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RESEARCH PAPER

Inventory and situation analysis of land resources for sustainable agriculture in Tamil Nadu

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Abstract : Rapid land use change has taken place in Tamil Nadu over the past three to four decades due to accelerated cultivation, industrialization and urbanization. Growth of population influenced increased food requirements. In order to meet the basic requirements, the Government has planned to increase the irrigation facilities and the agricultural inputs, (High yielding varieties (HYV), seeds, agricultural implements etc.) to the farmers and also implement the interventional schemes and incentives to enhance farmer's income. Land use change may be examined by considering conversion of forest to crop and rangeland; losses of productive land through various factors; conversion of wetlands to agriculture and urban use: and conversion of other types of land to various human uses. The key to meet the present day challenges lies in the integrated management of the natural resources. Therefore, the knowledge of soil and land resources with respect to their spatial distribution, characteristics, potentials, limitations and their suitability for alternate land uses helps in formulating strategies to obtain higher productivity on sustained basis. With these views in mind an attempt has been made to study the spatial and temporal changes in the land use in Tamil Nadu.

Key Words : Land use pattern, Land resources inventory, Size-holding, Land degradation

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INTRODUCTION

Land and water are the basic resources of agriculture. Land is the most important and tangible resource. Land, by definition, is the solid part of the earth's surface. It is a finite resource, so great care should be taken to preserve it. Land has been put to many new uses, apart from traditional ones. If consideration is limited to terrestrial conditions, it embraces land use in all its forms from agricultural uses to nature conservation in addition to all kinds of urban and industrial land uses. With the huge increase in human population, their affluences increased and became complex. As a result of increasing pressure of population, changes are occurring in the land-use and cropping pattern. Owing to increasing pressure of human and livestock population on the land and ever growing demand of food, fodder

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and fuel, there is a bare need of scientific, rational and economic use of every piece of land in a sustainable manner (Bardhan and Tewari, 2010). The land resources are under severe strain due to the pressure of the growing population and competing demands of the various land uses.

Land has become a prime speculative asset and its price has been escalated to astounding level (Viswamohan, 2013). The speculation carried out by professional speculators, developers and even by farmer owner himself. In the case of professional speculators and developers, they buy the land at cheap price and sell it dear. The speculator holds the land till increase in market value is higher than the cost incurred by them. The loss of farm lands to other uses is an unavoidable phenomenon during economic development, population growth and urbanization periods (Tan *et al.*, 2009).

Rapid land use change has taken place in Tamil Nadu over the past three to four decades due to accelerated cultivation, industrialization and urbanization. Due to the growth of population the food requirements were also increased. In order to meet the basic requirements, the Government has planned to increase the irrigation facilities and the agricultural inputs (HYV and seeds, agricultural implements etc.) to the farmers and also implement the interventional schemes and incentives to enhance farmer's income. Land use change may be examined by considering conversion of forest to crop and rangeland; losses of productive land through various factors; conversion of wetlands to agriculture and urban use: and conversion of other types of land to various human uses. The key to meet the present day challenges lies in the integrated management of the natural resources. Therefore, the knowledge of soil and land resources with respect to their spatial distribution, characteristics, potentials, limitations and their suitability for alternate land uses helps in formulating strategies to obtain higher productivity on sustained basis.

In order to develop an agricultural planning strategy for a region, it is very much essential to know the type of crops grown and concentration of crop area specialization or diversification in a region. Both the land use and cropping pattern are dynamic aspects of an agricultural landscape, as they gradually undergo a change. With these views in mind an attempt has been made to study the spatial and temporal changes in the land use in Tamil Nadu. The objectives of the study are to capture the phenomenal changes that happened among components of land use pattern, to analyse the changes among various size land holdings by farmers and to be apprised of land degradation issues in the state.

MATERIAL AND METHODS

The year wise land use data, number and area of operational holdings, area, production and productivity of crops for a period from 1970-71 to 2015-16 were collected from Season and Crop Report (Department of Economics and Statistics, Government of Tamil Nadu) and other sources as well. It is perhaps more pertinent to take a sufficient time series data to study the changing pattern, its magnitude and direction. Apart from tabular analysis, compound growth rate was also employed to study the change in the land use pattern and cropping pattern.

