3.2 SOIL AND WATER CONSERVATION INCLUDING NATURAL RESOURCES CONSERVATION AND RAINFED FARMING

Introduction

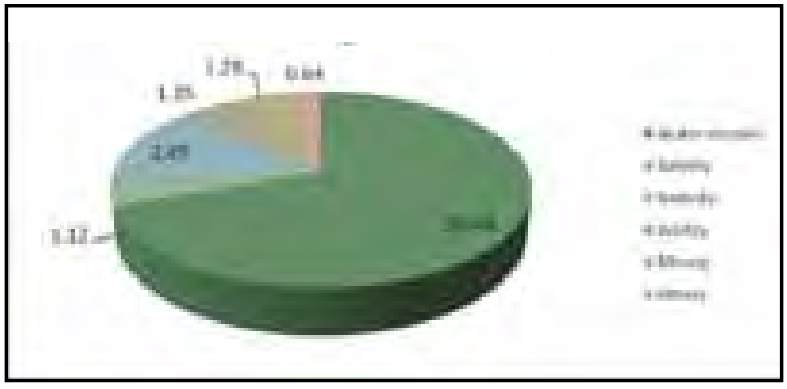
Land and water are the most precious natural resources important to human civilization. The natural resources of the State include land, water, soil and biodiversity, which dictate the opportunities for livelihoods and income for the people. However, both are facing threats of deterioration due to unrelenting human pressure and utilization incompatible with its capacity. In Tamil Nadu, the prime natural resource is 130.33 L.ha. of land of which 49.53 L.ha. is net area sown, 25.95 L.ha. is fallow land (current fallow and other fallow), 21.25 L.ha. is forest land and 1.09 L.ha. is grazing land. Since land is a non-renewable resource, diversion of land from agriculture to non-agricultural uses adversely affects the whole process of growth of the State. Even the available land is subjected to soil erosion of varying degrees and this result in degradation of cultivable land. Soil is highly vulnerable and nature takes a long period (say 300 – 1000 years) to form an inch of the top soil and it is mainly due to the combined effects of climate, vegetation, organisms, relief and time on the rocks and parent material. Global statistics revealed that there is a loss of 60 L. ha. of land/year, overuse and mismanagement leads to a loss of 24 billion tonnes of topsoil /year.

Water too is a critical input for agriculture and the State has harnessed almost the entire available irrigation potential. Land or the soil profile acts as storage for all water. Erosion and unscientific cultivation practices result in loss of top fertile soil. This leads to depletion of nutrients in fertile soil, resulting in poor yield, unviable agriculture, sedimentation in reservoirs leading to reduction in storage capacity, reduces cultivable area and ultimately influences the cycle of power generation, ecological imbalance, environmental pollution, drought and floods. Good soil health ensures sustainable agriculture and ecological balance. Hence, the conservation, development and management of the land and water resources are to be taken up intensively to protect and improve the physical, chemical and biological health of the soil profile. As water is a critical input for all sectors including agriculture, rain water harvesting, runoff management, recharging the aquifers and optimum utilization of water should be the integral part of all land development projects.

Land degradation in the State

Land degradation has numerous environmental, economic, social and

Graph 3.2.1: Land Degradation in Tamil Nadu (in L.Ha.)



Source: Land degradation in Tamil Nadu, 2009 by Remote Sensing and GIS centre, TNAU.

ecological consequences. Every ecosystem on earth is affected by some form of land degradation. In Tamil Nadu, an area of 22.30 L.ha is subjected to various degrees of land degradation, which constitutes 17.16 percent of total area of the State (130.33 L.ha). Water erosion is the major source of land degradation (15.46 L.ha.) in the State. The other major causative agents are sodicity, acidity and salinity. Mining and dumping activities accounted for land degradation in 1.28 L.ha. The details of the affected areas in various land degradation type are given in the Graph 3.2.1.

Soil and Water Conservation Works

Development of degraded lands has two objectives viz:- reversing degradation and reclamation of degraded land. The general management options for remediation of different degraded lands are through soil and water conservation programmes and rainwater harvesting. Tamil Nadu has recognized the importance of conserving soil and water to ensure sustainable agriculture and it is one of the pioneer States, which have been implementing soil conservation programmes since 1949.

