concentration (3.06%) and Atmakur mandal is reported as lowest concentration (0.10%) under this landuse category (Fig-2)

Changes in Land under Miscellaneous tree crops

During 25 years period there is a decrease of 0.72% area under miscellaneous trees in Nellore district. In the high concentration (>5%) zone the number of mandals have decreased to zero from 5 mandals during 25 years period in the district. The same tendency is observed in the low concentration zone (<2.5%) of miscellaneous tree crops. In the moderate concentration (2.5-5%), no change is observed in the number of mandals during 25 years of period. In the zero concentration category there is an increase of 8 mandals from 3 (1987-90) to 11 (2012-15). Change is also observed in the highest and lowest concentration mandals of the district and their areal extent (Table-2).

Spatial patterns of Cultivable waste land

During the period 1987-90, the land under cultivable waste accounted for 4.68 percent to the total geographical area. The highest concentration of cultivable waste was noticed in Kaligiri mandal with 14.43 percent. Lowest concentration of cultivable waste is seen in Marripadu mandal with 0.14 percent only. The high (>10%) and medium (5-10%) concentration of cultivable waste land is found in the central pockets of north and west and in few mandals of east coast. In about 3/4 of the mandals the concentration is low (<5%) and they are mainly confined to north coastal Plains and southern part of the district (Fig-2). The area under cultivable waste land is accounted as 3.40% to the total geographical area during 2012-15 in the study area. Highest concentration is found in Annasamudrampet mandal (13.10%) and lowest in Kovur mandal (0.20%).

Changes in Land under Cultivable waste land

During 25 years period there is a decrease of 1.28% of area under cultivable waste lands in the district. The number of mandals under high concentration category (>10%) have been decreased from 6 to 2 mandals. In the moderate concentration category (5-10%) also decrease is observed. There is an increase of 7 mandals in low concentration category (<5%) and 2 mandals in zero concentration category. The highest and lowest concentration mandals also changed during 25 years period both locationally and areally (Table-2).

