

Soil, water and biomass are vital natural resources for human survival. The growing population in the world and increasing demand are placing tremendous pressure on these resources, which results in fast depletion of these resources in many countries posing serious problems to agriculture sustainability, livelihood opportunities and vulnerable communities. Soil, water and biomass conservation including micro-scale water resource development is the foundation of any watershed development programme. The Watershed approach represents the principle carrier for transfer of rainfed agriculture. A watershed is a geographic area that drains to a common point, which makes it an ideal planning unit for conservation of soil, water and biomass; and encourage the sustainable development of the area by empowering people at the local level to manage their own resources. Watershed development provides immense scope for effective integration of various sectoral programs, primarily based on a “ridge to valley” approach. Integrated watershed management is a prerequisite not only for land, water, and biomass management of degraded areas but also for improving the livelihood of farmers as well as for conservation of areas so that biodiversity is protected for future generations.

Food security and social security are the two vital linkages of stability and wellbeing of man-kind. Anyone who has concern for the ‘mother earth’ and ‘future generation’ cannot be a silent spectator to the excessive greediness of certain human beings for mere economic motives at the cost of our food and social security. Increasing biotic pressure, absence of appropriate technology, lack of strong policy and public participation coupled with the lack of proper understanding of environmental inter-linkages etc. have led to progressive decline of natural resources and environment. Sustainable development has been the key objective of development strategies since 1970s.

The increasing human and livestock population is continuously exerting pressure on the natural resource base for land, food, fuel and fodder. Due to ever increasing extension of agricultural land towards the marginal and steep hill slopes, deforestation, erosion and many such ill-effects on local environment have been on the rise. Faced with immediate survival needs, local people often have no alternative and are being involved in extracting more natural resources. The forests have been ruthlessly over-exploited by both the legal and illegal encroachments. Consequently, forest depletion has accentuated further soil erosion, decline in land productivity and mounting dearth of fuel, fodder and water resources. People who sustain their livelihood on the utilization of such fragile environment and natural resources have over exploited these resources over a period of time and they have further eroded the resource base on which they must subsist.

Among the various environmental issues, accelerated rate of soil erosion, massive deforestation, productivity decline, drying up of large number of springs, climatic

changes etc. have stood as the main threats to the environment. All these go a long way towards influencing the conditions of development. Thus human interference has caused a decrease in forest land ratio. Many efforts have been made in order to maintain the productivity of land resources after the initiation of the five year plan in the country. The output of such resources has also increased by many folds, but in practice most of the people in mountain and hill regions still suffer from malnutrition. In short, backwardness of a region is not caused by lack of resources but by the problem of resource development and management.

High level of coordination strongly associated with high quality of communication is necessary between the various stakeholders involved in participatory natural resource management. Forward and backward linkages between the various organisations (such as PRI, transferred institution, NHG, watershed committee etc.) has to be assured for achieving the coordination towards the common goal. Separate strategy has to be worked out to participate different strata of society incorporating diverse interests and various hydrological units including private land, water resources, drainage line, government land, etc. The new opportunities for natural resource management emerging during the 12th plan need to be seized and provided with socio political impetus in the above line for watershed management to take root in the state.

The Integrated Watershed Management Programme (IWMP) is planned with an aim of integrated sustainable eco-friendly development of the rural areas of the country. The objective of the Integrated Watershed Management Programme (IWMP) is to attach locally available natural resources in an optimum manner to achieve the overall goal of sustainable development in the area. These objectives can be realized by conserving, protecting and restoring the ecological balance by developing natural resources and by preventing soil erosion, degradation of top soil cover, regeneration of natural vegetation, rain water harvesting and recharging of the ground water table. The programme also gives specific importance to the productivity enhancement of agriculture/horticulture/animal husbandry activities and innovative sustainable livelihood development of the community. The activities for resource development and usage will be planned to promote farming and allied activities to promote local livelihoods while ensuring resource conservation and regeneration.

Sustainable development of an economy depends on many factors. Especially the critical sector like agriculture plays a key role not only for the development but also for livelihood security. India is no exception to this phenomenon. The progress in agricultural sector in India during the past 60 years has been significant by changing the food shortage situation to the surplus state.

However, the increasing population, development of other sectors and the liberalized trade policies pose greater challenge to agricultural sector. This situation becomes more complex when the resources especially land and water, available for agricultural sector is shrinking day by day due to its competing uses.

Watershed Development Programmes - Kerala experience

Watershed development programmes are being implemented in Kerala for the last three decades or more by central and state agencies and a host of Non-Governmental Organizations. The Western Ghats Development Programme (WGDP) was the beginning point as far as the state was considered. This is followed by the Integrated Wasteland Development programme, Hariyali and now the Integrated Watershed Management Programme (IWMP) implemented through the Rural Development Department. Departments like the Agricultural Department, Land Use Board & Soil Survey Department are also engaged in watershed development activities. Various NGOs also are in the field taking up projects funded by central and state agencies. The concept regarding watershed development has undergone considerable change during this period. The treatments carried out by the different agencies differed at conceptual and implementation levels. This has generated a lot of debate regarding the effectiveness of the development programmes being implemented.

Watershed development programmes were aimed at land and water management, emphasis being on enhancing water availability. The ridge to valley treatment mainly includes civil engineering works like gully plugging, contour bunding, terracing construction of water percolation pits etc. These were aimed at enhancing water availability and improving the ground water recharging as well as reducing soil erosion. To further enhance water retention & improve the biomass cover, tree planting including social forestry activities were resorted to. All these activities were expected to support agricultural activities. More area was brought under cultivation and agricultural productivity and agricultural production increased subsequently.

Relevance of Watershed Management in Kerala

The relevance of watershed management in Kerala is established for the following reasons.

1. Steep slopes.

90% of the geographical area of the State comes under the midland and hilly regions with steep slopes making the area more prone to erosion hazards.

2. Unscientific agricultural practices.

The increase in density of population has resulted in people migrating to the hilly and forest areas resulting in drastic changes in the agricultural setup and land use of the State. The unscientific land use, change in cropping pattern, deforestation, etc. due to the encroachment hastened deterioration of the natural resources.

3. Intense rainfall confined to relatively lesser number of days.

Even though the State receives more than 3000mm of annual rainfall, the rainwater is not conserved or utilized effectively because of the improper water conservation and rain water harvesting measures. The per capita availability of water in the State is far below than the States of Rajasthan, Gujarat, etc.

4. Degradation of upper catchments

Degradation of upper catchments due to human interference resulting in drying up of river and siltation of reservoirs.

5. Rapid land use change

Rapid land use change due to deforestation, plantation crops and setting up of human habitations.

6. Fast running and short rivers

Most of the rivers of the State originate from the Western Ghats. Because of the steepness of the hill slopes and minimal horizontal distance to the sea, rainwater flows rapidly to the sea as soon as it reaches the ground.

7. Unscientific human interventions

Sand mining,destabilization of hill slopes,filling of wetlands and marshes for commercial and industrial purposes, conversion of paddy lands for cultivation of other cash crops and nonagricultural purposes are the common human interventions encountered in the State leading to instability of the natural ecosystem

8. Degradation of forest resources.

The forest area lying adjacent to human settlements are being subjected to rapid degradation due to human interventions.

9. Flood and drought

Though Kerala is receiving more than 3000 mm rainfall the State is facing intermittent drought and flood due to unscientific land utilizationand soil and water conservation practices.

10. Soil Erosion

About 9.5lakh ha of land is prone to severe erosion in the State. Annually around 15 tons of soil is lost from 1ha of such land. At the same time the formation of one inch of soil require around 1000 years.

11. Ground water scenario of the state.

Because of the over exploitation of the ground water resources, 5 blocks have been classified as over exploited, 15 blocks as critical and 30 blocks as semi critical. Besides this deterioration, critical levels of iron, NO₃ and fluoride has been noticed in some places.

Principles of Watershed Management

Sound watershed management means controlling floods and reducing land degradation as well as improving livelihood of farmers. The main principles of watershed management are given below:

1. Utilizing the land according to its carrying capacity.
2. Maintaining adequate vegetative cover particularly during the rainy season
3. Conserving maximum possible rainwater at the place where it falls
4. Draining out excess water with a safe velocity to avoid soil erosion and diverting it to storage tanks for future use

5. Preventing gully formation and checking at suitable intervals to control soil erosion and recharge groundwater
6. Maximizing productivity per unit area, per unit time, per unit of water
7. Increasing cropping intensity and land equivalent ratio through intercropping and sequential cropping
8. Safe utilization of marginal lands through alternative land use systems
9. Ensuring sustainability of the ecosystem benefiting the man-animal-plant-land-water complex in the watershed
10. Maximizing the combined income from the interrelated and dynamic crop-livestock-tree-labour complex over the years
11. Stabilizing total income and cutting down risks during aberrant weather situations,
12. Improving infrastructural facilities with regard to storage, transportation, and marketing, systematic and proper delineation of the watersheds,
13. Emphasizing locals initiatives and acknowledging larger public interest,
14. Taking long-term approach to use the best available scientific information and
15. Formulation of action plans based on an ecosystem approach.

Even after withdrawal of economic resources, technical expertise and infrastructure if the program survives, then it is sustainable. Hence it is important to note that People's participation right from pre-planning stage along with local level people's institution is required.

Need and scope for watershed development

A large portion of the rainfed areas (65 per cent of arable land) in India is characterized by low productivity, high risk and uncertainty, low level of technological change and vulnerability to degradation of natural resources. The rainfed region houses a sizable number of unemployed, poverty ridden and undernourished population. The majority of the population in the region is depending on agriculture.

Water is critical for rainfed areas. Not because of scarcity per se but lack of proper management that accelerates shortages.

Broadly, the rain fed areas are confronted with two major technical and water-related problems:

- (i) heavy and intense rainfall and surface run-off during the monsoons leading to soil erosion and siltation or pollution of water bodies in downstream, and
- (ii) severe drought in the summer season leading to acute scarcity of water for post-rainy season crops.

These two extreme eventualities need to be managed for enhancing agricultural productivity, augmenting income and preventing degradation of soil and water resources. The watershed programme was initiated with the basic premise to overcome such anomalies in the country. It was viewed as the key programme, which could meet the emerging and complex challenges of rainfed areas: deplorable poverty, huge unemployment and acute degradation of natural resources. The programme was

reckoned as a catalyst to bring the second-generation green revolution in the rainfed areas. The programme was expected to benefit the poor marginal farmers and bridge the gap between irrigated and rainfed areas.

The Integrated Watershed Management Programme (IWMP) was taken up to reduce the severity of drought especially in dry lands and bring them under productive use through soil conservation and other water resource development activities such as construction of major and minor check dams, percolation ponds, renovation of tanks, farm ponds, developing agro forestryplantation, horticulture, tree plantation, home-stead plantation etc.

The main objectives of the IWMP are

- (i) to promote the overall economic development and improvement of the socioeconomic conditions of rural poor people in the programme areas through optimum utilization of resources,
- (ii) generation of employment and
- (iii) Augmentation of other income generating activities.

Further, it also aims at encouraging restoration of ecological balance in the village through simple, easy and affordable technological and sustained community action (peoples' participation).

All these would result in overall uplift of poor and disadvantaged sections of the community.

Watershed approach to IWMP

The watershed approach has conventionally aimed at treating degraded lands with the help of low cost and locally accessed technologies such as in-situ soil and moisture conservation measures, afforestation etc. and through a participatory approach that seeks to secure close involvement of the user-communities.

The broad objective was the promotion of overall economic development and improvement of the socio-economic conditions of the resource poor sections of people inhabiting the programme areas. Many projects designed within this approach, at different points of time, were taken up by the Government of India. The Drought Prone Area Programme (DPAP) and the Desert Development Programme (DDP) were brought into the watershed mode in 1987. The Integrated Wasteland Development Programme also aimed at the development of wastelands on watershed basis. Other major programmes now being implemented through this approach are the 'National Watershed Development Project for Rainfed Areas' (NWDPA) and the 'Watershed Development in Shifting Cultivation Areas' (WDSCA) of the Ministry of Agriculture (MoA). While the focus of these programmes may have differed, the common theme that underpinned their structure has been the basic objective of land and water resource management for sustainable development of natural resources and community empowerment. Prof. Hanumanta Rao Committee, constituted by the Ministry of Rural Development (MoRD) studied the implementation and impact of the Drought Prone Area Programme and

Desert Development Programme all over the country and recommended a common set of operational guidelines, objectives, strategies and expenditure norms of watershed development projects integrating the futures of these programmes under the Ministry of Rural Development (MoRD). Accordingly, the guidelines of Watershed Development were framed and brought into force with effect from 1st April 1995 and subsequently reformulated the guideline by 2001. Currently the common guidelines were issued by the Government of India to implement the programme. Now separate agency has been identified at the State level as well as at the district level to effectively implement and monitor the programme.

However, the concept of Watershed Association and Watershed Committee at the village level was retained for implementing the projects under these programmes. The Ministry of Rural Development is committed to empower Panchayat Raj Institutions (PRIs) and has been impressing upon the State Governments to devolve necessary financial and administrative powers to the PRIs for self-governance particularly in planning, implementation and management of economic development activities in rural areas. Watershed Development has been included in the list of subjects to be devolved to the PRIs. The institutional frameworks of Watershed Association and Watershed Committees for the implementation of Watershed Development Programmes are being perceived as parallel bodies, with very little coordination between them and the Gram Panchayats / Grama Sabhas. With the devolution of necessary powers, the Gram Panchayats / Grama Sabha are expected to perform far better than the Watershed Associations / Committees since they are:

- i. equipped with statutory rights and mandate for natural resource planning,
- ii. have potential to plan according to people's wishes and integrate watershed management into wider development activities,
- iii. have capacity to draw on the services of the departments in an integrated manner and press for political pressure on line departments at higher levels,
- iv. potentially equipped with the powers to impose local taxes or user charges, and
- v. Committed to "reservations" for representation of women and weaker section as per the Constitutional provisions.

Thus, it is necessary to bring in suitable modifications and amendments to the existing institutional framework for implementation of Watershed Development Programmes so that the Ministry of Rural Development can fulfill its constitutional obligation of empowering PRIs. With this objective, the Prime Minister of India launched a new initiative called HARIYALI on 27th January 2003, which seeks to empower the PRIs both administratively and financially in the implementation of the Watershed Development Programmes of the Ministry of Rural Development. Accordingly, the Ministry has modified the existing provisions and brought out Guidelines for the new initiative. These Guidelines are called the Guidelines for Hariyali and are applicable to Integrated Wastelands Development Programme, Drought Prone Areas Programme and Desert Development Programme and any other Programmes notified by the Government

of India. Now the common guidelines were followed for implementation of the programmes under IWMP since 2008.

The programme has been designed in such a way that it encourages peoples' participation in all the stages of project implementation. The programme activities therefore have to be evaluated at different stages in order to have clear understanding about the status of implementation and the impact on soil-moisture conservation by undertaking the works viz., contour bunding, landleveling, summer ploughing; drainage line treatment activities such as construction of major and minor check dams, retaining wall and gully control measures; water resource development measures through percolation pond, renovation of tank, cattle pond and farm pond, afforestation and pasture development through developing social forestry, avenue plantation, fruit plantation, fodder development etc.; and other activities such as coir pith compost training, sericulture, homestead plantation, formation of self-help groups and other community organizational activities etc.

Key features of IWMP

It is in this context that in co-ordination with the Planning Commission, an initiative has been taken for Watershed Development Project in order to have a unified perspective by all Ministries. Hence common guidelines were formulated under IWMP, applicable to all Watershed Development Projects in all Departments. These guidelines broadly indicate a fresh frame work for the next generation watershed programmes.

The key features of this new unified approach is broadly outlined as follows:

- i. Delegating power to States
- ii. Dedicated Institutions
- iii. Financial Assistance to Dedicated Institutions
- iv. Specified Duration of Programme
- v. Livelihood Orientation
- vi. Cluster Approach
- vii. Scientific Planning
- viii. Capacity Building
- ix. Multitier Approach

Guiding Principles of IWMP

The common guidelines for watershed development projects are based on the following principles:

- I. **Equity and Gender Sensitivity:** Watershed Development Projects should be considered as levers inclusiveness. Project Implementing Agencies (PIAs), must facilitate the equity processes such as a) enhanced livelihood opportunities for the poor through investment in their assets and improvements in productivity and income, b) improving access of the poor, especially women to the benefits, c) enhancing role of women in decision making processes and their representation

- in the institutional arrangements and d) ensuring access to usufruct rights from the common property resources for the resource poor.
- II. **Decentralization:** Project management would improve with decentralization, delegation and professionalism. Establishing suitable institutional arrangements within the overall framework of the Panchayat Raj Institutions (PRIs), and the operational flexibility in norms to suit varying local conditions will enhance decentralization. Empowered committees with delegation to rationalize the policies, continuity in administrative support and timely release of funds are the other instruments for effective decentralization.
 - III. **Facilitating Agencies: Social** mobilization, community organization, building capacities of communities in planning and implementation, ensuring equity arrangements, etc. need intensive facilitation. Competent organizations including voluntary organizations with professional teams having necessary skills and expertise would be selected through a rigorous process and may be provided financial support to perform the above specific functions.
 - IV. **Centrality of Community Participation:** Involvement of primary stakeholders is at the centre of planning, budgeting, implementation and management of watershed projects. Community organizations may be closely associated with and accountable to Gram Sabhas in project activities.
 - V. **Capacity Building and Technology Inputs:** Considerable stress would be given on capacity building as a crucial component for achieving the desired results. This would be a continuous process enabling functionaries to enhance their knowledge and skills and develop the correct orientation and perspectives thereby becoming more effective in performing their roles and responsibilities. With current trends and advances information technology and remote sensing, it is possible to acquire detailed information about the various field level characteristics of any area or region. Thus, the endeavour would be to build in strong technology inputs into the new vision of watershed programmes.
 - VI. **Monitoring, Evaluation and Learning:** A participatory, outcome and impact-oriented and user-focused monitoring, evaluation and learning system would be put in place to obtain feedback and undertake improvements in planning, project design and implementation.
 - VII. **Organizational Restructuring :** Establishing appropriate technical and professional support structures at national, state, district and project levels and developing effective functional partnerships among project authorities, implementing agencies and support organizations would play a vital role.

In order to implement effectively, under the umbrella of State Level Nodal Agency (SLNA) various institutional mechanisms are formed. They are:

- i. Watershed Cell cum Data Center (WCDC)
- ii. Project Implementation Agency (PIA)
- iii. Watershed Development Team (WDT)
- iv. Watershed Committee (WC)
- v. Neighbourhood Groups (NHGs)
- vi. Self Help Groups (SHGs)
- vii. User Groups (UGs)

Major activities of Watershed Development Programme are sequenced into well-defined three phases. The three phases are:

- i. Preparatory Phase
- ii. Works Phase
- iii. Withdrawal Phase

Preparatory Phase

The major objectives of this phase are to build appropriate mechanisms for adoption of participatory approach and empowerment of local institutions (WC, SHG, and UG). WDT will assume a facilitating role during this phase. In this phase, the main activities will include:

- a. Taking up entry point activities to establish credibility of the Watershed Development Team (WDT) and create with the village community. The entry point activities, *inter-alia*, will include
 - i. Works based on urgent needs of the local communities such as revival of common natural resources, drinking water, development of local energy potential, augmenting ground water potential etc.
 - ii. Repair, restoration and upgradation of existing common property assets and structures (such as village tanks) may be undertaken to obtain optimum and sustained benefits from previous public investment and traditional water harvesting structures.
 - iii. Productivity enhancement of existing farming systems could also be an activity that helps in community mobilization and building rapport.
- b. Initiating the development of Village level institution such as Watershed Committee (WCs), Self-Help Group (SHGs) and User Group (UGs) and capacity building of different stakeholders on institutional and work related aspects.
- c. Environment building, awareness generation, undertaking of intensive IEC activities, creating involvement and participatory responses.
- d. Baseline surveys needed for preparation of Detailed Project Report (DPR), selection of sites and beneficiaries. Every effort must be made to collect gender-disaggregated data to adequately reflect the situation and priorities of women.

- e. Hydro-geological survey of the watershed to map out zones of potential ground water recharge, storage and sustainable ground water utilization.
- f. Building up a network of technical support agencies.
- g. Preparation of the DPR, including activities to be carried out, selection of beneficiaries and work-sites and design and costing of all works, ensuring that the interests, perceptions and priorities of women, dalits, adivasis and landless are adequately reflected in the DPR
- h. Working out detailed resource-use agreement (for surface water, ground water and common/ forest land usufructs) among User Group members in a participatory manner based on principles of equity and sustainability.
- i. Participatory monitoring of progress and processes.

Watershed Works Phase

This phase is the heart of the programme in which the DPR will be implemented. Some of the important activities to be included in this phase are:

- a. Ridge Area Treatment: All activities required to restore the health of the catchment area by reducing the volume and velocity of surface runoff, including regeneration of vegetative cover in forest and common land, afforestation, staggered trenching, contour and graded bunding, bench terracing etc.
- b. Drainage line treatment with a combination of vegetative and engineering structures, such as earthen checks, brushwood checks, gully plugs, loose boulder checks, gabion structures, underground dykes etc.
- c. Development of water harvesting structures such as low-cost farm ponds, nalla bunds, check-dams, percolation tanks and ground water recharge through wells, bore wells and other measures.
- d. Nursery raising for fodder, fuel, timber and horticultural species. As per as possible local species may be given priority.
- e. Land development including in-situ soil and moisture conservation and drainage management measures like field bunds, contour and graded bunds fortified with plantation, bench terracing in hilly terrain etc.
- f. Crop demonstrations for popularizing new crops/varieties, water saving technologies such as drip irrigation or innovation management practices. As far as possible varieties based on the local germplasm may be promoted.
- g. Pasture development, sericulture, bee keeping, back yard poultry, small ruminant, other livestock and micro-enterprises.
- h. Veterinary services for livestock and other livestock improvement measures.
- i. Fisheries development in village ponds/tanks, farm ponds etc.
- j. Promotion and propagation of non-conventional energy saving devices, energy conservation measures, bio fuel plantations etc.

Consolidation and Withdrawal Phase

In this phase the resources augmented and economic plans developed in Phase II are made the foundation to create new nature- based, sustainable livelihoods and raise productivity levels. The main objectives under this phase are:

- a. Consolidation and completion of various works.
- b. Building the capacity of the community based organizations to carry out the new agenda items during post project period.
- c. Sustainable management of (developed) natural resources and
- d. Up-scaling of successful experiences regarding farm production systems/off farm livelihoods.

An indicative list of various activities during this phase is given below:

i. Consolidation of various works

- a. Preparation of project completion report with details about status of each interventions;
- b. Documentation of successful experiences as well as lessons learnt for future use.

ii. Management of developed natural resources

- a. Improving the sustainability of various interventions under the project;
- b. Formal allocation of users right over common property resources (CPRs);
- c. Collection of user charges for CPRs;
- d. Repair, maintenance and protection of CPRs;
- e. Sustainable utilization of developed natural resources;
- f. Involvement of gram Panchayat/corresponding institutions (as a governance body) in addressing the above aspects.

iii. Intensification of farm production/systems/off-farm livelihoods

- a. Up scaling of successful experiences related to above aspects through revolving fund under the project as well as credit technical support from external institutions;
- b. Promotion of agro-processing, marketing arrangement of produce and similar off – farm and informal sector enterprises.
- c. Farmers may also be encouraged to develop non pesticidal management, low cost organic inputs, seed farms and links with wider markets to fetch competitive price.

iv. Project Management related aspects

- a. Participatory planning, implementation and monitoring of activities to be carried out during consolidation phase;
- b. Terminal evaluation of project as per the expected outcomes.

DETAILED PROJECT REPORT

A Detailed Project Report (DPR) describe what a Watershed Project will try to achieve over a tenure of watershed project of 4 to 7 years and how it intends to achieve it. DPR is containing the general features of the watershed project, contain an analysis of the current situations of watershed project area and particularly needs of the community with respect to land and water and existing potential in the project area.

Vamanapuram watershed project (IWMP 1) of Vamanapuram block of Thiruvananthapuram district is proposed for four years duration (2012-13 to 2016-17).

Objectives of DPR

PIA decided the following objectives for the DPR.

- To prepare a Simple, Logical, Community Friendly and Comprehensive Detail Project Report following community base participatory approaches involving all segments of communities and stakeholders.
- To develop a livelihood plan through livelihood analysis for optimum utilization of scarce available resources viz. natural, physical, human and financial and analysis of vulnerability in the project.
- To develop a detailed plan for improving agricultural and livestock productivity and to strengthen the micro enterprises in the project area.
- To develop a management grid for convergence with other department and their authorities for pool out the financial resources in the project area.

Methodology adopted

The following methodology adopted for the preparation of DPR.

1. **Rapport building in the project area**– PIA members and TSO devoted sincere efforts in the project area to understand the communities. TSO described about the project to the stakeholders. Through different levels of discussions and field visit, TSO understood the communities, their culture, socio economic status and project area. These efforts helped to establish a rapport in the project area.
2. **Organized Village Meetings** – PIA and TSO organized several meetings at village level and gram Panchayat levels to make aware the communities about the watershed project. Elected representatives and senior officers from the PIA also attended the meetings to motivate the community and develop faith in the project
3. **Base Line Survey** - TSO conducted the household survey in the project area with support of volunteers. The data collected were related to socio-economic status of project area. Secondary data were collected from the records and reports available with line departments.

4. **Participatory Rural Appraisal (PRA)** – This is the second most important tool for primary data collection. TSO carried out PRA in the every project village of the project area to ensure the participation and develop of ownership of project community with the watershed project.
5. **Develop thematic layers of watershed** - TSO developed the thematic layers of the watershed by using GIS and remote sensing technology. These maps help to understand the basic characteristics of the watershed area. The details are given in the coming chapters.
6. **Desk Research** - A systematic and focused desk research and internet assisted search for relevant documents, reports and appraisals were reviewed during preparation of DPR.
7. **Processing and Analysis of Data** - All the collected information from the primary and secondary sources, desk reviews were analyzed and calibrated. The findings of the analysis data have been used for developing vision document, strategy and action plan of the project
8. **Writing of DPR** - A comprehensive report was prepared by the TSO following the prescribed DPR template issued by State Level Nodal Agency.
9. **Sharing the plan in the Grama Sabha** – PIA share the action plan of the concerned GramaPanchayat in the respective Gram Sabha.
10. **Approval** – After approval of Grama Sabha, it will be submitted to Block Panchayat, District Panchayat and State Level Nodal Agency for approval at different tiers.

THIRUVANANTHAPURAM DISTRICT

Thiruvananthapuram District is the southernmost district of the coastal state of Kerala, in south India. It came into existence in the year 1957. The headquarters is the city of Thiruvananthapuram (Trivandrum) which is also the capital city of Kerala. The district has an area of 2,192 square kilometers and a population of 3,307,284 (as per the 2011 census), the second-most populous district in Kerala after Malappuram district. This gives it a ranking of 103rd in India (out of a total of 640 districts). It is the densest district in Kerala with 1,509 people per square kilometer. Its population growth rate over the decade 2001-2011 was 2.25%. Thiruvananthapuram has a sex ratio of 1088 females for every 1000 males, and a literacy rate of 92.66%. It is divided into four taluks, Thiruvananthapuram, Chirayinkeezhu, Neyyattinkara and Nedumangad. The urban bodies in the district are the Thiruvananthapuram Corporation, Varkala, Neyyattinkara, Attingal and Nedumangad municipalities. The district is 33.75% urbanized. More than 50% of the total population depends on agriculture for their livelihood. Agricultural labourers constitute 42% of the total labour class. Most of the people are engaged in low-remunerative pursuits which require very little capital. Political and social consciousness, coupled with the efforts of the social, religious and cultural leaders, have helped to pull down the age-old feudal order. Economic changes have also affected the social life and attitude of the people.

Geography

The district is situated between North latitudes at 8°17'– 8°54' and East longitudes 76°41' – 77°17'. The southern-most extremity, Kaliyikkavila is just 54 kilometres away from the southern peninsular tip of India, Cape Comorin (KanyaKumari). The district stretches 78 kilometres along the shores of the Arabian Sea on the West, Kollam district lies on the North with Thirunelveli and Kanyakumari districts of Tamil Nadu on the East and South respectively. Unlike the flat portion of the Kerala coast, at the northern coastal region of the district, cliffs are found adjacent to the Arabian Sea at Varkala. It is the only part in southern Kerala where cliffs were found. These tertiary sedimentary formation cliffs are considered as a unique geological feature. It is known among geologists as the "Varkala Formation" and a geological monument as declared by the Geological Survey of India.

Flora and fauna

The district has a rich variety of plants ranging from rare orchids, medicinal plants and spices to hedge plants, tuber crops, plants yielding edible fruits and fibre. Aromatic plants and spices such as pepper and ginger are cultivated on a large scale on the hilly tracts. Nedumangad taluk is one of the biggest centres of cultivation and trade of pepper and other hill produce. A major portion of the district comes under the middle plain and the region is under the cultivation of coconut, rice, tapioca, tuber crops, plantains and vegetables.

The forests of the district abound in a variety of animals and birds and are excellent wildlife habitats. Elephants, bisons, monkeys and rare species of reptiles have the place of prominence in them. The Neyyar reservoir and nearby areas abound in wild life. Nestled in the lap of the Western Ghats, a wildlife sanctuary is quickly growing over an area of nearly 777 square kilometres around this reservoir.

Rivers

Among the three rivers in the district, the Neyyar (56 km or 35 mi), the southernmost river of the Kerala state, has its origin in the Agasthyamala, the second-highest peak in the Western Ghats. The Karamana River (67 km or 42 mi) originates from Vayuvanthol (Vazhuvanthol), another mountain in Western Ghats, and the Vamanapuram River has its origin from Chemunji Mottai of the Western Ghats. There are 10 major back waters in the district. The major lakes are Veli, Kadinamkulam, Anchuthengu (Anjengo), Kaappil, Akathumuri and the Edava-Nadayara lakes. Besides these, there is a fresh-water lake at Vellayani in Thiruvananthapuram taluk, which has the potential to become the major water source of Thiruvananthapuram city in future.

Climate

The climate of Thiruvananthapuram district is generally humid tropical. The large forest reserves favourably affect the climate and induce rains. Cold weather is experienced in the mountain ranges, whereas lower down, the weather is bracing and is generally hot in the coastal regions. The mean maximum temperature is 35 °C and the mean minimum temperature is 20 °C. As the district stretches from north to south with the Arabian Sea in the west side, the relative humidity is generally high. It rises up to about 95% during the South-West monsoon. The total annual average rainfall in the district is about 1,500 mm per annum. The southwest monsoon, from June to September is the principal rainy season. The district receives most of its annual rainfall in this season. The second rainy season is the North-East monsoon. It is from October to November. The district also gets thunderstorm rains in the pre-monsoon months of April and May. December to February are the coolest months. The average temperature goes down to 20 °C in these months. It is generally considered as the winter season. The summer season starts in February and continues until May.

Agriculture

Agriculture has been the primary occupation of the people of the district. Cultivable land may be classified as wet, dry, garden and plantations. Rice is the most important crop cultivated in the wet lands. Tapioca and pulses are the important dry-land crops. Coconut, one of the most important crops of the district, is cultivated in an area of 843.08 km². The annual production is about 516 million coconuts. Rubber cultivation is mainly confined to Nedumangad taluk. At present, there are about 269.99 km² of rubber plantations and the annual production is estimated at 30,717 tonnes.

Development Blocks

There are 11 development blocks in the district, viz. Parassala, Perumkadavila, Athiyanoor, Nemom, Pothencode, Vellanad, Nedumangad, Vamanapuram, Kilimanoor,

Chirayinkeezhu and Varkala. The District Rural Development Agency co-ordinates the work in these blocks. Several welfare schemes are carried out in the blocks, such as: Swarnajayanti Gram SwarozgarYojana (SGSY), SampoornaGrameenRozgarYojana (SGRY), Total Sanitation Scheme (TSS), Rural Infrastructure Development Fund (RIDF), Prime Minister's GramSadakYojana (PMGSY), Indira AwaazYojana (IAY), etc.

VAMANAPURAM WATERSHED

The Vamanapuram watershed lies between 8^o35' to 8^o50' North latitudes and 76^o40' to 77^o15' East longitudes and is spread over the districts of Thiruvananthapuram and Kollam of Kerala State. It is bounded by Kottarakara taluk of Kollam district in the North, Nedumangad taluk of Thiruvananthapuram district in the south, Tamil Nadu in the East and Arabian sea in the West. The watershed has a total area of 766.89 sq.km (76689 ha) covering 31 villages spread over 33 Panchayats, 8 blocks and two districts.

Physiography

The Vamanapuram River emerges from the Chemmunji Motai at 1717 m above MSL and flows into the Anjengo lake at Chirayankeezhu. The general elevation ranges from 76m to 1717 m in the upper region, 45 m in the middle region to less than 4 m the lower region.

The Vamanapuram River emerges from the South eastern portion of the watershed. After traversing a distance of 7 km, it receives the Kalaiparai Ar. From Kallar, the river takes a slightly meandering course till its confluence with the upper Chit Ar. The river then flows west wards upto Manjappara. It continues the course till Choodal, where the Chit Aar joins the main river. From there it meanders westwards till Vamanapuram where the SH-1 road crosses it. The river again flows westwards and falls into the Anjengo lake at Chirayankeezhu.

The broad landforms at the upper region include low hills with isolated hillocks and lateritic mounds. The land forms of the middle region include midland laterites with valleys and low hills with isolated hillocks. The landforms at the lower region are coastal laterites.

The shape of the watershed is almost elliptical with a length width ratio of 2:1

Drainage

The major river draining through the watershed is the Vamanapuram River which has a length of 88 km. It starts from Chemmunji Motai and flows westward to fall into the Anjengo lake. The tributaries of this river are Kalaiparai Ar, Chit Ar, Pannavadai Ar, Manjappara river, Sarkara Ar, Kall Ar, Manjadimoodu Thodu, Tholikuzhi thodu, Mulakkara thodu, Vanjina thodu, Kurinchilakadu thodu, Chittar thodu and Parandam thodu. The drainage pattern appears to be dendritic.

Water Resources

Surface Water Resources

The major river of this watershed is the Vamanapuram River. The combined total yield and the annual utilizable yield of Vamanapuram, Ayirur and Mamom are 1324 Mm³ and 889 Mm³ respectively. The river has thirteen tributaries, including major and minor ones. Kozhithottam Kayal and Mungottu Kayal occupy the western part of the watershed.

Ground water resources

The area falls in the category of 'white' which means that only less than 65 percent of the ground water is utilized. There is no restriction for further development. The area under Chirayinkeezhu block will be in the category of 'dark' in the near future. The Eastern part of the upper region of the watershed is suitable for domestic wells whereas the Western part is suitable for large diameter dug wells. The middle region is suitable for large diameter dug wells. The lower region is suitable for heavy duty as well as medium capacity tube wells.

Watershed Delineation

The Vamanapuram Watershed is divided into 30 sub-watersheds and 52 micro watersheds.

Special Problems

1. The villages Pangode, Pullampara, Kallara and Peringamala of Vamanapuram block and Vellaloor of Chirayinkeezhu block have shown indications of land slips/landslides.
2. The erosion status of the area is moderate to severe.
3. A small portion of the forest land in the middle and upper region is of degradable nature.
4. The area experience stream bank erosion along the river course. The severity of stream bank erosion is observed in the middle and lower regions.
5. The stage of development of groundwater is more than 45% in Chirayinkeezhu block.

VAMANAPURAM BLOCK

Vamanapuram Block Panchayat is the largest block in Thiruvananthapuram district. It is situated in Nedumangad Taluk and has an area of 421.15 Sq. Km. (19.22% of total area of the district) There are 8 Grama Panchayat viz. Vamanapuram, Kallara, Nellanad, Pullampara, Pangod, Manickal, Nanniyod and Peringamala and 11 Villages viz. Vamanapuram, Kallara, Nellanad, Pullampara, Pangod, Kurupuzha, Palode, Peringammala, Thenoor, Manickal and Koliyakode under the jurisdiction of the block. The block panchayat has 15 block divisions. The block has a secretary (Block Development Officer), Joint Block Development Officers, Extension Officer and supporting staff at its office to perform the day to day activities.

The total population of the block as per 2001 censuses is 203349 of which 105194 are male and 115155 are female. The population density is 523 and sex ratio is 1056. The literacy ratio of this block is 89.12 percentages. Venjaramood is the major town which is situated 30 km from district headquarters on the way to Kottarakkara.

The physiography of the block includes low hills with isolated hillocks, laterite mounds and valleys. The eastern part of the block is under reserve forest.

There are a number of schools upto higher secondary levels in the block. There are two Arts and Science Colleges, one Engineering college, one medical college, one Ayurveda College and several other educational institutions. Ponmudi Hill Station, Santhigiri Ashramam, Pirappancode International Swimming Pool, Happy land Amusement park, Jawaharlal Nehru Tropical Botanic Garden and Research Institute, etc. are situated in this block.

The State Highway-1 passes through the western part of the block. The block has excellent transport network and is well connected to all parts of the district including state capital. The block does not find any place in the railway map.

Agriculture is the primary occupation of the people of the block. Cultivable lands are classified as wet, dry, garden and plantations. Rubber is the major plantation crop in the block. Coconut, Banana, Vegetables are also cultivated. The major river draining through the block is the Vamanapuram River. The block falls in the category of 'white' which means that less than 65 percent of the ground water is utilized.

Table.3.1 Demographic details of Vamanapuram Block

Name of Panchayath/Block	Area (in Sq. Km)	No. of House Holds	Density of population (Sq. Km.)	Total Population			Scheduled Castes			Scheduled Tribes		
				Person	Male	Female	Person	Male	Female	Person	Male	Female
Kallara	39.48	6354	653	25779	12080	13699	2916	1371	1545	11	7	4
Manikkal	33.34	8562	1088	36264	17553	18411	4852	2309	2543	57	23	34
Nanniyode	38.85	7262	725	28177	13406	14774	3181	1518	1663	5441	1162	1279
Nellanad	18.46	5820	1332	24593	11746	12847	3549	1697	1852	4	2	2
Pangode	23.31	7330	1297	30225	14445	15780	4523	2148	2376	1087	532	555
Peringamala	217.94	7702	143	31130	15006	16124	4059	1962	2097	3804	1833	1971
Pullampara	25.9	5247	867	22452	10730	11722	3769	1817	1952	57	28	29
Vamanapuram	23.87	5379	910	21729	10231	11498	2172	1035	1137	54	48	6
Vamanapuram Block	421.15	53656	523	220349	105194	115155	29021	13856	15165	7515	3635	3880

GRAMA PANCHAYATS FALLING IN THE PROJECT AREA

Parts of thirteen Grama Panchayats coming under four Block panchayats fall in the project area. The details are given in Table 3.2

Table 3.2 Grama Panchayats falling in the project area

No.	Panchayat	Total Geographical Area (TGA)	IWMP project area	% TGA under IWMP	% Area under IWMP
Vamanapuram Block					
1	Pangode	3572	450.21	12.60	5.64
2	Kallara	2720	2141.83	78.74	26.82
3	Pullampara	2623	2010.59	76.65	25.18
4	Nellanad	1850	1247.99	67.46	15.63
5	Manikkal	3312	915.45	27.64	11.46
6	Nanniyode	3803	26.96	0.71	0.34
7	Vamanapuram	2168	28.05	1.29	0.35
Chirayinkezhu Block					
1	Mudakkal	2562	806.59	31.48	10.10
Nedumangad Block					
1	Vembayam	3184	267.56	8.40	3.35
2	Panavoor	2378	64.01	2.69	0.80
3	Anad	2415	1.82	0.08	0.02
Pothencode Block					
1	Mangalapuram	2231	22.16	0.99	0.28
2	Pothencode	2085	2.39	0.11	0.03
	Total	34903	7985.61	22.88	100.00

CRITERIA FOR SELECTION OF WATERSHED

The Department of Land Resources follows the following criteria as provided in Para 48 and 64 to 66 of the Common Guidelines, 2008 for approving the selection of watersheds under the strategic and perspective plans of the States and allocation of budget amongst the States.

- i. Area of the State
- ii. Population of the State
- iii. The State must have its monitoring system in place and online monitoring must be operable.
- iv. States which formulate larger schemes consisting of contiguous Watersheds upto an area of 25,000 hectares will be given priority.
- v. Percentage of rainfed area to total cultivated area.
- vi. Area of the project should not be covered under assured irrigation.
- vii. Largest number of weaker section groups benefited - SCs/STs, women, landless labourers etc.
- viii. Acuteness of drinking water scarcity
- ix. Extent of over exploitation of ground water resources
- x. Preponderance of wastelands/degraded lands.
- xi. Contiguity to another watershed that has already been developed/treated.
- xii. Willingness of village community to make voluntary contributions, enforce equitable social regulations for sharing of common property resources, make equitable distribution of benefits, create arrangements for the operation and maintenance of the assets created.
- xiii. Proportion of Scheduled Castes/Scheduled Tribes.
- xiv. Productivity potential of the land.
- xv. Unspent balance
- xvi. Outstanding utilization certificates.
- xvii. Percentages of completed projects out of total projects.