In this report, markov chain analysis was used to study the probabilities of change between various components of land use pattern and to project the relative share of the same in future. A markov chain is a mathematical model for stochastic systems whose states, discrete or continuous, are governed by a transition probability. The current state in a markov chain only depends on the most recent previous states, e.g. for a 1st order Markov chain a discrete-time stochastic markov chain process could be written as:

$$P(X_j, t_{+1} : X_i, t, X_{i-1}, t_{-1}, \ldots, X_0, t_0) = P(X_j, t_{+1})$$

Markov chain analysis was used to study the land use pattern and changes (Feng and Segarra, 1992), changing cropping pattern (Kumar and Palanisami, 2010), land use changes (Mirkatouli *et al.*, 2015). Another basic assumption of Markov chain analysis is that the total should be constant. The assumption for transition probabilities was that there would be no new land management inventions or significant changes in Government programmes. Any of such could influence the predictions projected by the analysis.

RESULTS AND DISCUSSION

The results obtained from the present investigation as well as relevant discussion have been summarized under following heads :

Land use pattern:

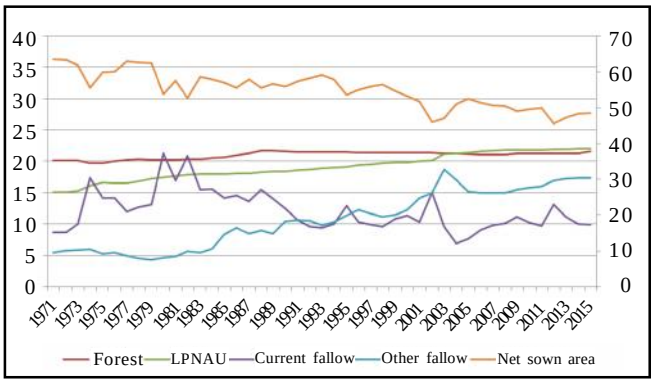
Land use pattern has undergone tremendous transformations due to the impact of urbanization and industrialization. Changes in the land use pattern bring

associated ecological changes. Therefore, at the outset, it is important to give an overview of land use pattern. The total geographical area of the state is 130 lakh ha. The decadal changes in land use pattern of Tamil Nadu from 1970-71 to 2015-16 are furnished in Table 1. The land use pattern consists of the nine fold components such as forest, area under non-agricultural uses, barren and un-cultivable land, permanent pasture and other grazing land, land under miscellaneous tree crops, cultivable waste land, other fallows, current fallow lands and net sown area.

Among these components forest, land put to non-agricultural uses, current fallows and net sown area contributes around 78 per cent of the TGA. Net sown area contributes around 37 per cent of the TGA which ensembles the importance of agriculture in the state. The area under barren and un-cultivable land has decreased from 6.80 lakh ha during 1970s to 4.82 lakh ha during 2010s. However, fallow land other than current fallow has increased tremendously from 5.20 lakh ha during 1970s to 16.94 lakh ha during 2010s. Such significant changes have to be studied in detail. Hence, among the nine fold classification of land use pattern components such as, other fallow lands along with area under forest, non-agricultural uses, current fallows and net sown area has to be discussed. These five components of land use also have more influence on the area available for agricultural purposes.

Forest area:

Area under forest includes all land classified either as forest under any legal enactment, or administered as forest, whether state-owned or private and whether wooded or maintained as potential forest land. The area of crops rose in the forest and grazing lands or areas open for grazing within the forests remain included under the "forest area". Fig. 1 represents the area under major components of LUS over the years. The forest area in Tamil Nadu during 2015-16 was 21.56 lakh ha. The area under forest has gone through imperceptible changes as it increased from 20.06 lakh ha during 1970s to 21.42 lakh ha during 1990s; further declined to 21.19 lakh ha during 2000s and again rose to 21.32 lakh ha during 2010s. It could also be asserted from the Fig. 2 which represents the decadal growth rate of major components of LUS. During 1980s the growth rate of forest area was 0.885 per cent however, it has declined to a negative of growth before it regained a meagre positive growth rate (0.291) during 2010s. Forest has contributed 16.35 per cent of TGA during 2010s. However, to maintain the ecological balance 33 per cent of the geographical area