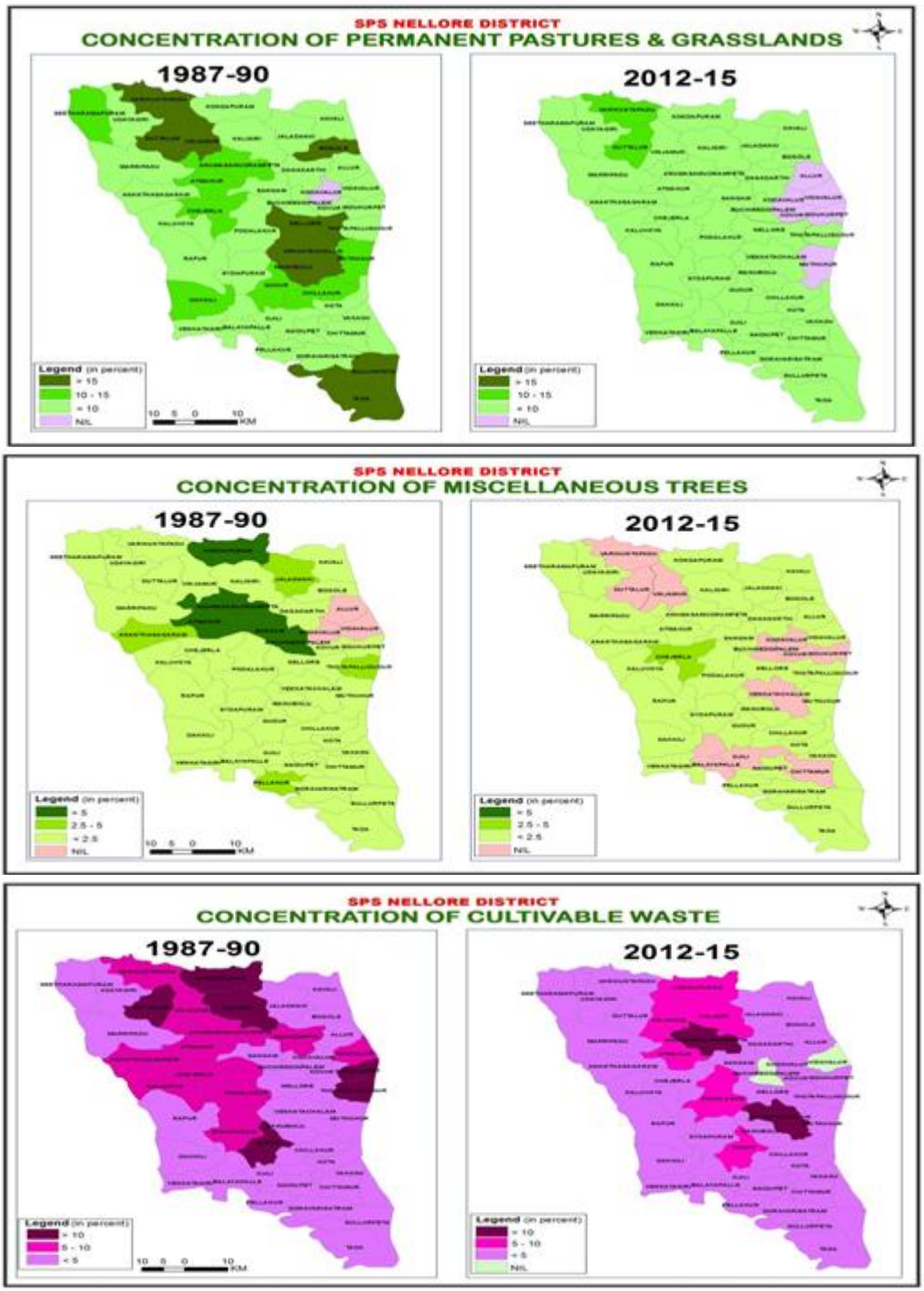


Table-2

CHANGES IN LAND UNDER PERMANENT PASTURES AND GRASSLANDS - NELLORE DISTRICT

S.No	Concentration of land under permanent Pastures and Grasslands	No. of Mandals		Changes in 25 years period
		1987-90	2012-15	
1	>15%	9	Nil	-9
2	10-15%	8	2	-6
3	<10%	28	38	+10
4	Zero	1	6	+5
5	Maximum	Nellore (18.31%)	Varikuntapadu (10.70%)	Change occurred
6	Minimum	Kovur (0.86%)	Bogole (0.10%)	Change occurred
7	District total	9.11%	2.70%	-6.41%

CHANGES IN LAND UNDER MISCELLANEOUS TREE CROPS – NELLORE DISTRICT

S.No	Concentration of land under Miscellaneous tree crops	No. of Mandals		Changes in 25 years period
		1987-1990	2012-2015	
1	+>5%	5	Nil	-5
2	2.5-5%	4	1	-3
3	<2.5%	34	34	No change
4	Zero	3	11	+8
5	Maximum	Kondapuram (5.48%)	Chejerla (3.60%)	Change occurred
6	Minimum	Dakkili (0.11%)	Atmakur (0.10%)	Change occurred
7	District total	1.32%	0.60%	-0.72%

CHANGES IN CULTIVABLE WASTE LAND– NELLORE DISTRICT

S.No	Concentration of Cultivable waste land	No. of Mandals		Changes in 25 years period
		1987-1990	2012-2015	
1	>10%	6	2	-4
2	5-10%	11	6	-5
3	<5%	29	36	+7
4	Zero	0	2	+2
5	Maximum	Kaligiri (14.43%)	Anumasamudrampeta (13.10%)	Change occurred
6	Minimum	Marripadu (0.14%)	Kovur (0.20%)	Change occurred
7	District total	4.68%	3.40%	-1.28%