Table 4.1 Criteria for selection of watershed

Sl. No.	Criteria	Maximum score	Ranges & scores			
i	Poverty index (% of poor to population)	10	Above 80 % (10)	80 to 50 % (7.5)	50 to 20 % (5)	Below 20 % (2.5)
ii	% of SC/ ST population	10	More than 40 % (10)	20 to 40 % (5)	Less than 20 % (3)	
iii	Actual wages	5	Actual wages are significantly lower than minimum wages (5)	Actual wages are equal to or higher than minimum wages (0)		
iv	% of small and marginal farmers	10	More than 80 % (10)	50 to 80 % (5)	Less than 50 % (3)	
v	Ground water status	5	Over exploited (5)	Critical (3)	Sub critical (2)	Safe (0)
vi	Moisture index/ DPAP/ DDP Block	15	-66.7 & below (15) DDP Block	-33.3 to -66.6 (10) DPAP Block	0 to -33.2 (0) Non DPAP/ DDP Block	
vii	Area under rain-fed agriculture	15	More than 90 % (15)	80 to 90 % (10)	70 to 80% (5)	Above 70 % (Reject)
viii	Drinking water	10	No source (10)	Problematic village (7.5)	Partially covered (5)	Fully covered (0)
ix	Degraded land	15	High – above 20 % (15)	Medium – 10 to 20 % (10)	Low- less than 10 % of TGA (5)	
x	Productivity potential	15	Lands with low	Lands with moderate	Lands with high	

	of the land		production & where productivity can be significantly enhanced with reasonable efforts (15)	production & where productivity can be enhanced with reasonable efforts (10)	production & where productivity can be marginally enhanced with reasonable efforts (5)	
xi	Contiguity to another watershed that has already been developed/ treated	10	Contiguous to previously treated watershed & contiguity within the microwatersheds in the project (10)	Contiguity within the microwatersheds in the project but non contiguous to previously treated watershed (5)	Neither contiguous to previously treated watershed nor contiguity within the microwatersheds in the project (0)	
xii	Cluster approach in the plains (more than one contiguous micro-watersheds in the project)	15	Above 6 micro-watersheds in cluster (15)	4 to 6 microwatersheds in cluster (10)	2 to 4 microwatersheds in cluster (5)	
	Cluster approach in the hills (more than one contiguous micro-watersheds in the project)		Above 5 micro-watersheds in cluster (15)	3 to 5 microwatersheds in cluster (10)	2 to 3 microwatersheds in cluster (5)	

xviii. Initially, the funds will be allocated among the States as per criteria. However, from January onwards the remaining funds will be allocated on first-come-first-serve basis except for the mandatory funds for the North-East.

Watershed Development Programme is prioritized on the basis of thirteen parameters namely Poverty Index, Percentage of SC/ST, Actual wages, Percentage of small and marginal farmers, Ground water status, Moisture Index, Area under rainfed agriculture, Drinking water situation in the area, Percentage of the degraded land, Productivity potential of the land, Continuity of another watershed that has already developed/treated, Cluster approach for plain or for hilly terrain. Based on these thirteen parameters, a composite ranking was given to IWMP-1 Watershed project as given in table below.

Weightage of the project

	Criteria	4V10a	4V11a	4V11b	4V25a	4V26a	4V29b
1	Poverty index	5	5	5	8	8	5
2	SC/ST population (%)	3	3	5	3	3	3
3	Small & marginal farmers (%)	10	10	10	10	10	10
4	Ground water status	0	0	0	0	0	0
5	Rainfed Area	15	15	15	15	15	15
6	Drinking water	7.5	7.5	7.5	7.5	7.5	7.5
7	Degraded land	0	0	0	0	0	0
8	Contiguity	10	10	10	10	10	10
9	Cluster approach	10	10	10	10	10	10
		60.5	60.5	62.5	63.0	68.0	60.5
	Cumulative score	375					

The area is prone to frequent drought and has a low moisture index. Drinking water is a major problem in this project area. In a broader view, the soil of this region is suitable for agriculture crops and cash crops. But due to lack of water harvesting structures and irrigation water, agriculture itself has become a constraint and the production potential has considerably gone low. The majority of the soil is very shallow to moderately deep and hence have a low rate of infiltration. However production of the land can be significantly brought up with the help of better management practices and availability of timely irrigation and use of organic and inorganic fertilizer. Cluster approach was followed taking into consideration 6 micro-watersheds covering a total treatable area of 7492Ha.

All the parameters taken together and a cumulative score of 375 is given to the watershed IWMP-1.

Watershed information

Table 4.2.General Features of Vamanapuram Watershed Project

Name of Project	Vamanapuram Watershed
Name of Program	IWMP-I
Location	8 ⁰ 38'39" to 8 ⁰ 45'50" North Latitude and 76 ⁰ 51'01" to 76 ⁰ 59'25 East Longitude
Type of project	Hilly
District	Thiruvananthapuram
Blocks	Vamanapuram, Chirayinkeezhu, Nedumangad & Pothencode
Gram Panchayats	13 - Pangode, Kallara, Pullampara, Nellanad, Manikkal, Nanniyode, Vamanapuram, Mudakkal, Vembayam, Panavoor, Anad, Mangalapuram and Pothencode.
Villages	14 - Pangode, Kallara, Vamanapuram, Palode, Pullampara, Nellanad, Manikkal, Koliyakode, Thekkada, Panavoor, Anad, Elamba-Mudakkal, Melthonakkal, Keezhthonakkal
No. of micro watersheds	6 –Aruvippuram (4V10a), Cheruvalam (4V11a), Kanchinada (4V11b), Ayanikuzhi (4V25a), Moozhi (4V26a) & Nellanad (4V29b)
Total Watershed Committees	6
Total Geographical Area	7985.61 Ha
Total Treatable Area	7492.00 Ha
Agro climate zone	Southern midland zone
Major crops	Coconut, Rubber, Banana, Tapioca, Vegetables
Major slope range	10-15 %
Major streams	First and second order
River Basin	Vamanapuram
Major soil series	Nedumanagad series with a solum thickness of 90 to 150cm, very dark brown to pale brown in colour, very strongly acid and having a surface texture of gravelly sandy clay loam to gravelly sandy clay
Rainfall	1509 mm
Marginal farmers	more than 60%
Major option of livelihoods	Agriculture, Animal husbandry, Wage employment
Water table	1.9 to 13.2 meters
Depth of well	2.0 to 14.1 meters

Source of drinking water	Open well, Bore well, Hand pump
Quality of drinking water	Good
Irrigation source	Open well and surface water bodies
Cattle	Cow, Buffalo and Goat
Nearest town	Venjaramood
Financial details	
Sanctioned Area	7492.00 Ha
Total Sanctioned Cost	1123.80 Lakhs
Proposed budget on Works	1451.74 Lakhs
Proposed budget on NRM	1033.55 Lakhs
Proposed budget on Livelihood Enhancement	163.36 Lakhs
Proposed budget on Productivity Enhancement	254.83 Lakhs
Cost per Ha (IWMP project)	15000 per Ha
From Project Cost	842.91 Lakhs
From Convergence	530.19 Lakhs
Project Implementation Agency	
Name of PIA	Vamanapuram Block Panchayath
Coordinating Person in PIA	Secretary, Block Panchayath
Address	Vamanapuram Block Office Venjaramood, Thiruvananthapuram Pin - 695607

Other developmental projects/schemes running in the IWMP-1block

The major development programmes running in the Vamanapuram Block area are MGNREGS (Mahatma Gandhi National Rural Employment Scheme), Indira AwasYojana (IAY) and SGSY.

MGNREGS: Centripetal terracing, staggered trenches, rain water pits, construction of wells, kutcharoad constructions works, pond deepening, check dams, earthen bunds and other labour intensive activity has been taken-up under MGNREGS. The block has secured second place in the State.

Indira AwasYojana: Total houses constructed in this project during 2011-12 are 971 which includes 446 (Scheduled Caste), 49 (Scheduled Tribe), 208 (Minority) and 268 (General) and all the villages of this project have Indira AwasYojana.

SGSY: Total groups under this scheme are 55 and are currently active and some of the groups are under grading process.

Kudumbasree: This scheme comprises of several self help groups which are sustainable for long time.

Table no. 4: Developmental programmes running in the project area:

Sl no	Name of the programme/ scheme	Sponsoring agency	Objectives of the programme/ scheme	Year of commencement	Panchayats covered
1	MGNREGS	DRDA	Employment	2009	All
2	IAY	DRDA	Housing	2005	All
3	Total Sanitation	DRDA	Sanitation	2009	All
4	SAY	District Panchayat	Housing	2005	All
5	Jalanidhi	Water Resources Department	Water Supply & Sanitation	2009	Manickal
6	Kudumbasree	PAU	Livelihood Development		All
7	Vegetable and Fruit Promotion Council, Kerala	Agriculture	Vegetable and Fruit production	1998	Kallara Pullampara Manickal

Budget

The distribution of budget for Vamanapuram IWMP -1 for the various components as per IWMP guidelines is given below:

No.	Budget component	% age	Amount in Rs.
1.	Administrative cost	10	1,12,38,000
2.	Monitoring	1	11,23,800
3.	Evaluation	1	11,23,800
Preparatory phase			
4.	Entry point activities	4	44,95,200
5.	Institution and capacity building	5	56,19,000
6.	Detailed Project Report	1	11,23,800
Watershed works phase			
7.	Watershed development works	56	6,29,32,800
8.	Livelihood activities for asset less	9	1,01,14,200
9.	Production system and micro enterprises	10	1,12,38,000
10.	Consolidation phase	3	33,71,400
		100	11,23,80,000

METHODOLOGY

Watershed Development Strategy

Watershed is a geo-hydrological and biological unit draining through a common point called outlet. It is a dynamic system of living and non-living things. It simply described as development of physical and biological elements for sustainable and self-reliant interdependence. It is obvious that watershed development is the development of all the constituents of a watershed. Such a development can be achieved through a complete understanding of a system and sub-system of the watershed. Hence, the exploration of all the elements of a watershed becomes an important component of watershed planning so as to efficiently address the needs of all the dependants.

Soil and water conservation remains the core activity. Soil conservation mainly means conserving and protecting the soil from wind or water erosion. It also means improving the microbial activities in the soil and making it "live". Water conservation will be achieved through both engineering and biological measures. In addition to soil and water conservation, watershed development project ought to address several issues for achieving sustainable development. Adoption of the following strategies can ensure sustainable watershed development. Scientific planning with participatory approach is only and one method to make the programme successful.

Watershed management as a strategy has been adopted by Government of India especially in the rainfed regions of semi-arid tropics. These regions are characterized by low and undependable rain, low soil fertility, poor infrastructure development, low literacy and high rate of migration. Several studies have identified that there is a great need for a systematic and scientific approach to deal with watershed development. The common guidelines generate a fresh and flexible framework for the new generation watershed development.

Scientific Planning

i) Cluster Approach

This envisages a broader vision of Geo-hydrological unit which involves treating a cluster of micro-watershed. The IWMP-1 Project consists of six micro- watersheds namely 4V10a, 4V11a, 4V11b, 4V25a, 4V26a, 4V29b as their respective codes. The project falls in part of 13 GramaPanchayats under four Block Panchayats.

ii) Transect Walk

Transect walk is a kind of exploratory walk, under taken by the team with the villagers to collect information on the soil type, land use pattern, cropping pattern, existing resource etc.,

In order to identify the areas to be treated, proposed work sites and assess the feasibility, the experts carried out a reconnaissance survey through transect walk. The sites were marked and the different treatment measures required for the treatment of

the area were also recommended. During the exploratory walk the present status of the watershed is observed along with their problems. The ground water level is observed and analyzed by the team during the summer and winter. The transect walk also enables in understanding the plantation crops and vegetables grown in the watershed area. Livestock populations are also accounted. Various pending and unsolved problems are located and are given prior importance as EPA.

iii) Base line Survey/ Household survey:

To access the impact of any watershed development programme a detailed baseline survey has to be conducted. This acts as a benchmark for any intervention during and post implementation of any development programme. A detailed baseline survey was undertaken which involved household census survey, Bio-physical survey and Village level data collection. Household census survey includes a detailed questionnaire which was been filled by visiting each and every household in the village. To understand the family dynamics of watershed community, household survey often play a key role in the process of planning. Community based information is assessed through PRA, which gives the family based information. Census survey is adopted to collect the data in this project.

Door to Door baseline survey was carried out through the Neighbour Hood Groups using structured questionnaire. The questionnaire covered the following areas.

- Demographic Information
- Socio Economic Information
- Agriculture / Horticulture Activities and its marketing
- Animal Husbandry activities and its marketing
- Fodder production and Availability
- Assets (domestic and agricultural)
- Land ownership,
- Land use
- Irrigation (water availability)
- Crops and productions
- Common Property Resources and Its usage

Bio-physical survey was undertaken to identify various natural resources available in the village. It included the soil typology, wells in the area, crop taken in the field, cropping pattern, fertilizers used and various sources of irrigation in the field.

Secondary data: The secondary data was obtained through Census reports (2001) and Panchayat Level Statistics (2010). Data pertaining to social profile is also collected through Census reports. Secondary data related to different kinds of capital assets were collected from different departments of Government such as Village Office, KrishiBhavan, Primary Health Center, District Rural Development Agency initiative-SGSY Programme office, Kudumbasreworking on poverty alleviation, GramaPanchayat, other NGO's and development societies etc. Climatic information like annual rainfall with monthly distribution of five year and temperature is collected from the Indian Meteorological

Department. The Resources Maps prepared by Kerala State Land Use Board provides the details of land use/land cover, drains, transport network, assets and other water resources. The Detailed Soil Survey report prepared by Department of Soil Survey and Soil Conservation was used to understand the soil classification, texture, depth, erosion and land capability.

Technical/ Field to field Survey: To know the present land use/land cover and slope, field to field survey was also carried out in the project area with the involvement of the local people. It also includes the numbers of water harvesting structure in the area, crop taken in the field, cropping pattern, fertilizer used and various sources of irrigation in the field. For the ridge –valley planning the field to field survey is carried on to demarcate the terrain in the cadastral map.

While implementing the project it is necessary that the treatments are carried out starting from ridge and progressing towards the valley. This approach is followed with the following objectives

- protect the upper reaches to avoid erosion and reduce runoff
- avoid siltation of structures in the middle and lower catchments
- ensure the cost effectiveness of structures in the valley and
- Improve overall efficacy of the measures.

iv) Participatory Rural Appraisal (PRA)

Watershed Development is a good way to generate more employment, to promote the economic development of the village Community and optimum utilization of the Watershed's natural resources like land, water, vegetation etc., which will mitigate the adverse effects of drought and prevent further ecological degradation.

Participatory approach towards Watershed Development would help in tackling all the problems ecologically, socially and economically on a sustained basis through larger people's participation. PRA not only does ease the implementation of the project, but also helps in bringing an equitable and sustainable development. People's participation in Watershed Development and Management programmes is crucial for their successful and cost effective implementation.

Participatory Rural Appraisal (PRA) is a way of enabling local people to analyze their living conditions, to share the outcomes and to plan their activities under this project.

Need for PRA

- Sustained change and the need for accurate and timely information.
- It advocates that the people themselves are solution agents for their problems
- It cuts down the "Normal Professional Bias" and anti-poverty bias towards people
- Reduces down the normal time consuming long methods of survey, which consumes the much needed resources and that gives results after a long time.
- The method is cost effective accurate and timely.

Objectives of PRA

- To use farmers criteria, choices and understand the local environments with clear local priorities.
- To learn farmer's indigenous technologies.
- To achieve triangulations by using different methods and involving various people
- To check and recheck the findings.
- To develop self-critical analysis and indirect contact with local needs and communities.

Purpose of PRA

- To collect firsthand information about the village community.
- To interact with the village community to understand their perspectives, perceptions and priorities.
- To know their needs and unfelt needs.
- To diagnose the important problems and a common understanding of the village community's priorities.
- To find out commonly acceptable and accessible solutions and to arrive at a common outline of an action plan for Watershed Development Programme.

The past experience of watershed has given tremendous input to focus on creating accountability of the stakeholders towards the programme. This has created an emphasis to include all the stakeholder communities and their local and Indigenous Technological Knowledge (ITK) while planning for any activity. Participatory approach provides a new path for planning, implementing, and monitoring and post- withdrawal activities with a complete accountability of the stakeholders. Various PRA techniques like resource mapping, social mapping, and season calendars were used to understand the physical and social orientation of the village in general and watershed in specific. These tools put the villagers in ease than the complicated questionnaires. Various tools like Matrix ranking were used to identify various local vegetations, Fodders crops, various institutions and their significance in the life of the farmers.

v) Focus Group Discussion

Kerala State Land Use Board has carried out the FGD with farmers and women in order to understand various issues related to their day to day life. PRA tools such as time line, daily activity chart, details of SHG's, details of common property resources, seasonal health problems, child education, problems of agriculture and seasonal charts were discussed. In this discussion women were encouraged to speak about their problem. The women who drew these charts described the differences between the rainy and dry season patterns. In the dry season, it took longer to get water from the well and collecting firewood to stockpile for the rainy season. When the rains come, things are much busier and the women's days are much longer because of all the work to be done in the fields.

Problems Identification

After analysis all the information collected during PRA exercise, field to field survey and Focus Group Discussions, the main problems identified includes the following:

- Problem in drinking water facilities
- Low production due to practices of traditional method of cultivation
- Low milk production due to local/ non-descript breed and less availability of fodder
- Low economic condition due to low production
- Soil erosion from farm land
- Less cultivation of vegetables
- Lack of value addition practices
- Less availability of fodder
- Migration

vi) Use of GIS and Remote Sensing for planning

Remote sensing and GIS plays an important role in the study of natural resources and helps in planning water resources development. One of the greatest advantages of using remote sensing data for hydrological investigations and monitoring is its ability to generate information in spatial and temporal domain, which is very crucial for successful analysis, prediction and validation. Use of various high science tools has been promoted at various stages of watershed development.

Prioritization: Geographical Information System (GIS) has been used for prioritization process. Various layer maps were created like Geo-morphological, Soil, BPL Population, SC/ST population, Ground water Status, Drinking water situation and Slope percent. These were all given proper weightage and this helped in prioritization of various watershed areas.

Planning: An action plan matrix was been formulated by taking into account various features like the slope percent, soil depth, soil texture, soil erosion in the area for wasteland, forest land and agricultural land. Global Positioning System (GPS) was used to identify each and every water conservation structures available in the project area. This was used to create a map. Contour Map of vertical interval of 10 meter at a scale of 1:25000 was used for identifying various location specific recommendations for soil and water conservation structures.

Hydrological modeling: Hydrology modeling technique was been used for locating drainage, stream length, flow direction, sink, and flow accumulation. This model overlaid over cadastral map help to calculate the catchment area of each structures like the check dam etc. This has helped to remove the human error which generally occurs while calculating the catchment area of a check dam.

Table no. 5.1: Details of Scientific Planning and Inputs in IWMP projects

S. No.	Scientific criteria/ inputs used	Scientific Criteria Used
	(A) Planning	
	Cluster approach	Yes

Whether technical back-stopping for the project has been arranged? If yes, mention the name of the Institute	Yes Kerala State Land Use Board
Baseline survey	Yes
Hydro-geological survey	Yes
Contour mapping	Yes
Participatory Net Planning (PNP)	Yes
Remote sensing data-especially soil/ crop/ run-off cover	Yes
Ridge to Valley treatment	Yes
Online IT connectivity between	
(1) Project and DRDA cell/ZP	Yes
(2) DRDA and SLNA	Yes
(3) SLNA and DoLR	Yes
Availability of GIS layers	
1. Cadastral map	Yes
2. Village boundaries	Yes
3. Drainage	Yes
4. Soil (Soil nutrient status)	Yes
5. Land use	Yes
6. Ground water status	Yes
7. Watershed boundaries	Yes
8. Activity	Yes
Crop simulation models	No
Integrated coupled analyzer/ near infrared visible spectroscopy/ medium spectroscopy for high speed soil nutrient analysis	No
Normalized difference vegetation index (NDVI)	No
Weather Station	
(B) Inputs	No
1. Bio-pesticides	No
2. Organic manures	Yes
3. Vermicompost	Yes
4. Bio-fertilizer	No
5. Water saving devices	Yes
6. Mechanized tools/ implements	Yes
7. Bio-fencing	Yes
8. Nutrient budgeting	No
9. Automatic water level recorders & sediment samplers	No

Usage of Data

The data, primary as well as secondary, which was obtained from the various authentic sources, was used in formulation of the local needs of the population and also to plan the interventions required for the optimum utilization of the available resources in the watershed area. The due emphasis was given to plan the activities to fill in the existing gaps and to address the weak indicators.

Preparation of Action Plan and Approval from Watershed Grama Sabha

Data were analysed and based on the identified needs and problems in the watershed area, a draft action plan was prepared and placed before the concerned Grama Sabha for approval. After detailed deliberations and incorporation of relevant suggestions into the plan, the action plan was got approved from the concerned Watershed Grama Sabha.

SWOT ANALYSIS

SWOT analysis is a strategic planning method used to evaluate the Strengths, Weaknesses/Limitations, Opportunities, and Threats involved in the implementation of a project. It involves specifying the objective of the project and identifying the internal and external factors that are favorable and unfavorable to achieve the objectives of the project. Setting the objective should be done after the SWOT analysis has been performed. This would allow achievable goals or objectives to be set for the organization.

- Strengths: characteristics of the project team that give it an advantage over others
- Weaknesses (or Limitations): are characteristics that place the team at a disadvantage relative to others
- Opportunities: external chances to improve performance (e.g. make greater profits) in the environment
- Threats: external elements in the environment that could cause trouble for the project

Identification of SWOTs is essential because subsequent steps in the process of planning for achievement of the selected objective may be derived from the SWOTs.

A SWOT analysis was done for the PIA and the result is as follows:

Strengths:

- (1) Strong linkages with line departments for technical guidance.
- (2) Scientific planning with the help of Kerala State Land Use Board.
- (3) State level and District level committees for monitoring, coordination & Co-operation.
- (4) Previous knowledge of convergence with various line departments
- (5) Prior acquaintance of officers with the villagers of selected project area, hence ease in implementation of project.
- (6) Well informed farmers and general public
- (7) Most of the project area is near to the PIA's office.

Weakness:

- (1) Inadequate infrastructural facilities
- (2) Various schemes are being implemented by the PIA with limited human resources.
- (3) Shortage of reputed training centres for capacity building at village level to ensure the proper implementation of the project.

Opportunities:

- (1) A number of different other development schemes of the government are running; so, there can be horizontal integration and convergence of programmes.
- (2) Neighbourhood Groups, User groups and Self Help Groups
- (3) Better financial provision under IWMP, better quality of work can be expected

- (4) Usage of new ICT tools like GIS, GPS and MIS integration of the project with the State Level Data Cell for online monitoring and evaluation.
- (5) Can easily identify and resolve the problems of the area
- (6) Transparency in Accounting System

Threats:

- (1) Rainfall being very scarce and unreliable in the project area, the activities planned to be taken up may yield limited impact.
- (2) Overloaded work may mislead the watershed project or may divert the vision at the time of implementation of the projects of IWMP
- (3) Options in production system are limited due to the lack of sufficient natural resources and due to limited resource base.
- (4) Irregularities in fund flow can derail the smooth functioning.
- (5) Political interference can dissatisfy the team to work properly.

In addition to this separate SWOT analysis was carried for the different area of intervention for identifying the internal and external factors that are favorable and unfavorable to achieve the objectives of the project. The details are presented in the Table below.

Table. No. 6.1 SWOT Analysis of Vamanapuram IWMP - 1

Sl. No	Area of Intervention	Strengths	Weaknesses	Opportunities	Threats
1	Agriculture	<ul style="list-style-type: none"> • Provides income and employment • Area potential to increase productivity • Availability of natural/man-made resources 	<ul style="list-style-type: none"> • Lack of irrigation facilities • Lack of organic farming practices 	<ul style="list-style-type: none"> • If provided with proper irrigation, considerable increase in agriculture production can be assured. • Minimal migration in search of jobs. • Increasing demand for organic products. 	<ul style="list-style-type: none"> • Rainfall being very scare and unreliable.
2	Horticulture	<ul style="list-style-type: none"> • Favorable climate for horticultural activities • Good vegetable and banana production 	<ul style="list-style-type: none"> • Lack of advanced varieties. • Lack of marketing facilities. • Lack of storage facilities 	<ul style="list-style-type: none"> • Availability of Land. • Interest of the villagers to expand horticulture activities. • Increasing price level • Food processing. 	<ul style="list-style-type: none"> • Rapid Climate Change.
3	Animal Husbandry	<ul style="list-style-type: none"> • Favourable environment to raise cow and goats. • Many households engaged in Animal Husbandry activities. • Provides income and employment 	<ul style="list-style-type: none"> • Lack of good quality fodder availability. • Lack of advanced cattle breed. • Low level of Milk production. • Lack of Knowledge base regarding scientific cattle management. 	<ul style="list-style-type: none"> • Providing more advanced cattle breeds can increase the milk production and enhance their subsidiary livelihood option. • Promotion of nursery raising and pasture development will address the lack of fodder availability. • Pasture Development. 	<ul style="list-style-type: none"> • Animal Diseases. • Excessive grazing on degraded and small community lands. • Lack of awareness of Dairy farming as a commercial activity. • Severe climatic conditions.
4	Natural Resources	<ul style="list-style-type: none"> • Extensive natural drainage system 	<ul style="list-style-type: none"> • No direct water distribution 	<ul style="list-style-type: none"> • If used advanced techniques like bench terracing more land 	<ul style="list-style-type: none"> • Rainfall being very scare and unreliable.

			<p>mechanisms.</p> <ul style="list-style-type: none"> • Prevalence of soil erosion. • No water storage body present. 	<p>can be converted into cultivable land.</p> <ul style="list-style-type: none"> • Construct water storage tank for irrigation. • Provides income and employment for MGNREGS. 	
5	BPL Household's Livelihoods	<ul style="list-style-type: none"> • Most of them are small and marginal farmers. • Some households are having livestock 	<ul style="list-style-type: none"> • Less income and limited livelihood options. • Lack of knowledge base. 	<ul style="list-style-type: none"> • If provided with livelihood options the income level of the households can be increased and the BPL status can be changed. • Quality of life. • Peoples are interested to take up livelihood activities. 	<ul style="list-style-type: none"> • Due to adverse weather conditions the normal working days are very less.
6	Micro-Enterprises and Production systems.	<ul style="list-style-type: none"> • People having the basic skills. • Organized micro-enterprise activities existing in the area • Availability of natural/man-made resources 	<ul style="list-style-type: none"> • Lack of Management skills. • Lack of technical support. • Lack of organized marketing facilities. 	<ul style="list-style-type: none"> • If provided good technical support and motivation, they can run the units in an organized way • Income level will increase. 	<ul style="list-style-type: none"> • Due to adverse weather conditions the normal working days are very less.

PROBLEM TOPOLOGY

Some of the major issues viz., land, water resources, common property resources and drinking water were analyzed and the details are presented below.

Table No. 6.2 Problem Topology of Vamanapuram IWMP - 1

Issues	Problem area	Constrains	Solutions	Project support	Likely benefit/beneficiaries
Land	<ul style="list-style-type: none"> • Soil erosion • Productivity • Vegetation 	<ul style="list-style-type: none"> • Undulated Topology • Severe Soil erosion • Uncontrolled Drainage • Heavy run off in the downstream and bank erosion • Un bunded up lands • Poor soil status • Lack of vegetation 	<ul style="list-style-type: none"> • Renovation of WHS • Construction of new WHS • Catchments of WHS will be treated • Renovation of old wells and stone patching • Percolation Tank, LBS, LBCD, Field bunding, masonry check dam, gully plugs in the area. • Plantation of Horticultural crops • LBCD with vegetative barriers, Earthen/ Masonry check dam • Afforestation 	<ul style="list-style-type: none"> • Renovation of existing water bodies • Construction of new water bodies • Different soil conservation measures from ridge to valley • Horticultural and forest species plantation through convergence 	<ul style="list-style-type: none"> • Soil and water conservation • Increase in production • All farmers
Water Resource	<ul style="list-style-type: none"> • Surface water source • Ground water source 	<ul style="list-style-type: none"> • Poor irrigation potentiality of WHS and water bodies • Siltation of water bodies • Erratic rainfall • Lack of vegetation 	<ul style="list-style-type: none"> • Repair of existing water bodies • Creation of new water bodies • Different soil and water conservation measures to recharge ground water • Field bunding • Farm pond and ring wells in the 	<ul style="list-style-type: none"> • Repair of existing WHS and ponds • Field bunding and contour bunding • Percolation tank in the upper reach • Ring wells and farm 	<ul style="list-style-type: none"> • Increase in ground water table • Increase production & income • All farmers

			lower reach to tap the ground water	ponds in the lower reach	
CPR	<ul style="list-style-type: none"> • Awareness • Degradation of forest 	<ul style="list-style-type: none"> • Encroached by watershed dwellers • Poor soil status • More prone to grazing 	<ul style="list-style-type: none"> • Mutual solution for possible measures • Pasture land development • Rejuvenation of degraded forest 	<ul style="list-style-type: none"> • Plantation of multiple species through Forest Dept. • Pasture land development for community fodder bank 	<ul style="list-style-type: none"> • Increase the Income of watershed dwells • Meet the basic need like food, fodder and fuel • All House holds
Drinking Water	<ul style="list-style-type: none"> • Drinking water quality • Availability • Low water table 	<ul style="list-style-type: none"> • During rainy season drinking water source get contaminated • Symptom of high level of iron and fluoride content in the water • Open wells get dried during summer due to low water table • Defunct hand pumps • Low ground water table 	<ul style="list-style-type: none"> • Repair of platform with drain and soak pit • Repairing of defunct hand pumps/ wells through local initiatives • Ground water recharge through various water conservation measures 	<ul style="list-style-type: none"> • Water testing of drinking water sources • Well recharging • Rain water harvesting 	<ul style="list-style-type: none"> • All House holds

The Vamanapuram project area has low productivity because of the following reasons:

i) Full dependence on monsoon:

The project area is dependent on monsoon. Water is an essential input in agriculture. Due to the absence of proper irrigation facility, 90% of the total cultivated area depends on the uncertain monsoon. Therefore, the success or failure of the monsoon determines the success or failure of agriculture production. The rainfall is unreliable due to two factors: untimely and inadequate.

ii) Low use of fertilizer per unit cropped area:

Farmers do not use sufficient fertilizer due to lack of water, scarcity of fertilizer in market and insufficient money for fertilizer. Many a times they don't get fertilizer at the right time.

iii) Traditional farming methods:

This also leads to low productivity. There is a lot of ignorance about the use of new farming methods and technologies such as multiple cropping. They are use of FYM and other input in a proper way; that is why they don't get 90% output. So these factors contribute to low productivity.

iv) Lack of adequate farm machinery:

Even today a large number of farmers in Vamanapuram use wooden ploughs and bullocks. They don't have adequate machinery like seed drill. So, old machineries take more time in tillage practices.

v) Lack of finances for farmers:

In the project area, most of the farmers are marginal and small. They do not have enough money to buy good quality seeds, machinery and other inputs.

vi) Lack of good quality seeds and fertilizers:

Good quality seed, fertilizer and pesticide are the important factors in agriculture productivity. The use of good quality seeds leading to higher productivity. In the project are there are two limitations in the use of fertilizer. First these fertilizers are most useful in irrigated condition. But in the project area, 90 per cent of land depends on rainfall. Secondly these fertilizers are not properly used.

vii) Lack of other facilities such as storage and marketing:

4-8% of agriculture products damage after harvesting due to scarcity of proper storage and proper market for sale. So he sells to local traders at the low prices. Farmers mainly have a limitation in obtaining proper means of transportation. And second problem is farmers don't have proper storage facilities.

Project Implementation

The Block Panchayat having the major area under the programme is selected as the Project Implementing Agency (PIA) by the State Level Nodal Agency (SLNA) for Integrated Watershed Management Programme (IWMP) in Kerala. The PIAs are responsible for implementation of watershed project. In Thiruvananthapuram district, for the IWMP – 1, the Vamanapuram Block Panchayat is selected as the Project

Implementing Agency. The office of PIA is located at Venjaramood, in NellanadGrama Panchayat.

The Project Implementing Agency (PIA) provides necessary technical guidance to the Grama Panchayat for preparation of development plans for the watershed through Participatory Rural Appraisal (PRA) exercise, undertake community organization and training for the village communities, supervise watershed development activities, inspect and authenticate project accounts, encourage adoption of low cost technologies and build upon indigenous technical knowledge, monitor and review the overall project implementation and set up institutional arrangements for post-project operation and maintenance and further development of the assets created during the project period.

The PIA, after careful scrutiny, shall submit the Action Plan for Watershed Development Project for approval of the DRDA and SLNA. The PIA shall submit the periodical progress report to WCDC. The PIA shall also arrange physical, financial and social audit of the work undertaken. It will facilitate the mobilization of additional financial resources from other government programmes, such as MGNREGS, State Horticulture Mission, VFPC, Tribal Welfare Schemes, Artificial Ground Water Recharging, Greening India, etc.

Co-ordination

The full responsibility of overseeing the watershed programme within the district will lie with the WCDC which will work in close collaboration with the District Planning Committee (DPC). The DPC will provide full governance support to the programme. The DPC will approve the perspective and annual action plans relating to watershed projects in the district. DPC will integrate the watershed development plans with over all district plans and also oversee its implementation. DWDU will help the DPC in providing oversight and ensuring regular monitoring and evaluation of the programme. The District Panchayat will have an important role of governance in matters relating to the co-ordination of various sectoral schemes with watershed development projects, review of progress, settling disputes etc.

BIO PHYSICAL RESOURCES

LOCATION OF THE PROJECT

Vamanapuram (IWMP-1) project area is mainly located in Nedumangad Taluk of Thiruvananthapuram district of Kerala State. A portion of the project area is also located in the Chirayinkeezhu and Thiruvananthapuram Taluks of Thiruvananthapuram district. The project is a cluster of six micro watersheds viz. 4V10a (Aruvipuram), 4V11a (Cheruvalem), 4V11b (Kanchinada), 4V25a (Ayanikuzhi), 4V26a (Moozhi) & 4V29b (Nellanad). The total area of the project is 7985.61 ha, of which 7492 ha is proposed to be treated under Integrated Watershed Management Programme (IWMP).

Table- 7.1.1 Details of Watershed code, name and area

No	Code of watershed	Name of watershed	Area in ha	Percentage
1	4V10a	Aruvipuram	1722.77	21.57
2	4V11a	Cheruvalem	175.59	2.20
3	4V11b	Kanchinada	726.02	9.09
4	4V25a	Ayanikuzhi	440.08	5.51
5	4V26a	Moozhi	1892.12	23.69
6	4V29b	Nellanad	3029.03	37.94
		Total	7985.61	100.00

The project area falls in 13 GramaPanchayats viz. Pangode, Kallara, Pullampara, Nellanad, Manikkal, Nanniyode, Vamanapuram, Mudakkal, Vembayam, Panavoor, Anad, Mangalapuram and Pothencode coming under four Block Panchayats viz. Vamanapuram, Chirayinkeezhu, Nedumangad and Pothencode. The Project area is located between 76°51'01" and 76° 59'25 E longitude and 8°38'39" and 8°45'50" N latitude.

Table-7.1.2 Details of Watersheds, GramaPanchayaths and area

No.	Watershed code	Name of Grama Panchayat	Name of Block Panchayat	Area (ha)
1.	4V10a	Kallara	Vamanapuram	1598.36
		Vamanapuram	Vamanapuram	5.04
		Nandiyodu	Vamanapuram	13.07
2.	4V11a	Kallara	Vamanapuram	118.05
		Pangode	Vamanapuram	34.60
		Nandiyodu	Vamanapuram	12.25
3.	4V11b	Pangode	Vamanapuram	419.90
		Kallara	Vamanapuram	261.86
4.	4V25a	Pullampara	Vamanapuram	413.28
5.	4V26a	Pullampara	Vamanapuram	1185.01
		Manikkal	Vamanapuram	278.18

		Vembayam	Nedumangad	251.27
		Panavoor	Nedumangad	60.11
		Anad	Nedumangad	1.71
6.	4V29b	Nellanad	Vamanapuram	1171.98
		Mudakkal	Chirayinkeezhu	757.46
		Manickal	Vamanapuram	580.80
		Pullampara	Vamanapuram	288.27
		Vamanapuram	Vamanapuram	21.31
		Mangalapuram	Pothencode	20.81
		Pothencode	Pothencode	2.24
Total Project Area				7985.61

The major town in the project area is Venjaramood which lies in the State Highway and connects with other major towns of the district. The project area lies in the edges of the Vamanapuram Reserve Forest. The livelihood of the people is primarily based on agriculture, animal husbandry, wage labour, rearing cows and buffaloes for milk production.

PHYSIOGRAPHY

The project area can be divided into three physiographical regions viz, Lowlands Midlands and Miduplands. The midland region lying between the Western Ghats and the lowland is made up of small and tiny hills and valleys. This is an area of intense agricultural activity. The region is rich in crops like coconut, tapioca, vegetables, banana, rubber, spices etc. The lowlands are the valley fills located in the project area. The Miduplands region comprises mainly of mountains. This area is seen towards the east and north eastern parts of the project area and is ideal for the major cash crop plantation viz. rubber. The elevation of the project area ranges from 10 m to 310 m above MSL and the highest elevation of 310 m above MSL is located in the Moozhi Watershed (4V26a). The lowest elevation is 10-20 m which is located in the paddy fields. The area in general has got a hilly topography and excessive relief features.

CLIMATE

The project area has a humid tropical climate.

Rainfall

Rainfall is the major source of ground water recharge and rainfall pattern plays an important role on the water levels in the phreatic aquifer and also indirectly to the deeper leaky and confined aquifers. The rainfall data for Thiruvananthapuram district from Indian Meteorological Department, Thiruvananthapuram, during the year 2011 is analyzed.

Annual rainfall distribution

The annual rainfall received for the year 2011 is 1509.2 which is the second lowest rainfall received among the various districts of the state. The district received 583.7 mm of rainfall during the south west monsoon, and 543.5 mm of rainfall during north east monsoon period. The monthly annual rainfall distribution during 2011 is given in table below.

Table No. 7.3.1- Monthly annual rainfall for 2011

Month	Rainfall (mm)	Month	Rainfall (mm)
Jan	43.6	July	97.6
Feb	73.6	Aug	84.4
Mar	15.0	Sep	131.5
Apr	157.1	Oct	141.2
May	92.7	Nov	233.4
June	270.2	Dec	168.9
Total annual rainfall			1509.2

Normal Rainfall Vs Actual Rainfall

The actual rainfall during different seasons has been compared with the normal rainfall of the season to find out the variations of the rainfall. The seasonal and their percentage departure from normal rainfall is given in table 7.3.3.

Table No. 7.3.3 Seasonal rainfall and their percentage departure from normal rainfall

Season	Period	Seasonal	Normal	% Dep
Winter	January- March	132.2	81.2	62
Summer	April- May	249.8	320.5	-23
South West Monsoon	June- September	583.7	857.8	-32
North East Monsoon	October-December	543.5	537.1	1

Winter period:- During the month of January to March 2011, the district receives a surplus of rainfall than the normal. The percentage departure from normal rainfall was 62 %.

Hot weather period:- During the month of April-May 2011, the departure of pre-monsoon rainfall recorded is -23% ie deficient type of rainfall during the season.

South West Monsoon period:- During the south west monsoon season from June to September 2011, the departure of rainfall recorded in the district is -32%. The district recorded deficient type of rainfall during the season.

North East Monsoon period:- During the north east monsoon period from October to December 2011, the district receives a surplus of rainfall with a slight percentage of departure of 1%.

