



15.3. SPECIAL AREA PROGRAMMES

15.3.1. Hill Areas Development Programme

Introduction

The Hill Area Development Programme (HADP) is in operation from the Fifth Five Year Plan (1975 – 1980) in sensitive hill areas of the Country. In Tamil Nadu, the programme commenced in the Nilgiris District with 100 percent financial assistance from the Government of India with a view to supplement the efforts of the State Government in preservation, protection and enrichment of the biodiversity of the Nilgiris District. Later, the funding pattern altered to 90 percent grant from the Government



Fig.15.3.1: The Nilgiris - Queen of Hills

of India and 10 percent loan from the State Government. The aim of the programme is to ensure ecologically sustainable socio-economic development of the Nilgiris District. The process adopted, focuses on the needs and aspirations of local communities, thereby promoting their participation and sense of

ownership in the design and implementation of strategies for conservation of biodiversity and sustainable livelihoods. The quantum of fund is decided on the basis of area and population.

The Nilgiris District forms an integral part of the Western Ghats. It has an area of 2549 sq km. It is bounded on the north by Karnataka state, Northwest by Kerala state, Southeast by Coimbatore District and Northeast by Erode District in Tamil Nadu. The entire district is hilly and is divided into two natural zones namely the Nilgiris Plateau and the Wynad table land. The average elevation is 2000 meter above mean sea level. The geographical area of 2.54 lakh hectares has 56.03 percent forest area of 1.42 lakh hectares, which is the highest among the 32 districts in the State. The net sown area is 78,800 hectares (30.96 percent). Non-food crops like tea and coffee are cultivated in nearly 65 percent of this area.

The Nilgiris District is diverse in its habitation pattern and consists of four Blocks, four Municipalities, one cantonment, eleven Town Panchayats and thirty-five Village Panchayats. Under the programme, forestry, soil conservation and horticulture were the core sectors till 1995-96. From 1996-97 onwards, emphasis has also been laid on the socio-economic and developmental needs of the District. Hence, funds have been provided for various sectors including welfare of vulnerable social groups, development of local bodies, human resources development, medical and public health, tourism, animal husbandry and dairy development and roads in order to increase productivity of land, for economic up-liftment of tribes in isolated settlements, and to strengthen infrastructure and basic amenities so as to improve the quality of life of local people and ensure people's participation in all developmental activities.



Box 15.3.1.1: Objectives of the Hill Area Development Programme

- To develop the ecology and environment, through eco-preservation, eco-restoration and eco-development.
- To stimulate socio-economic growth and development of infrastructure in the district.
- To involve the people and meeting their basic needs through improved management of their land and water resources.
- To give adequate and safe drinking water by development of gravitational sources of water.
- To improve health facilities including infrastructure facilities in primary health institutions.
- To evolve a proper land use pattern keeping the socio-economic and ecological parameters in view.
- To develop horticulture and plantation crops.
- To improve livestock and cattle husbandry in order to increase the income of rural households.
- To find the appropriate technology and scientific inputs, which would suit local conditions and harness local resources.
- To dovetail traditional practices with appropriate technology to serve the needs of the people living in the Hill areas.

Performance during the Eleventh Five-Year Plan

The Union Planning Commission, Government of India has released a sum of ₹211.48 crore for the different schemes implemented under the HADP in the Nilgiris District during the Eleventh Five Year Plan. A major portion of allocation under HADP was earmarked for the core sectors of soil

conservation, welfare of SC/ST, forestry, horticulture, development of local bodies, and roads sectors. Since 2002-03 onwards, the emphasis has gradually shifted to watershed based development with the aim of attaining sustainable development of the area. 60 percent of the total funds have been allocated to the identified priority watersheds. The financial and physical performance is given in Table 15.3.1.

