



15.4. LAND USE PLANNING FOR TAMIL NADU

Land Resource of Tamil Nadu

Tamil Nadu has about 5.96 percent of the Nation's population, occupies 4 percent of the land area and has 3 percent of the water resources of the Nation. The demographic changes, economic growth and social development assisted by welfare measures would in the coming decades, exert strong and competing demands on the finite natural resources of the states, such as land, water, raw-materials, etc. In Tamil Nadu, the per capita availability of land is only 0.18 ha while the per capita net sown area is only 0.07 ha. Even though the share of agricultural sector in the State Domestic Product of Tamil Nadu has declined from about 52 percent to 18 percent between 1960-61 and 2007-08, and further to 8.2 percent during 2010-11, agriculture continues to be a major source of livelihood for the rural people. Agriculture still employs about 40 percent of the workforce in the State. As a basic input for agriculture, land occupies a predominant position among all the resources required for a modern economy. Competition between agricultural and non-agricultural sectors for land is intensifying due to the increasing pressure on land for food production, housing and industrial expansion. Between 1960-61 and 2009-10 the total cultivated area in Tamil Nadu decreased from 7.32 million ha to 5.57 million ha and the net sown area has decreased from about 6 million ha to 4.90 million ha during the same period. However, this reduction in cropped area has been compensated by the increase in productivity of crops so that higher production has been possible.

Apart from agriculture, land is also required for afforestation purposes so as to maintain ecological balance, in view of the fact that the current share of forests in total geographical area of Tamil Nadu is only 16.3 percent as compared to the ecological norm

of 33 percent. A harmonious balance among the various uses of land, which does not compromise on the availability of life support systems and contribute for improving the quality of life of the various sections of the population who are dependent on land is essential. Trends in Land Use Pattern in Tamil Nadu are given in Annexure 15.4.1.

The long-term trends in area under different land use categories and their percentage share in total geographical area of Tamil Nadu reveal the following:

- There has been a marginal increase in area under forests from 19.04 lakh ha to 21.20 lakh ha while there was a decline in area under barren and uncultivable lands from 8.85 lakh ha to 4.93 lakh ha between 1960 and 2000s.
- Due to the increasing demand for land for industrial, housing and infrastructure development, the land put to non-agricultural uses has shown a sharp increase of 42 percent from 13.57 lakh ha to 21.05 lakh ha during this period.
- The area under cultivable wastes has decreased by about 50 percent from 6.60 lakh ha to 3.61 lakh ha.
- Though the area under current fallows increased to 16.18 lakh ha during 1980s, it decreased to around 10.09 lakh ha during 2000s.
- One of the most disturbing trends is the sharp increase in other fallows from 6.10 lakh ha in 1960s to 11 lakh ha in 1990s and to 15.25 lakh ha in 2000s.
- The current fallows reached the maximum during the 1980s while the other fallows reached the maximum during the latest decade.
- Consequently, the area under total fallow lands crossed 21 lakh ha during the latest



two decades thus accounting for about 16 percent of the total geographical area of the State and almost 50 percent of the net sown area during 2000s.

- But for the moderate increase in net sown area during the sixties and seventies, there has been stagnation in the net sown area in the State around 56 lakh ha, which has further decreased to about 48.2 lakh ha during the 2009-2010.
- The gross cropped area also remained stagnant around 67 lakh ha during the 50-year period from 1950 to 2000, thus leaving the cropping intensity constant around 120 percent. However, the gross cropped area in the state in 2009-10 has dipped to about 55.71 lakh ha with the cropping intensity slipping to 114 percent during 2009-2010.

To sum up, the dynamics of land use pattern in the State over the last fifty years reveals that there was a significant decline in the Net Sown Area, Gross Cropped Area, and the Area under Cultivable Wastes and Barren and Uncultivable Wastes while there was a sharp increase in the land put to non-agricultural uses and other fallow lands.

Water Resources

Tamil Nadu is one of the most water stressed States having per capita availability of 900 cubic meter water a year, compared to national average of 2,200 cubic meters. Tamil Nadu has about 6 percent of India's population, whereas its water potential is only 3 percent of what is available in the country. The details on water resources are available in Chapter 3.9 'Irrigation'. The annual average rainfall of Tamil Nadu is only 930.70 mm as against the national average of 1200 mm. Totally there are 2,239 canals, 41,262 tanks, 17,20,743 wells and 78 dams in Tamil Nadu. The net irrigated area is around 28.64 lakh hectares and the balance area of 20.28 lakh hectares is rainfed. Of the 28.64 lakh ha of irrigated area, 7.57 lakh hectares (26.4 percent) is covered by canal, 5.04 lakh hectares (17.6 percent) by tanks,

15.94 lakh hectares (55.7 percent) by wells and the balance 0.09 lakh hectares (0.3 percent) by other sources.