Table No. 7.3.2 Distribution of Rainfall and Departure from Long Period Averages (Normal RF) of Last 5 Years

Month	January		February		March		April		May		June	
Year	RF	% Dep.	RF	% Dep.	RF	% Dep	RF	% Dep.	RF	% Dep.	RF	% Dep
2007	0.30	-98	1.70	-90	3.70	-92	213.30	68	167.20	-27	348.7	-5
2008	0.00	-100	24.60	47	276.00	463	158.30	25	89.80	-61	116.3	-68
2009	5.00	-72	0.00	-100	60.00	22	44.60	-65	206.90	-10	183.3	-50
2010	108.30	515	0.00	-100	73.10	49	109.40	-14	216.70	-6	237.0	-35
2011	43.60	126	73.60	249	15.00	-58	157.10	35	92.70	-57	270.2	-20

Month	July		August		September		October		November		December		Annual	
Year	RF	% Dep.	RF	% Dep.	RF	% Dep	RF	% Dep.	RF	% Dep.	RF	% Dep	Total	% Dep.
2007	306.60	16	177.20	3	279.10	65	327.80	26	213.80	13	11.70	-82	2051.1	14
2008	286.00	8	180.60	5	202.60	20	363.90	40	195.20	3	38.20	-42	1931.5	7
2009	204.20	-23	87.30	-49	183.40	9	119.40	-54	346.30	82	42.50	-35	1482.9	-18
2010	234.90	-11	118.70	-31	114.10	-32	414.30	59	326.00	72	188.30	187	2140.8	19
2011	97.60	-57	84.40	-41	131.50	-19	141.20	-47	233.40	22	168.90	169	1509.2	-16

(Source: Indian Meteorological Department)

Seasonal rainfall contribution to the total rainfall in percentage

The seasonal rainfall contribution to the total rainfall in percentage is worked out and given in table.

Table No. 7.3.4 Seasonal rainfall distribution & their %age contribution to annual rainfall

Season	Period	Rainfall	Percentage
Winter	January- March	132.2	8.70
Summer	April- May	249.8	16.5
South West Monsoon	June- September	583.7	38.6
North East Monsoon	October- December	543.5	36.0
Total		1509.2	100.0

During 2011, the south west monsoon received from June to September records the major contribution of the rainfall. 38.68 % (583.7 mm) of the total rainfall is recorded during the season. The north east monsoon contributes 36.02 % and the summer rains contributes 16.55 %. Only 8.75 % of actual rainfall is received during January to March.

Comparison of 2011 seasonal rainfall with previous year (2010) rainfall

The rainfall in the various seasons of 2011 have been compared with previous year rainfall to understand the pattern of rainfall received and to have better assessment of the change in the ground water region.

Table No. 7.3.5 Comparison of 2011 rainfall with 2010

Season	Period	2011	2010	% Dep
Winter	January- March	132.2	181.4	-28
Summer	April- May	249.8	326.0	-24
South- West monsoon	June- September	583.7	704.7	-18
North- East monsoon	October- December	543.5	928.7	-72
Total		1509.2	2140.8	-30

During all the four seasons of the year the district recorded different rainfall. During the North- East monsoon season, the district recorded a departure of -72% and during South- West monsoon, summer and winter season a departure of -18%, -24% and -18% is noticed respectively. The annual rainfall received during the year shows a 30% deficient with the previous year which is so alarming.

Temperature

Cold weather is experienced in the highlands, whereas lower down, the weather is bracing and is generally hot in the lowland regions. The mean maximum temperature is 35 °C (April – May) and the mean minimum temperature is 20 °C (December – January). Humidity is high and rises to about 90 percent during the south west monsoon. The monthly mean daily temperature is given below.

Table No. 7.3.6 Monthly mean maximum and minimum temperature

Month	Mean temperature(°C)	
	Maximum	Minimum
January	30.7	22.4

February	31.2	23.0
March	32.1	24.4
April	32.1	25.3
May	31.3	25.2
June	39.3	23.9
July	28.8	23.4
August	29.0	23.5
September	29.6	23.6
October	29.5	23.6
November	29.6	23.3
December	30.3	23.8

The monthly mean maximum & minimum temperature and total rainfall based upon 1901-2000 data.

Table No. 7.3.7: Monthly mean maximum & minimum temperature and total rainfall (100 yrs)

Month	Mean temperature(⁰ C)		Mean rain fall in mm
	Maximum	Minimum	
January	30.7	22.4	22.9
February	31.2	23.0	21.9
March	32.1	24.4	36.4
April	32.1	25.3	110.5
May	31.3	25.2	210.0
June	39.3	23.9	343.5
July	28.8	23.4	218.6
August	29.0	23.5	143.2
September	29.6	23.6	152.5
October	29.5	23.6	267.9
November	29.6	23.3	199.0
December	30.3	23.8	70.2
Total			1796.6

SLOPE

Slope has a scale connotation. It refers to the ground surface configuration for scale that exceeds about 10 m and range upward to the landscape as a whole. Slope has gradient, complexity, length and aspect.

Slope gradient is the inclination of the surface of the land from the horizontal. It is generally measured with a hand level. The difference in elevation between two points is expressed as percentage of the distance between these points. If the difference in elevation is 1 m over a horizontal distance of 100 m, slope gradient is 1%. A slope of 45° is a slope of 100%, because the difference in elevation between two points 100 m apart horizontally is 100 m on a 45° slope.

Slope complexity refers to the surface form on the scale of mapping. Slope complexity has an important influence on the amount and rate of run-off and on sedimentation associated with run-off.

Slope aspect is the direction towards which the surface of the land faces. The direction is expressed as an angle between 0 degree and 360 degrees (measured clockwise from true north) or as a compass point such as east or north- north west. Slope aspects may affect soil temperature, evapo-transpiration and winds received.

Generally with increase in slope of the land, soil is subjected to erosion and the intensity of the erosion depends upon slope percentage. Steep slopes are prone to landslides.

The table showing the slope class, description, area and percentage are given below:

Table No. 7.4.1 Slope class, description, area and percentage

No.	Slope Class	Description	Area in Ha	Percentage
1	0-3 percent	Very gentle slope	653.93	8.19
2	3-5 percent	Gentle slope	210.93	2.64
3	5-10 percent	Moderately sloping	454.80	5.70
4	10-15 percent	Strongly sloping	3594.75	45.02
5	15-35 percent	Moderately steep to steep	1845.59	23.11
6	> 35 percent	Very steep	1195.31	14.97
7	River		30.36	0.38
Total area			7985.61	100.00

Majority of the area (3594.75 ha, 45.02 % of TGA) comes under the strongly sloping class of 10-15 %. This is major slope class in all micro watersheds except 4V25a. The second major category is moderately steep to steep class with 15-35 % slope. This occurs is 1845.59 ha (23.11 % of TGA). An area of 1195.31 ha (14.97 % of TGA) is having slope more than 35 %, which requires proper management and conservation measures.

The table showing the distribution of slope in the six micro watersheds is given below:

Table No.7.4.2: Distribution of slope classes in watersheds

Slope	4V10a	4V11a	4V11b	4V25a	4V26a	4V29b
1	139.61	8.77	54.42	17.32	95.26	338.54
2	28.40			5.39	21.10	155.98
3	18.14	2.57	40.79	17.23	50.34	325.74
4	849.66	102.03	537.34	76.42	673.51	1355.79
5	283.12	20.56	37.77	226.03	523.45	754.67
6	389.59	40.47	55.70	87.21	524.02	98.31
River	14.25	1.19		10.48	4.44	
Total	1722.77	175.59	726.02	440.08	1892.12	3029.03

GEOLOGY

The project area falls in the geological division viz. Archean Crystalline rock. This comprises of Khondalite Group, Charnockite Group and Migmatite Group. The Khondalite Group is composed of Garnetiferousbiotite-sillimanite gneiss, with occasional bands of calc-granulite and quartzite. Charnockite are acidic to intermediate in composition. Irregular patches of Khondalite, veins of pegmatite and quartz are seen within the Charnockite. Pyroxene granulite occurs within the Khondalite as thin discontinuous lenticular bands conformable to the foliation planes. Migmatite are evenly distributed in the major part of the area as narrow zones within Garnetiferoussillimanite gneiss. All these rocks are indicated by a number of dolerite dykes, but their distribution is restricted to the midland region. The tertiaries and the basement rocks of the midland are extensively laterised.

Reddish brown to buff colored vermicular to pisolite laterite is predominantly developed to the west of Thiruvananthapuram- Kottayam road. The thickness of laterite ranges from 5 to 8 m. Bauxite generally occurs on flat tops. Garnet- Biotite gneiss with migmatite is concentrated along the northern border of the area. A North West –South East strip stretching along Thengumukku, Muduvilla, Kallara area near Chullalam and a major area around Pullampara, Venjaramoodu, Manikkamangalam etc. GarnetiferousBiotite is scattered all over the block and mainly seen at the western part of the block near Mudakkal region.

More than half of the project area is under GarnetiferousBiotite and the remaining area is under Garnet - Biotite gneiss with Migmatite. Five major rock groups viz Basic rocks, Charnockite group of rocks, Khondalite group of rocks, Migmatite complex, sand and silt are seen in the project area. The major groups are Migmatite complex (53.39%) and Khondalite group of rocks (43.44%).

The table showing the distribution of geology in the six watersheds are given below:

Table No. 7.5.1: Distribution of geological units in watersheds

Geology	4V10a	4V11a	4V11b	4V25a	4V26a	4V29b	Area (in Ha)	%
Garnet-Biotite Gneiss with Migmatite	406.70		82.65	140.54	1696.59	1188.94	3515.42	44.02
Garnetiferous Biotite	1301.82	174.40	643.37	289.06	191.09	1840.09	4439.83	55.60
River	14.25	1.19		10.48	4.44		30.36	0.38
Total	1722.77	175.59	726.02	440.08	1892.12	3029.03	7985.61	100.00

GEOMORPHOLOGY

The thematic map on geomorphology reveals that there are four geomorphological units in the project area. Terrain basement rocks like Khondalite and Migmatite has an undulating to rolling topography and is characterized by undulating spurs. Thick columns of laterite soils in the area supports the growth of coconut. A quantitative analysis of the ground water potential of these units are also made through interpretation of lineaments supported by necessary ground truth. The various geomorphological units identified in the project area and their spatial extent is given below:

Table No. 7.6.1: Geomorphological units description, area and percentage

Sl. No.	Geomorphological unit	Area (in ha)	Percentage (%)
1	Valley fill	631.44	7.91
2	Lower plateau- laterite	7097.42	88.88
3	Linear ridges	102.97	1.29
4	Residual mounts	123.42	1.55
5	River	30.36	0.38
Total		7985.61	100.00

The majority of the area is under Lower plateau laterite and its occupies an area of 7097.42 ha (88.88 % of the total geographical area) followed by valley fill with an area of 631.44 ha (7.91 % of total geographical area).

The table showing the distribution of geomorphology in the six watersheds are given below:

Table No. 7.6.2: Distribution of geomorphological units in watersheds

Geomorphology	4V10a	4V11a	4V11b	4V25a	4V26a	4V29b
Valley Fill	145.54	2.66	54.99	15.50	71.19	341.56
Lower Plateau	1508.81	166.27	658.43	394.22	1739.54	2630.15
Linear Ridges	26.16	0.34	0.08	16.29	44.04	16.06
Residual Mount	28.01	5.13	12.52	3.59	32.91	41.26
River	14.25	1.19		10.48	4.44	
Total	1722.77	175.59	726.02	440.08	1892.12	3029.03

SOILS

Soil is the basic natural resource that supports all life on earth's surface. Its thickness varies from a few centimeters to a few meters on earth's surface, but takes millions of years for its formation. Knowledge of soils is fundamental to well being of the present generation and the prosperity to come.

Soil survey is the study and mapping of soil as they occur in nature. This involves the systematic examination, description, identification, classification, correlation and finally mapping the geographic distribution of different soil, in the landscape. Thus soil surveys provide basic information on soils for planning development programmes.

A soil survey describes the characteristics of the soils, classifies them, plots the boundaries of the soils on an appropriate base map and makes predictions about the behavior of the soils. This information collected in a soil survey helps in the development of optimum land use plans and evaluates and predicts the effects of land use on the environment.

Major Soils

As part of the detailed soil survey conducted by Department of Soil Survey and Soil Conservation, Govt. of Kerala, 12 series were identified and mapped on the project area viz. Mudakkal, Kuttichal, Manickal, Vembayam, Amaravila, Nedumangad, Palode, Vilappil, Thonnakkal, Trivandrum, Aryancode and Vamanapuram

Mudakkal soils are alluvial, in origin and are found along the banks of rivers and flood plains. Low land series viz. Kuttichal, Manickal, Vembayam and Amaravila are colluvio - alluvial in origin. The soils seen in the made up paddy fields are classified as Miscellaneous land type as they have no uniform character. The major upland soil series is Nedumangad which is distributed in an area of 4472.78 ha (56%) followed by Trivandrum series (1216.49 ha, 15.23% of TGA). The Nedumangad soil series with a solum thickness of 90 to 150cm is very dark brown to pale brown in colour, very strongly acidic and have a surface texture of gravelly sandy clayey loam to gravelly sandy clay. These soils are developed in Khondalite rocks. Pebbles and stones are found distributed in the sub surface region. These soils are well drained with moderate to moderately slow permeability. These soils have medium fertility & moderate to good water holding capacity. These soils occur in rolling topography with normal to excessive relief and the soils are generally gravelly. Optimum soil conservation measures and proper soil management with judicious application of fertilizers with irrigation will enhance crop production.

The other upland soil series identified and mapped in the project area are Palode, Vilappil, Thonnakkal, Aryancode and Vamanapuram series.

The occurrence of soil series and their extent are listed below.

Table No. 7.7.1: Distribution of soil series

Sl. No	Name of Soil Series	Occurrence	Area (ha)	%
1	Mudakkal	River bank of midlands	79.59	1.00
2	Kuttichal	Very gently sloping region valleys of midlands and midup lands	50.07	0.63
3	Manickal	Very gently sloping narrow valleys of midlands	175.81	2.20
4	Vembayam	Very gently sloping valleys of lowlands	122.30	1.53
5	Amaravila	Very gently sloping valleys of lowlands	209.48	2.62
6	Nedumangad	Low hill ranges of the midlands	4472.78	56.07
7	Palode	Step to very steeping sloping lands of midlands and midup lands	520.85	6.52
8	Vilappil	Moderately steep hill slopes of Midlands and miduplands	116.16	1.45
9	Thonnakkal	Moderately steep side slopes of midlands	49.93	0.63
10	Trivandrum	Low hills and laterate mounds in midland	1216.49	15.23
11	Aryancode	Low hill ranges of midlands	428.92	5.37
12	Vamanapuram	Low hill ranges of midlands	289.16	3.62
13	Miscellaneous	Gently sloping narrow valleys	223.71	2.80
14	River		30.36	0.38
Total			7985.61	100.00

Source: Dept of Soil Survey & Soil Conservation, Govt. of Kerala

Note: M stands for Miscellaneous soils that have no uniform character

SOIL CHARACTERISTICS

Soil Depth

The physical properties of the soil largely determine how best it can be made suitable for growing a particular crop, different species or types of crops. Some of the important soil properties are water holding capacity, permeability to water, aeration, plasticity, nutrient supplying ability, etc. they are influenced by the size, proportion, arrangement and mineral composition of the soil particles. The proportion of the four major components of the soil- inorganic or mineral particles, organic material, water and air vary substantially from place to place and with depth. So soil depth is an important parameter for agriculture development and according to the depth, the soils have been classified into:

1. Very Shallow - less than 25 cm
2. Shallow - 25-50 cm

3. Moderately shallow - 50-75 cm
4. Moderately deep - 75-100 cm
5. Deep - 100- 150 cm
6. Very deep - more than 150 cm

The table showing the distribution of soil depth in the six micro watersheds are given below:

Table No. 7.7.2: Distribution of soil depth in watersheds

Depth	4V10a	4V11a	4V11b	4V25a	4V26a	4V29b	Area in Ha	%
1	11.84				223.74	0.00	235.58	2.95
2	161.98	3.35			124.58	216.75	506.66	6.34
3	877.65	155.07	360.15	70.52	408.62	397.11	2269.12	28.42
4	474.46	8.61	314.61		45.84	1236.55	2080.07	26.05
5	151.33	7.37	51.26	300.93	951.35	1094.15	2556.39	32.01
6	31.26			27.31	21.01	4.14	83.72	1.05
M				30.84	112.54	80.33	223.71	2.80
River	14.25	1.19		10.48	4.44		30.36	0.38
	1722.77	175.59	726.02	440.08	1892.12	3029.03	7985.61	100.00

Source: Dept of Soil Survey & Soil Conservation, Govt. of Kerala

Note: M stands for Miscellaneous soils that have no uniform character

Out of the total area, 2556.39 ha (32.01 %) are covered by deep soils, 2269.12 ha (28.42 %) under moderately shallow soils and moderately deep soil is found in 2080.07 ha. moderately shallow, moderately deep and deep soil cover 82.48 % of the total project area. Shallow to very shallow soils having a depth less than 75 cm is found in 9.29 % of TGA (742.24 ha)

Surface Soil Texture

A number of soil factors, the important of which are soil texture, moisture content and temperature modify delivery of ions to plant root surface by diffusion and mass flow. The finer the texture of the soil, the less rapid will be the movement of the soil texture and diffusion of ions through the water. Also, ions diffusing through soil moisture in clay soil are much more likely to be attracted to adsorption sites than on sandy soil.

The important textural classifications of soil are (1) sandy, (2) loamy, (3) clayey. Sandy soils are very permeable and well drained; but are less water retentive and hence need more frequent irrigation for successful crop growth. The clayey soils can hold more moisture, but they have high wilting percentage. They are also subjected to water logging resulting in poor aeration and drainage. The moderately fine texture soils, the loams are the most suitable soils for crop growth, since they have the advantage of both sand and clay.

The various surface soil textures identified in the project area and their spatial extent is given below:

Table No. 7.7.3: Distribution of surface soil texture

No.	Texture	Area in Ha	Percentage
1	Clay	516.48	6.47
2	Gravelly clay	32.71	0.41
3	Gravelly clay loam	3689.60	46.20
4	Gravelly loam	2469.85	30.93
5	Sandy clay	239.72	3.00
6	Sandy loam	333.88	4.18
7	Clay loam	148.68	1.86
8	Sandy clay loam	94.06	1.18
9	Loam	83.66	1.05
10	Gravelly sandy clay loam	122.90	1.54
11	Miscellaneous	223.71	2.80
12	River	30.36	0.38
	Total	7985.61	100.00

Source: Dept of Soil Survey & Soil Conservation, Govt. of Kerala

Note: M stands for Miscellaneous soils that have no uniform character

The major soil texture of the project area constitutes that of gravelly clay loam texture which covers an area of 3689.60 ha (46.20%). Generally loam soils occurs in 2469.85 ha (30.93%). These surface soil texture covers the major area in all the six watersheds. Ten different soil textures are identified and mapped.

The table showing the distribution of surface soil texture in the six watersheds are given below:

Table No. 7.7.3: Distribution of surface soil texture in watersheds

Texture	4V10a	4V11a	4V11b	4V25a	4V26a	4V29b
Clay	94.25	5.86	30.28		4.28	381.81
Gravelly clay	32.71					
Gravelly clay loam	790.66	73.73	451.59	176.84	794.86	1401.92
Gravelly loam	702.55	92.15	223.16	151.29	757.92	542.78
Sandy clay	23.50			14.66		201.56
Sandy loam	64.85	2.66	20.99	27.16	46.56	171.66
Clay loam					0.51	148.17
Sandy clay loam				3.54		90.52
Loam				25.27	58.39	
Gravelly sandy clay loam					112.62	10.28
Miscellaneous				30.84	112.54	80.33
River	14.25	1.19		10.48	4.44	
	1722.77	175.59	726.02	440.08	1892.12	3029.03

Source: Dept of Soil Survey & Soil Conservation, Govt. of Kerala

Note: M stands for Miscellaneous soils that have no uniform character

Soil Erosion

Soil erosion is the process of detachment and displacement of soil particles from land surface. This mainly occurs by natural erosion on the geologic erosion and accelerated as soil erosion. The accelerated erosion is caused by the unscientific cultivation practices, heavy grazing and destruction of tree cover. The major factors influencing erosion are the rainfall, wind, type of soil, slope of the land, ground cover/land use pattern and human factors.

Four major erosion classes are mapped in the project area

- 1 – slight
- 2 – moderate
- 3 – severe
- 4 - very severe

The majority of the area is under moderate erosion class. An area of 3552.16 ha (44.48 % of TGA) is under this class and an area of 2905.13 ha is under moderate erosion class. Nearly 500 ha area is having slight erosion, which use the low lying fields in the project area.

The table showing the distribution of soil erosion in the six watersheds are given below:

Table No. 7.7.4: Distribution of soil erosion in watersheds

Erosion	4V10a	4V11a	4V11b	4V25a	4V26a	4V29b	Area (in Ha)	%
1	149.00	8.52	51.26	14.66	27.05	248.13	498.62	6.24
2	502.23	7.47	314.62	49.37	274.56	1756.88	2905.13	36.38
3	883.46	155.06	360.14	334.73	1091.83	726.94	3552.16	44.48
4	173.83	3.35			381.70	216.75	775.63	9.71
M				30.84	112.54	80.33	223.71	2.80
River	14.25	1.19		10.48	4.44		30.36	0.38
	1722.77	175.59	726.02	440.08	1892.12	3029.03	7985.61	100.00

Source: Dept of Soil Survey & Soil Conservation, Govt. of Kerala

Note: M stands for Miscellaneous soils that have no uniform character

LAND CAPABILITY

Land capability classification is an interpretative grouping of soils mainly based on the inherent soil characteristics, external land features and environment factors that limit the use of land. Information on first two aspects are provided by standard detailed soil survey. The internal characteristics include the nature of parent material, colour, texture, structure of soil, depth, soil erosion, etc. and the external land features includes the slope, erosion, drainage, etc.

The classification of soil units into capability grouping enables one to get a picture of the hazards of the soil to various factors which cause soil damage, deterioration or lowering in fertility and its potential for production. A soil with a capacity to grow a large

variety of crops and giving high yields will naturally qualify to be grouped in a better class. Thus the soils are mainly classified into 8 capability class and of which 6 classes and its associations falls in the project area.

Class	Description
II	Good cultivable land
III	Moderately good cultivable land
IV	Fairly good cultivable land suites for occasional or limited cultivation
VI	Well suited for forest or grazing. Suited for plantation crops which require minimum tillage
VII	Fairly well suited for grazing or forestry
VIII	Land suited only for wild life

These classes based on their limitations have the following sub-class association

c - climate limitation

e - erosion and run-off

s - soil limitations

w - wetness, high water table, flooding, drainage, etc.

Class I land is the best devoid to any limitation for intensive cultivation of all climatically adopted crops. Class II to VII lands has progressively increasing hazards or limitation. The sub classes provide information about the kind of problem involved. Climatic limitation (uneven rainfall distribution and high temperature) being common to the area has not been indicated along with the land capability class.

The table showing the distribution of land capability in the six watersheds are given below:

Table No. 7.8.1: Distribution of land capability classes in watersheds

Capability	4V10a	4V11a	4V11b	4V25a	4V26a	4V29b	Area (in Ha)
IIw	151.33	8.52	51.26	14.66	41.35	276.51	543.63
Ile						60.74	60.74
IIIw				30.84	150.20	19.63	200.67
IIle	31.26			27.33	47.84	227.56	333.99
IVe	571.48	8.54	424.50	193.01	518.53	1444.76	3160.82
IVes			60.53			283.19	343.72
VIe				154.41	348.67	234.11	737.19
Vles	784.16	153.99	189.73	5.81	313.18	305.50	1752.37
VIIe					126.21		126.21
VIIes	150.50	3.35		3.54	339.87	103.45	600.71
VIIIes	19.79				1.83	73.58	95.20
River	14.25	1.19		10.48	4.44		30.36
Total	1722.77	175.59	726.02	440.08	1892.12	3029.03	7985.61

Source: Dept of Soil Survey & Soil Conservation, Govt. of Kerala

The major land capability associations are:

II e: The area of 60.74 ha mapped under miscellaneous land type comes in this class. These are good cultivable lands with deep to very deep soils occurring on gently sloping lands subject to slight to moderate erosion. Spice trees, areca nut, coconut, betel vine, banana, vegetables etc. are the crops suited to the type of land.

II w: The area 543.63 ha comes under this class. These are good cultivable lands with deep to very deep soils occurring on gently sloping lands subject to drainage problem. Excess water is the major limiting factor which limits the choice of crop. Paddy is most suited for the soil.

III e: The area of 333.99 ha comes under the class. These are moderately good cultivable land which are subjected to slight and moderate erosion hazards. The soils are on moderate slopes subject to water erosion and sandy soils subject to wind erosion. These are problems due to moderate depth and gravelliness. These lands are suited for coconut, arecanut, banana, tapioca, vegetables, etc.

III w: An area of 200.67 mapped under miscellaneous land type comes in this class. These are moderately good cultivable lands. These are moderately good cultivable lands with deep to very deep soils occurring on gently sloping lands subject to slight to moderate erosion. Spice trees, arecanut, coconut, betel vine, banana, vegetables etc. are the crops suited to the type of land.

IV e: An area of 3160.82 ha comes under this class. This is the major land capability class mapped in this area. It occurs nearly in 40% of the project area. These are fairly good cultivable lands occurring in strongly sloping to steep lands subject to moderate erosion hazards. These lands are suitable for the cultivation of coconut, banana, pepper, rubber, pineapple, fruit trees, etc.

IV es:An area of 343.72 ha comes under this capability class. These are fairly good cultivable lands having moderately deep gravelly soils. These soils occur on strongly sloping to steep lands subject to moderate erosion hazards and soil limitation. These lands are suitable for the cultivation of coconut, banana, pepper, rubber, pineapple, fruit trees etc.

VI e:An area of 739.19 ha comes under this class. This class comprises of lands having deep soils and occurring on steep lands which are well suited for forestry or plantation crops which require minimum tillage. If possible these lands should be kept under permanent vegetative cover. These lands are suitable for growing rubber, cashew, fruit trees etc with zero tillage. Staggered contour trenching is needed for protecting soil.

VI es:An area of 1752.37 ha comes under this class. This is the second major capability class mapped in the project area and it occurs in nearly 20% of the project area. This class comprises of lands having moderately shallow soils occurring on steep lands, which are well suited for forestry or plantation crops, which require minimum tillage. Shallow rooting depth, rockiness etc. are the soil limitations. If possible these lands should be kept under permanent vegetative cover. These lands are suitable for growing rubber,

cashew, fruit trees etc. with zero tillage. Staggered contour trenching is needed for protecting soil.

VII e:An area of 126.21 ha comes under this class. These lands have moderately deep to deep soils occurring on very steep lands subject to severe erosion. Topography is the major limitation. These lands are non-arable lands but due to pressure on land, these lands are also cultivated to rubber and mixed trees. Permanent vegetative cover is suggested to protect this soil.

VII es:An area of 600.71 ha comes under this class. These soils have moderately shallow such occurring on steep to very steep lands subject to severe erosion. Rockiness, steep slope and moderately shallow depth are the limitations. These lands are non-arable lands but due to pressure on land, these lands are also cultivated to rubber and mixed trees. Permanent vegetative cover is suggested to protect this soil.

VIII es:An area of 95.20 ha occurs under the class. These lands are well suited for forestry and grazing. These soils are seen in steep lands subject to severe erosion, if soil cover is depleted. Highly erodible gullies and poorly managed lands are the major limitations. Precautions should be taken to maintain maximum cover for erosion control and improve the wild life.

GROUND WATER

Groundwater has been the mainstay for meeting the domestic needs of more than 80% of rural and 50% of urban population besides, fulfilling the irrigation needs of around 50% of irrigated agriculture. The ease and simplicity of its extraction has played an important role in its development. Recently the problems of decline in water table, contamination of groundwater, seawater intrusion etc. are being reported at many places.

The ground water potential of Kerala is very low as compared to that of many other states in the country. The estimated ground water balance is 5590Mm³. Dug wells are the major ground water extraction structure in Kerala. The dug wells have a maximum depth of about 10 to 15 meters and have a diameter of about 1 to 2 meters in coastal region and 2 to 6 meters in the midland and high land. The open well density in Kerala is perhaps the highest in the country – 200 wells per sq.km in the coastal region, 150 wells per sq.km in the midland and 70 wells per sq.km in the high land. The ground water withdrawal is estimated as 980Mm³ and the State Ground Water Department calculate the effective recharge as 8134 sq Mm³. The ground water level is receding drastically during the summer months and drying up of wells are common features of the ground water levels in many parts of Kerala. The ground water replenishment and hence the levels also depends on the geo-morphological, physical and chemical properties of the soil in general, The depth of water level in Kerala state varies from few cm bgl to 56 M bgl and most of the area fall under 0-20 M bgl. The depth of the water level in the weathered crystalline of midland areas in Kerala varies from 3- 16 M bgl. The midland area sustains medium capacity dugwells. Borewells tapping deeper fractured aquifer are

feasible along potential features in the midland and hill ranges. Potential fractures are seen down to 240 M and the most productive zone is between 60 M and 175 M. The discharge of borewells range between 3,600 lph and 1,25,000 lph. In laterites, which is the most widely distributed lithological area in the state having a thickness from a 3 M to 30 M, the depth of water level ranges from less than a meter to 25 M.bgl. Laterites form potential aquifer along valleys and can sustain wells with yields in the range of 0.5 M³ to 6 M³ per day. Along the coastal plains, the ground water occurs at depth ranging from less than a meter to 6 M.bgl. Filter point wells are feasible wherever the saturated availability indicate that ground water depths are farthest for laterite regions and shallowest for coastal alluvium during all times of the year. The availability of the groundwater level between the post and pre monsoon levels varies widely. The water level fluctuations in the post monsoon and pre monsoon vary between coastal alluvium, river alluvium and valley fills.

The details of the ground water resource, ground water resource potential and observation wells in the study area are given below:

Table No. 7.9.1 : Ground water resource of Vamanapuram Block
(As per GEC – 1997) on 31st March 2004

1	Domestic 2004	8.28
2	Domestic 2009	10.24
3	Industrial 2004	
4	Industrial 2009	0.56
5	Total Annual GW recharge (MCM)	54.71
6	Natural discharge during non-monsoon season (MCM)	5.47
7	Net annual GW availability (MCM) (5-6)	49.24
8	Existing gross ground water draft for irrigation (MCM)	8.41
9	Existing gross ground water draft for domestic & Industrial water supply (MCM)	8.28
10	Existing gross ground water draft for all uses (MCM) (8+9)	16.69
11	Allocation for domestic and industrial water supply upto next 25 years (MCM)	10.80
12	Requirement for domestic and industrial water supply upto next 25 years (MCM)	11.47
13	Net GW availability for future irrigation development (MCM) (7-8-11)	30.03
14	Stage of GW Development in % (10/7 x 100)	33.90
15	Category	safe

Ground Water Resource Potential of Vamanapuram Block
as on 31st March, 2004 in MCM

1	Command/Non command (NC)	NC
2	Recharge from Rainfall during Monsoon season	24.37

3	Recharge from other sources during monsoon season	Nil
4	Recharge from Rainfall during non-monsoon season	27.34
5	Recharge from other sources during non-monsoon season	3.00
6	Total Annual Ground Water Recharge	54.71
7	Natural Discharge during non-monsoon season	5.47
8	Net Annual Ground Water Availability	49.24

Observation wells

The details regarding the location of observation wells, depth of well and water table are given below:

Table 7.9.2: Distribution of observation wells in the watershed area

No.	Watershed code	Longitude	Latitude	Depth of well	Depth of water table
1	4V25a	76° 58' 41"	8° 41' 42"	3.5 Meters	1.9 Meters
2	4V25a	76° 57' 23"	8° 41' 19"	13.9 Meters	13.1 Meters
3	4V26a	76° 56' 34"	8° 40' 47"	3.1 Meters	1.9 Meters
4	4V26a	76° 57' 13"	8° 40' 18"	10.8 Meters	6 Meters
5	4V26a	76° 58' 35"	8° 40' 27"	12.8 Meters	12.1 Meters
6	4V26a	76° 56' 20"	8° 40' 38"	2 Meters	3.8 Meters
7	4V29b	76° 53' 42"	8° 40' 42"	9.1 Meters	7.3 Meters
8	4V29b	76° 55' 3"	8° 40' 46"	8 Meters	6 Meters
9	4V29b	76° 54' 45"	8° 39' 44"	7.2 Meters	6.6 Meters
10	4V29b	76° 52' 36"	8° 40' 52"	13.1 Meters	10.9 Meters
11	4V29b	76° 54' 26"	8° 41' 38"	8.3 Meters	5.4 Meters
12	4V10a	76° 58' 9"	8° 42' 37"	7 Meters	5.7 Meters
13	4V10a	76° 57' 18"	8° 42' 57"	11.7 Meters	9.1 Meters
14	4V10a	76° 58' 48"	8° 42' 58"	9.7 Meters	8.9 Meters
15	4V10a	76° 57' 44"	8° 43' 41"	14.1 Meters	13.2 Meters
16	4V10a	76° 56' 53"	8° 44' 51"	8.9 Meters	7.7 Meters
17	4V11b	76° 58' 53"	8° 43' 44"	11.9 Meters	11.1 Meters
18	4V11b	76° 58' 21"	8° 44' 40"	10.4 Meters	8.7 Meters

Table No. 8.1

INTERGRATED WATERSHED MANAGEMENT PROGRAMME - VAMANAPURAM (IWMP- 1)**VAMANAPURAM BLOCK PANCHAYATH, THIRUVANANTHAPURAM****FUNDING PATTERN - Master Plan for 4 Years***(Amount in Rupees)*

Year	Adminiatration	Monito ring	Evalu ation	Entry Point Activity	Institu tion & Capacity Building	DPR Preparation	Natural Resource Management Activities	Livelihood Activities	Production System & Micro Enterprises	Consoli dation Phase	Total IWMP Project Fund
1 st	2247600	224760	112380	4495200	2247600	1123800	6788700	1019760	2437500		20697300
%	2.00	0.20	0.10	4.00	2.00	1.00	6.04	0.91	2.17		18.42
2 nd	2809500	280950	280950		2247600		22227423	3355000	4379250		35580673
%	2.50	0.25	0.25		2.00		19.78	2.99	3.90		31.66
3 rd	2809500	280950	280950		1123800		18277975	4467500	3168050		30408725
%	2.50	0.25	0.25		1.00		16.26	3.98	2.82		27.06
4 th	3371400	337140	449520				15638453	1277500	1254000	3371400	25699413
%	3.00	0.30	0.40				13.92	1.14	1.12	3.00	22.87
Total	11238000	1123800	1123800	4495200	5619000	1123800	62932551	10119760	11238800	3371400	112386000
%	10.00	1.00	1.00	4.00	5.00	1.00	56.00	9.00	10.00	3.00	100.00

Table No. 8.2

INTERGRATED WATERSHED MANAGEMENT PROGRAMME - VAMANAPURAM (IWMP- 1)
VAMANAPURAM BLOCK PANCHAYATH, THIRUVANANTHAPURAM
Master Plan for 4 Years
FUNDING PATTERN FOR ENTRY POINT ACTIVITIES

(Amount in Rupees)

Sl. No	Name of Watershed	IWMP Fund	Convergence/ Beneficiary contributions	Total
1	4V10a- Aruvippuram	1018000	575000	1593000
2	4V11a- Cheruvalam	79000	60000	139000
3	4V11b- Kanchinada	436000	155000	591000
4	4V25a- Ayanikuzhi	256000	47000	303000
5	4V26a- Moozhi	1130000	648000	1779000
6	4V29b- Nellanad	1576000	966000	2542000
	Total	4495000	2451000	6946000

Table No. 8.3

INTERGRATED WATERSHED MANAGEMENT PROGRAMME - VAMANAPURAM (IWMP- 1)
VAMANAPURAM BLOCK PANCHAYATH, THIRUVANANTHAPURAM
NATURAL RESOURCE MANAGEMENT ACTIVITIES - Master Plan for 4 Years

(Amount in Rupees)

Sl. No	Name of Watershed	Year wise	IWMP Fund	Convergence	WDF	Total
1	4V10a- Aruvippuram	First Year	1318550.00	1896754.00	102355.00	3317659.00
		Second Year	4437770.00	4113064.00	306789.50	8857623.50
		Third Year	3632286.00	2796064.00	250741.10	6679091.10
		Fourth Year	4857034.00		305140.90	5162174.90
2	4V11a- Cheruvalam	First Year	112800.00	272709.20	11080.00	396589.20
		Second Year	353389.00	645418.40	30514.65	1029322.05
		Third Year	284809.00	528418.40	22456.65	835684.05
		Fourth Year	357647.00		26991.95	384639.00
3	4V11b- Kanchinada	First Year	741450.00	771617.00	59445.00	1572512.00
		Second Year	1995714.00	1766290.00	168933.90	3930937.90

		Third Year	1807134.00	760790.00	145475.90	2713399.90
		Fourth Year	1562614.00		120148.90	1682762.90
4	4V25a- Ayanikuzhi	First Year	345550.00	467545.60	34155.00	847250.60
		Second Year	1570732.00	966091.20	145389.95	2682213.15
		Third Year	819319.00	953891.20	71798.65	1845008.85
		Fourth Year	759159.00		57516.15	816675.15
5	4V26a- Moozhi	First Year	1394500.00	1660065.00	119450.00	3174015.00
		Second Year	5901524.00	3533130.00	506180.40	9940834.40
		Third Year	4773791.00	2703130.00	400907.10	7877828.10
		Fourth Year	3907051.00		283389.10	4190440.10
6	4V29b- Nellanad	First Year	2875850.00	2421145.00	272185.00	5569180.00
		Second Year	7968294.00	4989790.00	710757.40	13668841.40
		Third Year	6960636.00	4102290.00	610991.60	11673917.60
		Fourth Year	4194948.00		312178.80	4507126.80

Table No. 8.4

INTERGRATED WATERSHED MANAGEMENT PROGRAMME - VAMANAPURAM (IWMP- 1)
VAMANAPURAM BLOCK PANCHAYATH, THIRUVANANTHAPURAM
LIVELIHOODS FOR LANDLESS/ ASSETLESS - Master Plan for 4 Years

(Amount in Rupees)

Sl. No	Name of Watershed	Year wise	IWMP Fund	Beneficiary contributions	Total
1	4V10a- Aruvippuram	First Year	236530.00	101370.00	337900.00
		Second Year	785000.00	345000.00	1130000.00
		Third Year	1021250.00	643750.00	1665000.00
		Fourth Year	250000.00	300000.00	550000.00
2	4V11a- Cheruvalam	First Year	21630.00	9270.00	30900.00
		Second Year	52500.00	17500.00	70000.00
		Third Year	48750.00	16250.00	65000.00
		Fourth Year	52500.00	52500.00	105000.00
3	4V11b- Kanchinada	First Year	96390.00	41310.00	137700.00
		Second Year	325000.00	125000.00	450000.00

		Third Year	401250.00	203750.00	605000.00
		Fourth Year	160000.00	160000.00	320000.00
4	4V25a- Ayanikuzhi	First Year	58170.00	24930.00	83100.00
		Second Year	161250.00	53750.00	215000.00
		Third Year	201250.00	83750.00	285000.00
		Fourth Year	140000.00	140000.00	280000.00
5	4V26a- Moozhi	First Year	251860.00	107940.00	359800.00
		Second Year	816250.00	288750.00	1105000.00
		Third Year	1225000.00	910000.00	2135000.00
		Fourth Year	275000.00	375000.00	650000.00
6	4V29b- Nellanad	First Year	355180.00	152220.00	507400.00
		Second Year	1215000.00	505000.00	1720000.00
		Third Year	1570000.00	1060000.00	2630000.00
		Fourth Year	400000.00	500000.00	900000.00

Table No. 8.5

INTERGRATED WATERSHED MANAGEMENT PROGRAMME - VAMANAPURAM (IWMP- 1)
VAMANAPURAM BLOCK PANCHAYATH, THIRUVANANTHAPURAM
PRODUCTION SYSTEM & MICRO ENTERPRISES - Master Plan for 4 Years

(Amount in Rupees)

Sl. No	Name of Watershed	Year wise	IWMP Fund	Convergence	WDF	Total
1	4V10a- Aruvippuram	First Year	605000.00	780000.00	249300.00	1634300.00
		Second Year	852500.00	1039500.00	194850.00	2086850.00
		Third Year	729500.00	355500.00	131310.00	1216310.00
		Fourth Year	356400.00	408600.00	64152.00	829152.00
2	4V11a- Cheruvalam	First Year	30000.00	40500.00	12690.00	83190.00
		Second Year	88500.00	113000.00	18180.00	219680.00
		Third Year	47250.00	20250.00	8505.00	76005.00
		Fourth Year	34000.00	36000.00	6120.00	76120.00
3	4V11b- Kanchinada	First Year	240000.00	324000.00	101520.00	665520.00
		Second Year	407000.00	465600.00	87480.00	960080.00

		Third Year	331450.00	177050.00	59661.00	568161.00
		Fourth Year	112400.00	132600.00	20232.00	265232.00
4	4V25a- Ayanikuzhi	First Year	157500.00	210000.00	66150.00	433650.00
		Second Year	275250.00	307150.00	55575.00	637975.00
		Third Year	131250.00	56250.00	23625.00	211125.00
		Fourth Year	60000.00	60000.00	10800.00	130800.00
5	4V26a- Moozhi	First Year	605000.00	780000.00	249300.00	1634300.00
		Second Year	1126000.00	1334000.00	261900.00	2721900.00
		Third Year	777100.00	405900.00	139878.00	1322878.00
		Fourth Year	345600.00	389400.00	62208.00	797208.00
6	4V29b- Nellanad	First Year	800000.00	1080000.00	338400.00	2218400.00
		Second Year	1630000.00	1921000.00	359100.00	3910100.00
		Third Year	1151500.00	598500.00	207270.00	1957270.00
		Fourth Year	345600.00	419400.00	62208.00	827208.00

INSTITUTION BUILDING

The watershed development project has great potential and scope to empower socially disadvantaged sections of the community. Considering the needs and priorities of these sections, special activities were designed to reduce their drudgery. This was involved in a skills upgradation programme. People's organizations hold the key in ensuring the right integration between sustainable development and social equity. Such organizations have representations from socially backward communities and women with separate special interest groups. Within group interactions across group interactions and representation in village level institutions provide a platform for the disadvantaged groups to become a part of mainstream development. It is also important to note that it was properly ensured that these groups obtain equal opportunities to access the resources developed at the community level.