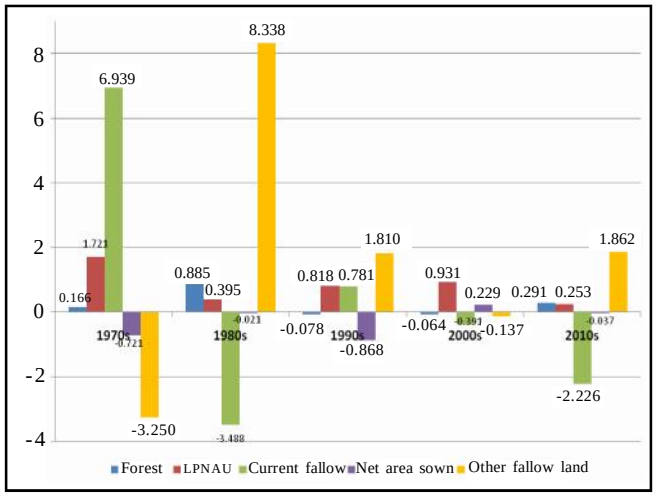
Source :
Note : NSAR alone is presented in secondary axis

Fig. 1 : Area under major components of LUS 1971-2015 (Lakh ha)

Table 1 : Decadal changes in land use pattern in Tamil Nadu (lakh ha)

Sr. No.	Particulars	1970s	1980s	1990s	2000s	2010s
1.	Forest	20.06	20.90	21.42	21.19	21.32
2.	Land put to non-agricultural uses	16.25	18.03	19.23	21.24	21.91
3.	Barren and un-cultivable land	6.80	5.51	4.91	4.94	4.82
4.	Permanent pasture and other grazing land	1.91	1.41	1.23	1.12	1.09
5.	Land under miscellaneous tree crops and	2.14	1.84	2.33	2.69	2.44
6.	Cultivable waste land	3.98	3.03	3.31	3.59	3.27
7.	Other fallows	5.20	7.62	11.12	15.60	16.94
8.	Current fallows	13.18	15.30	10.44	9.97	10.76
9.	Net area sown	60.54	56.43	56.04	49.87	47.79
	Area sown more than once	12.21	10.30	10.95	7.59	10.20
	Gross cropped area	72.75	66.73	66.99	57.46	57.99
	Total geographical area	130.06	130.08	130.04	130.21	130.33

Source:



Source :

Fig. 2 : Decadal growth rate of major components of LUS

must be under forest cover.

Among the districts of the state, The Nilgiris, Theni, Dharmapuri, Krishnagiri, Erode and Kanyakumari possess more than 31 per cent of the geographical area under forest cover. Districts such as Vellore, Tiruvannamalai. Salem and Coimbatore districts has forest area of 20-30 per cent whereas in the districts like Madurai, Namakkal, Dindigul and Tirunelveli have lesser forest cover (11 to 20%) of the total geographical area. Other districts like Kancheepuram, Thiruvallur, Cuddalore, Villupuram, Tiruppur, Trichy, Karur, Perambalur, Ariyalur, Pudukkottai, Thanjavur, Thiruvarur, Nagappattinam, Ramanathapuram, Virudhunagar, Sivagangai and Thoothukudi indicate that the percentage share of forest land is less than 10 per cent of their district geographical area. These statistics indicated that afforestation should be taken up on war- footing basis in these districts. Since the scope for bringing more area under natural cover is almost an impossible proposition, efforts must be dovetailed for intensification of natural cover in forest area as well as on hills and hillocks and planting the tree crops in shrub jungles, village waste lands and farms in almost all the districts in the state.