Rain Water Harvesting (RWH) programmes are being taken up exclusively with structures like farm ponds, percolation ponds, check dams etc., for recharging the ground water and storing the surplus water for providing supplementary irrigation to crop growth from the year 2005-06. Also, a massive scheme for Artificial Recharge of Groundwater is being implemented from the year 2008-09. Micro irrigation and water harvesting structures have resulted in increased water use efficiency and water harvesting. The National Watershed Development Project for Rainfed Areas (NWDPRA), Watershed Development Fund (WDF), Drought Prone Area Programme (DPAP), Integrated Wasteland Development Programme (IWDP) and Integrated Watershed Management Programme (IWMP) are being taken up on watershed basis under the soil and water conservation sector.

Eleventh Five Year Plan Performance

As against the outlay of ₹643.17 crore, an amount of ₹471.74 crore was spent during the Eleventh Five Year Plan.

The centrally sponsored River Valley Project (RVP) was implemented in south Pennaiyar and Mettur river valley catchments during the Eleventh Five Year Plan period. It covered 58453 ha. and 9324 structures were constructed at a cost of ₹67.14 crore. Integrated development of tribal pockets with multi-sector approach was implemented by covering 4586 ha. of tribal lands and 528 structures were constructed at a cost of ₹9.37 crore. IAMWARM project was implemented at a total outlay of ₹129.32 crore towards micro irrigation in an area of 28329 ha. for construction of 2110 farm ponds, 656 water harvesting structures, pipe laying works in 12 packages and distribution of 1105 farm machinery and implements to the Water User Associations (WUAs) in 51 sub-basins. Watershed Development Programme under Mission on Rainfed Farming –Adoption of International Crops Research Institute for Semi Arid Tropics (ICRISAT) technology was approved in Veppillaipatti watershed in Salem district and Kathari watershed in Vellore district at a total cost of ₹2.34 crore.

GIS centers at district level have collected the Ground Control Points for the existing structures constructed under various schemes and incorporated them in the digitised database. The updated database is used for prioritising micro watersheds and the selection of work components for the preparation of new proposals. At present, out of 385 blocks in Tamil Nadu, 25 blocks in the 15 districts have been digitised at cadastral level (1:5000 scale). Out of 16564

revenue villages in Tamil Nadu, digitization at cadastral level has been completed in 2044 villages. It is proposed to cover the remaining blocks in the coming years.

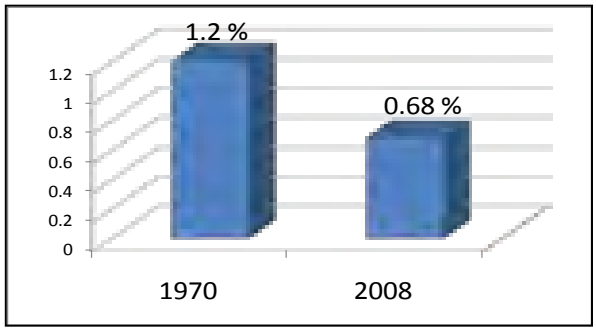
During the Eleventh Five Year Plan, under NWDPRA, 200 micro watersheds in 18 districts were covered at a cost of ₹30.89 crore. Similarly under DPAP, an area of 2.45 L.ha. was treated and an area of 3.09 L. ha. was treated under IWDP (Integrated Watershed Development Programme). Government of India has decided to disband the schemes of NWDPRA, DPAP and IWDP during the Twelfth Five Year Plan. It is proposed to cover the balance` watersheds under Integrated Watershed Management Programme (IWMP). During the Eleventh Five Year Plan, an area of 14415 ha. was covered in 159 watersheds across 24 districts at a cost ₹9.94 crore under Watershed Development Fund assisted by NABARD.

Integrated Watershed Management Programme (IWMP) was implemented in 1632 watersheds covering 8.42 L. ha at a total cost of ₹37.42 crore with people's participation for holistic development of the village. Scheme on reclamation of saline and alkaline soils was implemented in an area of 14091 acres at a total cost of ₹6.90 crore.

During the Eleventh Five Year Plan, detailed Soil Survey was conducted in an area of 5.65 L. ha at a cost of ₹5.42 crore by Soil Survey and Land Use Organization. In addition to this, the Department of Agriculture has undertaken a programme on Land resource inventory and GIS database for farm level planning in 14 blocks of 10 districts namely Ariyalur, Salem, Namakkal, Coimbatore, Villupuram, Dharmapuri, Dindugul, Krishnagiri, Perambalur and Ramnad in coordination with TNAU and the Department of Agricultural Engineering.