In order to implement effectively, under the umbrella of State Level Nodal Agency (SLNA) various institutional mechanisms are formed. They are:

- viii. Watershed Cell cum Data Center (WCDC)
- ix. Project Implementation Agency (PIA)
- x. Watershed Development Team (WDT)
- xi. Watershed Committee (WC)
- xii. Neighbourhood Groups
- xiii. Self Help Groups (SHGs)
- xiv. User Groups (UGs)

i) State Level Nodal Agency

A dedicated State Level Nodal Agency (SLNA) is constituted by the State Government with Agricultural Production Commissioner as the Chairman and Rural Development Commissioner as the Vice Chairman. SLNA is having an independent bank account. The SLNA sanction watershed projects for the State on the basis of approved state perspective and strategic plan as per procedure in vogue and oversee all watershed projects in the state within the parameters set out in these Guidelines.

ii) Watershed Cell cum Data Center (WCDC)

In district, a separate dedicated unit, called the Watershed Cell cum Data Center (WCDC) is established, which oversees the implementation of watershed programme in the district. WCDC has a separate independent account for this purpose. WCDC function in close co-ordination with the District Planning Committee. WCDC is a separate unit with full time Project Manager and 3 to 4 subject matter specialists on Agriculture/ Water Management / Social Mobilisation/ Management & Accounts appointed on the basis of their qualification and expertise on contract/deputation/transfer etc.

iii) Project Implementing Agency (PIA)

The Block Panchayat having the major area under the programme is selected as the Project Implementing Agency (PIA) by the State Level Nodal Agency (SLNA) for

Integrated Watershed Management Programme (IWMP) in Kerala. The PIAs are responsible for implementation of watershed project. In Thiruvananthapuram district, for the IWMP – 1, the Vamanapuram Block Panchayat is being selected as the Project Implementing Agency.

The Project Implementing Agency (PIA) provides necessary technical guidance to the Grama Panchayat for preparation of development plans for the watershed through Participatory Rural Appraisal (PRA) exercise, undertake community organization and training for the village communities, supervise watershed development activities, inspect and authenticate project accounts, encourage adoption of low cost technologies and build upon indigenous technical knowledge, monitor and review the overall project implementation and set up institutional arrangements for post-project operation and maintenance and further development of the assets created during the project period.

The PIA, after careful scrutiny, submits the Action Plan for Watershed Development Project for approval of the DWDU/DRDA and other arrangements. The PIA will also submit the periodical progress report to DWDU. The PIA shall also arrange physical, financial and social audit of the work undertaken. It will facilitate the mobilization of additional financial resources from other government programmes, such as MGNREGS, BRGF, SGRY, National Horticulture Mission, Tribal Welfare Schemes, Artificial Ground Water Recharging, Greening India, etc.

iv) Watershed Development Team (WDT)

Watershed Development Team is an integral part of the PIA and is set up by the PIA as per the directions of SLNA. WDT has seven members, broadly with knowledge and experience in agriculture, soil science, water management, social mobilization and institutional building. WDT functions in close collaboration with the team of experts at the district and state level. The expenses towards the salaries of the WDT members are charged from the administrative support to the PIA. WDT guides the Watershed Committee (WC) in the formulation of the watershed action plan. WDT assists Gram Panchayat / Gram Sabha in constitution of the Watershed Committee and their functioning. WDT also assist in organizing and nurturing User Groups and Self-Help Groups. WDT undertakes engineering surveys, prepare engineering drawings and cost estimates for any structures to be built. Monitoring, checking, assessing, undertaking physical verification and measurements of the work done are also done by WDT.

v) Watershed Committee

It is a committee that is constituted by Grama Sabha to implement the watershed project with technical support of WDT in the micro watershed area. This committee is registered as a sub group of the Grama Panchayat. The Grama Sabha of the Panchayat selects the chairman of the watershed committee with the secretary who will be an employee nominated by the Grama Panchayat, preferably the Village Extension Officer. The Watershed Committee (WC) will comprise of at least 9 members, half of the members shall be representatives of SHGs and User Groups, SC/ST community, women and landless persons in the village. One member of the WDT shall also be represented in

the Watershed Committee (WC). Where the Panchayat covers more than one village, they would constitute a separate subcommittee for each village to manage the watershed development project in the concerned village. Where a watershed project covers more than one Gram Panchayat, separate committees will be constituted for each Gram Panchayat.

The Watershed Committee was formed in all the six micro watersheds of IWMP-1 project area. The IWMP-1 is a cluster of 13 Grama Panchayats coming under 4 Block Panchayats. 6 main Watershed Committees and 4 sub-watershed committees are formed at Panchayats keeping all parameter of Watershed Committee keeping the gender sensitive issues intact. Watershed Committee members are briefed about the project objectives and a workshop is also conducted in this regard at every Panchayat.

The watershed committee has a pivotal role to play during and after the project implementation period. The Watershed Committee has a separate bank account to receive funds for watershed projects and will utilize the same for undertaking its activities.

vi) Neighbour Hood Groups

Neighbour Hood Groups are formed in every micro watershed combining 40 to 50 households living as clusters. The overall planning, coordination, management and maintenance of the activities pertaining to the area are implemented through this Group. These families are further subdivided into clusters of 7-8 houses and a person is selected to represent this cluster in the Neighbour Hood Committee ensuring the proper representation on different sections. The details of wards, households and NHGs in the project area are given below:

Table No. 9.6.1: Details of Panchayat, wards and NHGs

No.	Name of Panchayat	number of wards in full	number of wards in part	number of households	number of NHGs
1	Pullampara	10	2	4447	85
2	Nellanad	9	6	4901	84
3	Kallara	11	5	5639	105
4	Pangod	2	4	1298	22
5	Manickal	4	6	2121	47
6	Nanniyod		1	40	1
7	Vamanapuram		1	12	-
Vamanapuram block		36	25	18458	344
8	Mudakkal	4	5	2422	47
Chirayinkeezhu block		4	5	2422	47

9	Vembayam		2	296	7
10	Panavoor		3	205	4
11	Anad		1	12	-
Nedumangad block		0	6	513	11
12	Mangalapuram		1	52	1
13	Pothencode		1	-	-
Pothencode Block		0	1	52	-
Total		40	37	21445	403

vii) Self Help Groups

Self Help Groups are self-motivated, small homogenous groups organized together through highly successful of credit and thrift activities. Self Help Group initiative especially for women helps to uplift their livelihood. The Watershed Committee shall constitute SHGs in the watershed area with the help of WDT from amongst poor, small and marginal farmer households, landless/asset less poor agricultural labourers, women, shepherds and SC/ST persons. These Groups shall be homogenous groups having common identity and interest who are dependent on the watershed area for their livelihood. Each Self Help Group will be provided with a revolving fund of an amount to be decided by the Nodal Ministry

SHG initiative in this project was being organized by having a focused group discussion between various homogenous communities of women based on their livelihood separately. Each group discussed their basic problems with their facilitators. The major problems identified are:

- Lack of proper credit facilities due to low intervention of formal financial credit institution.
- Excessive exploitation of weaker section by money lenders
- Lack of attitude for saving among poor people due to complex and rigid conventional financial institution structures.
- Lack of small micro-loans without collaterals and high interest rates.
- Lack of knowledge on credit, thrift activity and banking.

With a view point of these problems it was planned to organize these women into a group consisting of 5 to 20 in each groups. It was planned to have some capacity building training regarding SHG activities. It was also proposed to have some livelihood activities which will promote women empowerment. This included Bakery units, Garments making, Mushroom Production, and Vermi compost activities with forward and backward linkage. This will ultimately lead into better human development in the village.

viii) User Groups

User Groups are normally formed to manage an activity or asset created under the programme on a long term basis. The Watershed Committee (WC) shall constitute User Groups in the watershed area with the help of WDT. These shall be homogenous groups of persons most affected by each work/ activity and shall include those having land holdings within the watershed areas. Each User Group shall consist of those who are likely to derive direct benefits from a particular watershed work or activity. The Watershed Committee (WC) with the help of the WDT shall facilitate resource-use agreements among the User Groups based on the principles of equity and sustainability. These agreements must be worked out before the concerned work is undertaken. It must be regarded as a pre-condition for that activity. The User Groups will be responsible for the operation and maintenance of all the assets created under the project in close collaboration with the Gram Panchayat and the Gram Sabha. The user group collects user charges from their members, oversee the works and manage the benefits

Some of the points which were considered while forming a user group in the villages of the IWMP-1 project are:

- a) In case of, Land Leveling, Farm Bundling, Roof Well Recharge, Kitchen Garden, Demonstration Plot, Contour Trench, Ring Bund, Soil Bund, Staggered Trenches, etc. all the beneficiaries of the individual and community activities who are involved are made user group members.
- b) In case of a check dam or Gully Plug, all the beneficiaries of the individual check dam where involved as user group members.

Focused group discussion will be conducted to between the user groups to discuss the above conditions and to select potential members. It was decided that each group would formulate certain internal rules and have a feeling of ownership with community spirit. Membership was on voluntary and democratic.

The following types of User Groups were planned to be formed in the villages of the Vamanapuram IWMP-1 watershed

No	Name of User Group	Major Task
1	Animal Husbandry	Bringing of new AH technology Management of New Cattle and their improvement
2	Agriculture	Self sufficiency in vegetables Increasing area under cultivation
3	Land Leveling	Equitable sharing of soil management
4	Farm bund	Equitable sharing of natural resources Assuring conduct of proper work
5	Gully Plug	Equitable sharing of soil and water management Development of community land for fodder development
6	Well Recharge	Equitable sharing of Water Management to

		improve ground water table
7	Check Dam	Equitable sharing of Water Management to improve ground water table and enhance water Storage Capacity
8	Plantation	Develop wasteland area and production of bio fuel.
9	Horticulture	Increase Livelihood
10	Kitchen Garden	Increase Livelihood & poison free vegetables
11	Mushroom	Increase Livelihood
12	Bee keeping	Increase Livelihood
13	Demonstration Plot	Demo to Village People on Modern Agriculture system and High Production
14	Fodder Bank & Cultivation	Bringing of More Fodder available in Village for village animal and their improvement.
15	Floriculture	Improve and purpose of livelihood
16	Vegetable Farming	Improve modern technology and purpose of livelihood
17	Fishery	Improve modern technology and purpose of livelihood

CAPACITY BUILDING

Capacity building is a conceptual approach to development that focuses on understanding the obstacles that inhibit people, Local Self Governments and various stakeholders working in the project area. This also aims at realizing their developmental goals while enhancing the abilities that will allow them to achieve measurable and sustainable results. Capacity building was aimed in strengthening the skills, competencies and abilities of people and communities in developing societies in order to overcome the causes of their exclusion and suffering. It was used to guide their internal development and activities. A series of trainings, awareness programmes, user group discussions and brain storming sessions were organized at different levels.

The following awareness seminars/trainings were conducted at block level

Awareness Seminar

To create awareness on watershed based local planning, a one day seminar on 19-12-2011 was organized at Vamanapuram Block Panchayat Hall by Kerala State Land Use Board in collaboration with Vamanapuram Block Panchayat. The seminar was organized with an inaugural session followed by technical session and user interactive discussion. The awareness seminar was inaugurated by Smt. Ramani. P. Nair, District Panchayat President, Thiruvananthapuram. Smt. Baby Sulekha, Block Panchayat President, Vamanapuram presided the function. Block Panchayat Vice President, Chairpersons of various Standing Committees and the Grama Panchayat Presidents also attended the inaugural function. The participants of the seminars were members of District/Block/ Grama Panchayats, CDS Chairpersons, LSGD Engineers, MGNREGS Engineers/Overseers,



Officials of development departments, etc. A total number of 106 participants attended the seminar. The topics presented includes concepts of Watershed Planning, Salient features of IWMP, convergence of IWMP with MGNREGS.

Orientation Seminar

One day orientation seminar was organized at Vamanapuram Block Panchayat Hall on 21-02-2012 for the people's representatives and officials of line departments coming under the IWMP project area. The objective of the seminar was to create awareness and motivate them on watershed planning and allied development activities.

The seminar was organized with an inaugural session followed by technical session and user interactive discussion. The awareness seminar was inaugurated by Smt. Baby Sulekha, Block Panchayat President, Vamanapuram. The Block Panchayat Presidents,



viz.O. S. Ambika (Chirayinkeezhu) and J. L. Sudharma (Nedumangad) and Grama Panchayat Presidents viz., ChullalamRajan (Pullmapara), AnithaMahesan (Nellanad), Dr. V. N. Sushama (Kallara), Airoor Mohan (Pangode), K. Thankappan Nair (Manickal) and Lenin. S (Mudakkal) were also present. The topic presented includes the concept of Watershed Planning &

Development, Integrated Watershed Management Programme, role of different tiers of Local Self Government Institutions and Neighbour Hood Groups. The participants of the seminars were members of District/Block/GramaPanchayats, CDS Chairpersons, LSGD Engineers, MGNREGS Engineers/Overseers, Officials of development departments in the project area. A total number of 86 participants attended the seminar. The seminar finalized the schedule of various levels of trainings to be organised at GramaPanchayats as part of capacity building for various institutional mechanisms. The methodology for field data collection and plan preparations at Grama Panchayat Level were also discussed and finalized.

Block level training on Drainage Line Treatment

One day training was organized at project area level to discuss on the various interventions to be undertaken on the drainage line and surface water sources. The



training was organized on 18-04-2012 at Govt. LPS, Venjaramood for the people's representatives, office bearers of Neighbour Hood Groups, PadashekharaSamithis, MGNREGS, etc. coming under the IWMP project area. The objective of the training was to identify the different agronomic and engineering interventions needed for the protection and conservation of drains and surface water bodies. The training was organized with an inaugural session followed by technical session and group

discussion. The one day training was inaugurated by, M.S. Raju, Member, District Panchayat, Thiruvananthapuram. Satheesan Nair, District Panchayat Member, Block

Panchayat Presidents, viz. Baby Sulekha (Vamanapuram) O. S. Ambika (Chirayinkeezhu), J. L. Sudharma (Nedumangad) and Grama Panchayat Presidents viz., Chullalam Rajan (Pullampara), Anitha Mahesan (Nellanad), Dr. V. N. Sushama (Kallara), Airoor Mohan (Pangode), K. Thankappan Nair (Manickal) and Lenin. S (Mudakkal) were also present. The topics presented include the concept of Watershed Planning and Interventions on Drainage Line. Followed by the technical session, group discussions were conducted at Panchayat level under the leadership of concerned Grama Panchayat Presidents. The Grama Panchayat Presidents presented the outcomes of the group discussion. The participants of the training were members of District/Block/Grama Panchayats, CDS Chairpersons, LSGD Engineers, MGNREGS Engineers/Overseers, Officials of development departments in the project area. A total number of 183 delegates participated in the training and group discussion.

Subsequently the following awareness seminars/trainings were conducted at Grama Panchayat level

Orientation Seminars

One day orientation seminars were organized in the Grama Panchayats to create awareness on the need of watershed level planning in local level development and planning. The programme was conducted with an inaugural session followed by technical presentations. The orientation seminars were formally inaugurated by the concerned Grama Panchayat Presidents. The lectures delivered includes concept of watershed planning, salient features of Integrated Watershed Management Programme and possible interventions for watershed conservation, development and management. The participants of the seminar includes people's representatives of Block & Grama Panchayats, officials of line departments, ADS chairpersons, progressive farmers, MGNREGS labour group, NGOs, Social Groups, etc.



The details of the orientation seminars showing the dates of seminar, name of Panchayat and number of participants attended are given below:

No.	Date	Name of Panchayat	No. of participants
1	27-02-2012	Pangode	15
2	27-02-2012	Mudakkal	41
3	01-03-2012	Pullampara	121
4	01-03-2012	Nellanad	50
5	01-03-2012	Kallara	83
6	01-03-2012	Manickal	46

Trainer’s Training for Base Line Survey

Proper planning and implementation of any development project could only be



achieved through collection of the baseline data regarding the project area by the active participation of beneficiaries. With this objective, it was decided to conduct one day training to the facilitators selected from the project area. The aim of the training was to empower the facilitators and to enable them to form the Neighbour Hood Groups as per the IWMP guidelines and collect the baseline information with the

involvement of the beneficiaries. The baseline information pertaining to the households, land holdings, agriculture practices, animal husbandry, soil and water conservation interventions required and present livelihood pattern were collected using a pretested structured questionnaire. The training was conducted with an inaugural session followed by technical presentations and user interactive discussions. The topics covered in the technical session include concept and salient features of Integrated Watershed Management Programme, Formation of Neighbour Hood Groups, Organization structure and Baseline data collection. The participants of the seminar includes two facilitators from each Neighbour Hood Group representing 40-50 houses, people’s representatives, ADS chairpersons and MGNREGS labour groups.

The details of the trainer’s trainings for base line survey showing the dates of training, name of Panchayat and number of participants attended are given below:

No.	Date	Name of Panchayat	No. of participants
1	07-04-2012	Pullampara	67
2	09-04-2012	Pullampara	108
3	10-04-2012	Nellanad	98
4	11-04-2012	Nellanad	60
5	13-04-2012	Kallara	168
6	15-04-2012	Mudakkal	89
7	21-04-2012	Pangode	40
8	21-04-2012	Manickal	107

Focus Group Discussions

Focus Group Discussions were organized at Grama Panchayat Level to understand the concepts of development and suggestions the people’s representatives, line departments, progressive farmers and beneficiaries regarding the different types of interventions – soil and water conservation, livelihood, production system and micro enterprises – to be undertaken in this project. One day workshop was conducted with an

inaugural session followed by an introductory remark explaining the purpose, context and key list of attributes to be discussed. Groups were formed at ward level and two hours was allotted for the group discussion. The technical officers of Kerala State Land Use Board facilitated the groups to deal tactfully with the outspoken group members, keep the discussion on track and to make sure that every participant was involved in the group discussion. After the group discussion, each ward member or his representative has presented the outcome of the discussion. The participants of the focus group discussion includes the Presidents and Secretaries of the Neighbour Hood Groups, people’s representatives, ADS chairpersons and MGNREGS labour groups and progressive farmers.



The details of the focus group discussions showing the dates of training, name of Panchayat and number of participants attended are given below:

No.	Date	Name of Panchayat	No. of participants
1	24.04.2012	Pullampara	180
2	25.04.2012	Kallara	222
3	25.04.2012	Pangode	41
4	25.04.2012	Nanniyod	2
5	26.04.2012	Nellanad	159
6	28.04.2012	Mudakkal	81
7	30.04.2012	Manickal	89

Trainer’s Training for Net Plan Preparation

A list of the different types of interventions – soil and water conservation, livelihood, production system and micro enterprises – to be undertaken in this project was derived through the focus group discussions and the baseline survey carried out in the project area. These were classified and a separate questionnaire was prepared for the data collection from each household and Neighbour Hood Groups. The Vice Presidents and Joint Secretaries of the Neighbour Hood Groups were selected for the Trainer’s Training for Net Plan Preparation. The aim of the training was to empower the facilitators enabling them to collect the detailed information required for the net plan preparation with the



involvement of the beneficiaries. The detailed information pertaining to the agriculture and animal husbandry improvements, soil and water conservation interventions in each household were collected using a pretested structured questionnaire. The training was conducted with an inaugural session followed by technical presentations and user interactive discussions. The topics covered in the technical session include concept of Watershed Management, Possible interventions and detailed data collection. The participants of the seminar includes Vice Presidents and Joint Secretaries from one Neighbour Hood Group representing 40-50 houses, people’s representatives, ADS chairpersons and MGNREGS labour groups.

The details of the trainer’s trainings for net plan preparation showing the dates of training, name of Panchayat and number of participants attended are given below:

No.	Date	Name of Panchayat	No. of participants
1	14.05.2012	Pullampara	140
2	15.05.2012	Manickal	70
3	17.05.2012	Mudakkal	60
4	18.05.2012	Kallara	133
5	18.05.2012	Pangode	15
6	18.05.2012	Nanniyod	3
7	21.05.2012	Nellanad	111

Suggestions received from Drainage Line Treatment discussions, Focus Group Discussions and Net Plan Preparation discussions were codified and this was further discussed with officials and elected representatives of Block and GramaPanchayaths. Based on such series of discussion the Entry Point Activities to be taken up in the project area were finalized.

Trainer’s Training for People’s Estimate and Project Report Consolidation

The list of different types of interventions to be undertaken in the project area was collected from each household and Neighbour Hood Groups. The detailed



information pertaining to the agriculture and animal husbandry improvements, soil and water conservation interventions in each household and Neighbour Hood Group were collected using pretested and structured questionnaires. The data forms were consolidated and the details were made available in an excel spread sheet to the Neighbour Hood Groups for verification and incorporating necessary corrections.

The office bearers of the Neighbour Hood Groups were selected for the Trainer’s Training for People’s Estimate and Project Report Consolidation. The aim of the training

was to empower the facilitators enabling them to draw out people's estimate especially for MGNREGS from the detailed information, with the involvement of the beneficiaries. The trainees were also asked to prepare the list of beneficiaries for the livelihood activities, productions systems ad micro enterprises. The training was conducted with an inaugural session followed by a brief technical presentation and user interactive discussions at ward level. The participants of the training includeoffice bearers from the Neighbour Hood Groups, ADS chairpersons and Ward Members.

The details of the trainer's trainings for net plan preparation showing the dates of training, name of Panchayat and number of participants attended are given below:

No.	Date	Name of Panchayat	No. of participants
1	17.06.2012	Kallara	184
2	21.06.2012	Mudakkal	213
3	25.06.2012	Pullampara	192
4	25.06.2012	Manickal	181
5	28.06.2012	Pangode	67
6	29.06.2012	Nellanad	224

Activities for Coming Years

It is proposed to carry out the following institutional based training and capacity building programmes in the first three years of the project period in order to equip various stakeholders to successfully participate and implement the project:

First Year:

1. Technical Trainings for Entry Point Activities
2. Orientation for Watershed Development Team and Watershed Development Committee Members and Panchayat Officials
3. Orientation course on Fund Management for Watershed Development Teams and Watershed Committees

Second &ThirdYear:

1. Orientation programme on Group management and Livelihood Activities with special focus on Nursery Raising, Kitchen Garden, Fisheries, Diary Development, Mushroom cultivation, Bee Keeping, Vermi compost, Small Restaurant, etc.
2. Orientation programme on water conservation, water literacy and well recharging.
3. Orientation for members of User Groups (UGs) and Self Help Groups (SHGs)
4. Orientation of Watershed Development Team (WDT) and Watershed Development Committees on Monitoring and Evaluation of the Project with special focus on RTI, Social Audit and Transparency

Capacity Building Plan

One of the key features of the watershed developmentis the capacity building support. It is a crucial component to achieve the desired results from watershed development projects. Five percent of the total project cost (Rs. 56.19 Lakhs) has been

earmarked for institution and capacity building. The funds available for different micro watersheds as per the IWMP guidelines are as follows:

No.	Name of micro watershed	Amount in Rs.
1	Aruvipuram (4V10a)	12,72,000
2	Cheruvalam (4V11a)	99,000
3	Kanchinada (4V11b)	5,45,250
4	Ayanikuzhi (4V25a)	3,12,000
5	Moozhi (4V26a)	14,26,500
6	Nellanad (4V29b)	19,64,250
Total		56,19,000

A series of awareness and training programmes were organized as part of the detailed project report preparation and entry point activities.

The remaining activities planned during the first, second, third and fourth year of the implementation area as follows:

Participants	Topics for Training
Watershed Development Team, Watershed Committee and Elected Representatives	Community organization in participatory preparation of DPR Fund management CPR management Participatory M & E Post – project management Benefit sharing Coordination and convergence with other allied several development activities
Watershed Committee Members and Neighbour hood Group Office bearers	Awareness on participatory WDP Organizing groups Conducting meetings Recording the proceedings Office management Accounting procedures Book keeping Assisting SHGs and UGs in identifying proper items for DPR Effective payments, etc.,
Neighbour Hood Groups Self Help Groups	Orientation on IWMP Nursery Management Homestead Vegetable garden Vermi-composting Mushroom cultivation Apiculture Green fodder production

	Livestock rearing – cow, goat, rabbit Livelihood activities – tailoring, detergent making, ornaments, candle making, etc. Skill up gradation inMarketing Benefit sharing
User Groups	Natural Resources Management CPR management Post project management of assets created Fund management Benefit sharing

Some ofthe training plans suggested for the watershed area are given in the session viz. Training Plan.

ENTRY POINT ACTIVITIES

Entry point activities are necessary to bring the community members towards the project and to bring about a positive air in the project area. Entry Point Activities are part of community mobilization process to get more and more participation of the community in the watershed planning and to meet a part of community needs. Entry Point Activities are those interventions identified by the community as felt needs, during the initial awareness.

EPA activities are taken up under watershed projects to build a rapport with the village community to make them to feel the presence at the beginning of the project; generally, certain important works which are in urgent demand of the local community are taken up. A Group Discussion was conducted with watershed Development Committee regarding the EPA activity. It was conveyed to the WC that a particular amount was allotted for EPA activity for each of their villages, which was 4 per cent of total allocated budget. The villagers discussed various activities which they felt is important but after a brief discussion it was conveyed to them that only those activities can be taken, which revive the common natural resources. It was also taken into priority that there should be an instrument of convergence which will result in sustainability of activities.

According to the Common Guidelines of Integrated Watershed Management Programme (IWMP), 4 per cent of the total project cost is earmarked for Entry Point Activities. A total amount of Rs. 44.95 lakhs is available for EPA and the details showing the watershed code, name of watershed, area and amount is given below:

No	Code of watershed	Name of watershed	Area in ha	Amount in lakhs
1	4V10a	Aruvipuram	1722.77	10.18
2	4V11a	Cheruvallam	175.59	0.79
3	4V11b	Kanchinada	726.02	4.36
4	4V25a	Ayanikuzhi	440.08	2.50
5	4V26a	Moozhi	1892.12	11.41
6	4V29b	Nellanad	3029.03	15.71
Total			7985.61	44.95

A series of workshops, trainings and user group discussions were carried out in the project area to finalize The Entry Point Activities to be undertaken. The suggestions derived were discussed in the Panchayat Level Watershed Committees (PLWCC) of each Grama Panchayat falling in the project area. With the approval of the PLWCC, it was decided to carry out the following Entry Point Activities in the project area such as establishment of biogas plants, construction of rain water harvesting structures, mini

rural drinking water schemes, renovation of ponds and drains, solar lightings and solar water heaters, planting of avenue trees and crop demonstrations.

The details of the entry point activities are given below:

“Jalashudhi”

Kerala is having highest density of open dug well (250 per sq.km) and more than 50% of population used this as the only source of water for drinking. The interactions between water and human health are indeed complex. Human health may be affected by the ingestion of contaminated water, either direct or through food, and by the use of contaminated water for purposes of personal hygiene and recreation. As per the recent estimates by the World Bank, 21% of communicable diseases in India are water related. With the importance of water supply and sanitation to health it is necessary to consider the status of these services globally and regionally. Those without access to an adequate and safe water supply and appropriate sanitation are those most at risk from waterborne diseases. Access to safe drinking water and adequate sanitation is a recognized universal human need.

It is common knowledge that access to safe drinkingwater is the key towards better health and welfare ofcommunities.The objective of the *Jalashudhi*project is to address the most critical issue of quality drinking water. The goal of *Jalashudhi*programmeis toevolve multiple models and technologies in ground water recharge and sanitization of waterand water sources through participatory action research programme to improve drinking water availability by addressing quantity and quality issues.

As an entry point activity, the quality of water will be tested and Water Quality Cards will be issued to all households in the project area. This will be taken up as a participatory programme of CCDU, Block Panchayats, GramaPanchayats and Neighbour Hood Groups. A facilitator from each NHG will be trained by CCDU. On successful completion of the training, the facilitator will be given the water quality testing kit. With the active participation of the NHGs, the water quality testing will be completed in 5 days. CCDU and Kerala State Land Use Board willcreate a data base regarding local water resource base and user behaviours as well asmake efforts to standardize the data base for wider application and research. Water Quality Cards will be issued to each household.

The details showing the name of watershed, name of Panchayat, entry points suggested, the amount earmarked from IWMP, amount utilized as part of convergence from other schemes/user contributions are detailed below:

Table No. 11.1: Details of Entry Point Activities suggested

(Amount in lakhs)

No.	Name of watershed	Name of Panchayat	Entry Point Activities suggested	IWMP	Convergen ce	Total
1	4V10a (Aruvipuram)	Kallara	Bio gas plant	9.00	5.50	14.50
			Vegetable Cultivation (Homestead/Terrace)	0.61	-	0.61
			Planting avenue trees	0.05	0.15	0.20

			with tree guard on road sides			
			Planting of bamboo seedlings along sides of Vamanapuram River	0.01	0.05	0.06
		Nanniyod	Planting of bamboo seedlings along banks of Vamanapuram River	0.01	0.05	0.06
		Awareness programmes		0.50	-	0.50
2	4V11a (Cheruvalem)	Kallara	Vegetable Cultivation (Homestead/Terrace)	0.38	-	0.38
			Planting avenue trees with tree guard on road sides	0.05	0.15	0.20
		Pangode	Crop demonstration (floriculture)	0.10	0.40	0.50
		Nanniyod	Planting bamboo seedlings along banks of Vamanapuram River	0.01	0.05	0.06
		Awareness programmes		0.25	-	0.25
3	4V11b (Kanchinada)	Pangode	Renovation and side protection of VazhathoppupachaKanchinadaThodu	2.31	1.40	3.71
		Kallara	Vegetable Cultivation (Homestead/Terrace)	1.50	-	1.50
			Planting avenue trees with tree guard on road sides	0.05	0.15	0.20
		Awareness programmes		0.50	-	0.50
4	4V25a (Ayanikuzhi)	Pullampara	Mini drinking water scheme for Mundanthadikkad	2.40	0.27	2.67
			Planting avenue trees with tree guard on road sides	0.05	0.15	0.20
			Planting bamboo seedlings along banks of Vamanapuram River	0.01	0.05	0.06
			Awareness programmes		0.10	-
5	4V26a (Moozhi)	Pullampara	Rain water harvesting at Janatha HSS, Thempamood	3.00	0.30	3.30
			Solar water heater for Govt. LPS Mukkudil	0.66	0.27	0.93
			Solar LED lamp at ThempamoodJn,	0.90	0.30	1.20

			Solar street lighting of colonies	1.40	0.52	1.92
			Planting avenue trees with tree guard on road sides	0.10	0.25	0.35
			Crop demonstration (water melon)	0.10	0.40	0.50
			Planting bamboo seedlings along banks of Vamanapuram River	0.05	0.20	0.26
		Manickal	Renovation and side protection of Thalayilthodu	1.09	3.99	5.08
		Vembayam	Mini drinking water scheme for Vettuppara	2.50	0.25	2.75
			Awareness programmes	1.50	-	1.50
6	4V29b (Nellanad)	Nellanad	Renovation of Parameswaram Chira	1.83	0.97	2.80
			Crop Demonstration (Vegetable) at Care Home for Aged, Venjaramood	0.26	1.00	1.26
			Planting avenue trees with tree guard on road sides	0.10	0.25	0.35
		Mudakkal	Renovation of Kottayathukonam Vetti aramoozhi Thodu	2.00	4.50	6.50
			Solar street lighting for KoorMicha Bhumi Colony	2.50	0.50	3.00
			Planting avenue trees with tree guard on road sides	0.10	0.25	0.35
		Manickal	Solar lamp for 8 colonies	3.50	0.30	3.80
			Crop demonstration (fruit plants) at GHSS, Pirappancode	0.10	0.40	0.50
		Pullampara	Renovation of Vadhyarukonam Chira	3.38	1.24	4.62
			Planting avenue trees with tree guard on road sides	0.10	0.25	0.35
			Awareness programmes	1.89	-	1.89
			Total	44.95	24.51	69.46

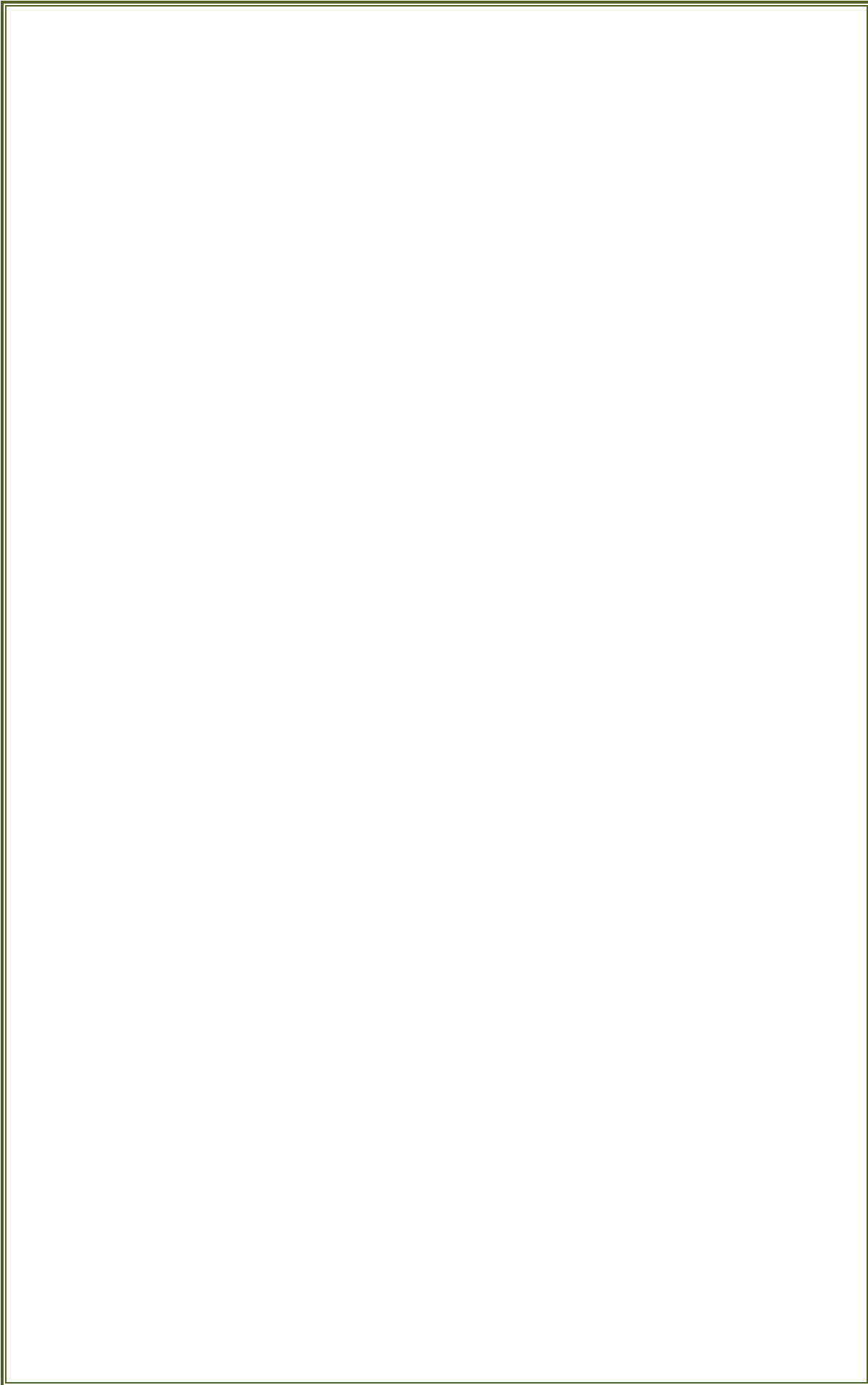
Pre-Intervention and Expected Post Intervention Status by the Entry Point Activities

The details of the various entry point activities with the pre intervention status and the expected post intervention status is given below:

Table No. 11.2: Pre-Intervention and Expected Post Intervention Status by EPA

No	Activity	Present Status	Post- Intervention Status
1	Rain Water Harvesting Structures	Watershed area has been experiencing drinking water scarcity with condition worsening in some regions	Harvested water can be recycled and used for many purposes such as drinking , irrigation, livestock etc.
2	Biogas Plant	Watershed area facing many unhygienic issues due to poor waste management system	Benefits of production of energy, transformation of organic waste to high quality facilities, improvement of hygiene conditions
3	Solar Water Heaters	High usage of electricity	Safe, efficient, reliable, non-polluting. Hot water available throughout day & night.
4	Solar Lamp	High usage of electricity	Easily installed and provide a non-conventional alternative
5	Mini drinking water scheme	Shortage of drinking water	Provide safe potable drinking water to habitation
6	Renovation of ponds and drains	Ponds and drains remains deposited by wastes and garbage and facing problem of sitting, reduction in depth etc.	Increasing availability of water, productivity can be increased by utilizing water for agricultural purposes.
7	Planting avenue tress with tree guard.	Barren land on the sides of road/drains leading to soil erosion	Soil erosion is controlled as trees prevent rapid run off after heavy rainfall
8	Crop demonstrations	Decline of area under agriculture and a growing import bill for fruits and vegetables is a symbol of Kerala’s food dependency	Extending the area under cultivation along with a diffusion of technical and scientific knowledge of package of practices among cultivators

The location details, technical details and detailed estimates of the various Entry Point Activities suggested were submitted as a separate report to PIA.



WATERSHED DEVELOPMENT WORKS

Watershed work phase is the core component of the project. This includes creating permanent structures as required by the slope, geology and topography, starting from ridge to valley, to conserve rain water at point of its incidence. Tapping the water resources at right place at right time will increase the effectiveness of this project. The objective being reclamation of natural resources and creating sustainability to assets created under this project. A multi-tier ridge to valley sequence approach was adopted towards implementation of watershed development projects. A net budget of 56 percent is allotted for this work.

NATURAL RESOURCES MANAGEMENT

The physical treatments are to be carried on during the watershed development work phase. While implementing the project, it is necessary that the treatments are carried out starting from ridge and progressing towards the valley. This approach is followed with the following objectives:

- a) Protect the upper reaches to avoid erosion and reduce runoff
- b) Avoid siltation of structures in the middle and lower catchments.
- c) Ensure the cost effectiveness of structures in the valley and
- d) Improve overall efficacy of the measures.

Works phase is the heart of the programme in which the DPR will be implemented. Some of the important activities included in this phase are:

- a. Ridge Area Treatment : All activities required to restore the health of the catchment area by reducing the volume and velocity of surface runoff, including regeneration of vegetative cover in forest and common land, afforestation, staggered trenching, contour and graded bunding, bench terracing etc.
- b. Drainage line treatment with a combination of vegetative and engineering structures, such as earthen checks, brushwood checks, gully plugs, loose boulder checks, gabion structures, underground dykes etc.
- c. Development of water harvesting structures such as low-cost farm ponds, nalla bunds, check-dams, percolation tanks and ground water recharge through wells, bore wells and other measures.
- d. Nursery raising for fodder, fuel, timber and horticultural species. As far as possible local species may be given priority.
- e. Land development including in-situ soil and moisture conservation and drainage management measures like field bunds, contour and graded bunds fortified with plantation, bench terracing in hilly terrain etc.
- f. Crop demonstrations for popularizing new crops/varieties, water saving technologies such as drip irrigation or innovative management practices. As far as possible varieties based on the local germplasm may be promoted.