Spatial patterns of Current Fallow lands

Lands left unsown during the current agricultural year only to regain fertility and for want of moisture and also due to economic reasons is defined as current fallows. About 4.08 per cent of the total area of Nellore district is classified as current fallows during 1987-90. The highest concentration of current fallows is found in Kodavalur mandal which is about 20.71 per cent. Lowest concentration is observed in Buchireddypalem (0.29%) mandal and in 3 mandals such as Udayagiri, Marripadu and Kavali current fallows are completely absent. High (>10%) to medium (5-10%) concentrations of current fallows are reported in the transition zone between coastal low lands and interior uplands. In about 2/3^{rds} of the total mandals the current fallow land concentration is low (<5%). It is mainly confined to Pennar delta and southern parts of the district (Fig-3).

During 2012-15, about 8.80% area is reported under current fallows in the district. The highest concentration is found in kaligiri mandal (19.30%) and the lowest concentration in Bogole (0.20%).

Changes in Current Fallow lands

In Nellore district the area under current fallows is increased to 8.80% in 2012-15 from 4.08% in 1987-90. About 12 mandals have increased under high concentration category during 25 years. In the moderate concentration category (5-10%) there is no change in the number of mandals during 1987-90 and 2012-15.There is a decrease in the number of mandals in low concentration (<5%) category and zero concentration category. The highest and lowest concentration mandals also changed during 25 years period (Table-3).

Spatial patterns of other Fallow lands

This landuse includes all lands which were taken up for cultivation but are temporarily unsown for a period of not less than one year and not more than five years. In Nellore district about 7.87 per cent of land is under other fallows during 1987-90. The highest concentration of this category of landuse is observed in ozili (20.06%) and Vinjamur (20.04%) mandals. The lowest concentration of other fallows is found in Udayagiri mandal (0.02%) and completely absent in Kavali mandal. In about 60 per cent of the mandals, the concentration of this landuse is high (>10%) to medium (5-10%) spreading throughout the district. In the remaining 40 per cent of mandals low concentration of less than 5 per cent are under other fallows, mostly confined to north coastal plains and western part of the district.

During 2012-15 the land under other fallows is accounted as 8 percent in Nellore district. Jaladanki mandal has been reported as highest concentration(20.60%) mandal and Manubolu as lowest concentration mandal (0.40%) under this landuse category (Fig-3).

Changes in other Fallow lands

There is a marginal change of 0.13% in the other fallows category during 25 years of period in Nellore district. The same is reflected in the levels of concentrations at mandal level. Minute changes have been observed in many mandals in the categories of moderate (5-10%) and low (<5%) concentration. Changes have been noticed both locationally and areally in highest and lowest concentration mandals of the district during 25 years period (Table-3)

Spatial patterns of Net area sown

The term 'arable land' was derived from the Latin word 'Arabilis', which means to plough as well as the Greek word 'Aroo' (plough). So it means the land that is fit for ploughing. But, in practice the term has a wide connotation and is used to cover the land which is actually ploughed and cropped. In the present study too, the term is used to include the land which actually cropped during the current agricultural year. The area under arable land in Nellore district accounts for 24.82 per cent of total geographical area during 1987-90. But it varies from a maximum of 75.16 per cent in Kovur to a minimum of 6.79 per cent in Rapur mandal. High (>50%) concentration of net sown area is observed in six mandals, located in Pennar delta. Good irrigation facilities, fertile soils, devotion towards farming, suitable climatic conditions, ``-0accessibility and nearness to district head quarters, etc., favouring these mandals to cultivate more land. It is clear that

high and medium (25-50%) concentrations of arable land are confined to coastal low lands. But in interior upland region there is low (<25%) concentration of arable land. In the extreme south-eastern corner also there is low concentration of arable land because of pulicot lake and Nelapattu Bird Sanctuary (Fig-3).