Land put to non-agricultural use:

The land put to non-agricultural use (LPNAU) also includes land occupied by buildings, roads and railways or under water rivers and canals and other land put to uses other than agriculture. Fig. 1 represents the area under major components of LUS over the years. The area under LPNAU in Tamil Nadu during 2015-16 was 22.01 lakh ha. The area under LPNAU has increased massively from 16.25 lakh ha during 1970s to 21.91 lakh ha during 2010s. The LPNAU has increased tremendously (Fig. 2) during the 1970s as the growth rate is estimated as 1.721 per cent during 1970s. However, the growth rate has declined to a 0.395 per cent during 1980s. It could be supposed that the rapid thirst for development has pushed on the area under LPNAU again to the growth rate of 0.818 per cent during 1990s and 0.931 per cent during 2000s. Forest has contributed 16.81 per cent of TGA during 2010s. The analysis revealed that Krishnagiri, Theni, Dindigul and The Nilgiris districts had less than 10 per cent of the geographical area under non-agricultural uses. The districts like Cuddalore, Vellore, Tiruvannamalai, Salem, Namakkal, Dharmapuri, Coimbatore, Tiruppur, Erode, Trichy, Karur, Perambalur, Ariyalur, Nagappattinam, Virudhunagar, Tirunelveli, Thoothukudi, Kanyakumari, Madurai, Villupuram and Thiruvarur had 11 to 20 per cent of area under non-agricultural uses. The percentage of area put to non-agricultural uses was 21-30 per cent in Pudukkottai, Thanjavur and Thiruvarur districts. However, Kancheepuram, Thiruvallur and Sivagangai districts had the maximum land area (more than 30%) under non-agricultural uses.

Current fallow:

Current fallow are the lands which are kept fallow during the current years, for regaining fertility of soil and other purposes during the agricultural year. Fig. 1 represents the area under major components of LUS over the years. The area under current fallow in Tamil Nadu during 2015-16 was 9.89 lakh ha. The current fallow area was highly fluctuating over the years. It has increased from 13.18 lakh ha during 1970s to 15.30 lakh ha during 1980s but declined to 9.97 lakh ha during 2000s and again rose to 10.76 lakh ha during 2010s. It could also be asserted from the Fig. 2 which represents the decadal growth rate of major components of LUS. During 1980s the growth rate of area under current fallow was remarkable 6.939 per cent however, it has declined to a negative of growth (-3.488) before it regained a positive growth rate (0.781) during 1990s. Conversely, it declined to negative growth rate during 2000s. Though, decadal average during 2010s has increased than that of 2000s, the growth rate during 2010s was negative. It is mainly because there was a decline in area under current fallow during 2014-15. Current fallow has contributed 8.25 per cent of TGA during

2010s.

Further reduction of current fallows is quite possible by the modernization of irrigation systems and adoption to water harvesting techniques in addition to other moisture conservation measures. The current fallow lands was 10-20 per cent in Cuddalore, Villupuram, Vellore, Tiruvannamalai, Namakkal, Tiruppur, Erode and Ramanathapuram districts. Rain fall, road density and the extent of urbanization reduce the extent of fallow lands.

Net sown area:

Net sown area consists of net area sown with crops and orchards excluding the area sown more than once. Net sown area denotes the extent of the cultivated area actually sown during the agricultural year. Fig. 1 represents the area under major components of LUS over the years. The net sown area in Tamil Nadu during 2015-16 was 48.32 lakh ha. The net sown area has extremely declined over the years. It has decreased from 60.54 lakh ha during 1970s to 47.79 lakh ha during 2010s. It could also be asserted from the Fig. 2 which represents the decadal growth rate of major components of LUS. Over the years the net sown area has attained negative growth rates during every decade except during 2000s. It is mainly because during 2004-08 net sown area has increased. Net sown area has contributed around 37 percent of TGA during 2010s which was 46.54 per cent during 1970s. This is a disturbing trend that needs immediate attention of policy makers and planners. This might be due to marked increase in lands put to non-agricultural uses due to rapid industrialization and urbanization. The area sown more than once had shown a marginal decreasing trend during the period under consideration. In fact, the area sown more than once decreased from 11.73 lakhs hectares in triennium average 1970-71 to 7.53 lakhs ha in triennium average 2010-11 and increased in the triennium average ending 2015-16 to 12 lakh hectares.