- g. Pasture development, sericulture, bee keeping, back yard poultry, small ruminant, other livestock and micro-enterprises.
- h. Veterinary services for livestock and other livestock improvement measures.
- i. Fisheries development in village ponds/tanks, farm ponds etc.
- j. Promotion and propagation of non-conventional energy saving devices, energy conservation measures, bio fuel plantation etc.

Soil and Water Conservation Works

Mainly the watershed development works are divided into three stages such as ridge area treatments, Slope treatment, Plains or flat level (Area treatment) and Drainage line treatments. Different treatments are planned for each micro watershed considering the geographic and socio economic condition of that specific area. The details are briefly described below:

A. Ridge Area Treatment Plans:

It is very important to treat the ridge as this is where the major water resources originate. This involves mainly hilly region. For the ridge area treatment of watersheds, following structures are been proposed after interaction between the watershed committee, Neighbour Hood Groups, GramaPanchayats, Block Panchayat and other field staff of line departments and WDT engineer.

- a) Graded Bunding
- b) Gully Plug
- c) Contour Trenches
- d) Staggered Trenches
- e) Earthen Bunds

a. Graded Bunding:

“Graded bunds or graded terraces or channel terraces are the bunds or terraces laid along a pre-determined longitudinal grade very near the contour but not exactly along contour”.



The graded bunds, commonly used are comparable to the narrow base terraces. They are used for the safe disposal of excess runoff in high rainfall areas and regions where the soil is relatively impervious [clay]. Farming operations are not done on bunds or bund channels.

Function:

1. These terraces act primarily as drainage channel to regulate and conduct runoff at non erosive velocity.
2. To make the runoff water to trickle rather than to rush out.

b. Gully Plug:

The portion where the stream begins, the structure is constructed by arranging loose boulder perpendicular to the flow of water is called gully plug.

Benefits:

1. Prevents soil erosion and reduces the flow of water.
2. Very useful in moisture conservation and reduces the desiltation of the streams.



c. Contour trenching:

It is a simple, and a low-cost method of checking the velocity of runoff in the ridge area of any watershed. A contour trench is a trench dug along a contour line. A contour line is a line which joins together points of the same elevation. Digging a trench along such a line increases the chances of retaining runoff for a longer period of time within the trench. It is also true that if trenches were not along the contour, such digging could actually increase the possibility of soil erosion.

Objectives:

- Slowing down the velocity of runoff
- Checking soil erosion, and
- Improving local soil moisture profile

Contour trenches are constructed in the ridge area of a watershed. Rainwater, which falls in this area, flows unchecked carrying with it eroded soil into the level portion of the watershed referred to as the "valley". This eroded soil gets deposited as silt in the reservoirs and ponds, thereby reducing their life. Thus, any water harvesting work undertaken in the valley will become meaningless unless appropriate measures such as contour trenching are undertaken to control runoff and soil erosion on the ridge. Contour trenches serve to collect the rainwater that falls in the ridge area. This way the soil moisture profile in the area adjacent to the trench gets improved. Along with the water, the eroded fertile topsoil also gets deposited in the trench. It is, therefore, necessary to combine trench construction with plantation.



d. Staggered trenches

In medium rainfall areas with highly dissected topography, Staggered Contour Trenches (SCT) are adopted. The length of the trenches is kept short around 2-3 m and the spacing between the rows may vary from 3-5 m. The chances of breaches of SCT are less as compared to Continuous Contour Trenches. Over time, experience of watershed programs has shown that it is better to stagger the digging of contour trenches. This is because it has been found



that invariably errors have been made in contouring over long distances. If the contour trench is not level and by mistake sloped, then water starts to flow from the high point to the low point, cutting a path and in-creasing soil erosion. Therefore, instead of making trenches continuously, they should be made in a staggered, discontinuous manner.

Objectives:

- Slowing down the velocity of runoff
- Checking soil erosion, and
- Improving local soil moisture profile

e. Contour earthen bunds

Contour bunding is a simple and low-cost method of checking the velocity of runoff in the ridge area of any watershed. A contour bund is a bund constructed along a contour line. A contour line is a line, which joins together points of the same elevation. Making a bund along such a line increases the chances of retaining runoff for a longer period of time within the bund.

Objectives:

- Slowing down the velocity of runoff
- Checking soil erosion
- Improving local soil moisture profile

Contour bunds are constructed on the ridge area of a watershed. Rainwater, which falls in this area, flows unchecked carrying with it eroded soil into the flatter portion of the watershed - the "valley". This silt gets deposited into the reservoirs and ponds, thereby reducing their life. Thus, any water harvesting work undertaken in the valley, will become meaningless unless appropriate measures such as contour trenching and bunding are undertaken to control runoff and soil erosion on "the ridge. Like contour trenches, bunds also collect the rainwater that falls in the ridge area. This way the soil moisture profile in the area adjacent to the bund is improved. Along with the water, eroded fertile topsoil also gets deposited in the bund. It is, therefore, important to combine contour bunding with appropriate vegetative measures.



B. Land Development

The second tier treatment is the slope treatment. This is generally done on agricultural land or waste land. This generally includes water conservation or surface water storage structures. This being highly labour intensive, will involve more of manual labour; so, funds from Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) can be taken. Following structures are been proposed in these areas

- a. Land Leveling/Bench Terracing
- b. Plantation
- c. Earthen Bund

Land leveling: Bench terracing means construction of nearly level steps like fields along contours usually by half cutting and half filling procedure. It is an earthen embankment or a ridge and channel, constructed across the slope at a suitable location to intercept surface runoff water. It may be constructed with an acceptable grade to an outlet or with a level channel and ridge. By adopting bench terracing, both degree and length of slope are reduced which help in soil moisture conservation for enhanced crop production. Bench terracing is recommended for slopes from 10 to 30%.

Planation: Several agronomical measures are adopted, supplementing the mechanical measures in the treated lands. These measures include: -

- a. Contour Farming - planting on contours.
- b. Mulching using various techniques that will increase the water retention capacity of the soil, for instance mixing straw and breaking clods. Mulching is particularly helpful in vegetable cultivation, where assured soil moisture is a necessity.
- c. Use of dense growing crops/ cover crops, for instance cowpea, pulses, paddy. These will reduce splash erosion.
- d. Mixed cropping
- e. Intercropping or strip cropping, alternating either blocks or strips with different crops.
- f. Use of organic manure or green manuring with legumes, such as cowpea, dhaincha, pulses. This improves water-holding capacity.

Earthen Bunds: Field bunding is one of the important structures which check the runoff of water from the farm level. Often farm area left without proper bunding, water freely flows out of the farm and scope for percolation is almost negligible. Hence farm bunding plays an important role in conservation of moisture at farm level. As the multi-tier approach ridge to valley, drainage line treatment and land development farm bund fall in the third agenda.

C. Plains or Flat Level Treatment:

This is generally done in the fields of the farmers where they are raising very high labour intensive crops. This generally includes field bunding, cropping pattern alteration, etc. The prime aim is to conserve the rain in the field. In this area stone bunding is not feasible due to unavailability of stone in the local area. So in the plain or flat level treatment, the four things are proposed as under.

1. Farm Bund
2. Centripetal terracing
3. Rain water harvesting pits
4. Afforestation/ Plantation

D. Water conservation Structures and activity:

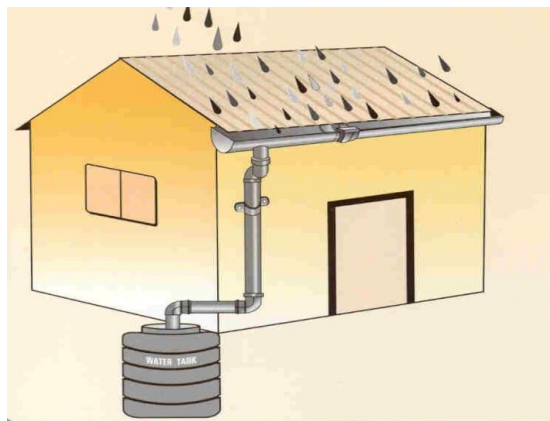
The activities are generally taken in the bottom area/ valley region of the watershed area. The structures will help in the storage of the water which increases the soil moisture and water table of the area. Land can be irrigated through these structures. The proposed structures are as follows:

1. Rain (Roof)Water Harvesting
2. Farm ponds/Irrigation wells
3. Check Dam
4. Well Recharge

Rainwater harvesting from rooftop catchments

Rooftop Rain Water Harvesting is the technique through which rain water is captured from the roof catchments and stored in reservoirs. Harvested rain water can be stored in sub-surface ground water reservoir by adopting artificial recharge techniques to meet the household needs through storage in tanks. The main objective of rooftop rain water harvesting is to make water available for future use. Capturing and storing rain water for use is particularly important in

dryland, hilly, urban and coastal areas. There are several reasons for harvesting rainwater today including: low-cost irrigation, domestic water supply, water and soil conservation, aquifer recharge, and flood control. It is also desirable to use rain because of the high quality and softness of the water and the relative absence of contaminants such as disinfection



byproducts (chlorinated hydrocarbons), endocrine disrupting compounds (antibiotics and hormones), heavy metals, agricultural chemicals and chlorine resistant microbes that are increasingly appearing in our ground and tap water. Rainwater collection systems are cost effective and easy to maintain by the average homeowner and are easier to install and use than wells or surface ponds.

Well recharge

The broad aim of the programme is to improve the water quantity and quality levels of homestead open dug wells and small homestead ponds. This will contribute to enhanced health and welfare of the community through improved access to drinking water. The reduction of public spending on Tanker Water Distribution to the water stressed regions which is common during summer is also envisaged as a broader goal of the programme.



The specific objectives of the programme are

- (i) recharge ground water
- (ii) improved drinking water availability across the year
- (iii) significantly reduce the impact of drought and consequent public spending on supply of drinking water in tankers to the water stressed regions
- (iv) Improved agricultural production and productivity.

The programme would also envisage strengthening of the decentralization programme and the PRIs, in discharging their basic mandate in water sector through community efforts that are cost effective and sustainable.

Biogas plants

The term 'biogas' is commonly used to refer to a gas which has been produced by the biological breakdown of organic matter in the absence of oxygen. The gases methane,



hydrogen and carbon monoxide can be combusted or oxidized with oxygen and the resultant energy release allows biogas to be used as a fuel. Biogas is a commonly used bio fuel around the world and is generated through the process of anaerobic digestion or the fermentation of biodegradable materials such as biomass, manure, sewage, municipal waste, rubbish dumps, septic tanks, green

waste and energy crops. This type of biogas comprises primarily methane and carbon dioxide.

Biogas has a wide variety of uses and can be used as a relatively low-cost fuel for the generation of energy and heating purposes, such as cooking. For example, basically any facilities which need power are able to use biogas to run engines, or to generate either mechanical or electrical power. Biogas can be compressed, similar to natural gas, and is able to be used to power motor vehicles. It is possible to concentrate the methane within biogas to the same quality standards as fossil fuel derived natural gas to produce biomethane. If concentrated and compressed this biogas can then be used in vehicle transportation.

PROMOTION OF NON-CONVENTIONAL ENERGY SAVING DEVICES

Solar LED Street Lighting

A solar lamp is a portable light fixture composed of a LED lamp, photovoltaic solar panel, and a rechargeable battery. Solar lamps recharge during the day. At dusk, they turn on (usually automatically, although some of them include a switch for on, off and automatic) and remain illuminated overnight, depending on how much sunlight they



receive during the day. Discharging time is generally 8 to 10 hours. Solar lights are easily installed and maintained, and provide a cheaper alternative to wired lamps.

LED Street lighting is a fresh new alternative to traditional street lamps such as LPS, HPS, or MH street lights. LED lighting provides a multitude of advantages over conventional incandescent light:

LED street lights are environmentally friendly, energy efficient, and cost-effective. This smart, "green" option for outdoor lighting has emerged on the green scene due to the recent technological advancements of LED illumination.

Solar lanterns

The solar lantern is a cheap alternative to a Solar Home System (SHS) providing 4-5 hours of high quality lighting service. It provides higher quality light than the use of candles or kerosene lamps. The Solar Lantern, powered from innovative solar technology, is the ultimate cost saving solution designed specially to give bettered bright light for long hours. It is a perfect fit for indoor and outdoor lighting conditions. Solar Lantern is simple and robust in its design. It is a permanent replacement for paraffin and kerosene lamps thereby creating a smoke free environment for all.



Solar water heating (SWH)

Solar water heating (SWH) or solar hot water (SHW) systems comprise several innovations and many mature renewable energy technologies that have been well established for many years. In a "close-coupled" SWH system the storage tank is horizontally mounted immediately above the solar collectors on the roof. No pumping is required as the hot water naturally rises into the tank through thermo siphon flow. In a "pump-circulated" system the storage tank is ground or floor-mounted and is below the level of the collectors; a circulating pump moves water or heat transfer fluid between the tank and the collectors.



SWH systems are designed to deliver hot water for most of the year. However, in winter season, there may not be sufficient solar heat gain to deliver sufficient hot water. In this case a gas or electric booster may be used to heat the water.

The heat from the sun is used to heat the water by a special method (FPC) so that hot water is available 24 hours, even in rainy days. In this system there is no electronic conversion, only heat exchange. Since this instrument is fixed on top of the building where sun light can strike the panel, additional space inside the house is not required. There is no electric hazard and no electricity bill to be paid. Pay only the initial installation charge and enjoy the natural hot water 24 hours. Suitable for houses, hospitals, hotels and factories. MNRE (Ministry of Natural Renewable Energy) subsidies are also available for renewable energy products.

MINI DRINKING WATER SUPPLY SCHEMES

In spite of heavy annual rainfall, and numerous rivers and ponds, the State of Kerala is paradoxically situated among the country's lowest per capita ground water availing state. Water plays an important role in the welfare of societies through its widespread linkages. Water needs are complexly linked with the daily life and its scarcity can be an obstacle to economic growth. The important aspects in this regard are (i) the availability of water for production and income generation; (ii) water for domestic needs, which have a significant role in maintaining human health; and (iii) sustainable environmental management. Among the water users in different sectors, consumption by households has very specific influence on human well-being. Even though the household consumption constitutes only eight per cent of the total water usage, the value of water for household purposes is reckoned much higher than the value of it for industrial use and farming.

Hence, providing potable water to all sections of the society becomes one of the major concerns of the governments. The problem of financing the water service may be one of the contributing factors for institutional change. In this context, privatization or market based profit dominated approach to water supply service has emerged as a policy suggestion to tackle the problem. However, privatization of an essential service of water is not politically and socially viable. Further market strategies and privatization tend to raise inequalities. Another approach, aiming both economic and environmental sustainability includes decentralized development with co-operation of NGOs and local communities. Community management of drinking water has recently emerged as an alternative.



Declining water table has a consequence on the family managed drinking water supply. In this background, conservation of the exiting water resources and its efficient management becomes the priority issue at policy level.

Providing rural drinking water supply is one of important functions of the Panchayat system. Wherever the water supply is lower than the norms laid down by Government, augmentation of water supply is to be taken up. Drinking water has to be provided within 1/2 km of the habitation.

It is proposed to start sixnumbers ofmini rural drinking water supply schemes in the project area, of which two has been started under the EPA.

CROP DEMONSTRATIONS

The agricultural system is characterized by low productivity, shift towards less labour intensive crops and increasing marginalization of agricultural income in the household economies. These deplorable conditions form the backdrop to the local initiative for agricultural rejuvenation.

At present the agricultural activities in the area are mainly aimed to meet the local needs and only small amount of vegetables are sent to outside market for sale. The farmers rely on old techniques and patterns for agricultural production. The area has wider scope for the use of modern techniques and improved tillage practices. As banana and vegetables are the key horticulture produce in the area, it is proposed to



bring more area under these crops. To popularize these crops, crop demonstrations were taken under the Entry Point Activities. It is proposed to give 5 banana seedlings to all households and to introduce organic vegetable cultivation in 50 cents per Neighbourhood Group. As crop diversification is also essential for economic sustainability, it is proposed to introduce water melon, jasmine and floriculture. The plants of money fetching horticulture plants like mango, rambutan, mangosteen, guava, etc. will also be supplied to the households to improve the economic condition of the farmers.

The activities aimed at irrigation will enhance the productivity and will irrigate more area which paves way to bring more area under agriculture/horticulture production. The villagers expressed much enthusiasm towards expanding their horticulture activities. Moreover the watershed area holds good potential for horticulture activities. Hence it is important to promote and expand horticulture activities in the area.

Avenue plantation

Afforestation is the process of establishing a forest on land that is not a forest, or has not been a forest for a long time by planting trees or their seeds. Trees could be planted along the roads, which could check the erosion in the depression of the roadside.

Advantages:

- It helps meet the world's increasing demands for timber and forest products
- Soil erosion is avoided as trees prevent rapid run off after heavy rainfall.
- Jobs are provided.
- Trees provide oxygen
- The beauty of the landscape is preserved
- Trees absorb carbon dioxide and help cut down the danger of global warming
- Trees help prevent heavy storms



Alarmed over the massive degradation of its lush green cover, it is proposed to launch an ambitious social forestry project aimed at instilling a love for nature in the student community, and other inhabitants. The programme will have three elements - 'Our Trees' for school students, 'Puzhayoram' for those who live in the reaches of major drains in the

area including the banks of Vamanapuram River and 'Vazhiyoram' (roadside tree shades) for other inhabitants of the area. Under the 'Our Tree' programme, students from Classes 5 will plant fruit trees in their school premises and take good care of it and manage them for five years. Necessary arrangements will be sought to provide grace marks according to how well they take care of the plants. Under 'Puzhayoram' seedlings of bamboo, reeds and other suitable plants will be planted along the sides of the major drains ensuring the side wall protection. Under 'Vazhiyoram', other inhabitants will plant trees along the sides of major roads. The persons who plant trees alongside the road sides will be responsible for taking care of them too. The Project Implementation Agency will be working in tandem with the Public Works Department to implement the project. The Social Forestry division of Kerala Forest Department will provide saplings of around 25 varieties of trees including teak, jackfruit, anjili, bamboo, reeds and gooseberry that would be planted as part of the programme.

It is proposed to bring all the educational institutions in the project area under this scheme.

Budget

The distribution of budget under the natural resources management activities for different micro watersheds as per IWMP guidelines is given below:

No.	Name of micro watershed	Amount in Rs.
1	Aruvipuram (4V10a)	1,42,46,400
2	Cheruvallam (4V11a)	11,08,800
3	Kanchinada (4V11b)	61,06,800
4	Ayanikuzhi (4V25a)	34,94,400
5	Moozhi (4V26a)	1,59,76,800
6	Nellanad (4V29b)	2,19,99,600
	Total	6,29,32,800

Major interventions suggested

The major interventions suggested under the watershed development works are the following:

1	Stream bank protection – engineering structures (1.50 M height)
2	Stream bank protection – engineering structures (1.00 M height)
3	Stone pitched contour bunding
4	Earthen bunds
5	Centripetal terracing with husk trenching and mulching
6	Strip terracing for rubber
7	Staggered trenches
8	Moisture collection pits
9	Wasteland development (planting of horticultural plants)
10	Planting horticultural crops as intercrops
11	Afforestation of school compounds and public buildings
12	Rain (roof) water harvesting
13	Gully plugs
14	Foot bridges
15	Water harvesting structures (ponds)
16	Water harvesting structures (wells)
17	Supply of Terafil Water Filter
18	Well recharging
19	Improvement of public wells
20	Improvement of existing wells
21	Renovation of drains
22	Renovation of ponds
23	Mini drinking water scheme
24	Renovation of borewells by replacing GI pipes with PVC pipes
25	Solar electrification of Grama Panchayat
26	Solar street lighting for colonies
27	Solar junction lights
28	Supply of Portable solar lamps
29	Bus shelters with solar panels
30	Biogas plant
31	Stream bank stabilisation using Geo textiles
32	Conservation of sacred grooves
33	Live hedges
34	Fodder cultivation

LIVELIHOOD ACTIVITIES FOR THE LANDLESS/ASSET LESS HOUSEHOLDS

One of the key features of the watershed development includes focused priority on livelihood activities for landless/asset less persons. Nine percent of the total project cost has been assigned to support the livelihood activities for landless/asset less households. This component aims to maximize the utilization of potential generated by watershed activities and creation of sustainable livelihoods and enhanced incomes for households within the watershed area. This will facilitate inclusiveness through enhanced livelihood opportunities for the poor through investment into assets, improvements in productivity and income, and access of the poor to common resources and benefits and augment the livelihood strategy at household level.

Guiding Principles

Livelihood improvement initiative emphasizes on natural resource based activities and conforms to principles of equity, gender sensitivity and transparency. It strives to:-

- a. Enhance livelihood opportunities for the poor through investment into asset creation and improvement in productivity and income.
- b. Improve access of the marginalized communities, including SC/ST, landless/assetless people, women, etc., to the benefits.
- c. Select the beneficiaries in a transparent manner.

Livelihood guidelines for landless/ assetless households aims at improved household income, participation and division of labour, access to information, knowledge, appropriate technologies and resources.

Planning and Implementation

The most important aspect is the inclusion of ‘micro level livelihood planning’ as an empowerment tool for the marginalized communities. This planning helps in understanding existing livelihood assets/capitals in a highly participatory manner to augment the existing livelihood platform.

Planning

- i. An awareness drive was undertaken at Panchayat level for communication & sensitization of the target beneficiaries.
- ii. A “Livelihood Action Plan” (LAP) was prepared for availing the funds under the livelihood component.
- iii. The livelihood action plan was prepared by analyzing the socio-economic conditions and existing livelihood capitals of the watershed, during the situation analysis by means of PRA and focus group discussion, in order to facilitate collection of information to feed into the livelihood action planning process. Livelihood action plan contains schedule of activities, interventions, no. of SHGs to be assisted and expected outcome.

- iv. To promote convergence, the PIA has worked in close association with other employment generating programmes such as MGNREGS, NRLM, Kudumbasree, VFPC, NHM, etc.

Mode of Operation

- i. The livelihood action plan will be implemented through Self Help Groups and/or their federation. However financial support to enterprising individuals was also be considered subject to a maximum of 10% of the funds under the livelihood component.
- ii. Livelihood activities will be carried out either through the existing SHGs having good performance or new SHGs formed with a group of 5-20 persons.
- iii. SHGs selected for implementing livelihood action plan will be homogeneous in-terms of their existing livelihood capitals, common interest and need.
- iv. SHGs can undertake any permissible activity jointly as a group or the group may decide to support individual(s) for the activities under the umbrella of the main SHG. In case of individual support under the SHGs, the individuals will be accountable to the main SHG for finances and performance.
- v. The financial support to enterprising individuals who prepare and submit a viable livelihood proposal, will be considered by Watershed Cell cum Data Centre (WCDC) on the recommendation of the Watershed Committee (WC). The plan has to be approved by the WCDC before extending financial support. However, support to individuals should not exceed a maximum of 10 % of funds under the livelihood component.

Funding pattern

The funding pattern under the livelihood components will be as follows

1	Seed money for Enterprising Individuals	10 percent
2	Seed money for SHGs	60 percent
3	Funding for Major Livelihood activities	30 percent

Capacity Building for Beneficiaries

The capacity building needs of the marginalized communities, including SC/ST, landless/asset less people, women, etc is also be included in the livelihood action plan prepared after the livelihood analysis. The capacity building aims at skill enhancement and not just knowledge and information. The expenditure for the training for livelihood component will be met from 5% of the budget component of the project cost earmarked for institution and capacity building.

Budget

The distribution of budget under the livelihood activities for the landless/asset less households for different micro watersheds as per IWMP guidelines is given below:

No.	Name of micro watershed	Amount in Rs.
1	Aruvipuram (4V10a)	22,89,600
2	Cheruvallam (4V11a)	1,78,200
3	Kanchinada (4V11b)	9,81,450
4	Ayanikuzhi (4V25a)	5,61,600
5	Moozhi (4V26a)	25,67,700
6	Nellanad (4V29b)	35,35,650
	Total	1,01,14,200

Major interventions suggested

The major interventions suggested under the livelihood activities for the landless/asset less households are the following:

A	Enterprising individuals (10 %)
1	Cow rearing
2	Goat rearing
3	Rabbit rearing
4	Bee keeping
5	Mushroom cultivation
6	Cloth bag making
7	Carpet making
8	Tailoring unit
B	Revolving fund to SHGs (60 %)
1	Bamboo
2	Soap making
3	Curry powder
4	Bakery
5	Pickle making
6	Ornaments
7	Cloth bag making
8	Carpet making
C	Major livelihood activities (30 %)
1	Nature fresh mini diary
2	Goat farm
2	Poultry unit
3	Small restaurant
4	Cover making unit
5	Agri Horti Collection centre
6	Jack fruit processing unit

7	Mushroom production unit
8	Vermicomposting
9	Nursery making
10	Agri Labour bank with implements

MICROENTERPRISES AND PRODUCTION SYSTEM

One of the important components in the watershed development activities under IWMP includes support to production/farming system based livelihood activities and enterprises. Ten percent of the total project cost is assigned to support the production system and microenterprises for land owning households. This component aims to diversify and maximize the production and productivity of agriculture system as a whole and targets the land holders with cascading benefits to landless agriculture labour, leased-in farmers and share-croppers.

The objective is to

- a) Promote diversified production/farming systems based livelihood activities/interventions, and.
- b) Encourage farmers to adopt and up-scale successful experiences of proven technologies, integrated farming systems and improved farming practises for livelihood augmentation.

Planning and Implementation

- a. The status of natural resources potential was analysed to determine the befitting production system and microenterprises based livelihoods conducive to the socio economic situation and existing livelihood capitals of the watershed village(s) in a participatory manner, at village level under each micro-watershed during the group discussions and user interactive workshops organised as part of the DPR preparation of the project.
- b. An action plan was prepared for production system and microenterprises based livelihood activities such as aquaculture, horticulture, agriculture, agro-forestry, animal husbandry, microenterprise, agro- processing, value addition, marketing etc for the project area.
- c. To ensure convergence with other production system and microenterprises schemes, the PIA should work in close association with other schemes such as MGNREGS, NRLM, VFPC, Kudumbasree, NHM, RKVY, NFSM, etc.
- d. Production system and microenterprises action plan contains location/farmer centric schedule of activities and interventions and these are delineated on the map.

Mode of Operation and Eligibility for Availing the Production System Funds:

- a. Individual land holders/owners can avail the benefits of production system on their private land. The small and marginal farming households, women headed farming households, SC & ST farmers will be given preference based on the wealth ranking exercise conducted during PRA. Those households whose land is in

close proximity to the developed natural resources may be preferred to make full use of natural resource potential.

- b. Selection of beneficiaries will be done by PIA, in consultation with WC.
- c. Beneficiaries having common interest will be organised into User Groups to pool and manage their resources as well as manage aggregating their produce for effective disposal and marketing, besides maintaining their natural resource base. This may also provide a means for deciding resource use arrangements based on equity and sustainability.
- d. The funds were earmarked for cost intensive farming system based livelihood activities/interventions such as aquaculture, agriculture, horticulture, agro-forestry, animal husbandry, agro-processing, value addition, etc.
- e. The beneficiary contribution of farmers will be 20 percent for general category and 10 percent for SC/ST.

Capacity Building for Beneficiaries

The capacity building needs of the marginalized communities, including SC/ST, landless/asset less people, women, etc is also be included in the action plan prepared for production systems and micro enterprises. The capacity building aims at skill enhancement and not just knowledge and information. The expenditure for the training for production systems and micro enterprises will be met from 5% of the budget component of the project cost earmarked for institution and capacity building.

Budget

The distribution of budget under the livelihood activities for the landless/asset less households for different micro watersheds as per IWMP guidelines is given below:

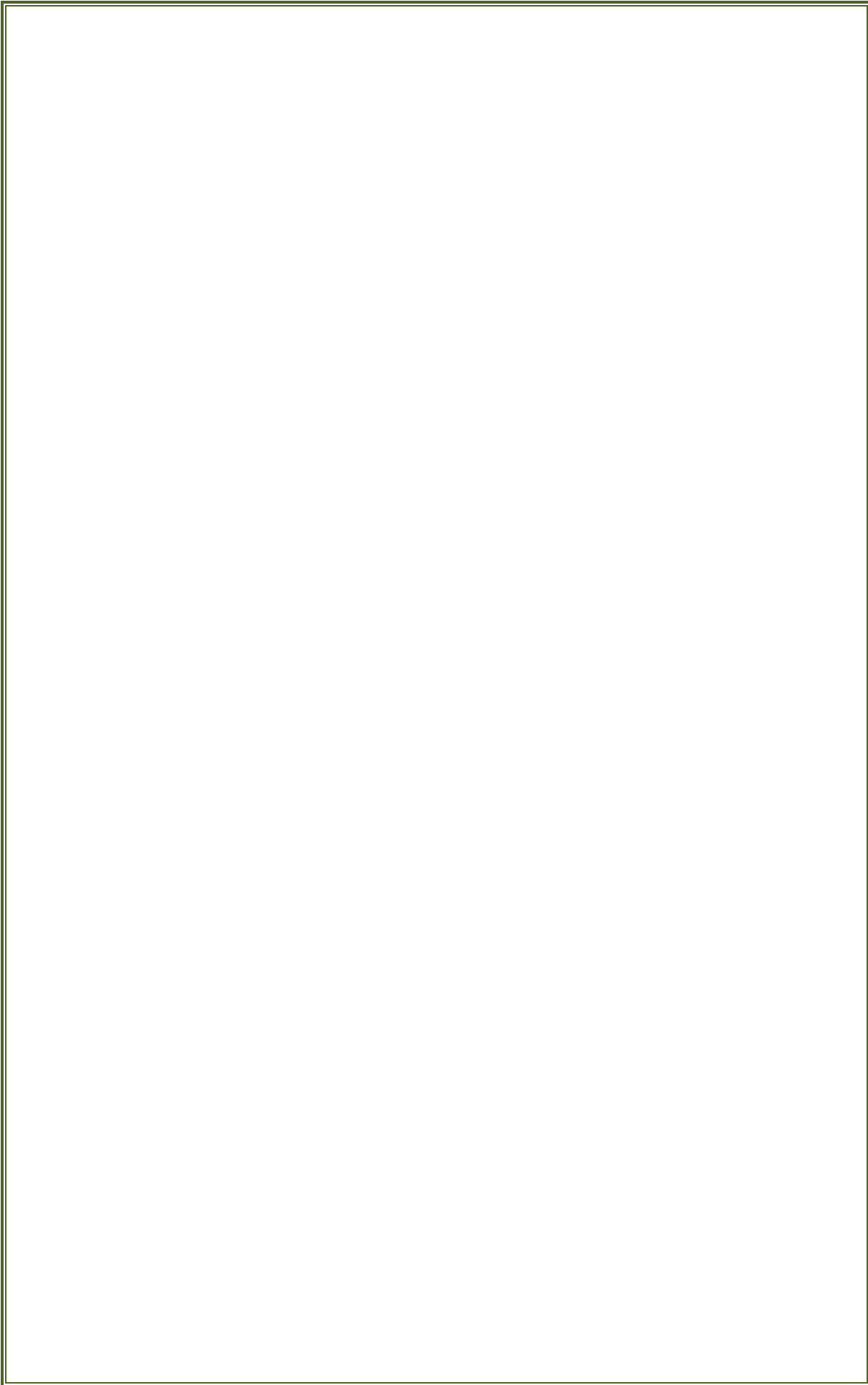
No.	Name of micro watershed	Amount in Rs.
1	Aruvipuram (4V10a)	25,44,000
2	Cheruvaram (4V11a)	1,98,000
3	Kanchinada (4V11b)	10,90,500
4	Ayanikuzhi (4V25a)	6,24,000
5	Moozhi (4V26a)	28,53,000
6	Nellanad (4V29b)	39,28,500
	Total	1,12,38,000

Major interventions suggested

The major interventions suggested under the Production System and Microenterprises based livelihood activities are the following:

A	Micro enterprises
1	Mushroom cultivation
2	Bee keeping

3	Cloth bag making
4	Carpet making
5	Detergent making
6	Ornaments making
7	Paper bag making
8	Floor cleaner making
B	Production system
	Individual
1	Planting of 5 banana plants
2	Planting of 2 fruit plants
3	Planting of 2 timber plants
4	Planting of 5 pepper seedlings
5	Vegetable cultivation in terraces
6	Mechanization support to livestock farmers
7	Support to women SHG for livestock rearing
8	Cow rearing
9	Goat rearing
10	Rabbit rearing
11	Bee keeping
12	Mushroom cultivation (10 beds)
	NHG
1	Organic vegetable cultivation
2	Planting of tuber crops
3	Organic banana cultivation
4	Bush jasmine cultivation



MICRO WATERSHED BASED ACTION PLAN
ARUVIPPURAM MICRO WATERSHED (4V10a)

Aruvippuram micro watershed is the third largest micro watershed in the IWMP cluster (IWMP-I) with an area of 1722.77 ha (21.57% of total geographical area). This micro watershed is located mainly in Kallara Grama Panchayath. Very small portions of Vamanapuram and Nanniyode Grama Panchayats neighbouring Kallara Grama Panchayat also come under this micro watershed. The Vamanapuram River flows through the south east & southern boundary of the watershed.

General Description

Table No. 13.1 General Description of Aruvippuram micro watershed

Name of micro watershed	: Aruvippuram
Micro watershed code	: 4V10a
River basin	: Vamanapuram
District	: Thiruvananthapuram
Block Panchayath	: Vamanapuram
Grama Panchayath	: Kallara, Vamanapuram & Nanniyode
Villages	: Kallara, Pullampara
Latitude	: 8 ^o 41'44" to 8 ^o 45'06" North
Longitude	: 76 ^o 55'53" to 76 ^o 59'15 East
Wards	: Kallara Panchayath- 4, 5, 9, 10, 11, 12, 13, 17 (full) Kallara Panchayath- 1, 3, 8, 14, 15, 16 (part) Vamanapuram – 9 (part) Nanniyode – 1 (part)
Total Area	: 1722.77 ha
% area in the IWMP cluster	: 21.57 %

Socio economic profile

The general socio economic situation of the micro watershed is average. As per the information provided in the baseline survey conducted, Aruvippuram micro watershed has a total number of 4480 households with a total population of 11234. The micro watershed has a total male population of 5370 and a total female population of 5864. 1619 numbers of BPL families reside in the micro watershed area. A total number of 2816 persons have registered under MGNREGS. 420 households belong to Schedule Caste and 48 families belong to Schedule Tribe. Majority of the farmers are marginal farmers having only less than 1 ha of land. Agriculture is the major source of livelihood in the micro watershed area. Apart from agriculture/horticultural practices, animal husbandry is also a source of livelihood for some families in the watershed area. The socio economic details of the Aruvippuram micro watershed are given below:

Table No. 13.2 Socio economic details of Aruvippuram micro watershed

1.	Total number of households		4480
2.	Population	Male	5370
		Female	5864
		Total	11234
	Child population	Male	2196
		Female	2179
		Total	4375
3.	No. of BPL families		1619
4.	No. of persons enrolled under MGNREGS		2816
5.	Households	Scheduled Caste	420
		Scheduled Tribe	48
		General	4012
6.	Land holdings	Landless	49
		Less than 5 cents	636
		Marginal (5 to 250 cents)	3986
		Small (250 to 500 cents)	63

Methodology

In line with the guidelines of IWMP, as suggested by Government of India, the following methodology was adopted for NRM planning and resource mapping.

1. Prepared the cadastral maps pertaining to the project area.
2. Overlaid the micro watershed boundaries over cadastral maps and corrected the boundaries through ground truth verification
3. Project Fellows were appointed as animators. The animators assisted the People's representatives in the formation of Neighbour Hood Groups. They act as master trainers and collected primary and secondary field data. The animators worked as the interface between LSGI and NHGs
4. Training Coordinators were engaged at project level for organizing the series of trainings at Block and Grama Panchayat levels.
5. Overseers were engaged for taking field estimates of the proposed activities.
6. Induction training was given for the project staff on PRA techniques, concept of maps and Resource Mapping.
7. Printed posters, banners and notices for providing wide publicity regarding the programme.
8. Two block level seminars were conducted for People's representatives of District/Block/GramaPanchayats, line departments, Kudumbasree, and other functionaries.
9. This was followed by orientation seminars at GramaPanchayats.
10. Conducted transect walk with ward members and ADS.

11. During the transect walk, major drains, gullies and drainage lines are identified and marked in the cadastral map.
12. NHGs were formed at grass root level comprising of 40 to 50 neighbouring households.
13. Panchayat Level Watershed Committees were convened at Grama Panchayats for finalizing the modalities of work.
14. Trainer's training for base line survey were conducted for two facilitators from each Neighbour Hood Group
15. Predefined questionnaire was prepared for data collection from each household.
16. A block level seminar was organized on drainage line treatment. Followed by Technical presentations, group discussions were held at Grama Panchayat level to draw out the requirements. The suggestions were presented by concerned Grama Panchayat Presidents.
17. Various resources like different water bodies, wells and farm ponds are identified and marked in the cadastral map with the help of the facilitators selected from the NHGs.
18. Focus Group Discussions were organised at Panchayat level for ward members & ADS Chairpersons, Presidents & Secretaries of NHGs, Padashekhara Samithi, Kera Samithi, Kudumbasree, MGNREGS, Officials of Agriculture, Veterinary& Soil Conservation Departments. Followed by technical sessions, group discussions at ward level were held and suggestions were presented by Grama Panchayat members.
19. New questionnaire for net plan preparation was prepared for data collection from each household and NHG.
20. The land resource maps already prepared were updated using high resolution satellite imagery and these interpreted maps were corrected with the help of NHGs and accordingly present land use map is prepared using different notions and symbols.
21. Trainer's training for detailed survey for net plan preparation organized at Grama Panchayat level for ward members & ADS Chairpersons, Vice Presidents & Joint Secretaries of NHGs, MGNREGS officials, etc. The information gathered includes soil and water conservation activities to be taken up through MGNREGS and other schemes and list of agricultural/veterinary/fisheries activates to be taken up in each household. The list of drains/ponds/wells to be rejuvenated/renovated and the details of group activities/livelihood activities to be taken up in each NHG were also collected.
22. Thematic maps on geology and geomorphology were interpreted from the high resolution satellite imagery and were corrected through ground truth verification.
23. Panchayat Level Watershed Committees were convened at Grama Panchayats and the list of entry point activities suggested were discussed and finalized.

24. Trainer's training for taking people's estimates and consolidation of project proposals. This was organized at Grama Panchayat and NHG level. Elected representatives, ADS Chairpersons, Officer bearers of NHGs, MGNREGS officials, etc. attended this training. The information gathered on soil and water conservation activities to be taken up through MGNREGS and other schemes and list of agricultural/veterinary/fisheries activities to be taken up were finalized. The list of drains/ponds/wells to be rejuvenated/renovated and the details of group activities/livelihood activities to be taken up in each NHG were also finalized. The livelihood action plan and the activities under production system were also consolidated.
25. The suggestions were split for four years and four separate annual plans were also prepared.
26. Finally a proposed land use map, area treatment map and drainage line treatment map were so prepared which is treated as the strategic action plan on Natural Resources Management perspective for the micro watershed during the entire project period.
27. Major activities included in the watershed project are.
 - Soil and moisture conservation measures like centripetal and bench terracing, earthen and stone pitched contour bunding, trenching, vegetative barriers, etc.
 - Rain water harvesting activities like farm ponds, percolation tanks, check dams etc.
 - Well recharging and rain water harvesting structures like roof water harvesting and rain water collection pits.
 - Planting and sowing of multipurpose trees, shrubs, grasses, legumes and pasture land development.
 - Encouraging natural regeneration including fodder cultivation.
 - Promotion of agro-forestry and horticulture
 - Capacity building and creation of a greater degree of awareness among the participants.
 - Encouraging people's participation with the involvement of NHGs.
 - Livelihood activities for asset less people
 - Production system and Micro enterprises

Biophysical Resources

Physiography

The relief of the watershed ranges from 20 m above MSL to 220 m above MSL. The majority of the area falls in the relief category of 60 to 90 m above MSL which occurs in an area of 692.95 ha (40.22 %). An area of 60.29 ha is located above 150m above MSL.

Slope

The watershed area is divided into six categories of slope classes. The majority of area is under the strongly sloping area having 10 – 15 % slope. The category spreads over

an area of 849.66 ha (49.32 %), 389.59 ha of the watershed area is having very steeply sloping lands which requires urgent soil and water conservation measures.

Drains

The Vamanapuram River flowing through the south-east and southern boundary of the watershed is the major drain of this watershed. A number of drains are originating from different parts of this watershed which drains to the Vamanapuram River near Kurinchilakkad. The watershed also has 17 number of ponds distributed throughout the watershed area. The details of the drains and ponds in the watershed area are given in tables given below.