Table 15.3.1: Eleventh Plan Expenditure - HADP

(₹ Crore)

S.No.	Name of the Sector	Eleventh Plan Expenditure
1	Soil Conservation	21.51
2	Forestry	18.44
3	Horticulture	11.39
4	Animal Husbandry & Dairy Development	2.74
5	Medical & Health	3.36
6	Minor Irrigation	4.95



S.No.	Name of the Sector	Eleventh Plan Expenditure
7	Tourism	9.61
8	Roads	13.36
9	Sericulture	0.51
10	Welfare Of SC	26.33
11	Welfare Of ST	11.02
12	HADP Cell	5.15
13	Human Resources Development	10.80
14	Geo Tech Cell	1.00
15	Remote Sensing & GIS	1.82
16	Evaluation	0.70
17	Tech. Cell, Secretariat	0.95
18	Development of Rural Local Bodies	18.64
19	Development of Urban Local Bodies	24.94
20	Research, Training and Documentation	0.91
21	Entry Point Activities	1.58
22	Water Shed Administration & Monitoring	1.75
23	Gap Filling Infrastructure	13.92
24	Social Welfare	4.68
25	Disaster Management and Mitigation	1.44
Total		211.48

Physical

HADP adopts the Integrated Common Watershed Management Approach to achieve the objectives of the programme. Under this approach, the resources information of watersheds were gathered and analyzed through Remote Sensing techniques, based on which ISRO, Bangalore, have delineated 75 macro watersheds in the district in co-ordination with Agricultural Engineering, Horticulture, Forest and other departments. The Nilgiris district is drained by major rivers like Bhavani, Moyar and Kabini which are tributaries of the Cauvery and Pandiar, forming these 75 Macro watersheds. Out of 75 macro watersheds identified in this District,

37 Macro Watershed have been prioritized for taking up works. During the Eleventh Plan period, 28 macro watersheds comprising of 208 micro watersheds have been selected and taken up for treatment. A total area of 28,046.65 ha. has been treated during the Eleventh Five Year Plan period.

Green initiative

Under soil conservation, gully control measures, landslide and mitigation works, channel alignment and allied works, terrace support wall, bench terracing, staggered trenching and sinking of community irrigation wells were undertaken.



Fig.15.3.2: Provision of foot bridge in rural Ooty



Fig. 15.3.3: Eco park at Ooty

Under forestry sector, afforestation in the degraded and denuded forest and their maintenance, shola afforestation and its maintenance, soil and water conservation activities inside forest areas, forest protection works, special works for wildlife management and eco tourism in forest areas, were undertaken. Under horticulture sector, promotion of coffee, spices, fruit plantations besides restoration of traditional agricultural farming practices, extension of area under economic plantations such as arecanut and coconut, medicinal plant cultivation,

mushroom production, floriculture, and research & development are undertaken. Other developmental activities such as provision of drinking water, construction of group houses, primary health centres, construction of Anganwadis, improvement of roads, approach paths/roads, construction of school buildings, drying yards etc are also taken during the Plan period. Strenuous attempts are made to include NGOs, local farmers associations, local user groups and local people in the implementation of the different schemes under HADP.



Fig. 15.3.4: Agriculture Development in HADP



The following assets as given in Table 15.3.2 were created under HADP:

Table 15.3.2: Assets created under HADP

Assets created	No.	Assets created	No.
New Orphanage Building	1	Tea harvesting Machines	200
Construction of Anganwadi centers	40	Development of Ethnographic Park and Arboretum *	
Building for Casualty ward, ICU to Government Head quarters hospital	3	Water Harvesting Structures / Gabion Checks / Silt traps	1188
Maternity Centre	1	Drying Yards	30
Primary Health Center	1	Establishment of She Buffalo farms for tribal	4
Construction of Seed Storage Godowns	2	Supply of Giriraja/ Birds to supplement income	5000 units
Low Cost Houses to SC / ST	1129	Creation of farm ponds and development of Aqua culture practices *	
Providing Solar lanterns to ST People	990	Construction of School Buildings	90
Providing Solar Water heaters to GTR, ADW & Backward class hostels *		Providing Computers to Schools	66
Development of Parking Lots	3	Construction of Library Building & Gymnasiums	3
Establishing Road side Gardens	5	Play grounds	30
Automated post harvest handling units for Washing /Sorting of vegetables	7	Construction of indoor /outdoor Stadiums in Coonoor, Kotagiri & Gudalur	3
Water Supply	132	Community Centers	25