Trends in Irrigated Area

Tamil Nadu's geographic area consists of 17 river basins, a majority of which is water-stressed. There are 61 major reservoirs; about 40,000 tanks and about 3 million wells (including those meant for drinking water) that heavily utilize the available surface water (17.5 BCM) and groundwater (15.3 BCM). Agricultural sector consumes about 75 percent of the water resources. Agriculture sector faces major constraints due to water scarcity. There is growing demand for water from industry and domestic users and also interstate competition for surface water resources also intensifies. Given the geographical area of about 13 m.ha and the average annual rainfall of about 950 mm with bi-modal distribution, the surface water potential is estimated at 26110 MCM (922 TMC) and the ground water potential is about 20649 MCM (729 TMC). The demand for non-agricultural purposes in the year 2025 will be about 16500 MCM (589 TMC) and the demand for agriculture purposes will be about 45000 MCM (1607 TMC) thus leaving a supply-demand gap of about 14100 MCM (504 TMC) (29.7 percent). Given the state water policy, priority is given for domestic use followed by irrigation and industry etc. indicating that agricultural sector has to manage the scarcity in the future. Further, the canal systems have poor water control and management. The data on source-wise share of area irrigated to net irrigated area in Tamil Nadu presented in Table 15.4.1 below shows that the share of the surface irrigation sources is on a continuous decline with tanks accounting for most of the decline, while the private well irrigation has gained a preeminent position. The share of well irrigated area has steadily increased from about 35 percent to more than 50 percent in the last decade. Also, out of the 1.8 million wells, about 0.16 million wells are defunct in the State as the water table is fast declining.



Table 15.4.1: Source-wise share of area irrigated to net irrigated area in Tamil Nadu

	(in %)			
Source	1970s	1980s	1990s	2000s
Canals	33.2	33	29.7	27.12
Tanks	31.5	24.6	22.4	18.95
Wells	35.3	42.4	47.9	53.45

Source: Season and Crop Reports for Tamil Nadu for various years

Table 15.4.2: Trends in area cropped, area irrigated and related variables in Tamil Nadu

		(Area in lakh ha)				
S.No.	Variable	1960s	1970s	1980s	1990s	2000s
1	Rainfall (mm)	928	932	880	917	969
2	Net sown area	60.26	61.33	56.22	56.32	50.35
3	Gross cropped area	72.00	74.23	66.77	67.29	58.31
4	Area irrigated by					
a)	Canals	8.82	8.93	8.23	8.24	7.42
b)	Tanks	9.12	8.49	6.07	6.21	5.18
c)	Wells	6.44	9.19	10.37	13.14	14.62
d)	Other sources	0.41	0.35	0.19	0.17	0.13
5	Net irrigated area by all sources	24.79	26.36	24.96	27.75	27.36
6	Gross irrigated area by all sources	32.69	35.23	31.09	33.94	31.02

Source: Season and Crop Reports for Tamil Nadu for various years

Challenges confronting scientific use of Land

Currently, land resources are clearly under stress; 17.16 percent of total geographical area is degraded and the percentage is increasing. Traditional systems of land management are either breaking down or are no longer appropriate, and the management and technology needed to replace them is not always available. The primary reason for this situation is the increasing demand placed on land by the unprecedented rate of population growth and

the effects it induces. Externalities related to global change are also becoming a constraint to sustainable land management.

Conventional land-use planning has frequently failed to produce a substantial improvement in land management, or to satisfy the priority objectives of the land users. As a result, rural development programmes have had mixed success in meeting production and conservation aims. In calling for an integrated approach to the planning and management of land resources,



the following specific needs are identified:

- Development of policies which will result in the best use and sustainable management of land
- Improvement and strengthening of planning, management, monitoring and evaluation systems
- Strengthening of institutions and coordinating mechanisms
- Creation of mechanisms to facilitate the active involvement and participation of communities and people at local level
- An effective and practical land use policy
- Utilize techniques whereby economic, social and natural concerns can be compared and traded off on an equal footing;
- Establish a land-use classification system which fully reflects the natural and ecological value of land;
- Use plans and tools that are more responsive to market conditions, recognizing the economic drivers of growth;
- Enhance the legal and administrative character of land-use plans so that they do not readily permit exceptions; and
- Consider 'spatial planning' as an alternative to land use planning.

Concerns in Land Use Planning

- The agricultural productivity coupled with farm and non-farm diversification has to be increased. Technological change has to be upgraded.
- Existing Infrastructure facilities like irrigation, roads, market etc. has to be improved and new facilities has to be created.
- The focus may be on Farm based planning.
- A transparent and people friendly mechanism has to be developed for regulation of land, water and other natural resources, and also for appropriate land

use planning.

- Efforts must be on updating the existing data and collection of new data on land use for various regions.
- A mechanism has to be evolved for the integrated system of land resource conservation, development and management.

Thrust Areas

- The fertile agricultural land and wetland has to be preserved and a mechanism has to be developed to control its diversion for non-agricultural purposes.
- The forest and tree cover has to be increased to restore ecological balance and to meet ecological norms of 33 percent.
- Town Planning should provide for green belts.
- Urban Planning must be restructured so as to ensure that highly productive and fertile land is not taken away.
- The problem of Wastelands has to be tackled and put to use for income generation. Programmes must be drawn up for providing vegetative cover like trees outside forests scheme
- The productivity of the agricultural land has to be increased in order to increase the income of farmers.
- Irrigation facility has to be expanded through conjunctive use of surface and ground water resources.
- Focus must be given on moisture conservation.
- Efficient Watershed management .