Table No. 13.3 Details of Drains in Aruvippuram micro watershed

Grama Panchayat	Drains	Length (m)	Breadth (m)	Depth (m)
Kallara	Alamcode Karikkakam Thodu	650	1	1
	Aruvippuram Cheru Thodu	700	1	1
	Chanthayil Kadu Ela Thodu	400	1	1
	Cheruthodu (1)	300	1	1
	Eettimukku Thodu	350	1	1
	Iruppu Thodu	1000	2	2
	Kaithodu	300	0.5	0.5
	Kaithodu (1)	140	0.5	0.5
	Kaithodu (2)	450	1	1
	Kaithodu (3)	150	0.5	0.5
	Kazhukanpacha Thodu	1750	2	2
	Kottayil Iruppu Thodu	1050	2	2
	Kottur Thodu	950	2	2
	Kurinjilakad Kaithodu	300	1	1
	Kurinjilakadu Thodu	4050	3	3
	Kurumbayam Cheru Thodu (1)	110	0.5	0.5
	Kurumbayam Cheru Thodu (2)	150	0.5	0.5
	Kurumbayam Cheru Thodu (3)	350	1	1
	Kurumbayam LPS Thodu	1500	2	2
	Kurumbayam Thodu	1400	2	2
	LPS Kaithodu	500	0.5	0.5
	Mulayilkonam Kaithodu(1)	650	2	2
	Mulayilkonam Kaithodu(2)	150	1	1
	Mulayilkonam Kaithodu(3)	220	1	1
	Mulayilkonam Thodu	2200	2	2
	Nanamkodu Thodu	750	2	2
Ozhukupara Thodu	3150	2	2	
Parappil Cheru Thodu	1050	2	2	

	Parappil Kaithodu	175	1	1
	Poochedi Karikkakom Cheru Thodu	650	1	1
	Poochedi Karikkakom Thodu	2900	2	0.5
	Poovanathmmoodu Thumbodu Thodu	1150	2	2
	Poovanathummoodu Thodu	1250	2	2
	Tharatta Thodu	1400	2	2
	Tharatta-Thapasagiri Thodu	1850	2	2
	Thumbodu Kaithodu (1)	200	0.5	0.5
	Thumbodu Kaithodu (2)	150	0.5	0.5
	Thumbodu Thodu			
	Unnavila Thodu	800	2	2
	Vattakarikkakom Ela Cheru Thodu	700	2	2
Nanniyod	Vattakarikkakom Ela Cheru Thodu	50	2	2

Table No. 13.4 Table showing the details of Ponds in Aruvippuram micro watershed

Sl. No	Grama Panchayat	Pond	Survey No.	Length (m)	Breadth (m)	Depth (m)
1	Kallara	MahadevaKshethraKulam	1433	38	36	3
2		ChandaKulam	1502	15	12	2
3		Pazhayachanda Quarry Kulam	1502	20	15	3
4		KurumbayamCheruKulam	1530	8	6	1
5		OzhukuparaKulam	1591	18	15	2
6		KazhukanpachaKulam	3056	8	7	3
7		ThazheParappil 1	3532	5	4	2
8		Kakkampacha 1	3685	2	1.5	1.5
9		Kakkampacha 2	3685	1.5	1	1
10		PoochediEdavila	3743	3	2	2
11		Thathengumcodu	3751	2	2	1
12		Kodamplachi	3770	4	2	2
13		KuzhiyilVeedu,Parappil	3776	3	2	1.5
14		ThazheParappil	3828	5	4	2
15		Parappil Grandasala1	3851	3	2	1.5
16		ParappilGrandasala 2	3839	1	1	1
17		Kodamplachi 2	4164	1	1	1

Land use

Agriculture is one of the prime activity in the watershed area. The major land use category mapped in the watershed area is rubber plantation with an area of 1081.91 ha (62.80 %). The second major category is the mixed crops which are the typical homestead cultivation of Kerala wherein the different crop species are grown together that cannot

be spatially mapped separately. This extends in an area of 405.23 ha. An area of 4.47 ha of paddy lands has been left as cultivable wasteland which can be brought to paddy cultivation by providing necessary labour and irrigation facilities. An area of 4.46 ha is mapped as cultivable wastelands which can be brought under horticulture. An area of 83.89 ha (4.87 %) is under the built up land and an area of 2.80 ha is under the rocky area. The details of land use categories with spatial extent are given in table.

Table No. 13.5 Land use categories in Aruvippuram micro watershed

Sl. No.	Land use category	Area in ha	Percentage
1	Built up land	83.89	4.87
2	Paddy	1.65	0.10
3	Paddy converted Builtup land	0.95	0.06
4	Paddy converted Coconut	3.14	0.18
5	Paddy converted Banana	15.90	0.92
6	Paddy converted Arecanut	1.83	0.11
7	Paddy converted Tapioca	7.79	0.45
8	Paddy converted Banana + Tapioca	14.48	0.84
9	Paddy converted Rubber	5.81	0.34
10	Paddy converted Vegetables	1.01	0.06
11	Paddy converted Mixed Crops	48.64	2.82
12	Paddy land left ascultivable waste land	4.47	0.26
13	Coconut	0.72	0.04
14	Mixed Crops	405.23	23.52
15	Plantation Rubber	1012.86	58.79
16	Plantation Rubber (Young)	69.05	4.01
17	Cultivable waste land	4.46	0.26
18	Rock	2.80	0.16
19	Road land	9.48	0.55
20	River Bank	13.56	0.79
21	River (Rocky area)	0.79	0.05
22	River/ Water body	14.26	0.83
	Total	1722.77	100.00

Geology

The major geological units in the watershed is Garnetiferous Biotite occurring in an area of 1301.8 ha (75.56 %). The remaining area as a geological formation Garnet- Biotite gneiss with Migmatite. There are four geomorphological units of which more than 87 % (1508.81 ha) of the area falls under the category viz. lower plateau (laterite). An area of 145.54 ha is mapped under the category viz. valley fill.

Soils

The major soil series mapped in the watershed area is Nedumangad series having a solum thickness of 150 cm with very dark brown to pale brown colour. The soil is very

strongly acid and has a surface texture of gravelly sandy clay loam to gravelly sandy clay. This is distributed in an area of 1331.94 ha (77.31 %). The river bank area is mapped under Mudakkal series which is alluvial in origin. Soils in more than half of the watershed area is moderately shallow with a depth of 50- 75 cm and 27.54 % of the area (747.4 ha) is having moderately deep soils with a depth of 75-100 cm. The major surface soil textures in the watershed area constitutes that of gravelly clay loam (790.66 ha) and gravelly loam (702.55 ha). Nearly 50 % of the watershed area is prone to severe soil erosion which calls for proper soil and water conservation measures in the area.

Capacity Building/Trainings

Extensive training programmes and user interaction meetings were organized for the stake holders as part of the preparation of detailed project report. The details are given below:

No.	Training	Participants
1.	Block level awareness training	Elected representatives of three tier
2.	Block level orientation training	Elected representatives and ADS chairpersons
3.	Training on Base line survey	Two facilitators from NHG.
4.	Training on Drainage line treatment	Elected representatives and one facilitator from NHG.
5.	Focus Group Discussion	Elected representatives, Presidents and Secretaries of the NHGs, ADS chairpersons and MGNREGS labour groups and progressive farmers
6.	Training for Net Plan Preparation	Elected representatives, Vice Presidents and Joint Secretaries from NHG, ADS chairpersons and MGNREGS labour groups.
7.	Training for People's Estimate and Project Report Consolidation	Elected representatives, Office bearers of NHGs, ADS chairpersons and MGNREGS labour groups.

Watershed Committee

Watershed Committee is constituted by Gram Sabha to implement the watershed project with technical support of WDT in the panchayat. Watershed committees are formed following the parameters of watershed committee, keeping the gender sensitive issues intact. Watershed committee members are briefed about the project objectives and a workshop is also conducted in this regard at every panchayat. The watershed committee has a pivotal role to play during and after the project implementation period.

The details of the Watershed Committee for Aruvippuram watershed is given below:

Table No. 13.6. Details of the Watershed Committee of Aruvippuram watershed

Office bearers

No.	Name	Designation	Sex	Position held	Phone No.
1	Dr. V. N. Sushama	Chairperson	F	President, Kallara GP	9446970234
2	Kallara Biju	Vice chairperson	M	Chairman, Standing Committee, Kallara	9447961877
3	Prasannan	Convenor	M	Lower Division Clerk, Kallara GP	9446700576
4	Pradeep Lal	Joint Convenor	M	NHG representative	9447023386
5	Anjana	Secretary	F	Social Mobilizer, WDT	9447181071
6	Manoj Kumar D. G.	Joint Secretary	M	NHG representative	9946881565
7	Joly S.	Treasurer	F	NHG representative	8943095364

Members

Zone	Name	Address
1	Manoj Kumar D. G.	T. G. Bhavan, Thapasagiri, Kallara P. O.
2	Pachayil Vijayan	Pachayil, Saraswathy Vilasom, Kurumbayam
3	Pradeep Lal	Sundar Bhavan, Thengumcode
4	Nirmala	Thadattarikathuveedu, Parappil, Muthuvila P. O.
5	Vilasini	Alamcode, Karikkakam, Muthuvila
6	Muraleedharan	M. G. Bhvan, Edattoodu, Muthuvila P. O.
7	Joly S.	Charuvilaveedu, Kurijilakkadu, Niramankadavu P. O.
8	Anitha Nair	Puthenveedu Elangam, Mritrimmala
9	Valsalakumari R.	Kamala Bhavan, Thumbodu, Kallara P. O.

Ex Officio Members

No.	Name	Position held
1	Sukhi Rajan	Member, District Panchayath
	Remani P. Nair	
2	Krishnaprasad B. L.	Member, Block Panchayath
	Kumari Sheela L. B.	
	M. S. Shaji	
3	Saifudeen M., Kallara ward	Member, Grama Panchayath
	Sheela K., Vellamkudi ward	

	Sunitha Murali, Thapasagiri ward	
	Athira P. L., Kurumbayam ward	
	Suma B., Cheruvalam ward	
	Dr. V. N. Sushama, Thengumcode ward	
	Lilli S., Parappil ward	
	Cheppilode Vijayakumar, Kalluvarambu ward	
	Maniyan M., Muthuvila ward	
	Sajithadevi E. S., Aruvipuram ward	
	Kurijilakkadu Bhasheer, Kurijilakkadu ward	
	Sreekala L, Mrithrimala ward	
	Satheesh S. K., Mulayilkonam ward	
	Kallara Biju,Thumbodu ward	
	Kavitha R., Anakkayam ward	
4	Santhakumar, Mrithrimala Service Co-operative Bank	President, Primary Service Co-operative Bank
	B. L. Krishnaprasad, Joint Farming Co-operative Society	
5	Sunitha Saifudeen, Kallara ward	Chairpersons, Kudumbhasree ADS
	Deepa, Vellamkudi ward	
	Jubairia, Thapasagiri ward	
	Ajithakumari, Kurumbayam ward	
	Sumangala, Cheruvalam ward	
	Shailaja,Thengumcode ward	
	Sheelakumari, Parappil ward	
	Sheeja, Kalluvarambu ward	
	Beena, Muthuvila ward	
	Lalithambika, Aruvipuram ward	
	Leela S. S., Kurijilakkadu ward	
	Rajamani, Mrithrimala ward	
	Reena, Mulayilkonam ward	
	Ambika, Thumbodu ward	
	Anakkayam ward	
6	Prasannan, Lower Division Clerk, Kallara Panchayath	Nominated Officer of Grama Panchayat
7	Anjana, Social Mobiliser, WDT	WDT Member

Neighbour Hood Groups

Neighbour Hood Groups are constituted in the watershed area combining 40 to 50 adjacent households which are living in a cluster. These are further subdivided into seven sub groups and one person from each subgroup is selected to the Neighbour Hood Group Committee. These seven members formed a Neighbour hood Group Committee with a President, Vice President, Secretary, Joint Secretary and Treasurer. Of these Treasurer and one Committee member is women. The ward members and ADS Chairpersons of the wards are Ex-officio members in all the NHG Committees. These

Committees are registered with the concerned Grama Panchayat. The Presidents and Secretaries of the NHG Committees are members of the Watershed Committee.

The details of the NHG Committees in Aruvippuram watershed is as follows:

KallaraGramaPanchayath

Sl. No	Ayalkoottam Reg. No	Total House holds	Land Holdings (in cents)					
			BPL	Land less	0-5	6-250	250-500	>500
1	IWMP/KP/1/1	36	4	1	2	33		
2	IWMP/KP/1/2	29	1		2	27		
3	IWMP/KP/3/1	49	20	4	10	35		
4	IWMP/KP/3/2	40	9		7	32	1	
5	IWMP/KP/3/3	60	21		8	49	3	
6	IWMP/KP/3/4	52	27		35	17		
7	IWMP/KP/4/1	51	23	2	14	35		
8	IWMP/KP/4/2	47	21		13	34		
9	IWMP/KP/4/3	60	28	1	14	45		
10	IWMP/KP/4/4	64	35		17	47		
11	IWMP/KP/4/5	66	37		16	50		
12	IWMP/KP/4/6	64	27		14	50		
13	IWMP/KP/4/7	46	21		10	36		
14	IWMP/KP/4/8	35	14		7	28		
15	IWMP/KP/4/9	32	9		6	25	1	
16	IWMP/KP/5/1	51	16	1	11	38	1	
17	IWMP/KP/5/2	64	35		12	52		
18	IWMP/KP/5/3	57	25		9	48		
19	IWMP/KP/5/4	50	15		11	39		
20	IWMP/KP/5/5	36	15		4	31	1	
21	IWMP/KP/5/6	69	25		2	67		
22	IWMP/KP/5/7	41	13		4	36	1	
23	IWMP/KP/5/8	50	15	2	5	43		
24	IWMP/KP/8/3	44	12		1	43		
25	IWMP/KP/8/9	53	22		3	47	3	
26	IWMP/KP/9/1	47	29		3	43	1	
27	IWMP/KP/9/2	38	18	1	8	29		
28	IWMP/KP/9/3	51	31		18	32	1	
29	IWMP/KP/9/4	57	28		7	47	3	
30	IWMP/KP/9/5	68	39	1	4	61	2	
31	IWMP/KP/9/6	55	32		3	51	1	
32	IWMP/KP/9/7	52	26		1	51		
33	IWMP/KP/9/8	73	29		19	54		
34	IWMP/KP/10/1	66	17		5	60	1	

Sl. No	Ayalkoottam Reg. No	Total House holds	Land Holdings (in cents)					
			BPL	Land less	0-5	6-250	250-500	>500
35	IWMP/KP/10/2	45	9		1	42	2	
36	IWMP/KP/10/3	63	27		4	58	1	
37	IWMP/KP/10/4	59	22		6	51	2	
38	IWMP/KP/10/5	53	26	2	5	46		
39	IWMP/KP/10/6	53	26	2	5	46		
40	IWMP/KP/10/7	43	13	1	2	38	2	
41	IWMP/KP/10/8	55	24		13	40	2	
42	IWMP/KP/11/1	50	8		6	42	2	
43	IWMP/KP/11/2	52	21		6	44	2	
44	IWMP/KP/11/3	56	19		4	50	2	
45	IWMP/KP/11/4	55	29		10	45		
46	IWMP/KP/11/5	56	37		4	52		
47	IWMP/KP/11/6	59	28	2	7	49	1	
48	IWMP/KP/11/7	66	25		11	52	3	
49	IWMP/KP/11/8	78	39		6	72		
50	IWMP/KP/12/1	58	21		12	45	1	
51	IWMP/KP/12/2	67	27		5	60	2	
52	IWMP/KP/12/3	43	16		2	41		
53	IWMP/KP/12/4	38	6		2	35	1	
54	IWMP/KP/12/5	35	20		3	30	2	
55	IWMP/KP/12/6	59	24	3	6	49	1	
56	IWMP/KP/12/7	61	24	1	9	51		
57	IWMP/KP/12/8	41	20		5	36		
58	IWMP/KP/12/9	45	20	4	8	33		
59	IWMP/KP/13/1	30	22		5	25		
60	IWMP/KP/13/2	24	15		6	18		
61	IWMP/KP/13/3	33	14	2	4	27		
62	IWMP/KP/13/4	11	5		1	10		
63	IWMP/KP/13/5	25	16		3	22		
64	IWMP/KP/13/6	40	32	1	2	37		
65	IWMP/KP/13/7	42	32		6	36		
66	IWMP/KP/13/8	46	27		3	43		
67	IWMP/KP/14/1	51	17			51		
68	IWMP/KP/14/2	51	15		2	49		
69	IWMP/KP/14/3	40	10		8	32		
70	IWMP/KP/15/1	57	21	2	1	54		
71	IWMP/KP/15/2	69	12		1	63	5	
72	IWMP/KP/15/3	43	13	3	4	36		

Sl. No	Ayalkoottam Reg. No	Total House holds	Land Holdings (in cents)					
			BPL	Land less	0-5	6-250	250-500	>500
73	IWMP/KP/16/1	90	29		11	77	2	
74	IWMP/KP/16/2	24	9		8	16		
75	IWMP/KP/16/3	57	26	1	5	51		
76	IWMP/KP/17/1	65	22		7	58		
77	IWMP/KP/17/2	57	28		16	38	3	
78	IWMP/KP/17/3	73	18	1	7	65		
79	IWMP/KP/17/4	74	11		9	65		
80	IWMP/KP/17/5	62	14	3	10	49		
81	IWMP/KP/17/6	72	18	1	5	66		
82	IWMP/KP/17/7	62	6	1	6	53	2	
83	IWMP/KP/17/8	56	18	4	3	47	2	
84	IWMP/KP/17/9	49	15		13	36		
85	IWMP/KP/17/10	64	12		12	51	1	
		4734	1871	49	636	3986	63	0

Self Help Groups

In addition to this, the existing Self Help Groups formed under the Kudumbasree Mission and other SHGs which are performing at a satisfactory level will be promoted to take various programmes under the Livelihood activities and Production Systems and Micro enterprises. If required, additional SHGs will also be formed in the watershed area in the coming years.

Activities proposed

Based on the series of discussions held with the different stakeholders the following activities are suggested for the micro watershed.

Table No. 13.8. Details of activities proposed

Entry Point Activities	
1	Bio gas plant
2	Vegetable Cultivation (Homestead/Terrace)
3	Planting avenue trees with tree guard
4	Planting of bamboo seedlings along sides of Vamanapuram River
Natural Resources Conservation Activities	
1	Stream bank protection – engineering structures (1.50 M height)
2	Stream bank protection – engineering structures (1.00 M height)
3	Stone pitched contour bunding
4	Earthen bunds
5	Centripetal terracing with husk trenching and mulching
6	Strip terracing for rubber

7	Moisture collection pits
8	Wasteland development (planting of horticultural plants)
9	Planting horticultural crops as intercrops
10	Afforestation of school compounds and public buildings
11	Gully plugs
12	Foot bridges
13	Water harvesting structures (wells)
14	Supply of Terafil Water Filter
15	Well recharging
16	Improvement of public wells
17	Improvement of existing wells
18	Renovationof drains
19	Renovation of ponds
20	Renovationof borewells by replacing GI pipes with PVC pipes
21	Solar electrification of Grama Panchayat
22	Solar junction lights
23	Supply of Portable solar lamps
24	Bus shelters with solar panels
25	Biogas plant
26	Stream bank stabilisation using Geo textiles
27	Conservation of sacred grooves

Budget

The distribution of budget for Aruvippuram micro watershed for the various components as per IWMP guidelines is given below:

Table No. 13.9. Budget for Aruvippuram micro watershed

No.	Budget component	% age	Amount in Rs.
1.	Administrative cost	10	25,44,000
2.	Monitoring	1	2,54,400
3.	Evaluation	1	2,54,400
Preparatory phase			
4.	Entry point activities	4	10,17,600
5.	Institution and capacity building	5	12,72,000
6.	Detailed Project Report	1	2,54,400
Watershed works phase			
7.	Natural Resources Conservation works	56	1,42,46,400
8.	Livelihood activities for asset less	9	22,89,600
9.	Production system and micro enterprises	10	25,44,000
10.	Consolidation phase	3	7,63,200
	Total	100	2,54,40,000

Aruvippuram Watershed (4V10a) - Action Plan

Table No. 13.10.1 - Sector-I- Natural Resources Conservation and Management - Ist Year Plan

No.	Activity	Unit	Unit cost	Target	IWMP	Convergence	WDF	Total
1	Earthen bunds	Rm	39.4	6100		240340		240340
2	Centripetal terracing with husk trenching and mulching	Nos.	278	1850		514300		514300
3	Strip terracing for rubber	Nos.	132	3000		396000		396000
4	Moisture collection pits	Nos.	49.82	600		29892		29892
5	Wasteland development (planting of horticultural plants)	cent	160	450	27000	45000	2700	74700
6	Planting horticultural crops as intercrops	cent	150	1000	50000	100000	5000	155000
7	Afforestation of school compounds and public buildings	cent	160	100	6000	10000	600	16600
8	Gully plugs	Nos.	1300	15	19500		1950	21450
9	Supply of Terafil Water Filter	Nos.	650	50	32500		3250	35750
10	Well recharging	Nos.	5000	30	150000		15000	165000
11	Improvement of public wells	Nos.	12000	4	48000		4800	52800
12	Improvement of existing wells	Nos.	6000	18	108000		10800	118800
13	Renovation of drains	m				406222		406222
14	Renovation of ponds	Nos.	250000	2	500000		25000	525000
15	Solar junction lights	Nos.	25000	14	245000	105000	17500	367500
16	Supply of Portable solar lamps	Nos.	2000	50	70000	30000	10000	110000
17	Conservation of sacred grooves	Nos.	10000	1	10000		500	10500

18	Live hedges	50 m	1750	25	23750	20000	2375	46125
19	Fodder cultivation	3 cents	600	48	28800		2880	31680
	Total				1318550	1896754	102355	3317659

Aruvippuram Watershed (4V10a) - Action Plan

Table No. 13.10.2 - Sector-I- Natural Resources Conservation and Management –IInd Year Plan

No.	Activity	Unit	Unit cost	Target	IWMP	Convergence	WDF	Total
1	Stream bank protection – engineering structures (1.50 M height)	m	2290	350	801500		40075	841575
2	Stream bank protection – engineering structures (1.00 M height)	m	1609	250	402250		20112.50	422362.50
3	Stone pitched contour bunding	m ²	100.46	2400	241104		24110.40	265214.40
4	Earthen bunds	Rm	39.4	12200		480680		480680
5	Centripetal terracing with husk trenching and mulching	Nos.	278	3700		1028600		1028600
6	Strip terracing for rubber	Nos.	132	6000		792000		792000
7	Moisture collection pits	Nos.	49.82	1200		59784		59784
8	Wasteland development (planting of horticultural plants)	cent	160	900	54000	90000	5400	149400

9	Planting horticultural crops as intercrops	cent	150	2000	100000	200000	10000	310000
10	Afforestation of school compounds and public buildings	cent	160	200	12000	20000	1200	33200
11	Gully plugs	Nos.	1300	15	19500		1950	21450
12	Foot bridges	Nos.	10327	8	82616		8261.60	90877.60
13	Water harvesting structures (wells)	Nos.	18000	9	162000		16200	178200
14	Supply of Terafil Water Filter	Nos.	650	75	48750		4875	53625
15	Well recharging	Nos.	5000	50	250000		25000	275000
16	Improvement of public wells	Nos.	12000	6	72000		7200	79200
17	Improvement of existing wells	Nos.	6000	18	108000		10800	118800
18	Renovationof drains	m				1037500		1037500
19	Renovation of ponds	Nos.	250000	2	500000		25000	525000
20	Renovationof borewells by replacing GI pipes with PVC pipes	Nos.	30000	15	450000		22500	472500
21	Solar electrification of Grama Panchayat	Nos.	500000	1	350000	150000	17500	517500
22	Solar junction lights	Nos.	25000	21	367500	157500	26250	551250
23	Supply of Portable solar lamps	Nos.	2000	75	105000	45000	15000	165000
24	Bus shelters with solar panels	Nos.	40000	3	108000	12000	6000	126000
25	Biogas plant	Nos.	6500	4	26000		2600	28600
26	Stream bank stabilisation using Geo textiles	m2	191	350	66850		6685	73535

27	Conservation of sacred grooves	Nos.	10000	2	20000		1000	21000
28	Live hedges	50 m	1750	50	47500	40000	4750	92250
29	Fodder cultivation	3 cents	600	72	43200		4320	47520
	Total				4437770	4113064	306789.50	8857623.50

Aruvippuram Watershed (4V10a) - Action Plan

Table No. 13.10.3 - Sector-I- Natural Resources Conservation and Management –IIIrdYear Plan

No.	Activity	Unit	Unit cost	Target	IWMP	Convergence	WDF	Total
1	Stream bank protection – engineering structures (1.50 M height)	m	2290	350	801500		40075	841575
2	Stream bank protection – engineering structures (1.00 M height)	m	1609	250	402250		20112.50	422362.50
3	Stone pitched contour bunding	m ²	100.46	2400	241104		24110.40	265214.40
4	Earthen bunds	Rm	39.4	12200		480680		480680
5	Centripetal terracing with husk trenching and mulching	Nos.	278	3700		1028600		1028600
6	Strip terracing for rubber	Nos.	132	6000		792000		792000
7	Moisture collection pits	Nos.	49.82	1200		59784		59784
8	Wasteland development (planting of horticultural plants)	cent	160	900	54000	90000	5400	149400

9	Planting horticultural crops as intercrops	cent	150	2000	100000	200000	10000	310000
10	Afforestation of school compounds and public buildings	cent	160	200	12000	20000	1200	33200
11	Foot bridges	Nos.	10327	16	165232		16523.20	181755.20
12	Water harvesting structures (wells)	Nos.	18000	18	324000		32400	356400
13	Well recharging	Nos.	5000	40	200000		20000	220000
14	Improvement of existing wells	Nos.	6000	9	54000		5400	59400
15	Renovation of drains	m				73000		73000
16	Renovation of ponds	Nos.	250000	2	500000		25000	525000
17	Renovation of bore wells by replacing GI pipes with PVC pipes	Nos.	30000	15	450000		22500	472500
18	Bus shelters with solar panels	Nos.	40000	3	108000	12000	6000	126000
19	Biogas plant	Nos.	6500	6	39000		3900	42900
20	Stream bank stabilisation using Geo textiles	m2	191	700	133700		13370	147070
21	Live hedges	50 m	1750	50	47500	40000	4750	92250
	Total				3632286	2796064	250741.10	6679091.10

Aruvippuram Watershed (4V10a) - Action Plan

Table No. 13.10.4 - Sector-I- Natural Resources Conservation and Management –IVth Year Plan

No.	Activity	Unit	Unit cost	Target	IWMP	WDF	Total
1	Stream bank protection – engineering structures (1.50 M height)	m	2290	1050	2404500	120225	2524725
2	Stream bank protection – engineering structures (1.00 M height)	m	1609	750	1206750	60337.50	1267087.50
3	Stone pitched contour bunding	m2	100.46	6200	622852	62285.20	685137.20
4	Foot bridges	Nos.	10327	16	165232	16523.20	181755.20
5	Water harvesting structures (wells)	Nos.	18000	18	324000	32400	356400
6	Stream bank stabilisation using Geo textiles	m2	191	700	133700	13370	147070
	Total				4857034	305140.90	5162174.90

Aruvippuram Watershed (4V10 a) - Action Plan

Table No. 13.11.1 - Sector-II- Livelihood Support system for landless/ assetless - Ist Year Plan

Sl. No	Name of Activity	Unit	Unit Cost	Target	IWMP Fund	Beneficiary Contribution	Total
A	Enterprising individuals (10 %)						
1	Cow rearing	Nos.	22500	6	94500	40500	135000
2	Goat rearing	Nos.	10500	3	22050	9450	31500
3	Rabbit rearing	Nos.	8000	3	16800	7200	24000
4	Bee keeping	Nos.	10300	8	57680	24720	82400
5	Mushroom cultivation	Nos.	9000	5	31500	13500	45000
6	Tailoring	Nos.	10000	2	14000	6000	20000
	Total				236530	101370	337900

Aruvippuram Watershed (4V10 a) - Action Plan

Table No. 13.11.2 - Sector-II- Livelihood Support system for landless/ assetless- IInd Year Plan

Sl. No	Name of Activity	Unit	Unit Cost	Target	IWMP Fund	Beneficiary Contribution	Total
B	Revolving fund to SHGs (60 %)						
1	Carpent making						
2	Soap making		25000	6	112500	37500	150000
3	Curry powder		20000	10	150000	50000	200000
4	Bakery unit		15000	30	337500	112500	450000
5	Animal husbandry		10000	8	60000	20000	80000
6	Cloth bag making						
					660000	220000	880000

C Major livelihood activities (30 %)							
1	Mushroom cultivation	Nos.	150000	1	75000	75000	150000
2	Vermi composting	Nos.	50000	2	50000	50000	100000
					125000	125000	250000
	Total				785000	345000	1130000

Aruvippuram Watershed (4V10 a) - Action Plan

Table No. 13.11.3 - Sector-II- Livelihood Support system for landless/ assetless- IIIrd Year Plan

Sl. No	Name of Activity	Unit	Unit Cost	Target	IWMP Fund	Beneficiary Contribution	Total
B Revolving fund to SHGs (60 %)							
1	Carpet making						
2	Soap making		25000	6	112500	37500	150000
3	Curry powder		20000	10	150000	50000	200000
4	Bakery unit		15000	35	393750	131250	525000
5	Animal husbandry		10000	8	60000	20000	80000
6	Cloth bag making						
					716250	238750	955000
C Major livelihood activities (30 %)							
1	Cow rearing	Nos.	500000	1	200000	300000	500000
2	Goat rearing	Nos.	105000	2	105000	105000	210000
					305000	405000	710000
	Total				1021250	643750	1665000

Aruvippuram Watershed (4V10 a) - Action Plan

Table No. 13.11.4 - Sector-II- Livelihood Support system for landless/ assetless- IVth Year Plan

Sl. No	Name of Activity	Unit	Unit Cost	Target	IWMP Fund	Beneficiary Contribution	Total
C	Major livelihood activities (30 %)						
1	Small restaurant	Nos.	100000	1	50000	50000	100000
2	Cover making unit	Nos.	250000	1	100000	150000	250000
3	Nursery making	Nos.	200000	1	100000	100000	200000
	Total				250000	300000	550000

Aruvippuram Watershed (4V10a) - Action Plan

Table No. 13.12.1 - Sector-III- Production system and Microenterprises - Ist Year Plan

Sl. No	Name of Activity	Unit	Unit Cost	Target	IWMP Fund	Convergence	WDF	Total
1	Vegetable cultivation in terrace	Nos.	1500	640	480000	480000	172800	1132800
2	Planting of 5 banana plants	Nos.	170	2500	125000	300000	76500	501500
	Total				605000	780000	249300	1634300

Note: 20 percent of the beneficiaries will be SC/ST. Contribution to WDF is 20 % for General and 10 % for SC/ST

Aruvippuram Watershed (4V10a) - Action Plan

Table No. 13.12.2 - Sector-III- Production system and Microenterprises –IInd Year Plan

Sl. No	Name of Activity	Unit	Unit Cost	Target	IWMP Fund	Convergence	WDF	Total
1	Backyard poultry	Nos.	1200	700	525000	525000	94500	1144500
2	Mushroom cultivation (10 beds)	Nos.	350	50	17500	32500	3150	53150

3	Bee keeping	Nos.	3500	40	160000	232000	25200	417200
4	Planting of 2 fruit plants	Nos.	80	2000	60000	100000	28800	188800
5	Planting of 2 timber plants	Nos.	70	2000	40000	100000	25200	165200
6	Planting of 10 pepper seedlings	Nos.	200	500	50000	50000	18000	118000
Total					852500	1039500	194850	2086850

Note: 20 percent of the beneficiaries will be SC/ST. Contribution to WDF is 20 % for General and 10 % for SC/ST

Aruvippuram Watershed (4V10a) - Action Plan

Table No. 13.12.3 - Sector-III- Production system and Microenterprises –IIIrd Year Plan

Sl. No	Name of Activity	Unit	Unit Cost	Target	IWMP Fund	Convergence	WDF	Total
1	Cow rearing	Nos.	22500	32	504000	216000	90720	810720
2	Goat rearing	Nos.	10500	10	73500	31500	13230	118230
3	Rabbit rearing	Nos.	8000	5	28000	12000	5040	45040
4	Mechanization support to livestock farmers	Nos.	45000	2	50000	40000	9000	99000
5	Support to women SHG for livestock rearing	Nos.	50000	2	50000	50000	9000	109000
6	Tailoring unit	Nos.	10000	3	24000	6000	4320	34320
Total					729500	355500	131310	1216310

Note: 20 percent of the beneficiaries will be SC/ST. Contribution to WDF is 20 % for General and 10 % for SC/ST

Aruvippuram Watershed (4V10a)-Action Plan

Table No. 13.12.4 - Sector-III- Production system and Microenterprises –IVth Year Plan

Sl. No	Name of Activity	Unit	Unit Cost	Target	IWMP Fund	Convergence	WDF	Total
1	Organic vegetable cultivation	Nos.	25000	11	110000	165000	19800	294800
2	Planting of tuber crops	Nos.	20000	11	88000	132000	15840	235840
3	Jasmine cultivation	Nos.	15000	2	14400	15600	2592	32592
4	Organic banana cultivation	Nos.	30000	8	144000	96000	25920	265920
	Total				356400	408600	64152	829152

Note: 20 percent of the beneficiaries will be SC/ST. Contribution to WDF is 20 % for General and 10 % for SC/ST

MICRO WATERSHED BASED ACTION PLAN
CHERUVALAM MICRO WATERSHED (4V11a)

Cheruvalam micro watershed is the smallest watershed in the IWMP cluster (IWMP-I) with an area of 175.59 ha (2.19 % of total geographical area). This micro watershed is spread over Kallara, Pangod, and Nandiyod Grama Panchayaths. The major portion of this micro watershed falls in the Cheruvalam ward of Kallara Grama Panchayat. The Vamanapuram River flows through the south eastern boundary of the watershed.

General Description

Table No. 14.1 General Description of Cheruvalam micro watershed

Name of micro watershed	:	Cheruvalam
Micro watershed code	:	4V11a
River basin	:	Vamanapuram
District	:	Thiruvananthapuram
Block Panchayath	:	Vamanapuram
Grama Panchayath	:	Kallara, Pangod, Nandiyod
Villages	:	Kallara, Palode
Latitude	:	8 ⁰ 43'10" to 8 ⁰ 44'21" North
Longitude	:	76 ⁰ 58'28" to 76 ⁰ 59'21" East
Wards	:	Kallara Panchayath - 8 (part) Pangod Panchayath - 14 (part) Nandiyod Panchayath - 1 (part)
Total Area	:	175.59 ha
% of area in the IWMP cluster	:	2.19 %

Socio economic profile

As per the information provided in the baseline survey conducted, Cheruvalam micro watershed has a total number of 473 households with a total population of 1152. The micro watershed has a total male population of 543 and a total female population of 609. 122 numbers of BPL families reside in the micro watershed area. A total number of 312 persons have registered under MGNREGS. 70 households belong to Schedule Caste and 2 families belong to Schedule Tribe. Majority of the farmers are marginal farmers having only less than 1 ha of own land. Agriculture is the major source of livelihood in the micro watershed area. Apart from agriculture/horticultural practices, animal husbandry is also a source of livelihood some families in the watershed area. The socio economic details of the Cheruvalam micro watershed are given below:

Table No. 14.2 Socio economic details of Cheruvalam micro watershed

1.	Total number of households	473
2.	Population	Male
		543

		Female	609
		Total	1152
	Child population	Male	232
		Female	263
		Total	495
3.	No. of BPL families		122
4.	No. of persons enrolled under MGNREGS		312
5.	Households	Scheduled Caste	70
		Scheduled Tribe	2
		General	401
6.	Land holdings	Landless	6
		Very marginal (less than 5 cents)	99
		Marginal (5 to 250 cents)	340
		Small (250 to 500 cents)	7

Methodology

In line with the guidelines of IWMP, as suggested by Government of India, the following methodology was adopted for NRM planning and resource mapping.

1. Prepared the cadastral maps pertaining to the project area.
2. Overlaid the micro watershed boundaries over cadastral maps and corrected the boundaries through ground truth verification
3. Project Fellows were appointed as animators. The animators assisted the People's representatives in the formation of Neighbour Hood Groups. They act as master trainers and collected primary and secondary field data. The animators worked as the interface between LSGI and NHGs
4. Training Coordinators were engaged at project level for organizing the series of trainings at Block and Grama Panchayat levels.
5. Overseers were engaged for taking field estimates of the proposed activities.
6. Induction training was given for the project staff on PRA techniques, concept of maps and Resource Mapping.
7. Printed posters, banners and notices for providing wide publicity regarding the programme.
8. Two block level seminars were conducted for People's representatives of District/Block/GramaPanchayats, line departments, Kudumbasree, and other functionaries.
9. This was followed by orientation seminars at GramaPanchayats.
10. Conducted transect walk with ward members and ADS.
11. During the transect walk, major drains, gullies and drainage lines are identified and marked in the cadastral map.
12. NHGs were formed at grass root level comprising of 40 to 50 neighbouring households.

13. Panchayat Level Watershed Committees were convened at Grama Panchayats for finalizing the modalities of work.
14. Trainer's training for base line survey were conducted for two facilitators from each Neighbour Hood Group
15. Predefined questionnaire was prepared for data collection from each household.
16. A block level seminar was organized on drainage line treatment. Followed by Technical presentations, group discussions were held at Grama Panchayat level to draw out the requirements. The suggestions were presented by concerned Grama Panchayat Presidents.
17. Various resources like different water bodies, wells and farm ponds are identified and marked in the cadastral map with the help of the facilitators selected from the NHGs.
18. Focus Group Discussions were organised at Panchayat level for ward members & ADS Chairpersons, Presidents & Secretaries of NHGs, Padashekhara Samithi, Kera Samithi, Kudumbasree, MGNREGS, Officials of Agriculture, Veterinary & Soil Conservation Departments. Followed by technical sessions, group discussions at ward level were held and suggestions were presented by Grama Panchayat members.
19. New questionnaire for net plan preparation was prepared for data collection from each household and NHG.
20. The land resource maps already prepared were updated using high resolution satellite imagery and these interpreted maps were corrected with the help of NHGs and accordingly present land use map is prepared using different notions and symbols.
21. Trainer's training for detailed survey for net plan preparation organized at Grama Panchayat level for ward members & ADS Chairpersons, Vice Presidents & Joint Secretaries of NHGs, MGNREGS officials, etc. The information gathered includes soil and water conservation activities to be taken up through MGNREGS and other schemes and list of agricultural/veterinary/fisheries activates to be taken up in each household. The list of drains/ponds/wells to be rejuvenated/renovated and the details of group activities/livelihood activities to be taken up in each NHG were also collected.
22. Thematic maps on geology and geomorphology were interpreted from the high resolution satellite imagery and were corrected through ground truth verification.
23. Panchayat Level Watershed Committees were convened at Grama Panchayats and the list of entry point activities suggested were discussed and finalized.
24. Trainer's training for taking people's estimates and consolidation of project proposals. This was organized at Grama Panchayat and NHG level. Elected representatives, ADS Chairpersons, Officer bearers of NHGs, MGNREGS officials, etc. attended this training. The information gathered on soil and water conservation activities to be taken up through MGNREGS and other schemes and

list of agricultural/veterinary/fisheries activities to be taken up were finalized. The list of drains/ponds/wells to be rejuvenated/renovated and the details of group activities/livelihood activities to be taken up in each NHG were also finalized. The livelihood action plan and the activities under production system were also consolidated.

25. The suggestions were split for four years and four separate annual plans were also prepared.
26. Finally a proposed land use map, area treatment map and drainage line treatment map were so prepared which is treated as the strategic action plan on Natural Resources Management perspective for the micro watershed during the entire project period.
27. Major activities included in the watershed project are.
 - Soil and moisture conservation measures like centripetal and bench terracing, earthen and stone pitched contour bunding, trenching, vegetative barriers, etc.
 - Rain water harvesting activities like farm ponds, percolation tanks, check dams etc.
 - Well recharging and rain water harvesting structures like roof water harvesting and rain water collection pits.
 - Planting and sowing of multipurpose trees, shrubs, grasses, legumes and pasture land development.
 - Encouraging natural regeneration including fodder cultivation.
 - Promotion of agro-forestry and horticulture
 - Capacity building and creation of a greater degree of awareness among the participants.
 - Encouraging people's participation with the involvement of NHGs.
 - Livelihood activities for asset less people
 - Production system and Micro enterprises

Biophysical Resources

Physiography

The relief of the watershed ranges from 40 m above MSL to 210 m above MSL. The majority of the area falls in the relief category of 70 to 100 m above MSL which occurs in an area of 85.93 ha (48.94 %). An area of 5.71 ha is located above 150m above MSL.