During 2012-15 the area under net area sown is accounted as (25.50%) in the district. Kodavalur mandal is recorded as highest concentration mandal (68.10%) and Rapur as lowest concentration mandal (6.30%). High and medium concentration of net area sown is found in coastal lands, Pennar delta and in the areas where irrigation facilities are available. In the interior upland region especially the western parts of the district is having low concentration (<25%) of net area sown.

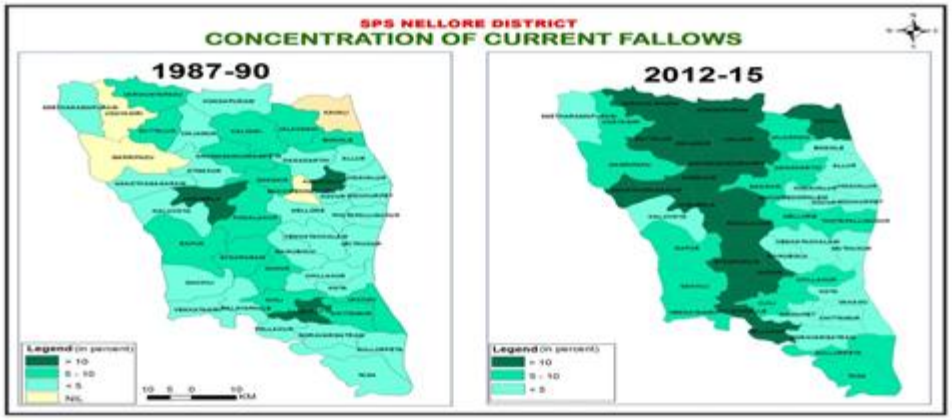
Changes in Net area sown

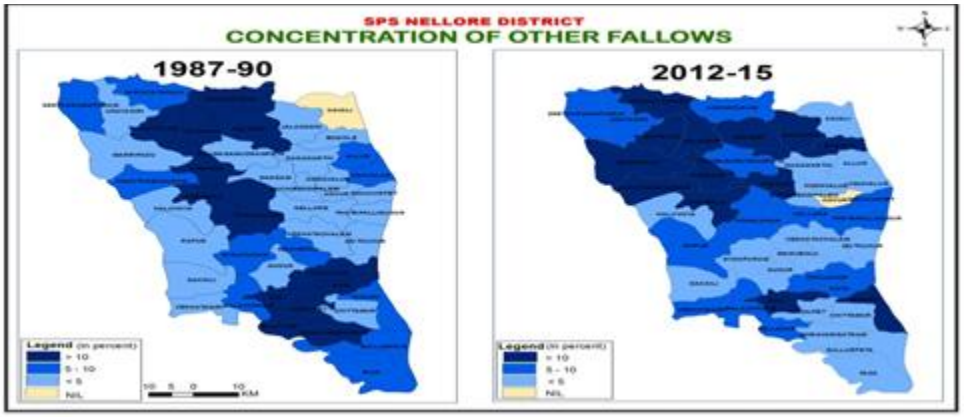
During 25 years of period there is only 1.48% of area has been increased under net area sown in the Nellore district. The number of mandals in the high concentration (>50%) zone of net area sown are decreased from 6 to 4 mandals during 1987-90 and 2012-15. The same trend of decrease (5 mandals) is observed in low concentration (<25%) category. An increase of 7 mandals is found in moderate concentration (25-50%) category. Change is also detected in highest concentration mandals both locationally and areally. But Rapur mandal is remained as lowest concentration mandal both in 1987-90 and 2012-15 (Table-3).

CONCLUSIONS

The geographical patterns of landuse in Nellore district during 25 years period revealed the following results.