Strategies

- An assessment of nature and extent of existing degraded land needs to be carried out.
- The adoption of land use according to the land capability classes (United States Development of Agriculture-USDA



classification modified to suit Tamil Nadu conditions) will ensure that the land is put to appropriate use.

- A balanced use of organic nutrients, chemical fertilizers, bio-fertilizers and other agro chemicals will ensure sustainability.
- A well-defined integrated land use policy should be developed.
- A National / State Land Use Commission should be instituted to lay down and formulate policies, implementation strategies and monitoring guidelines.
- The problem areas (saline and alkaline land, water logged marshy land, gullied ravine land, soil mined area, polluted land etc.) have to be clearly demarcated and strategies developed to use these lands to the optimum level.
- Steps to be taken to slow down the rate of loss of soil due to water and wind erosion.
- Dry farming technologies have to be propagated so that in-situ moisture conservation practices are adopted.
- To improve water use efficiency in canal and tank systems.
- Waste lands has to be developed and put to use for suitable agricultural and afforestation purposes.
- Reclamation of degraded and fallow lands as well as problem soils needs to be taken up.
- Implementation of land use policy has to be done at farm level.
- Cropping pattern could be checked by economic profitability at local level and overall compatibility at micro level.
- A Land Use Plan has to be drawn to control the conversion of agricultural land for non-agricultural purposes.
- Proper implementation of existing legislations and introduction of new legislations, if deemed necessary would be required to control indiscriminate diversion of agricultural land for non-

agricultural purposes.

- Joint Forest Management needs to be promoted in the entire State for protecting the forests and conserving water. The Shola forests and the Mangrove forests need to be protected.
- While preparing the Master Plans/ Regional Plans/Detailed Development Plans. Wetlands, waterbodies, hillocks, coastal areas, historical and heritage sites and areas of natural scenic beauty may be protected.

“The Earth, The Air, The Land And The Water Are Not An Inheritance From Our Fore Fathers But On Loan From Our Children. So We Have To Handover To Them At Least As It Was Handed Over To Us”.

-Mahatma Gandhi

Drivers of Future Land Use Policy

- Necessity of integrated approach for realization of sustainable land use: Stop-gap measures as symptomatic treatment is often necessary for sustainable land use, to stop environmental degradation. However, realization of social justice through poverty alleviation and establishment of people's stable economic base are fundamentally crucial. In that sense, promotion of local economy should be integrated into the policy package together with land use policy and planning.
- Necessity of improvement of agricultural productivity: responding to the difficulty of further expansion of agricultural land, improvement of agricultural productivity is indispensable for a fundamental solution to maintain or to improve the present level of self sufficiency in food.
- Necessity of Energy Saving Plan: Proper operation and maintenance of socio-economic infrastructure, promotion of the public awareness for energy saving, increase of renewable energy resources use such as hydropower, solar power, wind power, and biomass energy.



- Necessity of establishment of a fund raising mechanism to realize sustainable land use: a new mechanism should be established through collaboration of the stakeholders including the public and the private sectors.
- Necessity of further study on issues which may be solved in the framework of international division of labour and cooperation: in case of food security, for instance, each country may have the following alternatives. The first one is to attain the self-sufficiency in food within the country. The second one is to attain food security through international trade. A further study is necessary which alternative may bring about an optimal solution to each country and the international community in terms of sustainable land use.
- Necessity of counter measures against expanding regional imbalances: taking into account difficulty of expansion of agricultural land and population growth, appropriate policy measures are essential for promotion of agricultural productivity and strengthening of rural people's economic base.
- Necessity of strengthening of land use control: the rapid urbanization and urban planning responding to it may bring about inappropriate land use to some extent. This indicates that the land use management is at present rather weak and does not work as expected, coupled with the movement of decentralization of government roles.
- Necessity of a new paradigm for land use planning: land use planning was previously often drawn up for an urban area isolated from its surrounding suburban and rural areas. Therefore it often could not respond to interregional wide-area issues. For the future, the land use policy and planning needs to include the inter-regional aspects and also a view point of improvement of regional economy.

Issues in Land Allocation

Land use may be guided and regulated in selected areas. Competition between agricultural and non-agricultural sectors for land is intensifying due to the increasing pressure on land for food production, housing and industrial expansion. Therefore, zoning of land for a conflict less development with optimum use of land resources is the need of the hour. Accordingly, four major land use zones have been identified and policies and proposals for the zones are as follows:

- Controlled / development / regulated zone
- Highway Corridor zone
- Natural conservation zone
- Agricultural (rural) zone outside controlled/development/regulated areas.