There are 30 soil testing laboratories and 16 mobile soil testing laboratories functioning under the Department of Agriculture in Tamil Nadu and during the Eleventh Five Year Plan, 52.17 lakh soil samples were analyzed with a financial achievement of ₹40.72 crore. In addition to the existing soil testing laboratories, Agri clinic cum mini soil testing laboratories were established with the objective to provide consultancy services, supply of inputs and hiring of machinery and equipments to the farming community based on the 'one stop shop' concept. During the Eleventh Five Year Plan, out of 385 agri clinics cum mini soil testing laboratories, 350 nos. were established at a cost of ₹10.28 crore and the remaining 35 agri clinics were established by the Agricultural Marketing and Agri Business department.

Graph 3.2.2: Organic Matter Content (%)



Source: Tamil Nadu Agricultural University

During the Eleventh Five Year Plan period, 10883 MT of bio-fertilizer was produced and distributed with a total financial outlay of ₹20.12 crore. The organic matter content in the soil has gone down from 1.20 percent in 1970 to 0.68 percent in 2008 in Tamil Nadu due to intensive cropping, indiscriminate use of chemical fertilizers and inadequate availability of organic manures. The decline in organic matter content has brought undesirable changes in the soils which affect soil fertility and productivity. In order to increase the availability of organic manure such as vermi-compost, municipal compost and bio-inputs such as bio-pesticides and bio-fertilizers, the government has implemented programmes for the promotion of organic farming and organic manure production in 18 focused districts.

Rainfed Area Development Programme (RADP) was implemented at a total cost of ₹13.85 crore - towards adoption of appropriate cropping system in 10000 ha. at a cost of ₹7.25 crore, establishment of 980 vermi-compost units at a cost of ₹2.94 crore, provision of insurance premium for the cropping systems adopted in 10000 ha. at a cost of ₹1.52 crore and seed production for pulses and oilseeds (pulses 400 ha.+ oilseeds 500 ha.) at a cost of ₹2.14 crore.

Initiatives for Nutritional Security through Intensive Millets Promotion (INSIMP) was launched with the aim to demonstrate the improved production and post-harvest technologies in an integrated manner with visible impact to catalyze increased production of millets in Tamil Nadu. The INSIMP scheme was implemented in 19 districts at a total cost of ₹10.51 crore under NADP.

The conservation and management of the rain water is very important in dryland to reduce the impact of moisture stress and bring about sustainability in pulses production. 800 farm ponds were created under Integrated Development of Pulses Villages in Rainfed Areas under NADP for giving supplemental irrigation to pulse crops to enhance the production and productivity in five districts namely Krishnagiri, Dharmapuri, Vellore, Thiruvannamalai and Thoothukudi at a cost of ₹4.80 crore. Under Dryland Development and Maximising Crop Productivity (NADP), an area of 10500 ha. was covered in 18 focused districts by laying out demo in major rainfed crops such as pulses, oilseeds and millets. The project was implemented during the Eleventh Five Year Plan at a total cost of ₹4.16 crore.

Twelfth Five Year Plan- (2012-2017) Objectives, Strategies and Thrust areas

Vision Tamil Nadu 2023 envisages the development of a large watershed and water management project (programme) all over Tamil Nadu that increases the storage capacity (including that of groundwater) by 100 percent and the Twelfth Five Year Plan has been oriented to achieve the above vision for which the following objectives are envisaged:

Fig.3.2.1. Recharge shaft

- To conserve the soil moisture and prevent soil erosion on Mission Mode in hills and plains
- Improvement of land capability and moisture regime in the watersheds
- Promotion of land use to match land suitability
- Prevention of soil loss in the catchments to reduce siltation of multipurpose reservoirs and enhance the *in-situ* moisture conservation and surface rainwater storage in the catchments to reduce flood peaks and volumes of runoff
- To harness rainwater through appropriate surface water harvesting methods
- To augment ground water and thereby check decreasing ground water potential
- To improve water use efficiency
- Enable land users to practise dryland agriculture, horticulture and forestry including conservation and judicious use of soil and water resources on a sustainable basis
- To stabilize existing area under cultivation and to bring additional area under cultivation
- To ensure participatory approach by forming User Groups / Watershed Development Team / Watershed Associations

- To generate short term and long term employment opportunities and increase the income of watershed community
- Promotion of organic farming

Box 3.2.1: Soil Conservation and Watershed Management

"The benefits achievable from scientific measures in soil conservation and watershed management will be enormous in the long run, even though tangible benefits in the short run perspective may not be immediately visible. Also, intangible benefits to such development in the form of reducing the number of environmental damages, agricultural production instability etc. is much more important than what can be shown in fiscal terms. Long term support from the Government must be maintained to both research and programme implementation in soil and water conservation and watershed management".