* Not quantified



Fig.15.3.5: Basic Amenities to ST hamlets



Fig.15.3.6: Post Harvest handling Unit at M-Palada



Fig.15.3.7: Construction of farmers training centre in Ooty

Approach and Strategy for the Twelfth Five Year Plan

The Twelfth Plan will build on the successful efforts of previous periods and introduce innovations towards ensuring people's involvement to achieve programme goals. As in previous plans, out of 75 macro watersheds identified in this district, 37 macro watersheds have been prioritized for taking up works. The balance 38 watersheds are fully covered with reserve forests that are excluded for treatment. Out of 37 priority watersheds, 3 macro watersheds of Payyampuzha, Chaliyar and Mukkattihole were taken up in the Eleventh Five Year Plan and will be saturated by 2014-2015. Another 10 macro watersheds, which had been treated in the first phase 1999-2003 and now proposed from the year 2011-12, are included for treatment during the Twelfth Five Year Plan period. A total of 13 macro watersheds comprising 96 micro watersheds with total area of 27,782.22 ha will be taken up for treatment. Watershed Associations will be constituted in each of these macro watersheds and registered under the Societies Act and will function as the general body comprising of all willing members of the communities within the watershed. In order to ensure day-to-day management of watershed activities, local level institutions like Watershed Committees and the User Groups will be promoted. The groups will be funded through revenue generation and people's contributions.

The activities proposed under different sectors are listed:

Soil erosion and soil quality: The Soil erosion and soil quality continue to be the most serious problems threatening the ecology of this fragile district. The loss of fertile topsoil is almost impossible to replace, resulting in poor agricultural yields and simultaneously silting up major reservoirs. The major activities proposed under soil conservation during the Twelfth Five Year Plan are water harvesting structures, gabion check dams, channel alignment and lining works, landslide treatment and mitigation works, and construction of collection wells.

Forestry Sector: Forest conservation has been given top priority and major activities proposed are protection of shola and other endemic eco-systems of the Nilgiris; and construction, improvement and maintenance of trekking sheds under eco-tourism. Schemes for welfare of tribals living in remote forest areas include provision of drinking water facilities, employing them in anti-poaching activities, construction of check dams in Reserve forest areas and forest protection works like fireline scrapping works, urban/avenue planting, supply of seedlings to the public, creation of eco-awareness among local people and improvements of roads in forest areas.

Horticulture: The activities proposed are production of improved high yielding tea clones; in-filling and replanting in old tea



areas of SC/ ST/ SHGs farmers; production of economic plants and vegetable seeds in State horticulture farms; production of avenue tree plants, shade trees of various species; supply of agricultural implements; supply of organic manure; neem cake; vermicompost; and infrastructure development in horticulture gardens. A major initiative that began in the last year of the Eleventh Five Year Plan is the creation of farmer clusters to promote joint purchase of inputs, planning and marketing and a transformation in cropping practices, towards sustainable horticulture and organic farming.

Animal Husbandry: The sector has been identified as a major thrust sector aimed at improving livelihoods of the poor and especially tribals of the district. After an initial start, 5000 units of Giriraja/ Vanaraja birds are planned for distribution in 2011-12 and will be scaled up in the future to many multiples. As the cattle population has reduced from about 3.5 lakh in previous years to about 35,000 (10 percent) currently, a major plan for restocking with suitable breeds is under consideration.

Road sector: It is proposed to take up widening and improvement, formation of new roads etc to improve connectivity in the district.

Welfare of SC/ST: It is proposed to provide basic amenities to SC/ST habitations in the district by providing water supply, footpath, drain, road/path, streetlights, tribal shelter etc.

Tourism and Medical & Public Health: It is proposed to provide basic infrastructure facilities.

Development of Local Bodies: Sanitation, water supply and improvements to roads are the major activities proposed to be taken up in the financially weaker local bodies.

Human Resources Development: It is proposed to create additional infrastructure

and provide essential amenities in schools by constructing additional classrooms, formation of playgrounds, provision of toilet facilities, drinking water facilities and eco-awareness programmes among students.

The activities of the different sectors will be dovetailed with those of the other line departments to bring about greater synergy. The local public along with competent NGOs will also be actively involved in the Integrated Watershed Approach. The felt needs of the community will be identified through Participatory Rural Appraisal and regular meetings of all the stakeholders of the Watersheds and the proposals thus finalized will be included in the Perspective Plan prepared for the period of five years. The activities proposed will also be actively reviewed and monitored during execution.