The existing urbanizable areas and proposed built up areas have to be regulated. The agriculture (Rural) zone within the controlled / development / regulation areas has to be strictly adhered to. Immediate steps to be taken to declare these lands as a reserved agricultural zone which cannot be put to any other use other than agriculture. Urban expansion and concentration of population are a result of new employment opportunities in non-agriculture sector. These economic opportunities have increased the conversion of agricultural land to other non-agricultural uses. Therefore, the following policies have been proposed.

- Existing cultivated land be conserved for agriculture use as far as possible.
- Measures shall be initiated for protection of private agricultural land and ensure its needless conversion into non agricultural/ urban use.
- Utilization of less and least valuable land for urban/expansion / new urban centers/ development purposes.
- Industries should be located in organized industrial areas such as industrial estates, industrial parks, growth centers, software



parcs, textile parks and Special Economic Zones (SEZ) only.

- The developmental activities such as industry could be planned in such lands as the waste lands that are fit for construction activities and may be environmentally suitable. The necessary infrastructures such as roads and electricity and amenities such as schools and hospitals could be planned and developed.
- The Government Poramboke lands may be used for the particular purpose for which it is earmarked. All public roads, streets, lanes and paths, bridges, rivers, stream, tanks, seashore and canals have to be protected and free from encroachment. The Tamil Nadu Land Encroachment Act 1905 is not very effective leading to illegal occupation of Government lands by individuals. The Government lands can be treated similarly as private land and legal provisions may be enacted to file criminal trespass against the encroachers.

Land acquisition, Compensation and Rehabilitation

The acquisition of land for public purposes, industrialization, building of institutions, etc., has become far more numerous than ever before. The pendency of acquisition proceedings for long periods often causes hardship to the affected parties and renders unrealistic scale of compensation offered to them. It is necessary, therefore, to restructure the legislative frame-work for acquisition of land so that it is more adequately informed by this objective of serving the interests of the community in harmony with the rights of the individual.

The Land Acquisition Act, 1894 is one of the oldest enactments in our country. The Act is covered by the various processes. In regard to payment of compensation, the land owners as well as the acquisition department are facing number of problems.

Hence, there is a need for a reform in computation of the award amount or

land value payable to owner, so as to avoid dissatisfaction among the owners. The Tamil Nadu Government have already enacted various Acts like the Land Acquisition Act 1 of 1894, Tamil Nadu Highways Act, 2001 (TN Act 34 of 2002), Tamil Nadu Acquisition of land for Harijan Welfare Schemes Act, 1978, Tamil Nadu acquisition of lands for Industrial Purposes Act, 1997 (TN Act 10 of 1999) for promotion and growth of the economy in our State by streamlining Land Acquisition proposals.

National Land Acquisition and Rehabilitation and Resettlement Bill, 2011 meant to replace the 117 year old Land Acquisition Bill of 1894, which has been introduced in the Parliament, will mean Private Companies will have to give Relief and Rehabilitation Packages towards the displaced people even if they directly buy the land from land owners. Moreover, the new Land Acquisition and Rehabilitation and Resettlement Bill greatly emphasis fair compensation along with reasonable Rehabilitation and Resettlement Packages with minimum displacement for affected landowners/families. Special provisions for social impact, assessment, private negotiation, employment compensation and provision of social infrastructure for the project affected families has a new dimension towards welfare of the land owners and vulnerable sections of the society.

The new Bill will take some time to become an Act with the approval of the Parliament. The Government of Tamil Nadu may consider providing new Rehabilitation and Settlement Package for quick redress of the genuine problems and grievances of the land owners in the rural and urban areas. Section 23 of Land Acquisition Act, 1894 provides for determination of reasonable amount of compensation to be awarded for the lands acquired taking into consideration of the market value of land on the date of 4 (1) notification. As the market value of the land is increasing manifold times, it is very difficult to determine the market value



at a reasonable rate. Therefore, the market value may be enhanced by 100 percent for calculating the compensation.

In order to avoid litigations, further enhancement of compensation and land acquisition process, the Government in their GO Ms.No.885 Revenue Department dated 21.9.1995 has provided for acquiring land by a new method of private negotiation with the land owners. Thus, the Government have empowered the District and State Level Committee to fix the land value at 150 percent of the market value (or) guide-line value whichever is lesser. Presently, the land value is exorbitantly increasing year by year. Therefore, it is necessary to revise the ratio of fixation of the land value from the existing the 150 percent of market value of guide-line register value. Accordingly, it is suggested that the powers of the District / State Level Committee may be enhanced from 150 percent to 300 percent of market value (or) guide-line register value whichever is lower.

The Section 23(2) of Land Acquisition Act, 1894 provides for payment of 30 percent compensation on market value of the land to be acquired. There are various types of damages which persons has to bear during the Land Acquisition process Hence, it is suggested that besides 30 percent compensation, additional 100 percent rehabilitation package of land value should be provided for speedy redress of problems of the land owners.

As per Section 17(2) of the Land Acquisition Act, the District Collector is empowered to grant enter-upon permission to the land to be acquired and take possession with prior sanction of the Government. Before taking possession of the land, the District Collector shall tender payment of 80 percent of compensation to the persons interested. The 1894 Act provision does not stipulate early payment of compensation to the land owner in general cases. Therefore, it is suggested that at the time of granting enter-upon permission, the District Collector may be authorized to pay 50 percent

compensation within 15 days from the date of enter-upon permission granted.