-Dr.M.S.Swaminathan

Strategies

a) Scientific management of soil conservation on Mission Mode and on watershed basis for sustainable agriculture, b) Harvesting surface water for supplemental irrigation and increasing soil moisture regime, c) Augmentation of ground water through appropriate rain water harvesting and runoff management techniques, d) Promotion of efficient irrigation systems to optimise irrigation to improve productivity, e) Strengthening of database using remote sensing and Geographical Information Systems to facilitate scientific planning in prioritizing, selection and implementation of watershed programmes, f) Stratified soil sampling and analysis, g) Formation of Farmers Interest Groups and provision of revolving funds for livelihood activities, h) Integrated Farming System Approach under Watershed Development Programme, i) Popularization of dryland farm implements and machinery and j) Promotion of pulses cultivation in rainfed areas.

Promotion of Organic Agriculture

Organic agriculture is a production system that sustains the health of soils, ecosystems and people. Organic agriculture is gaining momentum all over the world as it offers a means to address safe food, self reliance, rural development and conservation of nature. Tamil Nadu with diverse seven agro climatic zones has potential to adopt organic agriculture and the Government is planning carefully to utilize the existing opportunities. Organic agriculture can be promoted in a big way in rainfed areas where chemical usage is minimal and the yield potential can still be enhanced. The strategies proposed for promotion of organic agriculture in Tamil Nadu are: a) Identification of potential districts and suitable crops for organic agriculture, b) Standardized protocol for quality organic inputs, c) Promotion of soil and water conservation, d) Promotion of animal husbandry, e) Promotion of agro forestry system, f) Recycling of organic wastes, g) Creation of on-farm renewable energy units, h) Organic market promotion and h) Awareness program for organic agriculture. It has been proposed to cover an area of 1.58 lakh acres under organic certification during the Twelfth Five Year Plan.

Thrust Areas

Thrust areas identified are: a) Dryland development through soil and moisture conservation practices, b) RWH through farm ponds, c) Augmentation of groundwater, d) Promotion of technologies for economic water use, e) Watershed approach, f) Farmers participation, g) Improving soil health, h) Farm mechanization on mission mode and i) Promotion of farmers groups.

Twelfth Five Year Plan Programmes

Ongoing Schemes

The major ongoing programmes like soil and water conservation in river valley catchments, tribal areas, Western Ghat Development Programme, Hill Area Development Programme, rainwater harvesting and runoff management programme, artificial ground water recharge structures and watershed development will be continued during the Twelfth Five Year Plan period.

New Schemes

Dam Rehabilitation and Improvement Project - Soil Conservation and Catchment Area Treatment in Krishnagiri and Kundah Reservoir Projects

The World Bank aided Dam Rehabilitation and Improvement Project (DRIP) will prevent land degradation by adoption of multi-disciplinary integrated approach of soil conservation and watershed management in catchment areas and reduce siltation of multipurpose reservoirs. The conservation measures that are proposed to be taken up in catchment areas of Krishnagiri reservoir are: minor, medium, major check dams, diversion drains, sunken ponds/ farm ponds, percolation ponds, retaining wall etc., The conservation measures proposed in catchment areas of Kundah reservoir are: staggered trench, drainage line treatment works, terrace support wall/facial revetment, river widening and channel alignment, silt detention structures and landslide treatment works. These activities will prevent soil erosion and siltation, which will ultimately increase the life span of the dams. An amount of 3.21 million US dollars (₹15.41 crore) has been earmarked for the purpose of executing soil conservation works and catchment area treatment in both the projects and total project period is six years.