Twelfth Five Year Plan Outlay

The outlay proposed for HADP in the Twelfth Five Year Plan is ₹316.80 crore, to be spent over five years at ₹63.36 crore per year.

Around 60 percent of the annual outlay under HADP is proposed to be earmarked for undertaking works in the identified priority watersheds on Integrated Watershed basis and remaining 40 percent is proposed for other than watershed works which include 15 percent for maintenance of assets created under HADP and 10 percent towards establishment costs.



Fig.15.3.8: Water Conservation Works Under HADP



15.3.2 Western Ghats Development Programme (WGDP)

Introduction

The Western Ghats region in Tamil Nadu ranges from Gudalur Taluk in the Nilgiris district and ends up at Agastheeswaran Taluk in Kanniyakumari district. Since the Nilgiris district is covered under Hill Area Development Programme, it is excluded for the implementation of WGDP. Western Ghats region, therefore, falls in 33 taluks of eight districts, - Coimbatore, Tirupur, Dindigul, Theni, Madurai, Virudhunagar, Tirunelveli and Kanniyakumari. The total area covered under WGDP is 26,000 sq.km. which is 20 percent of the total area of Tamil Nadu.



Fig.15.3.9: Terraced fields in Western Ghats Mountains in Kodaikanal, Tamil Nadu

Box 15.3.2.1: Salient features of WGDP

- Development with watershed as basic treatment unit.
- Focus on soil and moisture conservation measures and conservation of bio-diversity.
- Participatory approach through involvement of PRIs and NGOs.

The Western Ghats Development Programme commenced in 1975-76, initially with 100 percent Central Assistance and currently shared between the Government

of India and State Government in the ratio of 90:10. Although began as a beneficiary-oriented economic development programme, the emphasis has shifted towards socio-economic growth, development of infrastructure and promotion of ecology. Under WGDP, 70 percent of resources are earmarked for schemes in these priority areas such as soil and water conservation, forestry, gap filling and other infrastructure. Most of the schemes aim at promoting sustainable livelihoods.

Performance during the Eleventh Five Year Plan

During the Eleventh Plan period, Agriculture and allied activities, including soil and water conservation measures, were taken up in 166 watersheds at a cost of ₹101.16 crore. Horticultural activities such as production and distribution of planting materials and development and maintenance of horticultural farms were undertaken. Forestry, eco-restoration, eco-protection, eco-development, eco-stabilization, avoidance of human animal conflict, tribal development, soil and water conservation measures, gap filling infrastructure, welfare of SC/ ST were taken up. The other activities taken up under WGDP were animal husbandry, sericulture, fisheries, rural roads, tourism, minor irrigation, khadi and village industries, renewable energy, development in town panchayats, etc. From the year 2010-2011, implementation of schemes under this programme emphasises the watershed approach. In order to ensure that implementation is consistent and an integrated approach with full local participants, a pilot strategy was adopted for implementation in Dindigul, Madurai and Theni districts through Tamil Nadu Watershed Development Agency (TAWDEVA), while the remaining districts continue to operate through the line departments. The remaining districts will be progressively transferred for implementation through TAWDEVA.

**Table 15.3.3: Eleventh Plan Expenditure – WGDP**

		(₹ Crore)
S. No.	Sector	Eleventh Plan Expenditure
1	Soil Conservation	36.63
2	Forestry	19.10
3	Gap Filling Infrastructure	9.40
4	Tamil Nadu Watershed Development Agency	6.98
5	Rural Roads	5.02
6	Adi Dravidar Welfare	3.92
7	Tribal Welfare	3.75
8	Horticulture	2.50
9	Tourism	2.45
10	Development of Town Panchayat	2.28
11	WGDP Technical Cell (TC-I)	1.58
12	Sericulture	1.51
13	Fisheries	1.43
14	Non-Conventional Source of Energy (Renewable Energy)	1.00
15	Minor Irrigation	0.92
16	Khadi & Village Industries	0.85
17	Animal Husbandry and Dairy Development	0.78
18	Evaluation	0.71
19	Organic Farming	0.21
20	Preparation of Detailed Project Report (TAWDEVA)	0.14
Total		101.16

Approach and Strategy for the Twelfth Five-Year Plan

The WGDP basic objectives will be retained which are as follows:

- Maintenance of ecological balance essential for the life support system.
- Preservation of genetic diversity.
- Restoration of ecological damage caused by human interaction.