Slope

The watershed area is divided into five categories of slope classes. The majority of area is under the strongly sloping area having 10 – 15 % slope. The category spreads over an area of 102.03 ha (58.11 %), 40.47 % of the watershed area is having very steeply sloping lands which requires urgent soil and water conservation measures.

Drains

The Vamanapuram River flowing through the south-east boundary of the watershed is the major drain of this watershed. The Parandamthodu is flowing through the eastern boundary of the watershed. Few small drains are originating from different parts of this watershed which drains to the Parandamthodu which join to the Vamanapuram River at the south- east boundary of the watershed. The details of the drains and ponds in the watershed area are given in table No. 14.3

Table No. 14.3. Details of Drains in Cheruvalam micro watershed

Grama Panchayat	Drains	Length (m)	Breadth (m)	Depth (m)
Kallara	Paluvalli Thodu	150	3	2
	Venkattamoodu Ela Thodu	180	2	2
Pangode	Paluvalli Thodu	350	3	2
	Venkattamoodu Ela Thodu	700	2	2
Nanniyode	Parandan Thodu	200	3	2

Land use

Agriculture is the prime activity in the watershed area. The major land use category mapped in the watershed area is rubber plantation. It occurs in an area of 132.49 ha (75.45 %). The second major category is the mixed crops which are the typical homestead cultivation of Kerala wherein the different crop species are grown together that cannot be spatially mapped separately. This is mapped in an area of 26.46 ha. An area of 2.46 ha is under Coconut cultivation which is suitable for multi tire cropping. An area of 0.46 ha (0.26 %) is under the built up land and an area of 0.16 ha is under the rocky area. The details of the land use categories with spatial extent are given in table.

Table. No. 14.5 Table showing land use categories in Cheruvalam micro watershed

Sl. No.	Land use category	Area in ha	Percentage
1	Builtup land	0.46	0.26
2	Paddy converted Mixed Crops	5.34	3.04
3	Paddy converted Rubber	3.23	1.84
4	Coconut	2.46	1.40
5	Mixed Crops	26.46	15.07
6	Plantation Rubber	122.23	69.61
7	Plantation Rubber (Young)	10.26	5.84
8	Rock	0.16	0.09
9	River	1.19	0.68
10	River Bank	3.81	2.17
	Total	175.59	100.00

Geology

The watershed falls the geological unit of Garnetiferous Biotite. The majority of the area has Khondalite group of rocks and in a small patch Charnokite group is also formed. There are four geomorphological units of which more than 90 % (166.27 ha) of

the area falls under the category viz. lower plateau (laterite). An area of 2.66 ha is mapped under the category valley fill.

Soils

The major soil series mapped in the watershed area is Palode series which is moderately shallow, moderately deep, moderately well drained, fine textured, brownish and acidic in nature. The soil has a surface texture of gravelly sandy clay to gravelly clay. This is distributed in an area of 117.22 ha (66.75 %). Soils in more than 75 % of the watershed area (115.07 ha) is moderately shallow with a depth of 50- 75 cm 8.61 ha is having moderately deep soils with a depth of 75- 100 cm. The major surface soil textures in the watershed area constitutes that of gravelly loam (92.15 ha) and gravelly clay loam (73.73 ha). Nearly 75 % of the watershed area is prone to severe soil erosion which calls for proper soil and water conservation measures in the area.

Capacity Building/Trainings

Extensive training programmes and user interaction meetings were organized for the stake holders as part of the preparation of detailed project report. The details are given below:

No.	Training	Participants
1.	Block level awareness	Elected representatives of three tier
2.	Block level orientation training	Elected representatives and ADS chairpersons
3.	Training on Base line survey	Two facilitators from NHG.
4.	Training on Drainage line treatment	Elected representatives and one facilitator from NHG.
5.	Focus Group Discussion	Elected representatives, Presidents and Secretaries of the NHGs, ADS chairpersons and MGNREGS labour groups and progressive farmers
6.	Training for Net Plan Preparation	Elected representatives, Vice Presidents and Joint Secretaries from NHG, ADS chairpersons and MGNREGS labour groups.
7.	Training for People's Estimate and Project Report Consolidation	Elected representatives, Office bearers of NHGs, ADS chairpersons and MGNREGS labour groups.

Watershed Committee

Watershed Committee is constituted by Gram Sabha to implement the watershed project with technical support of WDT in the panchayat. Watershed committees are formed following the parameters of watershed committee, keeping the gender sensitive issues intact. Watershed committee members are briefed about the project objectives

and a workshop is also conducted in this regard at every panchayat. The watershed committee has a pivotal role to play during and after the project implementation period.

The details of the Watershed Committee for Cheruvalam watershed is given below:

Table No. 14.6. Details of the Watershed Committee of Cheruvalam watershed

Office bearers

No.	Name	Designation	Sex	Position held	Phone No.
1	Dr. V. N. Sushama	Chairperson	F	President, Kallara GP	9446970234
2	Ayiroor Mohanan	Vice chairperson	M	President, Pangode GP	9496040712
3	Binith Shankar	Convenor	M	Village Extension Officer, Kallara	9946421343
4	Sachithra	Joint Convenor	F	NHG representative	9995430079
5	Anjana. P. B	Secretary	F	Social Mobilizer, WDT	9447781073
6	Suresh	Joint Secretary	M	NHG representative	9946129183
7	Pushpavilasini	Treasurer	F	NHG representative	04722820970

Members

Zone	Name	Address
1	Bhavana	Sreekrishnavilasom, Cheruvalam
2	Shamla Shajahan	Sheeja Manzil Cheruvalam, K. T. Kunnu P. O.
3	Sobha	Makam Nivas, Cheruvalam
4	Pushpavilasini	Aambadi House, Cheruvalam
5	Salini	Thadattarikattu Veedu, Cheruvalam
6	Pushpangadan	Melathil Veedu, Cheruvalam
7	Suresh	Charuvila Puthen veedu Cheruvalam
8	Sachithra	Sachithra Bhavan, Kanchinada, Pangod
9		Anakkulam Ward, Nandiyode Panchayath

Ex Officio Members

No.	Name	Position held
1	Sukhi Rajan	Members, District Panchayath
	Remani P. Nair	
2	Kumari Sheela	Members, Block Panchayath
	Anu. S. Nair	

	M. S. Shaji	
3	Sumi B., Cheruvalam ward	Members, Grama Panchayath
	Prabhakaran Nair, Vellayamdesham ward	
	Kavitha R., Aanakkayam ward	
4	Santhakumar, Mrithrimala Service Co-operative Bank	President, Primary Service Co-operative Bank
	B. L. Krishnaprasad, Joint Farming Co-operative Society	
5	Sumangala, Cheruvalam ward	Chairpersons, Kudumbhasree ADS
	Vellayamdesham ward	
	Anakkayam ward	
6	Binith Sankar, VEO	Nominated Officer of Grama Panchayat
7	Anjana. P. B, Social Mobiliser, WDT	WDT Member

Neighbour Hood Groups

Neighbour hood Groups are constituted in the watershed area combining 40 to 50 adjacent households which are living in a cluster. These are further subdivided into seven sub groups and one person from each subgroup is selected to the Neighbour hood Group Committee. These seven members formed a Neighbour hood Group Committee with a President, Vice President, Secretary, Joint Secretary and Treasurer. Of these Treasurer and one Committee member is women. The ward members and ADS Chairpersons of the wards are Ex-officio members in all the NHG Committees. These Committees are registered with the concerned Grama Panchayat. The Presidents and Secretaries of the NHG Committees are members of the Watershed Committee.

The details of the NHG Committees in Cheruvalam watershed is as follows:

Table No. 14.7- NHG Committees in Cheruvalam watershed

Sl. No	Ayalkoottam Reg. No	Total House holds	Land Holdings (in cents)					
			BPL	Land less	0-5	6-250	250-500	>500
KallaraGramaPanchayath								
1	IWMP/KP/8/1	49	21		3	45	3	
2	IWMP/KP/8/2	48	15		2	46		
3	IWMP/KP/8/4	86	34	1	22	42		
4	IWMP/KP/8/5	60	37	1	34	24	2	
5	IWMP/KP/8/6	28		1	5	22		
6	IWMP/KP/8/7	40	4		4	35	1	
7	IWMP/KP/8/8	45	20	2	20	21		
PangodeGramaPanchayath								
1	IWMP/PAN/14/1	77	32	1	5	70	1	
NanniyodeGramaPanchayath								
1	IWMP/NAN/1/1	39	12		4	35		

Self Help Groups

In addition to this, the existing Self Help Groups formed under the Kudumbasree Mission and other SHGs which are performing at a satisfactory level will be promoted to take various programmes under the Livelihood activities and Production Systems and Micro enterprises. If required, additional SHGs will also be formed in the watershed area in the coming years.

Activities proposed

Based on the series of discussions held with the different stakeholders the following activities are suggested for the micro watershed.

Table No. 14.8 – Activities suggested

Entry point Activities	
1	Vegetable Cultivation (Homestead/Terrace)
2	Crop demonstration (floriculture)
3	Planting avenue trees with tree guard
4	Planting bamboo seedlings along banks of Vamanapuram River
Natural Resources Conservation Activities	
1	Stream bank protection – engineering structures (1.50 M height)
2	Stream bank protection – engineering structures (1.00 M height)
3	Stone pitched contour bunding
4	Earthen bunds
5	Centripetal terracing with husk trenching and mulching
6	Strip terracing for rubber
7	Moisture collection pits
8	Planting horticultural crops as intercrops
9	Afforestation of school compounds and public buildings
10	Gully plugs
11	Water harvesting structures (wells)
12	Supply of Terafil Water Filter
13	Well recharging
14	Improvement of public wells
15	Improvement of existing wells
16	Renovationof drains
17	Renovation of ponds
18	Renovationof borewells by replacing GI pipes with PVC pipes
19	Solar junction lights
20	Supply of Portable solar lamps
21	Bus shelters with solar panels
22	Biogas plant
23	Stream bank stabilisation using Geo textiles

24	Live hedges
25	Fodder cultivation

Budget

The distribution of budget for Cheruvalam micro watershed for the various components as per IWMP guidelines is given below:

Table No. 14.9 – Budget for Cheruvalam micro watershed

No.	Budget component	% age	Amount in Rs.
1.	Administrative cost	10	1,98,000
2.	Monitoring	1	19,800
3.	Evaluation	1	19,800
Preparatory phase			
4.	Entry point activities	4	79,200
5.	Institution and capacity building	5	99,000
6.	Detailed Project Report	1	19,800
Watershed works phase			
7.	Natural Resources Conservation works	56	11,08,800
8.	Livelihood activities for asset less	9	1,78,200
9.	Production system and micro enterprises	10	1,98,000
10.	Consolidation phase	3	59,400
		100	19,80,000

Cheruvalam Watershed (4V11a) - Action Plan

Table No. 14.10.1 - Sector-I- Natural Resources Conservation and Management - Ist Year Plan

No.	Activity	Unit	Unit cost	Target	IWMP	Convergence	WDF	Total
1	Earthen bunds	Rm	39.4	700		27580		27580
2	Centripetal terracing with husk trenching and mulching	Nos.	278	300		83400		83400
3	Strip terracing for rubber	Nos.	132	270		35640		35640
4	Moisture collection pits	Nos.	49.82	60		2989.20		2989.20
5	Planting horticultural crops as intercrops	cent	150	100	5000	10000	500	15500
6	Afforestation of school compounds and public buildings	cent	160	10	600	1000	60	1660
7	Gully plugs	Nos.	1300	2	2600		260	2860
8	Supply of Terafil Water Filter	Nos.	650	8	5200		520	5720
9	Well recharging	Nos.	5000	5	25000		2500	27500
10	Improvement of public wells	Nos.	12000	1	12000		1200	13200
11	Improvement of existing wells	Nos.	6000	4	24000		2400	26400
12	Renovationof drains	m				100000		100000
13	Solar junction lights	Nos.	25000	1	17500	7500	1250	26250
14	Supply of Portable solar lamps	Nos.	2000	5	7000	3000	1000	11000
15	Live hedges	50 m	1750	2	1900	1600	190	3690
16	Fodder cultivation	3 cents	600	20	12000		1200	13200
	Total				112800	272709.20	11080	396589.20

Cheruvalam Watershed (4V11a) - Action Plan

Table No. 14.10.2 -Sector-I- Natural Resources Conservation and Management –IInd Year Plan

No.	Activity	Unit	Unit cost	Target	IWMP	Convergence	WDF	Total
1	Stream bank protection – engineering structures (1.50 M height)	m	2290	15	34350		1717.5	36067.5
2	Stream bank protection – engineering structures (1.00 M height)	m	1609	15	24135		1206.75	25341.75
3	Stone pitched contour bunding	m ²	100.46	400	40184		4018.40	44202.40
4	Earthen bunds	Rm	39.4	1400		55160		55160
5	Centripetal terracing with husk trenching and mulching	Nos.	278	600		166800		166800
6	Strip terracing for rubber	Nos.	132	540		71280		71280
7	Moisture collection pits	Nos.	49.82	120		5978.40		5978.40
8	Planting horticultural crops as intercrops	cent	150	200	10000	20000	1000	31000
9	Afforestation of school compounds and public buildings	cent	160	20	1200	2000	120	3320
10	Gully plugs	Nos.	1300	2	2600		260	2860
11	Water harvesting structures (wells)	Nos.	18000	2	36000		3600	39600

12	Supply of Terafil Water Filter	Nos.	650	12	7800		780	8580
13	Well recharging	Nos.	5000	10	50000		5000	55000
14	Improvement of public wells	Nos.	12000	1	12000		1200	13200
15	Improvement of existing wells	Nos.	6000	4	24000		2400	26400
16	Renovation of drains	m				300000		300000
17	Renovation of bore wells by replacing GI pipes with PVC pipes	Nos.	30000	1	30000		1500	31500
18	Solar junction lights	Nos.	25000	2	35000	15000	2500	52500
19	Supply of Portable solar lamps	Nos.	2000	10	14000	6000	2000	22000
20	Biogas plant	Nos.	6500	1	6500		650	7150
21	Stream bank stabilisation using Geo textiles	m ²	191	20	3820		382	4202
22	Live hedges	50 m	1750	4	3800	3200	380	7380
23	Fodder cultivation	3 cents	600	30	18000		1800	19800
	Total				353389	645418.40	30514.65	1029322.05

Cheruvalam Watershed (4V11a) - Action Plan

Table No. 14.10.3 -Sector-I- Natural Resources Conservation and Management –IIIrdYear Plan

No.	Activity	Unit	Unit cost	Target	IWMP	Convergence	WDF	Total
1	Stream bank protection – engineering structures (1.50 M height)	m	2290	15	34350		1717.50	36067.50
2	Stream bank protection – engineering structures (1.00 M height)	m	1609	15	24135		1206.75	25341.75

3	Stone pitched contour bunding	m2	100.46	400	40184		4018.40	44202.40
4	Earthen bunds	Rm	39.4	1400		55160		55160
5	Centripetal terracing with husk trenching and mulching	Nos.	278	600		166800		166800
6	Strip terracing for rubber	Nos.	132	540		71280		71280
7	Moisture collection pits	Nos.	49.82	120		5978.40		5978.40
8	Planting horticultural crops as intercroops	cent	150	200	10000	20000	1000	31000
9	Afforestation of school compounds and public buildings	cent	160	20	1200	2000	120	3320
10	Water harvesting structures (wells)	Nos.	18000	3	54000		5400	59400
11	Well recharging	Nos.	5000	5	25000		2500	27500
12	Improvement of existing wells	Nos.	6000	2	12000		1200	13200
13	Renovationof drains	m				200000		200000
14	Renovationofborewells by replacing GI pipes with PVC pipes	Nos.	30000	1	30000		1500	31500
15	Bus shelters with solar panels	Nos.	40000	1	36000	4000	2000	42000
16	Biogas plant	Nos.	6500	1	6500		650	7150
17	Stream bank stabilisation using Geo textiles	m2	191	40	7640		764	8404
18	Live hedges	50 m	1750	4	3800	3200	380	7380
	Total				284809	528418.40	22456.65	835684.05

Cheruvalem Watershed (4V11a) - Action Plan

Table No. 14.10.4 -Sector-I- Natural Resources Conservation and Management –IVth Year Plan

No.	Activity	Unit	Unit cost	Target	IWMP	WDF	Total
1	Stream bank protection – engineering structures (1.50 M height)	m	2290	45	103050	5152.5	108202.5
2	Stream bank protection – engineering structures (1.00 M height)	m	1609	45	72405	3620.25	76025.25
3	Stone pitched contour bunding	m ²	100.46	1200	120552	12055.2	132607.2
4	Water harvesting structures (wells)	Nos.	18000	3	54000	5400	59400
5	Stream bank stabilisation using Geo textiles	m ²	191	40	7640	764	8404
Total					357647	26991.95	384639

Cheruvalem Watershed (4V11 a) - Action Plan

Table No. 14.11.1 -Sector-II- Livelihood Support system for landless/ asset less – 1st Year Plan

Sl. No	Name of Activity	Unit	Unit Cost	Target	IWMP Fund	Beneficiary Contribution	Total
A	Enterprising individuals (10 %)						
1	Bee keeping	Nos.	10300	3	21630	9270	30900
Total					21630	9270	30900

Cheruvalam Watershed (4V11 a) - Action Plan

Table No. 14.11.2 -Sector-II- Livelihood Support system for landless/ asset less - IInd Year Plan

Sl. No	Name of Activity	Unit	Unit Cost	Target	IWMP Fund	Beneficiary Contribution	Total
B	Revolving fund to SHGs (60 %)						
1	Soap making						
2	Animal husbandry		15000	4	45000	15000	60000
3	Cloth bag making		10000	1	7500	2500	10000
	Total				52500	17500	70000

Cheruvalam Watershed (4V11 a) - Action Plan

Table No. 14.11.3 -Sector-II- Livelihood Support system for landless/ asset less - IIIrd Year Plan

Sl. No	Name of Activity	Unit	Unit Cost	Target	IWMP Fund	Beneficiary Contribution	Total
B	Revolving fund to SHGs (60 %)						
1	Soap making						
2	Animal husbandry		25000	1	18750	6250	25000
3	Cloth bag making		20000	2	30000	10000	40000
	Total				48750	16250	65000

Cheruvalam Watershed (4V11 a) - Action Plan

Table No. 14.11.4 -Sector-II- Livelihood Support system for landless/ assetless- IVth Year Plan

Sl. No	Name of Activity	Unit	Unit Cost	Target	IWMP Fund	Beneficiary Contribution	Total
C	Major livelihood activities (30 %)						
1	Goat rearing	Nos.	105000	1	52500	52500	105000
	Total				52500	52500	105000

Cheruvalam Watershed (4V11a) - Action Plan

Table No. 14.12.1 -Sector-III- Production system and Microenterprises - Ist Year Plan

Sl. No	Name of Activity	Unit	Unit Cost	Target	IWMP Fund	Convergence	WDF	Total
1	Vegetable cultivation in terrace	Nos.	1500	30	22500	22500	8100	53100
2	Planting of 5 banana plants	Nos.	170	150	7500	18000	4590	30090
	Total				30000	40500	12690	83190

Note: 20 percent of the beneficiaries will be SC/ST. Contribution to WDF is 20 % for General and 10 % for SC/ST

Cheruvalem Watershed (4V11a) - Action Plan

Table No. 14.12.2 -Sector-III- Production system and Microenterprises –IInd Year Plan

Sl. No	Name of Activity	Unit	Unit Cost	Target	IWMP Fund	Convergence	WDF	Total
1	Backyard poultry	Nos.	1200	50	37500	37500	6750	81750
2	Bee keeping	Nos.	3500	10	40000	58000	6300	104300
3	Planting of 2 fruit plants	Nos.	80	100	3000	5000	1440	9440
4	Planting of 2 timber plants	Nos.	70	150	3000	7500	1890	12390
5	Planting of 10 pepper seedlings	Nos.	200	50	5000	5000	1800	11800
	Total				88500	113000	18180	219680

Note: 20 percent of the beneficiaries will be SC/ST. Contribution to WDF is 20 % for General and 10 % for SC/ST

Cheruvalem Watershed (4V11a) - Action Plan

Table No. 14.12.3 -Sector-III- Production system and Microenterprises –IIIrd Year Plan

Sl. No	Name of Activity	Unit	Unit Cost	Target	IWMP Fund	Convergence	WDF	Total
1	Cow rearing	Nos.	22500	3	47250	20250	8505	76005
	Total				47250	20250	8505	76005

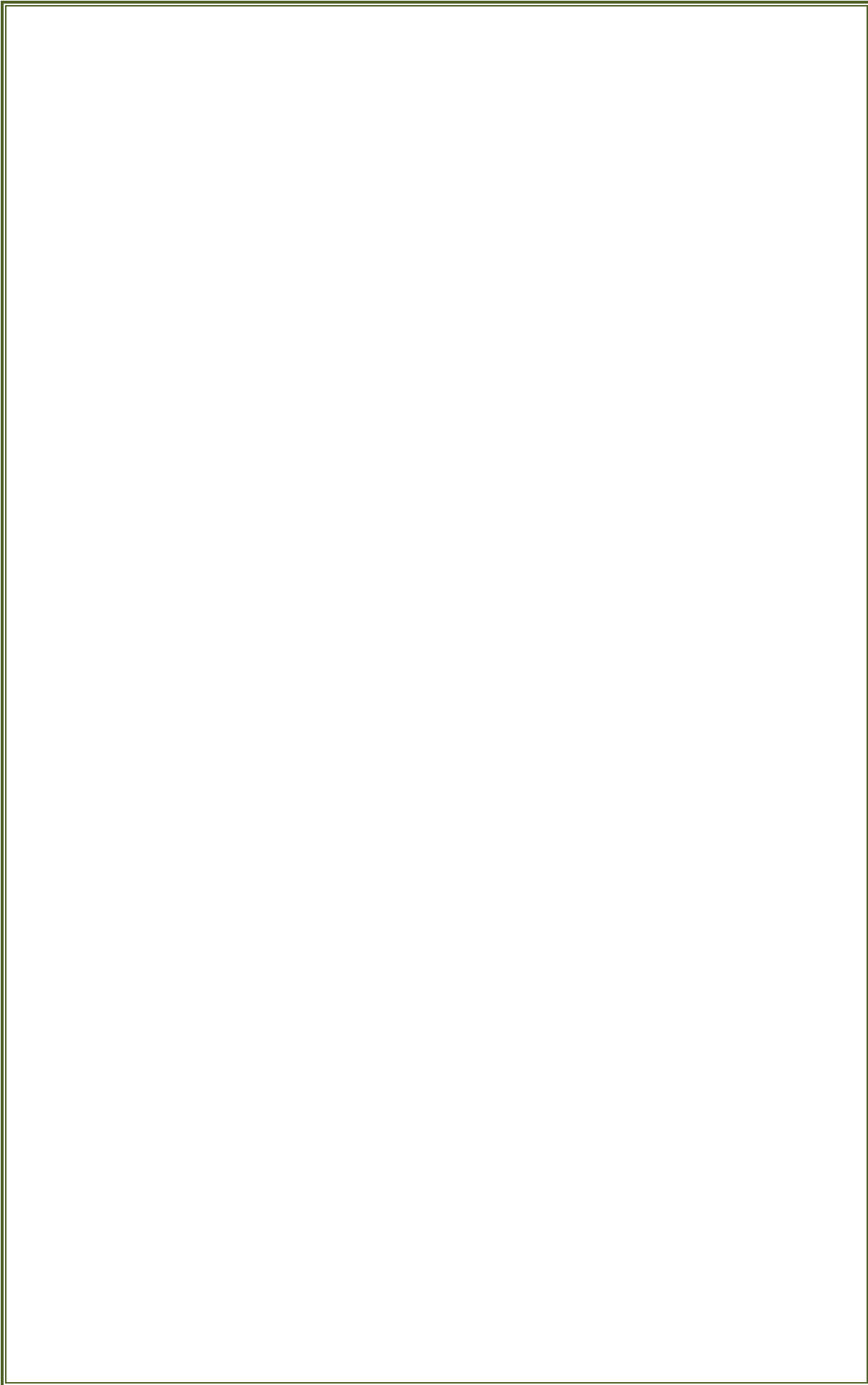
Note: 20 percent of the beneficiaries will be SC/ST. Contribution to WDF is 20 % for General and 10 % for SC/ST

Cheruvalam Watershed (4V11a) - Action Plan

Table No. 14.12.4 -Sector-III- Production system and Microenterprises –IVth Year Plan

Sl. No	Name of Activity	Unit	Unit Cost	Target	IWMP Fund	Convergence	WDF	Total
1	Planting of tuber crops	Nos.	20000	2	16000	24000	2880	42880
2	Organic banana cultivation	Nos.	30000	1	18000	12000	3240	33240
	Total				34000	36000	6120	76120

Note: 20 percent of the beneficiaries will be SC/ST. Contribution to WDF is 20 % for General and 10 % for SC/ST



MICRO WATERSHED BASED ACTION PLAN
KANCHINADA MICRO WATERSHED (4V11b)

Kanchinada micro watershed is a micro watershed in the IWMP cluster (IWMP-I) with an area of 726.02 ha (9.09 % of total geographical area). This micro watershed is spread over Pangod and Kallara Grama Panchayaths. The micro watershed is located in the northern part of the IWMP cluster. A small portion of Vamanapuram reserve forest is also located in the eastern portion of this watershed.

General Description

Table No. 15.1 General Description of Kanchinada micro watershed

Name of micro watershed	: Kanchinada
Micro watershed code	: 4V11b
River basin	: Vamanapuram
District	: Thiruvananthapuram
Block Panchayath	: Vamanapuram
Grama Panchayaths	: Pangod, Kallara
Villages	: Pangod, Kallara
Latitude	: 8 ^o 43'54" to 8 ^o 45'50" North
Longitude	: 76 ^o 57'23" to 76 ^o 59'25" East
Wards	: Pangodu Panchayath - 17, 18 (full), 3, 15 (part) Kallara Panchayath – 7 (full), 6 (part)
Total Area	: 726.02 ha
% of area in the IWMP cluster	: 9.09 %

Socio economic profile

As per the information provided in the baseline survey conducted, Kanchinada micro watershed has a total number of 2026 households with a total population of 4233. The micro watershed has a total male population of 2011 and a total female population of 2222. 621 numbers of BPL families reside in the micro watershed area. A total number of 1070 persons have registered under MGNREGS. 130 households belong to Schedule Caste and 15 families belong to Schedule Tribe. Majority of the farmers are small farmers having only less than 1 ha of own land. Agriculture is the major source of livelihood in the micro watershed area. Apart from agriculture/horticultural practices, animal husbandry is also a source of livelihood for some families in the watershed area. The socio economic details of the Kanchinada micro watershed are given below:

Table No. 15.2 Socio economic details of Kanchinada micro watershed

1.	Total number of households		2026
2.	Population	Male	2011
		Female	2222

		Total	4233
	Child population	Male	917
		Female	917
		Total	1834
3.	No. of BPL families		621
4.	No. of persons enrolled under MGNREGS		1070
5.	Households	Scheduled Caste	130
		Scheduled Tribe	15
		General	1881
6.	Land holdings	Landless	15
		Very Marginal (less than 5 cents)	237
		Marginal (5 to 250 cents)	1720
		Small (250 to 500 cents)	22

Methodology

In line with the guidelines of IWMP, as suggested by Government of India, the following methodology was adopted for NRM planning and resource mapping.

1. Prepared the cadastral maps pertaining to the project area.
2. Overlaid the micro watershed boundaries over cadastral maps and corrected the boundaries through ground truth verification
3. Project Fellows were appointed as animators. The animators assisted the People's representatives in the formation of Neighbour Hood Groups. They act as master trainers and collected primary and secondary field data. The animators worked as the interface between LSGI and NHGs
4. Training Coordinators were engaged at project level for organizing the series of trainings at Block and Grama Panchayat levels.
5. Overseers were engaged for taking field estimates of the proposed activities.
6. Induction training was given for the project staff on PRA techniques, concept of maps and Resource Mapping.
7. Printed posters, banners and notices for providing wide publicity regarding the programme.
8. Two block level seminars were conducted for People's representatives of District/Block/GramaPanchayats, line departments, Kudumbasree, and other functionaries.
9. This was followed by orientation seminars at GramaPanchayats.
10. Conducted transect walk with ward members and ADS.
11. During the transect walk, major drains, gullies and drainage lines are identified and marked in the cadastral map.
12. NHGs were formed at grass root level comprising of 40 to 50 neighbouring households.

13. Panchayat Level Watershed Committees were convened at Grama Panchayats for finalizing the modalities of work.
14. Trainer's training for base line survey were conducted for two facilitators from each Neighbour Hood Group
15. Predefined questionnaire was prepared for data collection from each household.
16. A block level seminar was organized on drainage line treatment. Followed by Technical presentations, group discussions were held at Grama Panchayat level to draw out the requirements. The suggestions were presented by concerned Grama Panchayat Presidents.
17. Various resources like different water bodies, wells and farm ponds are identified and marked in the cadastral map with the help of the facilitators selected from the NHGs.
18. Focus Group Discussions were organised at Panchayat level for ward members & ADS Chairpersons, Presidents & Secretaries of NHGs, Padashekhara Samithi, Kera Samithi, Kudumbasree, MGNREGS, Officials of Agriculture, Veterinary& Soil Conservation Departments. Followed by technical sessions, group discussions at ward level were held and suggestions were presented by Grama Panchayat members.
19. New questionnaire for net plan preparation was prepared for data collection from each household and NHG.
20. The land resource maps already prepared were updated using high resolution satellite imagery and these interpreted maps were corrected with the help of NHGs and accordingly present land use map is prepared using different notions and symbols.
21. Trainer's training for detailed survey for net plan preparation organized at Grama Panchayat level for ward members & ADS Chairpersons, Vice Presidents & Joint Secretaries of NHGs, MGNREGS officials, etc. The information gathered includes soil and water conservation activities to be taken up through MGNREGS and other schemes and list of agricultural/veterinary/fisheries activates to be taken up in each household. The list of drains/ponds/wells to be rejuvenated/renovated and the details of group activities/livelihood activities to be taken up in each NHG were also collected.
22. Thematic maps on geology and geomorphology were interpreted from the high resolution satellite imagery and were corrected through ground truth verification.
23. Panchayat Level Watershed Committees were convened at Grama Panchayats and the list of entry point activities suggested were discussed and finalized.
24. Trainer's training for taking people's estimates and consolidation of project proposals. This was organized at Grama Panchayat and NHG level. Elected representatives, ADS Chairpersons, Officer bearers of NHGs, MGNREGS officials, etc. attended this training. The information gathered on soil and water conservation activities to be taken up through MGNREGS and other schemes and

list of agricultural/veterinary/fisheries activities to be taken up were finalized. The list of drains/ponds/wells to be rejuvenated/renovated and the details of group activities/livelihood activities to be taken up in each NHG were also finalized. The livelihood action plan and the activities under production system were also consolidated.

25. The suggestions were split for four years and four separate annual plans were also prepared.

26. Finally a proposed land use map, area treatment map and drainage line treatment map were so prepared which is treated as the strategic action plan on Natural Resources Management perspective for the micro watershed during the entire project period.

27. Major activities included in the watershed project are.

- Soil and moisture conservation measures like centripetal and bench terracing, earthen and stone pitched contour bunding, trenching, vegetative barriers, etc.
- Rain water harvesting activities like farm ponds, percolation tanks, check dams etc.
- Well recharging and rain water harvesting structures like roof water harvesting and rain water collection pits.
- Planting and sowing of multipurpose trees, shrubs, grasses, legumes and pasture land development.
- Encouraging natural regeneration including fodder cultivation.
- Promotion of agro-forestry and horticulture
- Capacity building and creation of a greater degree of awareness among the participants.
- Encouraging people's participation with the involvement of NHGs.
- Livelihood activities for asset less people
- Production system and Micro enterprises

Biophysical Resources

Physiography

The relief of the watershed ranges from 60 m above MSL to 220 m above MSL. The majority of the area falls in the relief category of 100 to 130 m above MSL which occurs in an area of 356.12 ha (49.05 %). An area of 54.59 ha is located above 150m above MSL.

Slope

The watershed area is divided into five categories of slope classes. The majority of area is under the strongly sloping area having 10 – 15 % slope. The category spreads over an area of 537.34 ha (74.01 %), 55.70 ha of the watershed area is having very steeply sloping lands which requires urgent soil and water conservation measures.

Drains

The VazhathoppupachaKanchinada drain flowing through the centre of the watershed is the major drain of this watershed. A number of drains are originating from different parts of this watershed which drains to this drain which joins the Parandamthodu at the south eastern portion of the watershed. The water from this area reaches the Vamanapuram River through Parandamthodu. The details of the drains and ponds in the watershed area are given in table No. 15.3&15.4

Table No. 15.3 Table showing the details of Drains

Grama Panchayat	Drains	Length (m)	Breadth (m)	Depth (m)
Pangod	Elavoor Karikkakom Thodu	550	2	1
	Elayavankadu Thodu	1100	2	0.5
	Kadamankuzhi Thodu	400	1	0.5
	Kochalummoodu Kanyarukuzhi Thodu	3250	3	1
	Kodungancheri Ela Thodu	250	1	0.5
	Kodungancheri Ela Valiya Thodu	1850	2	0.5
	Mankottukonath Ela Thodu	450	1	0.5
	Moonnattimoola Thodu	575	1	1
	Paluvalli Thodu	2900	3	1
	Thottumpurath Ela Thodu	750	1	1
Kallara	Elavoor Karikkakom Thodu	1400	2	2
	Moonnattimoola Kaithodu	650	1	1
	Thottumpurath Ela Thodu	1100	1	1
	Vattakarikkakom Thodu	350	1	1

Table No. 15.4 Table showing the details of Ponds

Sl. No	Grama Panchayat	Pond	Survey No.	Length (m)	Breadth (m)	Depth (m)
1	Kallara	VattakarikkakomCheruKulam	2898	5	4	3
2	Pangod	UrananKuzhiKulam	332	6	5	3
3		VarthukonamKulam	353	5	4	3
4		Kodungan Cheri Kulam	365	6	4	2
5		Pond	301	10	7	4

Land use

Agriculture is major activity in the watershed area. The major land use category mapped in the watershed area is rubber plantation. It occurs in an area of 398.04 ha (54.82 %). The second major category is the mixed crops which are the typical homestead cultivation of Kerala wherein the different crop species are grown together that cannot be spatially mapped separately. This is mapped in an area of 201.26 ha. An area of 1.57 ha of paddy lands can be brought to paddy cultivation by providing necessary labour and

irrigation facilities. An area of 2.75 ha is mapped as cultivable wastelands which can be brought under horticulture. An area of 72.97 ha (5.91 %) is under the built up land and an area of 3.60 ha is under the rocky area. The details of the land use categories with spatial extent are given in table.

Table No. 15.5 Table showing land use categories in Kanchinada micro watershed

Sl. No.	Land use category	Area in ha	Percentage
1	Builtup land	42.97	5.92
2	Paddy	1.57	0.22
3	Paddy converted Banana	1.14	0.16
4	Paddy converted Coconut	3.60	0.50
5	Paddy converted Tapioca	2.09	0.29
6	Paddy converted Mixed Crops	32.29	4.45
7	Paddy converted Rubber	8.52	1.17
8	Mixed Crops	201.26	27.72
9	Plantation Rubber	363.99	50.13
10	Plantation Rubber (Young)	33.69	4.64
11	Plantation Eucalyptus	28.23	3.89
12	Cultivable Waste Land	2.75	0.38
13	River Bank	0.32	0.04
14	Rock	3.60	0.50
	Total	726.02	100.00

Geology

The major geological units in the watershed is Garnetiferous Biotite occurring in an area of 643.37 ha (88.62 %). The remaining area has a geological formation, viz. Garnet-Biotite gneiss with Migmatite. There are four geomorphological units of which more than 90 % (658.43 ha) of the area falls under the category viz. lower plateau (laterite). An area of 54.99 ha is mapped under the category, valley fill.

Soils

The major soil series mapped in the watershed area is Nedumangad series having a solum thickness of 150 cm with very dark brown to pale brown colour. The soil is very strongly acid and has a surface texture of gravelly sandy clay loam to gravelly sandy clay. This is distributed in an area of 582.30 ha (80.20 %). An area of 92.46 ha is mapped under Palode series which is fine textured and acidic in nature. Soils in more than half of the watershed area (360.15 ha) is moderately shallow with a depth of 50- 75 cm and 43.33 % of the area (314.61 ha) is having moderately deep soils with a depth of 75- 100 cm. The major surface soil textures in the watershed area constitutes that of gravelly clay loam (451.59 ha) and gravelly loam (223.16 ha). Nearly 50 % of the watershed area is prone to

severe soil erosion which calls for proper soil and water conservation measures in the area.

Capacity Building/Trainings

Extensive training programmes and user interaction meetings were organized for the stake holders as part of the preparation of detailed project report. The details are given below:

No.	Training	Participants
1.	Block level awareness training	Elected representatives of three tier
2.	Block level orientation training	Elected representatives and ADS chairpersons
3.	Training on Base line survey	Two facilitators from NHG.
4.	Training on Drainage line treatment	Elected representatives and one facilitator from NHG.
5.	Focus Group Discussion	Elected representatives, Presidents and Secretaries of the NHGs, ADS chairpersons and MGNREGS labour groups and progressive farmers
6.	Training for Net Plan Preparation	Elected representatives, Vice Presidents and Joint Secretaries from NHG, ADS chairpersons and MGNREGS labour groups.
7.	Training for People’s Estimate and Project Report Consolidation	Elected representatives, Office bearers of NHGs, ADS chairpersons and MGNREGS labour groups.

Watershed Committee

Watershed Committee is constituted by Gram Sabha to implement the watershed project with technical support of WDT in the panchayat. Watershed committees are formed following the parameters of watershed committee, keeping the gender sensitive issues intact. Watershed committee members are briefed about the project objectives and a workshop is also conducted in this regard at every panchayat. The watershed committee has a pivotal role to play during and after the project implementation period.

The details of the Watershed Committee for Kanchinada watershed is given below:

Table No. 15.6 Details of the Watershed Committee for Kanchinada watershed

Office bearers

No.	Name	Designation	Sex	Position held	Phone No.
1	Ayiroor Mohan	Chairman	M	President, Pangode GP	9496040712
2	Dr. V. N. Sushama	Vice chairperson	F	President, Kallara GP	9446970234

3	Rafi	Convenor	M	Village Extension Officer, Pangode	9946312487
4	Baburaj	Joint Convenor	M	NHG representative	9605100278
5	Anjana. P. B	Secretary	F	Social Mobilizer, WDT	9447781073
6	Subhash	Joint Secretary	M	NHG representative	9656869016
7	Valsala	Treasurer	F	NHG representative	9605194926

Members

Zone	Name	Address
1	Jaleela	Mukkadayil House, Pangode
2	Shamsudeen	Shafeek Manzil, Kochalummoodu P. O.
3	Baburaj	B. S. Land, Kochalummoodu P.O.
4	Sugatha V.	Thunduvila, Puthen veedu, Boundarmukku, Kochalummoodu
5	Subhash	Plavila veedu, Kadumamkuzhi, Pangod
6	Mohanan	Lekshmi Bhavan, Vazhathoppupacha, Pangod
7	Babi Pilla	Renjith Bhavan, Padara, Pangod
8	Jayachandran	Chandana Bhavan, Palkulam, K. T. Kunnu P.O.
9	Valsala	Charuvila Puthen Veedu, Vattakarikkakam, K. T. Kunnu P. O.