Soil and Water Conservation Measures in Dryland Areas

Soil and water are the most important natural resources in all the ecosystems. Good soil and water conservation practices involve appropriate land use, vegetative cover, increased water use efficiency and other structural and non-structural actions to achieve specific objectives. The main objectives are: a) Controlling, channelizing and collecting surface runoff, b) Reducing adverse impact of rain on soil, c) Reducing the speed of flowing water to increase its infiltration and d) Enhancing water holding capacity and improving soil structure and stability. With this background, the following specific soil and water conservation measures are proposed for dryland areas. For fulfilling the farmers need, right from seed to marketing, integrating all the farmers in villages and improving village economy as a whole, watershed greening project will be implemented in the selected watersheds.

i) Field Boundary based Bunding for Red Soil Areas

The construction of narrow base terrace is known as bunding. These structures yield desirable results in reducing the runoff, increasing soil moisture and yield improvement of dryland crops as evidenced from the results of NADP Dryland Development Project. The programme will be implemented in selected areas prone to erosion under dryland situation throughout the State (except Thanjavur, Nagapattinam, Tiruvarur, The Nilgiris, Kanyakumari and Chennai districts). The total outlay proposed for the Twelfth Five Year Plan is ₹11.00 crore to cover an area of 26,000 ha @ Rs 4000/ ha including documentation costs of ₹0.60 crore. The possibilities of planting Gliricidia to augment green leaf manuring along the bunds during the southwest monsoon period will be explored and thereby steps will be taken to enhance the soil organic matter content.

ii) Construction of Farm Ponds with Portable Sprinkler Units

Farm ponds with portable sprinklers for supplemental irrigation serve as good source to mitigate moisture stress. Farm ponds of size 30m x 30m x 1.5m with

1350m^3 capacity will be useful not only for supplemental irrigation but also for water requirements of livestock and other farm needs. It is highly essential to supplement the water requirement of second crop, mainly pulses and oilseeds. It is proposed to construct a total of 5000 farm ponds with portable sprinkler sets covering all districts except Chennai, The Nilgiris and Kanyakumari. In the Twelfth Five Year Plan, it has been proposed to establish 5000 units with an outlay of ₹60.00 crore.

iii) Mechanisation in Dryland Farming

Dryland agriculture plays an important role in food production and so it is necessary to promote farm machinery/ implements for sustainability and to increase production. Hence, it is proposed to promote following agricultural machinery/ implements: chisel plough, tractor drawn bund former, broad bed former, seed cum fertilizer drill, mechanised weeder and multi-crop thresher among dryland farmers with 50 percent subsidy assistance to the tune of ₹35.00 crore during the Twelfth Five Year Plan and is tabulated in Table 3.2.1.

Table 3.2.1: Agricultural Mechanisation in Dryland Farming – Twelfth Plan

Name of Machinery / Implement	Physical in (Nos.)	Average unit cost (₹ in Lakh)	Total cost (₹ in crore)	Subsidy Amount (₹ in crore)
Chisel plough	80	0.25	0.20	0.10
Tractor with bund former/ Reversible plough / rotovator	440	5.00	22.00	11.00
Broad bed former	240	0.25	0.60	0.30
Seed cum fertilizer drill	200	0.60	1.20	0.60
Mechanized weeder	310	1.00	3.10	1.55
Power tiller	2200	1.50	33.00	16.50
Multi crop thresher	330	3.00	9.90	4.95
Total			**70.00**	**35.00**

Source: Agricultural Engineering Department, GoTN

To enhance the income of rainfed area farmers, efforts will be taken to increase the yield of rainfed crops with technical coordination of TNAU and ICRISAT. For this purpose, assistance will be extended at 50 percent subsidy for all activities in addition to soil health improvement.

New Schemes under Farm Mechanization

For improving the economic status of SC & ST farmers, it is proposed to form Farmers Group with preference to youth in 385 blocks. Location specific farm machinery and implements will be supplied to these groups at free of cost and training will be imparted on operation and maintenance of machinery. To carry out timely field operations from seed to seed, it is proposed to form 30 farm labourer groups throughout the State at the rate of one per district.

Organic Farming to Improve Soil Health- Distribution of Green Manure Seeds

The application of green manure is one of the recommended practices to increase the soil health. It fixes atmospheric nitrogen through root nodules and adds biomass to the soil. It improves soil structure, water

holding capacity, better drainage and releases the locked up nutrients, besides improving the soil status in the long run at a cheaper cost. Hence, it is proposed to distribute green manure seeds for the next five years at 25 percent subsidy. An amount of ₹6.19 crore towards procurement and distribution of green manure seeds (1625 MT) is proposed. In addition to distribution of green manure seeds, rotovator for trampling the green manure crops will be supplied at subsidised rent.