Employment opportunity should be given in the same project to one member of the family from whom the land is acquired. Similarly, skilled training at the expenses of Government / Requisitioning body should be imparted to the selected members of project affected families with subsequent employment opportunity in the same sector/project.

The above incentives may be incorporated in the Government Order to provide effective Rehabilitation and Resettlement of the project affected families until the enactment of new Land Acquisition and Rehabilitation and Resettlement Act 2011.

Policy Measures for Land Use and Management

Strategies for Managing Problem Soil Areas

With the increasing population, there is increasing demand for food, fodder, fuel and fibre. The solution lies in increasing the productivity of existing lands, in view of the non-availability of additional lands for cultivation in our State. Land degradation due to desertification, soil salinity /alkalinity, water logging, drought/flood, excessive soil erosion and unscientific agricultural practices have resulted in the creation of vast stretches of wastelands of 2.42 million hectares in Tamil Nadu, further decreasing the per capita cultivable lands. Realizing the need for the potential utilization of land resources for the people of Tamil Nadu, the Government of Tamil Nadu has emphasized the development of degraded and wastelands in the State on the basis of priority and in a phased manner over a defined period.

Reclamation of Salt affected lands

Two techniques of reclamation of sodic soils can be adopted. The first is gypsum



Fig. 15.4.1: Salt affected lands

technology and the second is the spent wash technology. The spent wash technology can be used for spot reclamation of wastelands, which includes opening of pits, treatment with spent wash, filling the pit with normal soil and planting of trees.

Tannery effluent affected lands

Tannery effluents have higher Chromium content which gets into food chain through crops like sugarcane and sunflower. Therefore phyto remediation with eucalyptus,



Fig. 15.4.2: Rice Field affected due to Chromium from Tannery

casuarina, acacia and neem and growing of flower crops are the other recommendations which can be followed for the improvement of wastelands.

Degraded forests lands

Forests with less than 20 percent area are classified as degraded forests under

wasteland classification. According to Forest Survey of India (FSI), the forests with less than 40 percent vegetative cover are grouped under degraded forests. As per the estimates given by FSI, 6 lakh ha were classified as degraded forests and out of this, forest



Fig. 15.4.3: Degraded forests lands

department has already improved 3 lakh ha of lands by afforestation.

Degraded pasture lands

Kangayam model of silvipasture consisting of Acacia and Cenchrus ciliaris species can be adopted in the degraded pasturelands. Goat rearing is the best animal component to be advocated for these lands. Manila tamarind (Kodukkapuli) can be planted in areas where goat rearing is commonly done.



Fig. 15.4.4: Degraded pasture lands

Eco-restoration in Swampy and Marshy lands

Wastelands classified under swampy and marshy lands in coastal areas need not



be reclaimed and brought under cultivation as the natural swamp and marshy area facilitates wild life habitats. Similarly, the inland waterlogged areas can be left as such since they facilitate ground water recharge in the neighboring cultivated lands.



Fig. 15.4.5: Swampy and Marshy lands

Improving the Productivity of Drylands

Present status of dry lands in Tamil Nadu

In Tamil Nadu, millet crops such as Chulam, Cumbu, Maize, Ragi and other minor millets, pulses crops such as blackgram, redgram, greengram, horsegram and cowpea, oilseed crops such as groundnut, gingelly, sunflower and castor are raised under rainfed conditions. About 80 percent of the area under these rainfed crops is mostly raised during kharif season specifically during June – July months.

Strategies to Increase the Productivity of Drylands

Improving the Organic Matter Content

The organic matter content in the soil has gone down from 1.20 percent in 1971 to 0.68 percent in 2008 in Tamil Nadu due to intensive cropping, indiscriminate use of chemical fertilizers and inadequate availability of organic manure. Therefore balanced use of organic and inorganic fertilizers in the cropping system has to be promoted. In order to increase the productivity, composting

of farm wastes using Pleurotus, vermi-composting, application of bio-fertilizers and green manuring are to be undertaken during the Twelfth Five Year Plan period.

Location-specific Cropping System

The rapid shift in cropping pattern and adoption of suitable crop varieties with appropriate technology in rain fed areas would increase the productivity in rain fed areas. Crops like millets, pulses, cotton and oilseeds are recommended in the cropping system according to the local needs. The schemes such as INSIMP (Initiative for Nutritional Security through Intensive Millet Promotion), RADP (Rainfed Area Development Programme), Integrated Development of Pulse villages in Rainfed Areas under NADP (National Agricultural Development Programme) that are in vogue shall be continued during the Twelfth Five Year Plan period.