The distribution of net sown area indicated that Cuddalore, Ariyalur, Thanjavur, Thiruvarur, Nagappattinam and Perambalur districts have registered sown of more than 50 per cent and less than 75 per cent net area of the total geographical area whereas Kancheepuram and Sivagangai have registered less than 25 per cent of net sown area (Fig. 4). The remaining 23 districts have 26-50 per cent of the geographical area under net sown area. Rainfall and irrigation facilities are the only variables that have increased the area under net sown area in the state.

Other fallow lands:

Other fallow lands consist of all land which was taken up for cultivation but is temporarily out of cultivation for a period of not less than one year and not more than five years. Fig. 1 represents the area under major components of LUS over the years. The other fallow land in Tamil Nadu during 2015-16 was 17.29 lakh ha. As stated earlier, the other fallow land have has massively increased over the years. It has increased from 6.05 lakh ha during 1970s to 16.94 lakh ha during 2010s. It could also be asserted from the Fig. 2 which represents the decadal growth rate of major components of LUS. Over the years the other fallow land has attained highest positive growth rates during 1980s (8.338%). The other fallow land has contributed around 13 per cent of TGA during 2010s. The increasing trend of other fallow land might be because of various but for sure is a serious threat to net sown area.

Cropping intensity:

It is the ratio of net sown area to the total cropped area. The average cropping intensity in Tamil Nadu over the past 46 years has never crossed 120 per cent. Very rarely one or two districts have around 200 per cent of cropping intensity in the districts like Thiruvarur (> 200

Table 2 : Distribution of cropping intensity in districts of Tamil Nadu during 2015-16

Cropping intensity (%)	Districts covered
100-120	Coimbatore, Tiruppur, Erode, Trichy, Karur, Perambalur, Ariyalur, Pudukkottai, Madurai, Theni, Dindigul, Ramanthapuram, Virudhunagar, Sivagangai, Tirunelveli, Thoothukudi, The Nilgiris, Kanyakumari
121-140	Kancheepuram, Vellore, Tiruvannamalai, Salem, Namakkal, Krishnagiri,
141-160	Thiruvallur, Cuddalore, Villupuram, Dharmapuri, Thanjavur,
161-180	--
181-200	Nagappattinam
>200	Thiruvarur

Source:

%) and Nagappattinam (181-200%). The cropping intensity was will be in the range of 141 to 160 per cent in the districts of Tiruvallur, Cuddalore, Villuppuram, Dharmapuri and Thanjavur (Table 2). The cropping intensity of more than state average of 120 per cent was observed in Kancheepuram, Vellore, Tiruvannamalai, Salem, Namakkal and Krishnagiri districts with in the range of 121-140 per cent.

Coimbatore, Tiruppur, Erode, Trichy, Karur, Perambalur, Ariyalur, Pudukkottai, Madurai, Theni, Dindigul, Ramanathapuram, Virudhunagar, Sivagangai, Tirunelveli, Thoothukudi, The Nilgiris and Kanyakumari districts have cropping intensity with in the range between 100 and 120 per cent. Higher the cropping intensity indicates that higher portion of the net area is being cropped more than once in the district during the agricultural year. This also implies higher productivity per unit of arable land during a year. The low intensity indicates the area have more rain fed and dry farming.

Transitional probability matrix for shift in land uses in the Tamil Nadu during 1998-99 to 2015-16:

It is revealed from the Table 3 below that the forest land retained its area by 59 per cent while the remaining areas have been moved to net sown area (41%). Net sown area (NSA) has gained 25 per cent of the area from barren and uncultivable waste land (B and UCL). LPNAU has retained 89 per cent of land area and the rest has been moved to fallow lands (CF+OF) (11%). Cultivable waste land losses its area to 21 per cent to PP+MTC. Around 38 per cent of the area under PP+MTC also was lost and shifted to B and UCL and 8 percent to CW. Fallow land losses each 12 per cent to forests and net sown area. Though the NSA retains vast majority of the area (74%) it also losses 11 per cent to forest, 2 per cent to B and UCL, two per cent to PP+MTC and 11 per cent to fallow lands.