Programme for Documentation of Area Treated under Soil and Water Conservation

Documentation of projects provides basis for policy makers. Documentation of scheme activities will ensure information availability to all sections of people including farmers, experts, planners and administrators. During the Twelfth Five Year Plan, necessary provision will be given under each scheme to document the respective scheme activities. The estimated cost of this programme is ₹1.75 crore for the Twelfth Five Year Plan. It is proposed to provide broadband connections with NIC assistance, other handheld devices for facilitating area and terrain survey and uploading the inputs from the farmers' fields at the level of sub-divisions for continuous updation of data.

Creation of Infrastructure in Rainfed Areas (Construction of Drying Yards)

At the time of harvest, farmers face difficulties in drying and threshing the produce due to non availability of proper drying yards near the field. The loss due to absence of proper drying yard is estimated around 10 percent and the farmers are using the highway roads and rural roads for drying the pulses and cereals. Moreover, if these drying yards are provided, the loss will be eliminated. The drying yards are proposed based on the demands from the farmers and the availability of *Poramboke lands*. During the Twelfth Five Year Plan, it is proposed to take up construction of 1500 drying yards focusing rainfed areas with a financial outlay of ₹45.00 crore.

Polythene Mulching for Crop Production

Mulching is the process or practice of covering the soil/ground to create conducive conditions for plant growth, development and efficient crop production. Plastic mulches are completely impermeable to water when compared to other natural mulches such as straw, dead leaves, compost etc., and prevents direct evaporation of moisture from the soil and thus limits the water losses and soil erosion over the surface and moisture is preserved for several days and increases the period between two irrigations.

An experiment on mulching with plastic films was conducted for groundnut in Coconut Research Station Aliyar (TNAU). Mulching with 50 micron Linear Low Density Polyethylene (LLDPE) film was found to give higher pod yield due to better moisture conservation, reduced weed growth, when compared to coirpith mulch and control. During the Twelfth Five Year Plan, plastic mulching is proposed in Krishi Vigyan Kendras (KVK), State Seed Farms and farmers' fields for demonstration and popularization among the farming community in an area of 300 ha., at an unit cost of ₹75,000/ha. (two seasons) is proposed with a total outlay of ₹2.25 crore. It is also proposed to install drip irrigation systems for the entire 300 ha and the total cost of the scheme is ₹5.25 crore.

Creation of Farm Level Database and Monitoring Software

i) Creation of Farm Level Database in 1:5000 Scale

At present 1:50000 scale Survey of India maps and schematic maps derived from Survey of India (SOI) topo-sheets are used for watershed planning. These maps are useful for planning at macro level, i.e. planning at district / taluk level. In agriculture, it is required to build the database at field level

of the individual farmers. Hence, detailed maps in the scale of 1:5000 are required for creating base maps and narrowing down at field level. Already Agricultural Engineering Department has 12773 village maps out of 16564 revenue villages in Tamil Nadu. ₹0.15 crore is required for the procurement of 3791 village maps. It is proposed to digitize these maps at a cost of ₹6.60 crore. Data validation may be uploaded on the central repository for the purpose of updating spatial and non-spatial data by any user department and ₹1.80 crore is required for this purpose. The total estimate for this project is ₹8.55 crore.

ii) Creation of Monitoring Software from Google/any Imagery

Simultaneously, it is also proposed to digitise and create a separate digital layer on sub-division survey number wise from google/any imagery. It is required to develop separate software to create these layers from the google any imagery for the purpose of locating beneficiaries and implementation of several welfare schemes. The approximate cost of this software is ₹0.15 crore and recurring cost is of ₹0.05 crore for 5 years. The total cost is around ₹0.20 crore. This software would provide information on the beneficiary details and location of sites for the purpose of monitoring.

iii) Development of Software on Irrigation Advisories to Farmers

A Mobile Web Portal/Mobile Services Delivery gateway is proposed to pass information about minor irrigation, mobile sprinklers and Government assistance available for constructing new farm ponds, details of schemes, subsidy assistance etc., to farmers as a location based service. For developing Mobile Web Portal/Mobile Services Delivery gateway, one time cost of ₹0.05 crore is proposed in the Twelfth Five Year Plan.

Mixed Farming in Rainfed Areas

Mixed farming is one in which crop production is combined with the rearing of livestock. The livestock enterprises are complementary to crop production, so as to provide a balanced and productive system of farming. It is proposed to demonstrate mixed farming with rainfed crops in 7000 fields and also proposed to purchase livestock for 7000 farmers. An outlay of ₹17.50 crore is proposed in the Twelfth Five Year Plan.