- Creation of awareness among the people and educating them on the severe consequences of ecological degradation and for securing their active participation in eco-development schemes.

The Western Ghats region is facing considerable soil erosion and eco-degradation. The WGDP therefore aims at development in a holistic manner with Special Area Programmes. Watershed is adopted as the basic treatment unit for augmentation and stabilization of production



and productivity, minimizing ecological degradation, reduction in regional disparity and opening up of greater livelihood opportunities for the rural poor. The broad objectives under WGDP are maintenance of environmental stability through forest preservation, conserving natural heritage by preserving the remaining natural forests, checking soil erosion and denudation of the catchment areas of rivers, lakes, marshes, reservoirs and springs in the interest of soil and water conservation, increasing the sustainability of forest/tree cover through afforestation and social forestry programmes, meeting the livelihood requirement of fuel, fodder, minor forest produce and small timber of the rural and tribal population and for creating a massive people's movement with the involvement of women towards achieving

these objectives. A major initiative began in the last year of the Eleventh Five year plan is the creation of farmers clusters to promote joint purchase of inputs, planning and marketing and a transformation in cropping practices towards sustainable horticulture and organic farming. Animal husbandry is visualized as a vital component of these aims and initiatives taken in the previous years are to be amplified.

Twelfth Five Year Plan Outlay

With a view to achieve the above objectives and to undertake the above activities, the outlay for implementation of WGDP during the Twelfth Five-Year Plan period is proposed at ₹113.85 crore with annual projection of ₹22.77 crore per year.



Fig.15.3.10: Western Ghats, Tamil Nadu



15.3.3 Eastern Ghat Development Programme(EGDP)

Introduction

The Eastern Ghats in Tamil Nadu is spread over in an area of about 3.25 million ha in 16 districts - 3 districts in coastal Eastern Ghats, 9 districts in central

Eastern Ghats and 4 districts in Southern Eastern Ghats. The major hills in Eastern Ghats are: a) Javadhu hills (Vellore district), b) Pachaimalai (Trichy & Salem districts), c) Kollimalai, Servarayan and Bodamalai (Salem district), d) Kalrayan hills (Salem and Villupuram district), Chitteris and Melagiris (Dharmapuri).



Fig.15.3.11: Eastern Ghats– Tamil Nadu

Box 15.3.3.1: Threats to Eastern Ghats

Eastern Ghats have rich sources of manganese, bauxite, graphite, limestones, gemstones, magnetite etc and are easily accessible for encroachment for human habitation and cultivation. Due to heavy pressure, list of threatened species in this area is increasing day by day which requires immediate attention to restore the original ecosystem.

Problems and constraints

The general problems and constraints encountered in Eastern Ghat areas are:

- Soil erosion, poor fertility status of soil, and stream bank erosion in some rivers.
- Large-scale deforestation.
- Degraded and gullied common lands and grassing lands due to large-scale exploitation.
- Lack of information on farming and cropping systems.
- Lack of good water management system and practices in the irrigated areas.
- Incidents of fire due to phases of burning during process of shifting cultivation.
- Low economic status and fragmentation of land holdings.
- Periodic droughts and floods due to heavy run-off and siltation of river beds.
- Uncontrolled mining activities.
- Declining ground water table due to excessive use and withdrawal of ground water and lack of water harvesting / water conservation measures.
- Inappropriate land use system.



Objectives and Strategies of the Eastern Ghats Development Programme

Box 15.3.3.2: Objectives and Strategies

Objectives

- Biodiversity conservations
- Providing vegetal cover to the degraded and highly eroded forest areas
- Improvement of water yield and ground water
- Prevention of soil loss
- Skill development and generation of employment opportunities for the local people / tribal to improve their socio-economic status
- Creation of eco-awaerness
- Research of specific problem related area

Strategies

- Watershed based development
- People's participation to meet their basic needs in consonance with their ecological and livelihood security

Performance during the Tenth and Eleventh Five Year Plan

During the Tenth Five Year Plan period, an amount of ₹1.00 crore was sanctioned during 2005-06 for the implementation of Eastern Ghats Development Programme. Against this, an amount of ₹0.96 crore was spent on various activities by different departments.