Specific Interventions to Improve Rainfed Agricultural Productivity

- Appropriate cropping systems to be developed by the ICAR in consultation with State Agricultural Universities and recommended.
- Village-based Integrated Nutrient Management (INM) recommendations shall be developed.
- Suitable technologies would be evolved to replace the age old practices
- Suitable varieties/hybrids would replace the obsolete ones.
- Cluster approach and village concepts to be promoted
- Region wise, area wise appropriate water storage strategies/mechanism /structures to be developed
- Formation of farmers interest groups in the rain fed areas. Necessary revolving funds can be provided for livelihood activities of the groups.
- 100 percent subsidy to the farmers who enroll under crop insurance schemes in



rain fed areas.

- Available improved varieties shall be evaluated by the farmers by adopting farmer's participatory selection approach.
- Vermi-composting to recycle agricultural waste shall be promoted.
- Using the foundation seed, farmers shall be supported to produce quality seeds in the village.
- Participating farmers shall be trained in improved management practices including soil sampling, INM, IPM (Integrated Pest Management), seed production and vermi-composting.
- Integrated Farming System Approach under Watershed Development Programme
- Dryland Development through soil and moisture conservation practices
- Popularisation of dry land farm implements and machineries – seed drill, rotovator
- Promotion of pulses cultivation in rain fed areas covered under watershed programmes.
- By lining the existing old ponds and constructing new ponds in watershed area to conserve rainwater.

Increasing Water Use Efficiency in Agriculture

Strategies for canal irrigation

Majority of the canal irrigation system in Tamil Nadu are supply-based systems. It is very difficult to improve water use efficiency in supply-based systems beyond a certain level. Therefore gradually all the canal irrigation systems should be converted to demand based systems.

Better way to beneficially use water during nights is to do groundwater recharges through the existing open wells and construction of injection wells. Farmers must be encouraged to allot land for construction of farm ponds in their own lands through subsidies. Canal water available during night



Fig. 15.4.6: Canal Irrigation

time may be stored in these farm ponds. Sometimes, when their due share of water is more than the field demand, that water can also be stored in their farm ponds. The poromboke lands available in the canal command areas can also be used for the construction of tanks to store water.

During periods of rainfall, the supply should be reduced based on the data regarding rainfall distribution. For this purpose, farmers and lascars should be trained to use very simple low cost rain gauges and transmission of data to the Water Resources Department can be done through cell phone via SMS.

Strategies for Tank Irrigation

The water use efficiency in tank irrigation can be improved more easily than the canal irrigation system. The area of tank irrigation systems is smaller than the canal irrigation systems. For all the tank irrigation systems, water users association should be strengthened and the total management of tank irrigation systems should be handed over to water users associations.

Implementation of modern technologies such as automatic sluice operations and modelling of stochastic demand and inflow into tanks can be done. The modelled demand and supply can be efficiently used in real-time irrigation scheduling with the assistance of computers.



Strategies for well irrigation

Compared to canal and tank irrigation, the water use efficiency is found to be always higher in well irrigation. But there is still a good scope for improving water use efficiency in well irrigation. If water is conveyed through pipes from well to the field instead of field channels, the conveyance efficiency can be increased. Subsidies can be provided for installation of plastic conveyance system. If subsidy is provided for this, then the present popular way of applying water to coconut through tap system would also be recognized as an efficient water conveyance system eligible for government subsidy.



Fig. 15.4.7a: Well Irrigation

Presently, the electric power supply for irrigation is free of cost to the farmers. This is said to be one of the prime reason for poor water use efficiency due to indiscriminate pumping of groundwater. Without withholding of free power supply, there is a possibility of indirectly improving water use efficiency and also reducing the electric power use. All the electric connections should be installed with electric power meters to measure the amount



Fig. 15.4.7b: Well Irrigation

of power used. For each farmer the optimal power that is needed should be worked out based on the land holding, crops and depth of water level. Farmers who use less power should be provided with financial aid and based on the magnitude of power saved. The farmers who use more power will naturally start using less power as they would not get any financial aid from the government.

Development of Wastelands

Extent of Wastelands in Tamil Nadu

The National Remote Sensing Centre (NRSC), Hyderabad and Institute of Remote Sensing, Anna University undertook the task of categorization and delineation of wastelands by employing satellite imageries of 1:50,000 scale. According to this estimate, there are 2.42 million hectares (17 per cent) of wasteland in Tamil Nadu. The percentage of wastelands to the total geographical area at district level is 30-40 percent in Ooty, Tiruvarur and Nagapattinam districts, 20-30 percent in Erode, Salem, Dharmapuri, Tiruvannamalai, Tiruchirapalli and Pudukottai, 10-20 percent in Kanyakumari, Ramanathapuram, Sivagangai, Virudhunagar, Madurai, Dindigul, Coimbatore and Namakkal and less than 10 percent in the remaining districts.

Wasteland Management Strategies

The task of rehabilitation of wasteland is a complex one since each category of wasteland has its own causative origin and needs special approach for reclamation. Some of the problems afflicting the wastelands are inherent while some are the result of ever increasing human and cattle needs, prolonged period of unscientific agricultural practices and also perhaps geological transformation.

Wasteland if properly developed can supply fuel, timber and other useful things to the villages, raw materials for the agro-based industries and fodder for the cattle; there is an urgent need in the country as well as state to attain self-sufficiency in these products. So the methods to be used for its development



will consist of three major objectives.