1. The concentration of forest area has been increased by 2.18 per cent from 18.62 per cent in 1987-90 to 20.80 per cent in 2012-15.
2. Land under the non-agricultural activities has ben increased by 8.58 per cent during 25 years of period from 14.92 per cent in 1987-90 to 23.50 per cent 2012-15.
3. During the study period the Barren & Un-cultivable land has been decreased more than half of the area from 14.57 per cent (1987-90) to 6.30 per cent (2012-15).
4. Land under permanent pastures and grass lands has been decreased by 6.41 per cent from 9.11 per cent in 1987-90 to 2.70 per cent in 2012-15.
5. There is a decrease of 0.72 per cent area under miscellaneous tree crops in Nellore district during 25 years period.
6. Under cultivable waste lands a decrease of 1.28 per cent of area has been found during 25 years period in Nellore district.
7. The area under current fallows has been increased to 8.80 per cent in 2012-15 from 4.08 per cent in 1987-90.
8. There is a marginal change of 0.13 per cent of area the land is category of other fallows.
9. With regard to net area sown only 1.48 per cent area has been increased in the district during 25 period from 24.82 per cent in 1987-190 to 25.50 in 2012-15.





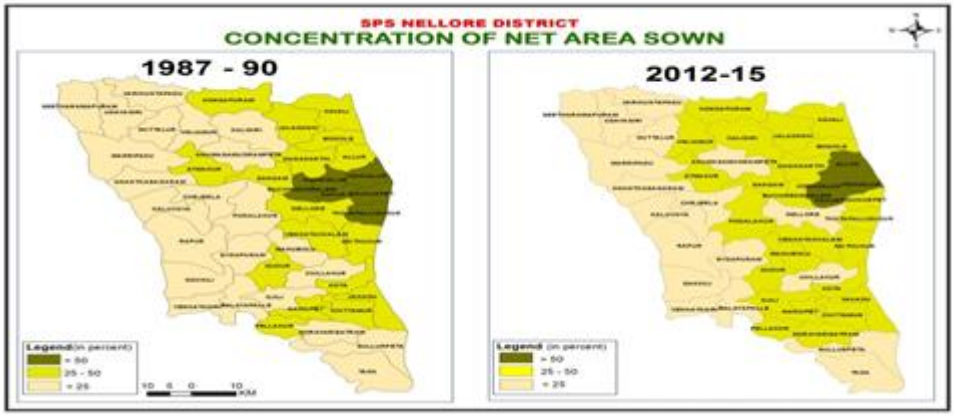


Table-3

CHANGES IN CURRENT FALLOWS – NELLORE DISTRICT

S.No	Concentration of current fallows	No. of Mandals		Changes in 25 years period
		1987-1990	2012-2015	
1	>10%	3	15	+12
2	5-10%	14	14	No change
3	<5%	25	17	-8
4	Zero	4	0	-4
5	Maximum	Kodavalur (20.71%)	Kaligiri (19.30%)	Change occurred
6	Minimum	Buchireddipalem (0.29)	Bogole (0.20%)	Change occurred
7	District total	4.08%	8.80%	+4.72%

CHANGES IN OTHER FALLOWS– NELLORE DISTRICT

S.No	Concentration of other fallows	No. of Mandals		Changes in 25 years period
		1987-1990	2012-2015	
1	>10%	13	13	No change
2	5-10%	11	14	+3
3	<5%	21	18	-3
4	Zero	1	1	No change
5	Maximum	Ozile (20.06%)	Jaladanki (20.60%)	Change occurred
6	Minimum	Udayagiri (0.02%)	Manubolu (0.40%)	Change occurred
7	District total	7.87%	8.00%	+0.13%

CHANGES IN NET AREA SOWN– NELLORE DISTRICT

S.No	Concentration of Net Area sown	No. of Mandals		Changes in 25 years period
		1987-1990	2012-2015	
1	>50%	6	4	-2
2	25-50%	17	24	+7
3	<25%	23	18	-5
4	Maximum	Kovur (75.16%)	Kodavalur (68.10%)	Change occurred
5	Minimum	Rapur (6.79%)	Rapur (6.30%)	No change
6	District total	24.02%	25.50%	+1.48%

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