Fig.15.3.12: Eastern Ghats– Tamil Nadu

During the Eleventh Five Year Plan, an amount of ₹5.00 crore was proposed for taking up a pilot project area, so that this can be developed as a model and this lead to further developmental activities in other parts of the Eastern Ghats area. It was also proposed to utilize a part of the fund for preparing a detailed project report on this programme. However no project was taken up during the Eleventh Five Year Plan period.

Twelfth Five Year Plan proposal

In the Twelfth five-year plan, in the Eastern Ghats districts, 50,000 hectares shall be identified as high priority area and proposed for treatment with planting, fire control measures. Forest consolidation activities, soil and water conservation works and community development works in a span of five years shall be taken up with a proposed amount of ₹40.00 crore.



15.3.4. Coastal Area Development Programme

Introduction

Coastal area may be regarded as the land immediately behind the shore. The coastline of Tamil Nadu extends over 1076 km in length commencing from Pulicat lake to Kanniyakumari with about 80-96 km width with an average elevation of 77m above the sea level. The geographical area of the 11 coastal districts accounts for nearly one-third of the total geographical area of

the State. The coastal area is characterized by the rich natural resources and intense human activities.

The coastal area in Tamil Nadu is susceptible to cyclones periodically, which cause damage to life and property. The coastal area supports several important economic activities such as fisheries, ports, industries and tourism. Most ecologically critical and threatened areas in the coastal areas are coastal wet lands especially lagoons and estuaries and their mangrove swamps. The coastal areas provide food and shelter for waterfowls, fishes, crustaceans, molluscs including some of the world’s lucrative



Fig.15.3.13: Coastal area - Tamil Nadu

Coastal Area: Problems and Potentials

Problems	Potentials
<p>The problems are sea water intrusion which affects drinking water in coastal areas, swamps, which occupies large area and is unproductive creating environmental problems, sea erosion due to monsoon wind, waves etc.</p>	<p>The potentials are sandy tracts that could be used for agricultural production by growing vegetables and fruit crops by using drip irrigation. The excess rain water and flood water could be used by the farmers to grow fish, which will bring more income to them. Further, there is a great scope for promotion of tourism in the entire costal belt.</p>



fisheries. Mangroves and coral reef system are important for protecting shorelines and coastal lines against erosion. Thus coastal areas play a prominent role in the human life.

Objectives

- To protect heritage and cultural sites and fragile ecosystem. Promote natural resources by conservation-based development in order to achieve continuous improvements in the quality of human life.
- Foster sustainable human development through an employment based economic growth strategy.
- Develop integrated area development projects covering capture fisheries, brackish water, aquaculture and coastal forestry and agro forestry.
- Establish cyclone and disaster mitigation measures and infrastructure.
- Develop monitoring mechanisms for ensuring the health of coastal ecosystem and conservation of coastal bio-diversity.

Performance during the Tenth and Eleventh Five Year Plan

During the Tenth Five Year Plan period, an amount of ₹1.00 crore was sanctioned during of 2005-06 for the implementation of Integrated Coastal Area development. Against this, an amount of ₹0.93 Crore was utilized.

During the Eleventh Five Year Plan, an amount of ₹5.00 crore was proposed for taking up works mainly by Forest department, Agriculture department and other Allied departments. However, no programme was sanctioned and the amount was not utilized.

Twelfth Five-Year Plan Proposed Programmes

More than half of the world's population lives within 60 km of the sea, and three quarters of all large cities are located on

the coast. Globally, 60 percent of the world's population lives in Low Elevation Coastal Zones (less than 10 metres above sea level). The Low Elevation Coastal Zones represents 2 percent of the world's area but 10 percent of its population. Coastal zones are the most urbanized with 80 percent of coastal populations living in cities. 14 of the world's 19 largest cities are port cities and Chennai is one of them. Tamil Nadu has a vast stretch of coast, which is very vulnerable.