- Stop further degradation
- Development or reclamation of the degraded land
- Soil and moisture conservation measures in wastelands

Since wastelands occur in every type of climate and under various conditions, they may need different methods to reclaim them at the same time or one after the other or even some may have to be employed

simultaneously. Vettiver can be used as vegetative barrier as it conserves soil and water. Like vettiver, weeping love grass is recommended for soil and water conservation in hilly areas. Stabilization of field bunds can also be done with *Jatropha* and *Nochi* (*Vitex nigundo*). Wastelands occupied by *Prosopis* can be used for growing horticultural crops and / or agro-forestry for timber / fuelwood purposes. Converting wastelands into grazing lands / pastures can also be another option to put them to economic use.



Fig. 15.4.8: Waste Lands - Tirunelveli Rain Shadow Area



Table 15.4.3: Desired cropping pattern for Different Agro-climatic Zones

Agro climatic zones	Canal irrigated	Tank irrigated	Well irrigated	Rainfed
North Eastern Zone (Kancheepuram, Thiruvallur, Villupuram, Thiruvannamalai, Vellore and Cuddalore districts)	Rice/Fallow- Rice- pulses/ gingelly	Fallow-Rice – rice / maize / gingelly	Rice-rice- groundnut. Banana - vegetables – maize (2 year rotation). Sugarcane – ratoon sugarcane . Maize - rice – pulses.	Cumbu - groundnut Gingelly - groundnut Groundnut – pulses / ragi / gingelly
North Western Zone(Dharmapuri, Krishnagiri,Salem and Namakkal Districts)	Rice-rice / cot- ton Turmeric Sugarcane ra- toon sugarcane	--	Tapioca / Turmeric Groundnut - Cole vegetables - pulses / gingelly. Cotton - pulses / gingelly / sunflower Rice – rice / cotton.	Tapioca Groundnut + pulses / sunflower / castor / sorghum/ragi / samai/ kudiraivali - horsegram
Western Zone (Erode, Coimbatore, Karur, Dindigul Theni districts and Namakkal (Tiruchengodu taluk only)	Rice – pulses / ground nut / gingelly Turmeric Sugarcane - ratoon sugar- cane	--	Tapioca / Turmeric Cotton / groundnut - vegetables - pulses / gingelly / sunflower. Rice – rice. Banana / sugarcane	Tapioca Groundnut- horsegram Sorghum -maize / pulses
Cauvery Delta Zone (Thanjavur, Thiru- varur, Nagapattinam, Trichirapalli, Peram- balur Pudukottai districts)	Rice – rice - pulses / ground nut / gingelly / cotton Maize – rice - pulses / cotton / gingelly / sun- flower Sugarcane - ratoon sugar- cane	Rice- pulses Rice-ragi/ groundnut - pulse	Rice – ground nut. Maize / Vegetables – rice. Banana ratoon banana. Sugarcane - ratoon sugarcane.	Groundnut + redgram Green chilli /cluster bean / bhendi Gingelly - cot- ton + coriander



Southern Zone (Madurai, Ram-anathapuram, Virudhunagar, Sivagangai, Tirunelveli and Thoothukudi districts)	Rice - rice - pulses Rice -cotton Sugarcane-ratoon sugarcane Banana-ratoon banana	Fallow Rice-cotton / chillies / pulses	Chillies / groundnut - cotton. Rice - pulses . Pearlmillet-vegetables. Cotton - maize. Sugarcane - ratoon sugarcane.	Upland rice / millets / chillies / cotton + pulses Maize/sorghum/ gingelly /groundnut/ sunflower
High Rainfall Zone (Kanyakumari District)	Rice - rice - pulses Banana-ratoon banana	Rice -rice - pulses	Rice – pulses. Red banana - ratoon banana. Tapioca + pulses Flowers.	Tapioca + pulses Groundnut- - pulses
Hilly and High Altitude Zone: The Nilgiris	Tea / coffee, Potato/ cabbage/ radish / carrot, Cut flowers			
Kodaikanal	Potato, pear, peaches, plums, apple, garlic, cabbage, cauliflower, ginger, Cut flowers			
Shevroys, Elagiri, Jevadhi, Kollimalai, Palanis and Podhigaimalai	Coffee, mandarin, cocoa, vanilla, chowchow, pineapple, french beans, avocado, cardamom, pepper			

Source: CARDS, TNAU, Coimbatore

Development of Grazing Lands

The main factors that hinder livestock development in the state are:

- Unbalanced ration leading to deficiency of protein and micro nutrients
- Lack of availability of sufficient green and dry fodder
- It is estimated that total availability is 399.900 lakh tonnes
- Short fall of 100.62 lakh tonnes of green fodder with deficiency of 20 to 25 percent.
- Lack of facility to store surplus green foddors.

Therefore, the main objective of

developing grazing lands is to increase fodder production by 100.62 lakh tonnes so as to accelerate livestock production in the state. The following strategies are suggested for Twelfth Five Year Plan period to increase fodder production in the State.