Operational holdings:

Operational holdings often determine agricultural production and productivity. The distribution of operational holdings as per the Agricultural Census are furnished in Table 4 to 6. The results of successive Agricultural Census confirm the growing imbalance and asymmetry in the distribution of size of holdings. The number of marginal farmers in the state had increased from 64.65 per cent of the total holdings operated in 1976-77 to 77.19 per cent of total holdings operated in 2010-11. However, the marginal farmers have operated only 21.07 and 35.32 per cent of total area in 1976-77 and 2010-11, respectively. Semi-medium, medium and large farmers accounted for a small proportion of 16.93 per cent of

Table 3 : Transitional probability matrix for shift in land uses in the Tamil Nadu during 1998-99 to 2015-16

	Loss							
	Forest	B and UCL	LPNAU	CW	PP+MTC	CF+OF	NSA	
Forest	0.59	0.00	0.00	0.00	0.00	0.00	0.41	
B and UCL	0.04	0.30	0.40	0.00	0.00	0.00	0.25	
LPNAU	0.00	0.00	0.89	0.00	0.00	0.11	0.00	Gain
CW	0.00	0.00	0.00	0.79	0.21	0.00	0.00	
PP+MTC	0.00	0.38	0.00	0.08	0.54	0.00	0.00	
CF+OF	0.12	0.04	0.01	0.00	0.01	0.70	0.12	
NSA	0.11	0.02	0.00	0.01	0.02	0.11	0.74	

Note: B and UCL: Barren and un-cultivable Land; LPNAU: Land put to non- agricultural uses; CW: Cultivable waste; PP+MTC: Permanent pastures and Miscellaneous tree crops; CF+OF: Curretnt fallow and other fallow lands; and NSA: Net sown area

Table 4 : Number of operational holdings as per agricultural census

Size-number	1976-77	1979-80	1985-86	1990-91	1995-96	2000-01	2005-06	2010-11
Marginal	3951175	5014754	5497725	5848096	5951104	5845962	6227705	6266555
Small	1125740	1209059	1260306	1274515	1233836	1226193	1234054	1181344
Semi- medium	683086	657868	648822	617605	600833	570716	542025	502308
Medium	305496	269059	260685	227594	199791	192634	169599	150646
Large	46056	39763	39185	31122	26268	23382	19590	17371
Total	6111553	7190503	7706723	7998932	8011832	7858887	8192973	8118224

Source:

holdings and they have operated a higher proportion of 58.13 per cent of total area in 2010-11 (Table 4 and 5). In sum, the number of marginal farmers has been increasing over years which show that the process of marginalization of farmers is continuing and they tend to subsist on low income levels.

Average size of holdings:

The distribution of size of holdings in Tamil Nadu is furnished in Table 6. It could be seen from the table that the average size of marginal holdings had declined from 0.41 hectare in 1976-77 to 0.37 hectare in 2010-11. However, there had been no marked differences in the average size of small, semi-medium and medium holdings over years. The average size of large holdings had increased from 17.28 hectares in 1976-77 to 19.48 hectares in 2000-01and 20.13 hectares in 2010-11. In sum, the average size of holdings in Tamil Nadu state had decreased from 1.25 hectares in 1976-77 to 0.89 hectare in 2000-01 and 0.80 hectare in 2010-11.

Land degradation:

Land degradation, in general, implies temporary or permanent recession from a higher to a lower status of productivity through deterioration of physical, chemical and biological aspects. The physical processes, which contribute to land degradation, are mainly water and wind erosion, compaction, crusting and water logging. The chemical processes include salinization, alkalization, acidification, pollution and nutrient depletion. The biological processes, on the other hand are related to the reduction of organic matter content in the soil, degradation of vegetation and impairment of activities of micro-flora and fauna. The main soil problems in the state of Tamil Nadu are salinity, alkalinity, acidity, water logging and water and wind erosion. Table 7 provides the area under these problem soils.