Construction of Community Farm Ponds

In Tamil Nadu, there is high potential for rainwater harvesting through community farm ponds. One community farm pond of size of 90m x 90 m x 1.50 m duly provided with mobile sprinkler unit with diesel engine pumpset can irrigate an ayacut area of 20 ha. Hence, area will be selected on cluster basis in such a way that each cluster will have an area of 20 ha. and a minimum of 10 nos. of beneficiary farmers. The programme will be implemented in 30 districts except Chennai and The Nilgiris by adopting an unit cost of ₹8.70 lakh per cluster as grant. Every year, five community farm ponds in each district with a total of 750 community farm ponds will be constructed during the Twelfth Five Year Plan period under NADP .

Construction of Community Bore Wells

In order to bring the Second Green Revolution, the community bore well scheme is proposed to be taken up in all districts of Tamil Nadu except in Chennai and The Nilgiris. Community bore wells will be constructed in such a way that each bore well will irrigate an ayacut area of minimum of 20 ha. having at least 10 beneficiary farmers. Priority will be given to these community bore wells by the TNEB for giving power supply connection for the energisation of pumpsets. It is proposed to construct 20 community borewells with pumpset in each district by adopting a cost norm of ₹35000/ha amounting to ₹42.00 crore in a year and the cost requirement

works out to ₹ 210.00 crore for the Twelve Five Year Plan period. The subsidy pattern for the community bore well is 50:50 ratio by the Government and Community. Hence, the Government contribution will be ₹105.00 crore.

Rain Water Harvesting (RWH) in South Eastern Dry Tracts of Tamil Nadu

It is very much essential to harvest the rainwater and recharge the ground water through construction of RWH structures for sustaining the existing dryland crops grown in that area as well as doubling the crop area to fetch more income. In order to harvest the rainwater, it is planned to construct 2072 RWH structures such as farm ponds, medium and major check dams and percolation ponds in Sivagangai, Virudhunagar and Ramnad districts at a total cost of ₹13.05 crore during the Twelfth Five Year Plan period. In addition to the RWH structures, the anti evaporation thin film will be covered over the RWH structures to arrest the evaporation loss of water from water spread area of the structures at a cost ₹0.50 lakh per structure. It is proposed to cover 1500 numbers of both old and new farm ponds in the above areas with anti evaporation thin film at a total cost of ₹ 7.50 crore.

Application of Tank Silt in Farmers' Fields

Continuous cropping constantly removes plant nutrients and exports them out of the farm in harvested products. There had been a decline in soil organic matter from 1.20 percent in 1970s to 0.68 percent in 2008. The water storage capacity of the tank can be increased if the desilting works are taken up. The Agricultural Engineering Department (AED) has constructed 36653 numbers of water harvesting structures such as farm ponds, check dams, village ponds and percolation ponds through different schemes during the last 10 years period.

The desilting work in the waterbodies is currently taken up by the Rural Development Department under Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) using the manual labourers. The removed silt is to be carried to the individual farmers' field by the AED. The excavated silt is to be applied in the ayacut area of the respective tanks to enrich the soil fertility. Every year around 750 numbers of tanks will be taken up covering 3750 numbers during the Twelfth Five Year Plan period in 30 districts of Tamil Nadu towards application of silt in the farmer's field by the AED under NADP. The average unit cost for application of silt in the farmers' field is ₹ 1.25 lakh. The overall cost of the project for 5 year period is ₹ 46.88 crore.

Soil Survey and Farm Level Planning

The database required for Farm Level Planning in the State can be obtained by carrying out detailed characterization and mapping of all the existing land resources like soil, climate, water, minerals and rocks,

Fig.3.2.2: Soil profile examination

vegetation, crops, land use pattern, socio-economic conditions, infrastructure, marketing facilities and various schemes and developmental works of the Government.

To increase the productivity of major crops such as paddy, millets, pulses, cotton, sugarcane and oilseeds and to bridge the yield gap at village, block, district and State level, it is necessary that detailed soil survey is to be done to know the status and suitability of soil to raise various crops, thereby farmers may be encouraged to grow more suitable crops by adopting improved scientific technologies and

hence, higher productivity is ensured. This will not only help in sustainable agriculture but also serve as a concrete step in making the Nation move towards food surplus.