Major coastal activities: Major coastal activities responsible for coastal/marine pollution in Tamil Nadu are discharge and disposal of treated (1.8 mld)/untreated sewage and industrial wastes; discharge on industrial coolant waters, harbour activities such as dredging, cargo handling, dumping of ship wastes, spilling of cargoes such as chemicals and metal ores, oil transport, fishing activities such as mechanized fishing vessels movements, draining of waste oil, painting of fishing vessels, scrapping of metal lining of fishing vessels, dumping of wastes and trash fishes, oil exploration and oil refining activities, recreation and tourism activities, salt production etc. These can be classified and categorized in different ways according to the nature, source, physical state etc. The most widely known, according to nature and source are sewage, heavy metals, pesticides and oil.

- Coastal area management is an important aspect of land use management given the vast stretch of coastal area in the State. Coastal area rehabilitation, prevention of sea water intrusion, and seawater farming are some of the important strategies. The techniques for rehabilitation of coastal areas consist of planting Casuarina up to 10 m width along the coast and inner areas with cashew nut interspersed with coconut. The plantation gives economic returns after 5 years. The tree species suggested for the regions are: Casuarina equisetifolia, Cocos nucifera, Ficus spp. Calophyllum inophyllum, Anacardium occidentale, Mangifera indica, Thespesia



populnea etc. and among grasses – Sporobolus spp., Cynodon dactylon, Panicum maximum, Cenchrus spp. Chloris spp., etc. Shelterbelt plantations and Mangroves protect the shore from the sea and the sea from the shore besides enriching the eco system. Studies conducted after Tsunami struck the coast, indicated that the villages which had the protection of Mangrove forests and shelterbelt plantations in Pudukottai, Nagapattinam and Cuddalore etc., districts suffered minimum damage to the property and minimum loss of lives compared to the villages which had no protection from bio shields. The Shelterbelts shall be developed in consultation with experts by planting tree and shrub species. Similarly Mangroves shall also be developed in the coastal area with different species.

- Seawater Intrusion Monitoring System: This project aims to install a “Seawater Intrusion Monitoring System in Tamil Nadu”. A network of 300 observation piezometers along the 902 km coastal line of Tamil Nadu will be installed; monthly water quality samples will be taken and analysed; the extent and rate of sea water intrusion will also be monitored on monthly basis: the outcome of the monitoring will be used to mitigate the seawater intrusion by taking suitable mitigation measures like regulation and groundwater schemes in vulnerable areas. This project is vital for the state as the seawater intrusion is practically irreversible and prevention is the only way-out.
- Coastal areas have to be earmarked for fishery activities such as aquaculture, infrastructure development, etc. Remote Sensing and Geographical Information system (GIS) shall be used for identifying the potential areas for all fishery related activities along the coastal line. Unutilized/ Defunct salt pans can be used for integrated fish farming. The defunct and unutilized salt pans have to be earmarked. Coastal lands need to be earmarked for creating shore based infrastructure facilities such as cold storages, provision of communication (road network), open water aquaculture, fish drying, drying fish nets, berthing of fishing crafts, construction of whole sale / retail fish markets, etc., in the existing fishing harbors and landing centres and also the traditional land area practices and access to coastal land of Fisheries needs to be protected. Freshwater aquaculture/Brackish water aquaculture potential areas should be vested with Fisheries Department. This will enable the Fisheries Department to use these resources in a sustainable manner for the benefit of fishermen community. Flood plain area can be used for fish seed rearing for a short duration - may be for 3 to 4 months, during the non-flood period. The flood plain areas in Tamil Nadu have to be identified and earmarked for this purpose. This activity can empower alternative employment opportunities to the fisherwomen in fish seed rearing.
- Sea grass and seaweeds: Sea grasses occur in the inter tidal and mid tidal zones of shallow and sheltered areas of sea, gulf, bays, backwaters and lagoons. They are submerged monocotyledonous plants and are adapted to the marine environment for the completion of their life cycle under water. They form a dense meadow on sandy and coral rubble bottom and sometimes in the crevices under water. Training shall be imparted to the fisher women on the cultivation of Seagrass and seaweeds for various ends – products with an efficient buy-back system.
- Minor ports should be developed in the coastal area where the potential for fishing is very less.
- The Coastal Area Development Programme is very much inter-twined with the Disaster Mitigation Measures. The suggested safety measures in coastal areas are :
 - Construction of cyclone shelters.
 - Plantation of mangroves and coastal forests along the coastline.