The data revealed that the area under erosion due

Table 5 : Area of operational holdings 1976-77 to 2010-11

Size-area (ha)	1976-77	1979-80	1985-86	1990-91	1995-96	2000-01	2005-06	2010-11
Marginal	1607533	1906499	2017615	2117826	2210343	2158755	2286370	2291702
Small	1586429	1709987	1771546	1794471	1721288	1711874	1720819	1643697
Semi- medium	1875796	1821579	1778374	1686514	1622810	1551135	1467697	1355509
Medium	1763039	1555400	1507986	1301124	1134853	1094303	957721	847811
Large	795663	714394	720419	573742	613910	455449	391339	349652
Total	7628460	7707859	7795940	7473677	7303206	6971516	6824000	6489000

Source:

Table 6: Average size of holdings in Tamil Nadu state

Size-area (ha)	1976-77	1979-80	1985-86	1990-91	1995-96	2000-01	2005-06	2010-11
Marginal	0.41	0.38	0.37	0.36	0.37	0.37	0.37	0.37
Small	1.41	1.41	1.41	1.41	1.40	1.40	1.39	1.39
Semi- medium	2.75	2.77	2.74	2.73	2.70	2.72	2.71	2.70
Medium	5.77	5.78	5.78	5.72	5.68	5.68	5.65	5.63
Large	17.28	17.97	18.39	18.44	23.37	19.48	19.98	20.13
Total	1.25	1.07	1.01	0.93	0.91	0.89	0.83	0.80

Source: Tamil Nadu – An Economic Appraisal, 2005-06 and 2011-12 to 2013-14, Evaluation and Applied Research Department, Government of Tamil Nadu, Chennai

Table 7: Area under the problem soils

Sr. No.	Problem soil type	Area (lakh ha)	Percent on TGA
1.	Salinity	0.42	0.33
2.	Alkalinity	3.54	2.72
3.	Saline-alkaline	0.34	0.26
4.	Acidity	4.68	3.60
5.	Water logging	0.80	0.62
6.	Water erosion and wind erosion	49.00	36.03

Source: INSEDA report, 2017 *[include in reference]*

to water and wind shared the largest area (49 lakh ha) under problematic soil with 36.03 per cent. The problem due to acidity shared 3.60 per cent by holding 4.68 lakh ha and alkaline soil covered 3.54 lakh ha accounting for 2.72 per cent. The other problems due to salinity covers 0.42 lakh ha (0.33%), saline-alkaline (0.34 lakh ha) with 0.26 per cent and water logged area covers 0.80 lakh ha (0.62) per cent from the total geographical area (Table 7).

Water erosion, sheet erosion (Rills, gullies and ravines) wind erosion (Stabilized dunes / Partially stabilized dunes and un-stabilized dunes), water logging (Surface ponding and sub-surface water logging), Salinization / alkalization, acidification, glacial, frost heaving, degradation due to anthropogenic factors (Industrial effluent affected areas, mining and dump areas and Brick kiln areas) and others are the land degradation categories. Some of the degraded lands, which could not be included in the above type of land degradation, are mass movement/ mass wastage, barren rocky / stony waste areas and Miscellaneous. These various categories of land degradation affected to an extent of 53 lakh hectares. These various categories degradation leads to loss of 21 per cent of total production.

Conclusion:

Over years, the area under forest had increased very marginally by about 1.01 lakh over the period from 1970-71 to 2015-16. There is a need for 33 per cent of the geographical area under forest cover. There exists scope for intensification of green cover in forest area as well as on hills and hillocks and planting tree crops in shrub- jungles, village wastelands, and farms in almost all the districts of the State. Nearly 20.90 per cent of the geographical area is under current fallow and other fallows which need immediate attention to bring under green cover. Reduction of both categories of fallow lands is quite possible by the modernization of irrigation systems and adoption of water harvesting techniques, in addition to other moisture conservation measures and suitable crop /tree /grass cultivation. This might be, of course, there was a marked increase in lands put to non-agricultural uses, due to rapid industrialization and urbanization. It has to be regularized to avoid the conversion of agricultural land in to non-agricultural purposes. In sum, perusal of the land use statistics of Tamil Nadu State clearly showed that there exist scopes for, arresting the down-trend in the net sown area and its stabilization, reducing the area under current fallows and cultivable waste, developing the wastelands like barren and uncultivable land as well as other fallow lands, intensive fodder development activities under permanent pastures and regulations of preventing diversion of lands to non-agricultural use. Large number of small and marginal holdings have to be supported with suitable technology package and institutional arrangements for utilizing their available human and natural resources.

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