Apart from promoting fodder production in the farm holdings, conservation and management of common grazing lands should form an integral part of land use and management strategy. Grazing lands especially Meikal Poromboke lands in the villages should be developed with the participation of the community. The villagers should be sensitized on the necessity to maintain the developed grazing lands and the importance of rotational grazing. The land developed can be handed over to the



village panchayat and the villagers can be permitted for grazing by remitting nominal user fees. Conversion of Meikal poromboke land for other purposes has to be prevented. Tree fodder cultivation shall be encouraged in degraded grazing lands and cultivation of Deenanath grass (*Pennisetum pedicellatum*) may be advocated for rocky soils / lands.

Control on Land Conversion

The concept of optimum land use is basic to land use planning. Great care should be taken so that superior quality of land is not put for a purpose suited for the land of inferior quality and vice versa and indiscriminate diversion of agricultural lands for non-agricultural purposes should be effectively controlled.

Box 15.4.1: Conservation of Wet Lands

While acquiring lands for other than agricultural purpose there is a ban for acquiring wetland. But, on several occasions when wetlands are in between dry lands and non availability of dry lands in that area relaxation is being given. This kind of relaxation of ban order may be completely removed and no wet lands should be acquired for non-agricultural purpose at any cost.

To conserve the paddy land and wetland and to restrict the conversion or reclamation thereof, in order to promote growth in the agricultural sector and to sustain the ecological system, in the State of Kerala, an Act has been passed entitled Kerala State's Conservation of Paddy Land and Wetland Act, 2008. Similar Act shall also be passed in Tamil Nadu for the conservation of wetlands and other prime Agricultural land.

When allotment of lands is made to the industries of major projects, allotments are made without critical and technical assessment of requirements of land. As such many institutions are having land more than requirement. To curtail this kind of excess

allotment, a separate State Level Committee may be formed for analyzing and approving the actual requirement. After getting clearance from such Committee, the allotment of land should be made.

When large chunk of lands are used for a project, the water-bodies, supply channels and distribution channels are occupied and removed by most of the institutions. Due to these activities, agriculture and ground water level will be worst affected and also without normal water supply, annual crops will be either washed away or drowned due to floods. Hence, strict enforcement may be made by law for protecting such water-bodies and channels.

Increasing the Productivity of Temple Lands

One of the important constraints in increasing the productivity of temple lands is the tenancy insecurity. Therefore the authority concerned may strictly enforce this Act, by compulsorily registering all the tenants, each year. The Act may be amended to that extent, taking into consideration the interests of both tenants and owners.

The policy support through remunerative prices, and assured markets for the produce and input subsidies may help the poor tenants to diversify. For the real benefit from any such policy, tenancy must be registered. The fear of owners of lands about possible loss of their right to sell the land competitively must be removed by suitable amendments to the RTR (Tamil Nadu Agricultural Lands Record of Tenancy Rights) Act, 1969.

Increasing Forest / Tree Cover

The Tamil Nadu Afforestation Project Phase-II and National Afforestation Programme are the main schemes which contribute to increase forest cover inside forests.

To increase the forest / tree cover outside forests, programmes like tree



cultivation in private lands, raising teak plantation in Padugai lands and free distribution of seedlings to institutions and individual households are being implemented. These programmes would also help to bridge the gap between future supply and demand of fuelwood and timber in the State.

Tree Cultivation in Private Lands

This scheme not only ensures increased income to farmers but also paves way for wood based entrepreneurship in the State by providing the needed pulpwood, matchwood, furniture wood etc., for future industrial needs.

Raising Teak Plantations on Padugai Lands

The objective of the scheme is to create timber resources in the State by planting teak on the canal banks and on river Padugai lands to increase tree cover outside the Reserve Forests and to prevent soil erosion in the canal and river banks.

Tamil Nadu Biodiversity Conservation and Greening Project

An agreement of implementation of “Tamil Nadu Biodiversity Conservation and



Fig. 15.4.9: Tamil Nadu Forest Department Nursery

Greening Project” from Japan International Cooperation Agency fund was signed by the State Government of Tamil Nadu on 1st October 2010 for implementation of the project at a cost of ₹686.11 crore from 2011-12 to 2018-19 for a period of 8 years.

Sustainable Hill Area Development

Strategy of previous Five Year Plans

The existing hill areas in the State which predominantly consists of Western Ghats, Eastern Ghats are to be managed through conservation approach. Wherever hill areas are degraded, the reforestation efforts are to be made for protecting the land cover and conserving the land and water. The approach and strategy for sustainable development of hill areas have evolved through the Five-Year Plans in the past.

Programmes for Twelfth Five Year Plan

- Soil and water conservation in the catchments of river valley project
- Soil and water conservation in tribal areas
- Soil conservation under Western Ghats Development Programme (WGDP)
- Soil conservation under Hill Area Development Programme (HADP)
- Eastern Ghats Development Project (EGDP)
- Dam Rehabilitation and Improvement Project (DRIP)
- Coastal Area Management