- Development of a network of local knowledge centers (rural/urban) along the coastlines to provide necessary training and emergency communication during crisis time
- Construction of location specific sea walls and coral reefs in consultation with experts.
- Development of well-designed break waters along the coast to provide necessary cushion against cyclone and tsunami hazards.
- Development of tsunami detection, forecasting and warning dissemination Centers.
- Development of Bio-Shields - The narrow strip of land along the coastline of Tamil Nadu is highly vulnerable to natural calamities. Their impact can be mitigated by carefully designed windbreaks with appropriate tree vegetation, namely Bioshields. These locations may also have public spaces for awareness generation and demonstration of safety measures.
- Identification of vulnerable structures and appropriate retrofitting for tsunami/ cyclone resistance of all such buildings as well as appropriate planning, designing, and construction.

Proposed Outlay for the Twelfth Plan period is ₹10.00 crore.

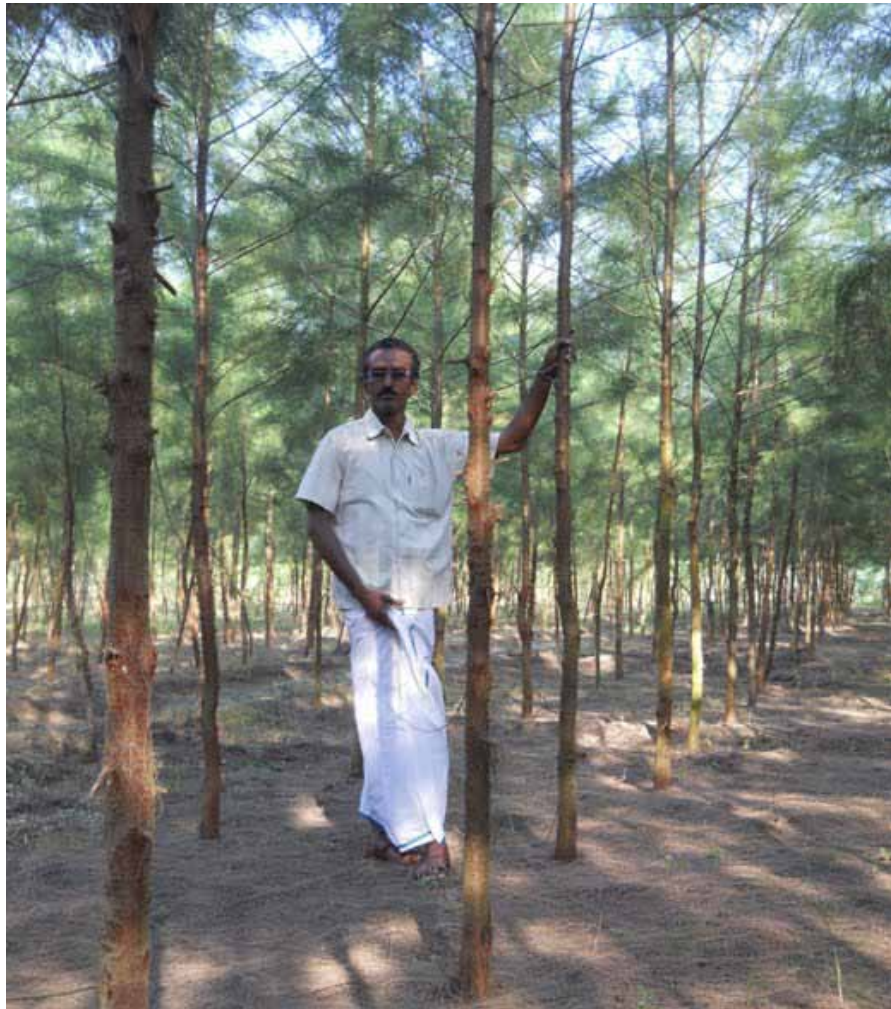


Fig. 15.3.14: Windhardy Casuarina