During the Twelfth Five Year Plan, the detailed soil survey will be undertaken in an area of 5.50 L.ha. at a total cost of ₹ 9.02 crore. The total outlay proposed for implementing schemes for Soil and Water Conservation including Rainfed Agriculture during the Twelfth Five Year Plan is ₹ 1202.82 crore. Proposed outlay is furnished in Table 3.2.2. and the monitorable targets are provided in the Table 3.2.3.

Table 3.2.2: Twelfth Plan Outlay – Soil and Water Conservation Sector

(₹ crore)

S.No.	Programmes/projects	Outlay
	Ongoing schemes	
1	Soil conservation in the catchment of RVP, Tribal, WGDP, HADP	128.38
2	Rainwater Harvesting and Runoff Management Programme	154.94
3	Scheme for Artificial Recharge of Ground Water	52.84
4	Integrated Watershed Management Programme (IWMP)	8.77
5	Integrated Development of Pulses Villages in Rainfed Areas under NADP	24.00
6	Reclamation of Saline and Alkaline lands	7.86
7	Land Resource Inventory & GIS database for Farm Level Planning and Soil Survey and Land Use Organization	69.02
8	Soil Testing Laboratories	69.88
9	Schemes for Rainfed Agriculture including Community Farm Ponds , Borewells & Community Borewell	366.55
10	Watershed Development Fund (NABARD)	64.00
11	Irrigated Agriculture Modernization and Water bodies Restoration and Management (TNIAMWARM)	50.68
	Total - Ongoing Schemes	**996.92**
	New schemes	
12	Dam Rehabilitation and Improvement Project	15.41
13	Soil and Water Conservation Measures Including Moisture Conservation in Dryland Areas	71.00

Table 3.2.2: Twelfth Plan Outlay – Soil and Water Conservation Sector (Contd.)

(₹ crore)

S.No.	Programmes/projects	Outlay
14	Mechanization in Dryland farming	35.00
15	Documentation and data base management	10.55
16	Creation of Infrastructure in Rainfed Area (Construction of Drying Yards)	45.00
17	Polythene Mulching for Crop Production	5.25
18	Organic farming to improve soil health- distribution of green manure seeds	6.19
19	Mixed farming in rainfed area	17.50
	Total New schemes	**205.90**
	Grand Total	**1202.82**

Table 3.2.3: Twelfth Plan Monitorable Targets – Soil and Water Conservation Sector

S.No.	Programme	Area/Structures
1	Soil and Water Conservation in River Valley Catchments (NADP funding)	66045 ha.
2	SWC in Tribal areas	10531ha. : 1234 Nos
3	SWC under Western Ghat Development Programme(WGDP)	6000 ha.; 6669 Nos
4	SWC under Hill Area Development Programme (HADP)	500 ha; 4181 Nos.
5	Rainwater Harvesting (RWH) and Run off Management Programme	21305 Nos.
6	Scheme for Artificial Ground Water Recharge (AGR) Structures	1182 Nos.
7	Irrigated Agriculture Modernization and Water bodies Restoration and Management (TN IAMWARM)	6100 ha. 50 Nos.

Table 3.2.3: Twelfth Plan Monitorable Targets – Soil and Water Conservation Sector (Contd.)

S.No.	Programme	Area/Structures
8	Watershed Development Fund (NABARD assisted)	80 watersheds
9	Watershed Development Programme under Mission on Rainfed Farming -Adoption of ICRISAT technology	1365 Nos.
10	Integrated Development of Pulses Villages in Rainfed Areas under NADP	4000 Nos.
11	Integrated Watershed Management Programme (IWMP)	1300 watersheds, 7.37 lakh ha.
12	Reclamation of Saline and Alkaline soils	20000 ac.
13	Detailed Soil Survey	5.50 L.ha.
14	Land Resources Inventory and GIS database for Farm level Planning	6 million ha
15	Analysis of soil samples	143 Lakh samples
16	Bio-Fertilizer Production	42750 MT
17	Solid Waste Management Programme	500 units
	Mechanisation	
18	Chisel plough	80Nos.
19	Tractor with bund former / Reversible plough / rotovator	440 Nos.
20	Broad bed former	240 Nos.
21	Seed cum fertilizer drill	200 Nos.
22	Mechanized weeder	310 Nos.
23	Power tiller	2200 Nos.
24	Multi crop thresher	330 Nos.