Ex Officio Members

No.	Name	Position held
1	Sukhi Rajan	Member, District Panchayath
2	M. Sasikala,	Members, Block Panchayath
	Anu A. Nair	
	Kumari Sheela L. B.	
3	M. M. Shafi, Pangod ward	Members, Grama Panchayath
	Sheenamol S. S., Kochalummoodu ward	
	Jayan T. G., Pulikkari ward	
	Adv. L. A. Hashim, Uliyancode ward	
	Prameela S. Prakash, Palkulam ward	
	Anaampacha Suresh, K. T. Kunnu ward	
4	Pangode Service Co-operative Bank	President, Primary Service Co-

	Santhakumar, Mrithrimala Service Co-operative Bank	operative Bank
	B. L. Krishnaprasad, Joint Farming Co-operative Society	
5	Sulekha, Pangode ward	Chairpersons, Kudumbhasree ADS
	Shamila, Kochalumoodu ward	
	Sulochana, Pulikkara ward	
	Beena, Uliyancode ward	
	Geetha R. Prakash, Palkulam ward	
	Anithakumari, K. T. Kunnu ward	
6	Rafi, VEO, Pangode Grama Panchayath	Nominated Officer of Grama Panchayath
7	Anjana. P. B, Social Mobiliser, WDT	WDT Member

Neighbour hood Groups

Neighbour hood Groups are constituted in the watershed area combining 40 to 50 adjacent households which are living in a cluster. These are further subdivided into seven sub groups and one person from each subgroup is selected to the Neighbour hood Group Committee. These seven members formed a Neighbour hood Group Committee with a President, Vice President, Secretary, Joint Secretary and Treasurer. Of these Treasurer and one Committee member is women. The ward members and ADS Chairpersons of the wards are Ex-officio members in all the NHG Committees. These Committees are registered with the concerned Grama Panchayat. The Presidents and Secretaries of the NHG Committees are members of the Watershed Committee.

The details of the NHG Committees in Kanchinada watershed is as follows:

Table No. 15.7- Details ofNHG Committees in Kanchinada watershed

Sl. No	Ayalkoottam Reg. No	Total House holds	Land Holdings (in cents)					
			BPL	Land less	0-5	6-250	250-500	>500
Pangode Grama Panchayath								
1	IWMP/PAN/3/1	81	3	3	14	64		
2	IWMP/PAN/3/2	41			8	32	1	
3	IWMP/PAN/3/3	61			7	54		
4	IWMP/PAN/3/4	52			36	16		
5	IWMP/PAN/15/1	60	20	1	7	52		
6	IWMP/PAN/15/2	46			7	37	2	
7	IWMP/PAN/15/3	60	18		6	54		
8	IWMP/PAN/17/1	57	14		1	56		
9	IWMP/PAN/17/2	52	22		3	49		
10	IWMP/PAN/17/3	65	28		12	53		
11	IWMP/PAN/17/4	62	15		7	55		
12	IWMP/PAN/17/5	61	16		6	55		
13	IWMP/PAN/17/6	66	20		3	62	1	

Sl. No	Ayalkoottam Reg. No	Total House holds	BPL	Land Holdings (in cents)				
				Land less	0-5	6-250	250-500	>500
14	IWMP/PAN/17/7	73	12	2	2	69		
15	IWMP/PAN/18/1	60	15		8	52		
16	IWMP/PAN/18/2	43	14	2	5	36		
17	IWMP/PAN/18/3	46	24		3	43		
18	IWMP/PAN/18/4	61	19	1	5	55		
19	IWMP/PAN/18/5	60	17	1	5	53	1	
20	IWMP/PAN/18/6	46	15	2	12	32		
21	IWMP/PAN/18/7	61	10		5	56		
Kallara GramaPanchayath								
22	IWMP/KP/6/1	68	22		7	61		
23	IWMP/KP/6/2	64	33	2	6	56		
24	IWMP/KP/6/3	64	24		5	59		
25	IWMP/KP/6/4	64	19		4	60		
26	IWMP/KP/6/5	64	26		9	53	2	
27	IWMP/KP/7/1	59	20		10	46	3	
28	IWMP/KP/7/2	51	22		1	47	3	
29	IWMP/KP/7/3	52	14		4	47	1	
30	IWMP/KP/7/4	60	27		4	55	1	
31	IWMP/KP/7/5	80	38	1	11	66	2	
32	IWMP/KP/7/6	58	18		2	54	2	
33	IWMP/KP/7/7	41	15		2	36	3	
34	IWMP/KP/7/8	55	28		10	45		
		1994	588	15	237	1720	22	

Self Help Groups

In addition to this, the existing Self Help Groups formed under the Kudumbasree Mission and other SHGs which are performing at a satisfactory level will be promoted to take various programmes under the Livelihood activities and Production Systems and Micro enterprises. If required, additional SHGs will also be formed in the watershed area in the coming years.

Activities proposed

Based on the series of discussions held with the different stakeholders the following activities are suggested for the micro watershed.

Table No. 15.8 Details of activities suggested

Entry point Activities	
1	Renovation and side protection of VazhathoppupachaKanchinadaThodu
2	Vegetable Cultivation (Homestead/Terrace)
3	Planting avenue trees with tree guard
Natural Resources Conservation Activities	
1	Stream bank protection – engineering structures (1.50 M height)
2	Stream bank protection – engineering structures (1.00 M height)
3	Stone pitched contour bunding
4	Earthen bunds
5	Centripetal terracing with husk trenching and mulching
6	Strip terracing for rubber
7	Moisture collection pits
8	Wasteland development (planting of horticultural plants)
9	Planting horticultural crops as intercrops
10	Afforestation of school compounds and public buildings
11	Gully plugs
12	Foot bridges
13	Water harvesting structures (wells)
14	Supply of Terafil Water Filter
15	Well recharging
16	Improvement of public wells
17	Improvement of existing wells
18	Renovationof drains
19	Renovation of ponds
20	Mini drinking water scheme
21	Renovationof borewells by replacing GI pipes with PVC pipes
22	Solar electrification of Anganavadis
23	Solar junction lights
24	Supply of Portable solar lamps
25	Bus shelters with solar panels
26	Biogas plant
27	Stream bank stabilisation using Geo textiles
28	Conservation of sacred grooves
29	Live hedges
30	Fodder cultivation

Budget

The distribution of budget for Kanchinada micro watershed for the various components as per IWMP guidelines is given below:

Table No. 15.9-Budget for Kanchinada micro watershed

No.	Budget component	% age	Amount in Rs.
1.	Administrative cost	10	10,90,500
2.	Monitoring	1	1,09,050
3.	Evaluation	1	1,09,050
Preparatory phase			
4.	Entry point activities	4	4,36,200
5.	Institution and capacity building	5	5,45,250
6.	Detailed Project Report	1	1,09,050
Watershed works phase			
7.	Natural Resources Conservation works	56	61,06,800
8.	Livelihood activities for asset less	9	9,81,450
9.	Production system and micro enterprises	10	10,90,500
10.	Consolidation phase	3	3,27,150
	Total	100	1,09,05,000

Kanchinada Watershed (4V11b) - Action Plan

Table No. 15.10.1 -Sector-I- Natural Resources Conservation and Management - Ist Year Plan

No.	Activity	Unit	Unit cost	Target	IWMP	Convergence	WDF	Total
1	Earthen bunds	Rm	39.4	600		23640		23640
2	Centripetal terracing with husk trenching and mulching	Nos.	278	400		111200		111200
3	Strip terracing for rubber	Nos.	132	600		79200		79200
4	Moisture collection pits	Nos.	49.82	250		12455		12455
5	Wasteland development (planting of horticultural plants)	cent	160	350	21000	35000	2100	58100
6	Planting horticultural crops as intercrops	cent	150	600	30000	60000	3000	93000
7	Afforestation of school compounds and public buildings	cent	160	10	600	1000	60	1660
8	Gully plugs	Nos.	1300	5	6500		650	7150
9	Supply of Terafil Water Filter	Nos.	650	24	15600		1560	17160
10	Well recharging	Nos.	5000	20	100000		10000	110000
11	Improvement of public wells	Nos.	12000	3	36000		3600	39600
12	Improvement of existing wells	Nos.	6000	20	120000		12000	132000
13	Renovation of drains	m				406222		406222
14	Renovation of ponds	Nos.	300000	1	300000		15000	315000
15	Solar junction lights	Nos.	25000	3	52500	22500	3750	78750
16	Supply of Portable solar lamps	Nos.	2000	30	42000	18000	6000	66000
17	Live hedges	50 m	1750	3	2850	2400	285	5535

18	Fodder cultivation	3 cents	600	24	14400		1440	15840
	Total				741450	771617	59445	1572512

Kanchinada Watershed (4V11b) - Action Plan

Table No. 15.10.2 -Sector-I- Natural Resources Conservation and Management –IInd Year Plan

No.	Activity	Unit	Unit cost	Target	IWMP	Convergence	WDF	Total
1	Stream bank protection – engineering structures (1.50 M height)	m	2290	70	160300		8015	168315
2	Stream bank protection – engineering structures (1.00 M height)	m	1609	50	80450		4022.50	84472.50
3	Stone pitched contour bunding	m2	100.46	1500	150690		15069	165759
4	Earthen bunds	Rm	39.4	1200		47280		47280
5	Centripetal terracing with husk trenching and mulching	Nos.	278	800		222400		222400
6	Strip terracing for rubber	Nos.	132	1200		158400		158400
7	Moisture collection pits	Nos.	49.82	500		24910		24910
8	Wasteland development (planting of horticultural plants)	cent	160	700	42000	70000	4200	116200
9	Planting horticultural crops as intercrops	cent	150	1200	60000	120000	6000	186000
10	Afforestation of school compounds and public buildings	cent	160	20	1200	2000	120	3320
11	Gully plugs	Nos.	1300	6	7800		780	8580

12	Foot bridges	Nos.	10327	2	20654		2065.40	22719.40
13	Water harvesting structures (wells)	Nos.	18000	10	180000		18000	198000
14	Supply of Terafil Water Filter	Nos.	650	36	23400		2340	25740
15	Well recharging	Nos.	5000	60	300000		30000	330000
16	Improvement of public wells	Nos.	12000	5	60000		6000	66000
17	Improvement of existing wells	Nos.	6000	20	120000		12000	132000
18	Renovation of drains	m				1037500		1037500
19	Renovation of ponds	Nos.	300000	1	300000		15000	315000
20	Mini drinking water scheme	Nos.	200000	1	200000		20000	220000
21	Renovation of bore wells by replacing GI pipes with PVC pipes	Nos.	30000	1	30000		1500	31500
22	Solar electrification of Anganavadis	Nos.	50000	1	35000	15000	2500	52500
23	Solar junction lights	Nos.	25000	4	70000	30000	5000	105000
24	Supply of Portable solar lamps	Nos.	2000	50	70000	30000	10000	110000
25	Bus shelters with solar panels	Nos.	40000	1	36000	4000	2000	42000
26	Biogas plant	Nos.	6500	1	6500		650	7150
27	Stream bank stabilisation using Geo textiles	m2	191	20	3820		382	4202
28	Conservation of sacred grooves	Nos.	10000	1	10000		500	10500
29	Live hedges	50 m	1750	6	5700	4800	570	11070
30	Fodder cultivation	3 cents	600	37	22200		2220	24420
Total					1995714	1766290	168933.90	3930937.90

Kanchinada Watershed (4V11b) - Action Plan

Table No. 15.10.3 -Sector-I- Natural Resources Conservation and Management –IIIrdYear Plan

No.	Activity	Unit	Unit cost	Target	IWMP	Convergence	Beneficiary	Total
1	Stream bank protection – engineering structures (1.50 M height)	m	2290	70	160300		8015	168315
2	Stream bank protection – engineering structures (1.00 M height)	m	1609	50	80450		4022.50	84472.50
3	Stone pitched contour bunding	m ²	100.46	1500	150690		15069	165759
4	Earthen bunds	Rm	39.4	1200		47280		47280
5	Centripetal terracing with husk trenching and mulching	Nos.	278	800		222400		222400
6	Strip terracing for rubber	Nos.	132	1200		158400		158400
7	Moisture collection pits	Nos.	49.82	500		24910		24910
8	Wasteland development (planting of horticultural plants)	cent	160	700	42000	70000	4200	116200
9	Planting horticultural crops as intercrops	cent	150	1200	60000	120000	6000	186000
10	Afforestation of school compounds and public buildings	cent	160	20	1200	2000	120	3320
11	Foot bridges	Nos.	10327	2	20654		2065.40	22719.40
12	Water harvesting structures (wells)	Nos.	18000	20	360000		36000	396000

13	Well recharging	Nos.	5000	70	350000		35000	385000
14	Improvement of existing wells	Nos.	6000	10	60000		6000	66000
15	Renovationof drains	m				73000		73000
16	Renovation of ponds	Nos.	300000	1	300000		15000	315000
17	Renovationof borewells by replacing GI pipes with PVC pipes	Nos.	30000	2	60000		3000	63000
18	Solar electrification of Anganavadis	Nos.	50000	2	70000	30000	5000	105000
19	Bus shelters with solar panels	Nos.	40000	2	72000	8000	4000	84000
20	Biogas plant	Nos.	6500	1	6500		650	7150
21	Stream bank stabilisation using Geo textiles	m2	191	40	7640		764	8404
22	Live hedges	50 m	1750	6	5700	4800	570	11070
Total					1807134	760790	145475.9	2713399.9

Kanchinada Watershed (4V11b) - Action Plan

Table No. 15.10.4 -Sector-I- Natural Resources Conservation and Management –IVth Year Plan

No.	Activity	Unit	Unit cost	Target	IWMP	WDF	Total
1	Stream bank protection – engineering structures (1.50 M height)	m	2290	210	480900	24045	504945
2	Stream bank protection – engineering structures (1.00 M height)	m	1609	150	241350	12067.50	253417.50

3	Stone pitched contour bunding	m2	100.46	4500	452070	45207	497277
4	Foot bridges	Nos.	10327	2	20654	2065.40	22719.40
5	Water harvesting structures (wells)	Nos.	18000	20	360000	36000	396000
6	Stream bank stabilisation using Geo textiles	m2	191	40	7640	764	8404
Total					1562614	120148.90	1682762.9

Kanchinada Watershed (4V11b) - Action Plan

Table No. 15.11.1 -Sector-II- Livelihood Support system for landless/ assetless - 1st Year Plan

Sl. No	Name of Activity	Unit	Unit Cost	Target	IWMP Fund	Beneficiary Contribution	Total
A	Enterprising individuals (10 %)						
1	Cow rearing	Nos.	22500	2	31500	13500	45000
2	Goat rearing	Nos.	10500	3	22050	9450	31500
3	Bee keeping	Nos.	10300	4	28840	12360	41200
4	Tailoring	Nos.	10000	2	14000	6000	20000
Total					96390	41310	137700

Kanchinada Watershed (4V11b) - Action Plan

Table No. 15.11.2 -Sector-II- Livelihood Support system for landless/ assetless- IInd Year Plan

Sl. No	Name of Activity	Unit	Unit Cost	Target	IWMP Fund	Beneficiary Contribution	Total
B	Revolving fund to SHGs (60 %)						
1	Soap making		25000	2	37500	12500	50000
2	Animal husbandry		20000	5	75000	25000	100000
3	Carpet making		15000	10	112500	37500	150000
4	Cloth bag making		10000	10	75000	25000	100000
					300000	100000	400000
C	Major livelihood activities (30 %)						
1	Vermi composting	Nos.	50000	1	25000	25000	50000
					25000	25000	50000
	Total				325000	125000	450000

Kanchinada Watershed (4V11b) - Action Plan

Table No. 15.11.3 -Sector-II- Livelihood Support system for landless/ assetless- IIIrd Year Plan

Sl. No	Name of Activity	Unit	Unit Cost	Target	IWMP Fund	Beneficiary Contribution	Total
B	Revolving fund to SHGs (60 %)						
1	Soap making		25000	3	56250	18750	75000
2	Animal husbandry		20000	5	75000	25000	100000
3	Carpet making		15000	8	90000	30000	120000

4	Cloth bag making		10000	10	75000	25000	100000
					296250	98750	395000
C	Major livelihood activities (30 %)						
1	Goat rearing	Nos.	105000	2	105000	105000	210000
					105000	105000	210000
	Total				401250	203750	605000

Kanchinada Watershed (4V11b) - Action Plan

Table No. 15.11.4 -Sector-II- Livelihood Support system for landless/ assetless- IVth Year Plan

Sl. No	Name of Activity	Unit	Unit Cost	Target	IWMP Fund	Beneficiary Contribution	Total
C	Major livelihood activities (30 %)						
1	Jack fruit processing unit	Nos.	320000	1	160000	160000	320000
	Total				160000	160000	320000

Kanchinada Watershed (4V11b) - Action Plan

Table No. 15.12.1 -Sector-III- Production system and Microenterprises - Ist Year Plan

Sl. No	Name of Activity	Unit	Unit Cost	Target	IWMP Fund	Convergence	WDF	Total
1	Vegetable cultivation in terrace	Nos.	1500	240	180000	180000	64800	424800
2	Planting of 5 banana plants	Nos.	170	1200	60000	144000	36720	240720
	Total				240000	324000	101520	665520

Note: 20 percent of the beneficiaries will be SC/ST. Contribution to WDF is 20 % for General and 10 % for SC/ST

Kanchinada Watershed (4V11b) - Action Plan

Table No. 15.12.2 -Sector-III- Production system and Microenterprises –IInd Year Plan

Sl. No	Name of Activity	Unit	Unit Cost	Target	IWMP Fund	Convergence	WDF	Total
1	Backyard poultry	Nos.	1200	380	285000	285000	51300	621300
2	Mushroom cultivation (10 beds)	Nos.	350	40	14000	26000	2520	42520
3	Bee keeping	Nos.	3500	12	48000	69600	7560	125160
4	Planting of 2 fruit plants	Nos.	80	500	15000	25000	7200	47200
5	Planting of 2 timber plants	Nos.	70	500	10000	25000	6300	41300
6	Planting of 10 pepper seedlings	Nos.	200	350	35000	35000	12600	82600
	Total				407000	465600	87480	960080

Note: 20 percent of the beneficiaries will be SC/ST. Contribution to WDF is 20 % for General and 10 % for SC/ST

Kanchinada Watershed (4V11b) - Action Plan

Table No. 15.12.3 -Sector-III- Production system and Microenterprises –IIIrd Year Plan

Sl. No	Name of Activity	Unit	Unit Cost	Target	IWMP Fund	Convergence	WDF	Total
1	Cow rearing	Nos.	22500	12	189000	81000	34020	304020
2	Goat rearing	Nos.	10500	7	51450	22050	9261	82761
3	Carpet making	Nos.	22500	2	25000	25000	4500	54500
4	Mechanization support to livestock farmers	Nos.	45000	1	25000	20000	4500	49500
5	Support to women SHG for livestock rearing	Nos.	50000	1	25000	25000	4500	54500
6	Tailoring unit	Nos.	10000	2	16000	4000	2880	22880
	Total				331450	177050	59661	568161

Note: 20 percent of the beneficiaries will be SC/ST. Contribution to WDF is 20 % for General and 10 % for SC/ST

Kanchinada Watershed (4V11b) - Action Plan

Table No. 15.12.4 -Sector-III- Production system and Microenterprises –IVth Year Plan

Sl. No	Name of Activity	Unit	Unit Cost	Target	IWMP Fund	Convergence	WDF	Total
1	Organic vegetable cultivation	Nos.	25000	3	30000	45000	5400	80400
2	Planting of tuber crops	Nos.	20000	4	32000	48000	5760	85760
3	Jasmine cultivation	Nos.	15000	2	14400	15600	2592	32592
4	Organic banana cultivation	Nos.	30000	2	36000	24000	6480	66480
	Total				112400	132600	20232	265232

Note: 20 percent of the beneficiaries will be SC/ST. Contribution to WDF is 20 % for General and 10 % for SC/ST

MICRO WATERSHED BASED ACTION PLAN
AYANIKUZHI MICRO WATERSHED (4V25a)

Ayanikuzhi micro watershed is located along the southern banks of Vamanapuram River with an area of 440.08 (5.51%) This micro watershed is located in northern portion of the Pullampara GramaPanchayath covering parts of three wards. The Vamanapuram River flows through the northern boundary of the watershed.

General Description

Table No. 16.1 General Description of Ayanikuzhi micro watershed

Name of micro watershed	: Ayanikuzhi
Micro watershed code	: 4V25a
River basin	: Vamanapuram
District	: Thiruvananthapuram
Block Panchayath	: Vamanapuram
GramaPanchayath	: Pullampara
Villages	: Pullampara
Latitude	: 8 ⁰ 40'47" to 8 ⁰ 42'01" North
Longitude	: 76 ⁰ 56'55" to 76 ⁰ 58'46" East
Wards	: Pullampara Panchayath- 5, 6, 8 (part)
Total Area	: 440.08 ha
% of area in the IWMP cluster	: 5.51 %

Socio economic profile

As per the information provided in the baseline survey conducted, Ayanikuzhi micro watershed has a total number of 4480 households with a total population of 2122. The micro watershed has a total male population of 996 and a total female population of 1126. 1619 numbers of BPL families reside in the micro watershed area. A total number of 2816 persons have registered under MGNREGS. 420 households belong to Schedule Caste and 48 families belong to Schedule Tribe. Majority of the farmers are marginal farmers having only less than 1 ha of own land. Agriculture is the major source of livelihood in the micro watershed area. Apart from agriculture/horticultural practices, animal husbandry is also a source of livelihood some families in the watershed area. The socio economic details of the Ayanikuzhi micro watershed are given below:

Table No. 16.2 Socio economic details of Ayanikuzhi micro watershed

1.	Total number of households		724
2.	Population	Male	996
		Female	1126
		Total	2122
	Child population	Male	390

		Female	384
		Total	774
3.	No. of BPL families		301
4.	No. of persons enrolled under MGNREGS		596
5.	Households	Scheduled Caste	65
		Scheduled Tribe	2
		General	657
6.	Land holdings	Landless	11
		Very Marginal (less than 5 cents)	105
		Marginal (5 to 250 cents)	602
		Small (250 to 500 cents)	10
		Large (more than 500 cents)	0

Methodology

In line with the guidelines of IWMP, as suggested by Government of India, the following methodology was adopted for NRM planning and resource mapping.

1. Prepared the cadastral maps pertaining to the project area.
2. Overlaid the micro watershed boundaries over cadastral maps and corrected the boundaries through ground truth verification
3. Project Fellows were appointed as animators. The animators assisted the People's representatives in the formation of Neighbour Hood Groups. They act as master trainers and collected primary and secondary field data. The animators worked as the interface between LSGI and NHGs
4. Training Coordinators were engaged at project level for organizing the series of trainings at Block and Grama Panchayat levels.
5. Overseers were engaged for taking field estimates of the proposed activities.
6. Induction training was given for the project staff on PRA techniques, concept of maps and Resource Mapping.
7. Printed posters, banners and notices for providing wide publicity regarding the programme.
8. Two block level seminars were conducted for People's representatives of District/Block/GramaPanchayats, line departments, Kudumbasree, and other functionaries.
9. This was followed by orientation seminars at GramaPanchayats.
10. Conducted transect walk with ward members and ADS.
11. During the transect walk, major drains, gullies and drainage lines are identified and marked in the cadastral map.
12. NHGs were formed at grass root level comprising of 40 to 50 neighbouring households.
13. Panchayat Level Watershed Committees were convened at Grama Panchayats for finalizing the modalities of work.

14. Trainer's training for base line survey were conducted for two facilitators from each Neighbour Hood Group
15. Predefined questionnaire was prepared for data collection from each household.
16. A block level seminar was organized on drainage line treatment. Followed by Technical presentations, group discussions were held at Grama Panchayat level to draw out the requirements. The suggestions were presented by concerned Grama Panchayat Presidents.
17. Various resources like different water bodies, wells and farm ponds are identified and marked in the cadastral map with the help of the facilitators selected from the NHGs.
18. Focus Group Discussions were organised at Panchayat level for ward members & ADS Chairpersons, Presidents & Secretaries of NHGs, Padashekhara Samithi, Kera Samithi, Kudumbasree, MGNREGS, Officials of Agriculture, Veterinary & Soil Conservation Departments. Followed by technical sessions, group discussions at ward level were held and suggestions were presented by Grama Panchayat members.
19. New questionnaire for net plan preparation was prepared for data collection from each household and NHG.
20. The land resource maps already prepared were updated using high resolution satellite imagery and these interpreted maps were corrected with the help of NHGs and accordingly present land use map is prepared using different notions and symbols.
21. Trainer's training for detailed survey for net plan preparation organized at Grama Panchayat level for ward members & ADS Chairpersons, Vice Presidents & Joint Secretaries of NHGs, MGNREGS officials, etc. The information gathered includes soil and water conservation activities to be taken up through MGNREGS and other schemes and list of agricultural/veterinary/fisheries activates to be taken up in each household. The list of drains/ponds/wells to be rejuvenated/renovated and the details of group activities/livelihood activities to be taken up in each NHG were also collected.
22. Thematic maps on geology and geomorphology were interpreted from the high resolution satellite imagery and were corrected through ground truth verification.
23. Panchayat Level Watershed Committees were convened at Grama Panchayats and the list of entry point activities suggested were discussed and finalized.
24. Trainer's training for taking people's estimates and consolidation of project proposals. This was organized at Grama Panchayat and NHG level. Elected representatives, ADS Chairpersons, Officer bearers of NHGs, MGNREGS officials, etc. attended this training. The information gathered on soil and water conservation activities to be taken up through MGNREGS and other schemes and list of agricultural/veterinary/fisheries activates to be taken up were finalized. The list of drains/ponds/wells to be rejuvenated/renovated and the details of

group activities/livelihood activities to be taken up in each NHG were also finalized. The livelihood action plan and the activities under production system were also consolidated.

25. The suggestions were split for four years and four separate annual plans were also prepared.

26. Finally a proposed land use map, area treatment map and drainage line treatment map were so prepared which is treated as the strategic action plan on Natural Resources Management perspective for the micro watershed during the entire project period.

27. Major activities included in the watershed project are.

- Soil and moisture conservation measures like centripetal and bench terracing, earthen and stone pitched contour bunding, trenching, vegetative barriers, etc.
- Rain water harvesting activities like farm ponds, percolation tanks, check dams etc.
- Well recharging and rain water harvesting structures like roof water harvesting and rain water collection pits.
- Planting and sowing of multipurpose trees, shrubs, grasses, legumes and pasture land development.
- Encouraging natural regeneration including fodder cultivation.
- Promotion of agro-forestry and horticulture
- Capacity building and creation of a greater degree of awareness among the participants.
- Encouraging people's participation with the involvement of NHGs.
- Livelihood activities for asset less people
- Production system and Micro enterprises

Biophysical Resources

Physiography

The relief of the watershed ranges from 20 m above MSL to 160 m above MSL. The majority of the area falls in the relief category of 40 to 80 m above MSL which occurs in an area of 244.15 ha (55.47 %). An area of 60.92 ha is located above 100m above MSL.

Slope

The watershed area is divided into six categories of slope classes. The majority of area is under the moderately steep to steep slope class having 15-35 % slope. The category spreads over an area of 226.03 ha (51.36 %), 87.21ha of the watershed area is having very steeply sloping lands which requires urgent soil and water conservation measures.

Drains

The Vamanapuram River flowing through the northern boundary of the watershed is the major drain of this watershed. A number of drains are originating from

the different parts of this watershed which drains to the Vamanapuram River near Ayanikuzhi. The details of the drains and ponds in the watershed area is given in table 16.3 & 16.4

Table No. 16.3 - Table showing the details of Drains

Grama Panchayat	Drains	Length (m)	Breadth (m)	Depth (m)
Pullampara	Kaduvankuzhi Thodu	200	2	0.5
	Nedum Kaithodu	1000	5	1.5
	Puttukonam Thodu	950	4	1.5
	Urulu Kidanna Kuzhi	200	2	0.5

Table No. 16.4 - Table showing the details of Ponds

Sl. No	Grama Panchayat	Pond	Survey No.	Length (m)	Breadth (m)	Depth (m)
1	Pullampara	KonathukuzhiKulam	126	2	3	4
2		UranpuramKulam	133	4	5	3
3		VarikkaparaKulam	249	3	4	6
4		Varikkapara Kulam1	146	4	5	3
5		PaladannukuzhiKulam	220	2	3	5
6		KoovanvengaKulam	258	3	2	5
7		PuttukonamKulam	264	8	5	6
8		PaluvalliKulam	285	3	2	2
9		Paluvalli Kulam1	269	5	3	7
10		AruvippuramPaluvalliKulam	271	3	2	4

Land use

Agriculture is one of the prime activity in the watershed area. The major land use category mapped in the watershed area is rubber plantation. It occurs in an area of 338.71 ha (76.96 %). The second major category is the mixed crops which are the typical homestead cultivation of Kerala wherein the different crop species are grown together that cannot be spatially mapped separately. This is mapped in an area of 56.05 ha. An area of 1.19 ha is mapped as cultivable wastelands which can be brought under horticulture. An area of 3.98 ha (0.9 %) is under the built up land and an area of 1.53 ha is under the rocky area. The details of the land use categories with spatial extent are given in table.

Table No. 16.5 - Table showing land use categories

Sl. No.	Land use category	Area in ha	Percentage
1	Builtup land	3.98	0.90
2	Paddy converted Banana + Tapioca	3.45	0.79
3	Paddy converted Mixed Crops	3.29	0.75

4	Paddy converted Rubber	8.55	1.94
5	Coconut	2.61	0.59
6	Mixed Crops	56.05	12.74
7	Cultivable Waste Land	1.19	0.27
8	Plantation Rubber	316.11	71.83
9	Plantation Rubber (Young)	22.60	5.13
10	Rock	1.53	0.35
11	River Bank	10.20	2.32
12	River (Rocky area)	0.46	0.10
13	River	10.06	2.29
	Total	440.08	100.00

Geology

The major geological units in the watershed is Garnetiferous Biotite occurring in an area of 289.06 ha (65.68 %). The remaining area has a geological formation, viz. Garnet-Biotite gneiss with Migmatite. There are four geomorphological units of which nearly 90 % (394.22 ha) of the area falls under the category viz. lower plateau (laterite). An area of 15.50 ha is mapped under the category viz. valley fill.

Soils

The major soil series mapped in the watershed area is Nedumangad series having a solum thickness of 150 cm with very dark brown to pale brown colour. The soil is very strongly acid and has a surface texture of gravelly sandy clay loam to gravelly sandy clay. This is distributed in an area of 286.25 ha (66.04 %). The river bank area is mapped under Mudakkal series which is alluvial in origin. An area of 24.33 ha mapped under this category. Soils in more than half of the watershed area (68%) are deep soils with a depth of 100- 150 cm and 16 % of the area (70.5 ha) is having moderately shallow with a depth of 50-75 cm. The major surface soil textures in the watershed area constitutes that of gravelly clay loam (176.84 ha) and gravelly loam (151.29 ha). Nearly 75 % of the watershed area is prone to severe soil erosion which calls for proper soil and water conservation measures in the area.

Capacity Building/Trainings

Extensive training programmes and user interaction meetings were organized for the stake holders as part of the preparation of detailed project report. The details are given below:

No.	Training	Participants
1.	Block level awareness training	Elected representatives of three tier
2.	Block level orientation training	Elected representatives and ADS chairpersons
3.	Training on Base line survey	Two facilitators from NHG.
4.	Training on Drainage line treatment	Elected representatives and one facilitator from NHG.

5.	Focus Group Discussion	Elected representatives, Presidents and Secretaries of the NHGs, ADS chairpersons and MGNREGS labour groups and progressive farmers
6.	Training for Net Plan Preparation	Elected representatives, Vice Presidents and Joint Secretaries from NHG, ADS chairpersons and MGNREGS labour groups.
7.	Training for People’s Estimate and Project Report Consolidation	Elected representatives, Office bearers of NHGs, ADS chairpersons and MGNREGS labour groups.

Watershed Committee

Watershed Committee is constituted by Gram Sabha to implement the watershed project with technical support of WDT in the panchayat. Watershed committees are formed following the parameters of watershed committee, keeping the gender sensitive issues intact. Watershed committee members are briefed about the project objectives and a workshop is also conducted in this regard at every panchayat. The watershed committee has a pivotal role to play during and after the project implementation period.

The details of the Watershed Committee for Ayanikuzhi watershed is given below:

Table No. 16.6 -Details of the Watershed Committee

Office bearers

No.	Name	Designation	Sex	Position held	Phone No.
1	Chullalam Rajan	Chairperson	M	President, Pullampara GP	9446979551
2	Velu. A	Vice chairperson	M	Member, Pullampara GP	9746963579
3	Sajithakumari	Convenor	F	VEO, Pullampara GP	
4	Anvar (Joy)	Joint Convenor	M	NHG representative	9745373737
5	Anjana. P. B	Secretary	F	Social Mobilizer, WDT	9447781073
6	Sunil Kumar R.	Joint Secretary	M	NHG representative	9645673359
7	Laila Beevi P.	Treasurer	F	NHG representative	8547180080

Members

Zone	Name	Address
1	R. Gopi	Vinod Bhavan, Vayyakavu, Kunanvega P. O.
2	Anvar (Joy)	Aniyam, Nedumkaitha Kunanvega P.O.
3	Sajanakumari S.	Sreenilayam, Kunanvega P.O.

4	Laila Beevi P.	O. P. House Varikkappara, Kunanvega P.O.
5	Rajendhu Rajan	Sindhu House, Varikkappara, Kunanvega P.O.
6	Shafi M.	Sathar Mandiram Manchadi, Kunanvega P.O.
7	B. Radhakrishnan	Sakthipuram, Kunanvenga P. O.
8	Sunil Kumar R.	Chembancode veedu, Thellikkachal
9	Vasanthakumari	R. V. Nilayam Kunnumpurathu veedu, Poikkakam

Ex Officio Members

No.	Name	Position held
1	Remani P. Nair	Member, District Panchayath
2	M. S. Shaji	Member, Block Panchayath
3	Chullalam Rajan, Chullalam ward	Members, Grama Panchayath
	Pulimoottukonam Salim, Pullampara ward	
	Velu. A, Koonanavenga ward	
4	E. Abdul Azeez, Pullampara Service Co-operative Bank	President, Primary Service Co-operative Bank
5	Deepa Kumari, Chullalam ward	Chairpersons, Kudumbhasree ADS
	Rafeelabeevi, Pullampara ward	
	Jayasree B., Kunanvenga ward	
6	Sajithakumari, VEO	Nominated Officer of Grama Panchayath
7	Anjana. P. B, Social Mobiliser, WDT	WDT Member

Neighbour hood Groups

Neighbour hood Groups are constituted in the watershed area combining 40 to 50 adjacent households which are living in a cluster. These are further subdivided into seven sub groups and one person from each subgroup is selected to the Neighbour hood Group Committee. These seven members formed a Neighbour hood Group Committee with a President, Vice President, Secretary, Joint Secretary and Treasurer. Of these Treasurer and one Committee member is lady. The ward members and ADS Chairpersons of the wards are Ex-officio members in all the NHG Committees. These Committees are registered with the concerned Grama Panchayat. The Presidents and Secretaries of the NHG Committees are members of the Watershed Committee.

The details of the NHG Committees in Ayanikuzhi watershed is as follows:

Table No. 16.7 -Details of the NHG Committees in Ayanikuzhi watershed

Pullampara Grama Panchayath								
Sl. No	Ayalkoottam Reg. No	Total House holds	Land Holdings (in cents)					
			BPL	Land less	0-5	6-250	250-500	>500
1	IWMP/PP/5/1	68	36		9	57	2	

2	IWMP/PP/5/2	44	20	1	3	40		
3	IWMP/PP/5/4	72	24	3	11	58		
4	IWMP/PP/5/5	56	32	1	18	36	1	
5	IWMP/PP/6/1	54	30		8	46		
6	IWMP/PP/6/2	52	31		7	45		
7	IWMP/PP/6/3	39			5	34		
8	IWMP/PP/6/4	33	23		1	31	1	
9	IWMP/PP/6/5	83	34		4	73	6	
10	IWMP/PP/8/3	60	34	1	11	48		
11	IWMP/PP/8/5	44	12	2	6	36		
12	IWMP/PP/8/6	69	37	2	16	51		
13	IWMP/PP/8/7	54	29	1	6	47		
		728	342	11	105	602	10	0

Self Help Groups

In addition to this, the existing Self Help Groups formed under the Kudumbasree Mission and other SHGs which are performing at a satisfactory level, will be promoted to take various programmes under the Livelihood activities and Production Systems and Micro enterprises. If required, additional SHGs will also be formed in the watershed area in the coming years.

Activities proposed

Based on the series of discussions held with the different stakeholders the following activities are suggested for the micro watershed.

Table No. 16.8 – Details of activities suggested

Entry point Activities	
1	Mini drinking water scheme for Mundanthadikkad
2	Planting avenue trees with tree guard
3	Planting bamboo seedlings along banks of Vamanapuram River
Natural Resources Conservation Activities	
1	Stream bank protection – engineering structures (1.50 M height)
2	Stream bank protection – engineering structures (1.00 M height)
3	Stone pitched contour bunding
4	Earthen bunds
5	Centripetal terracing with husk trenching and mulching
6	Strip terracing for rubber
7	Moisture collection pits
8	Wasteland development (planting of horticultural plants)
9	Planting horticultural crops as intercrops
10	Afforestation of school compounds and public buildings

11	Gully plugs
12	Foot bridges
13	Water harvesting structures (wells)
14	Supply of Terafil Water Filter
15	Well recharging
16	Improvement of public wells
17	Improvement of existing wells
18	Renovation of drains
19	Renovation of ponds
20	Mini drinking water scheme at Kaduvankuzhy
21	Solar junction light at Chullalam Junction
22	Solar street lighting for colonies
23	Solar junction lights
24	Supply of Portable solar lamps
25	Bus shelters with solar panels
26	Biogas plant
27	Stream bank stabilisation using Geo textiles
28	Live hedges
29	Fodder cultivation

Budget

The distribution of budget for Ayanikuzhi micro watershed for the various components as per IWMP guidelines is given below:

Table No. 16.9 – Budget for Ayanikuzhi micro watershed

No.	Budget component	% age	Amount in Rs.
1.	Administrative cost	10	6,24,000
2.	Monitoring	1	62,400
3.	Evaluation	1	62,400
Preparatory phase			
4.	Entry point activities	4	2,49,600
5.	Institution and capacity building	5	3,12,000
6.	Detailed Project Report	1	62,400
Watershed works phase			
7.	Natural Resources Conservation works	56	34,94,400
8.	Livelihood activities for asset less	9	5,61,600
9.	Production system and micro enterprises	10	6,24,000
10.	Consolidation phase	3	1,87,200
	Total	100	62,40,000

Ayanikuzhi Watershed (4V25a) - Action Plan

Table No. 16.10.1 –Sector-I- Natural Resources Conservation and Management - Ist Year Plan

No.	Activity	Unit	Unit cost	Target	IWMP	Convergence	WDF	Total
1	Earthen bunds	Rm	39.4	900		35460		35460
2	Centripetal terracing with husk trenching and mulching	Nos.	278	500		139000		139000
3	Strip terracing for rubber	Nos.	132	600		79200		79200
4	Moisture collection pits	Nos.	49.82	80		3985.60		3985.60
5	Wasteland development (planting of horticultural plants)	cent	160	250	15000	25000	1500	41500
6	Planting horticultural crops as intercrops	cent	150	600	30000	60000	3000	93000
7	Afforestation of school compounds and public buildings	cent	160	15	900	1500	90	2490
8	Gully plugs	Nos.	1300	4	5200		520	5720
9	Supply of Terafil Water Filter	Nos.	650	24	15600		1560	17160
10	Well recharging	Nos.	5000	25	125000		12500	137500
11	Improvement of public wells	Nos.	12000	1	12000		1200	13200
12	Improvement of existing wells	Nos.	6000	12	72000		7200	79200
13	Renovationof drains	m				100000		100000
14	Solar junction lights	Nos.	25000	2	35000	15000	2500	52500
15	Supply of Portable solar lamps	Nos.	2000	10	14000	6000	2000	22000
16	Live hedges	50 m	1750	3	2850	2400	285	5535
17	Fodder cultivation	3 cents	600	30	18000		1800	19800
	Total				345550	467545.60	34155	847250.60

Ayanikuzhi Watershed (4V25a) - Action Plan

Table No. 16.10.2 –Sector-I- Natural Resources Conservation and Management –IInd Year Plan

No.	Activity	Unit	Unit cost	Target	IWMP	Convergence	WDF	Total
1	Stream bank protection – engineering structures (1.50 M height)	m	2290	36	82440		4122	86562
2	Stream bank protection – engineering structures (1.00 M height)	m	1609	25	40225		2011.25	42236.25
3	Stone pitched contour bunding	m ²	100.46	500	50230		5023	55253
4	Earthen bunds	Rm	39.4	1800		70920		70920
5	Centripetal terracing with husk trenching and mulching	Nos.	278	1000		278000		278000
6	Strip terracing for rubber	Nos.	132	1200		158400		158400
7	Moisture collection pits	Nos.	49.82	160		7971.20		7971.20
8	Wasteland development (planting of horticultural plants)	cent	160	500	30000	50000	3000	83000
9	Planting horticultural crops as intercrops	cent	150	1200	60000	120000	6000	186000
10	Afforestation of school compounds and public buildings	cent	160	30	1800	3000	180	4980
11	Gully plugs	Nos.	1300	4	5200		520	5720
12	Foot bridges	Nos.	10327	1	10327		1032.7	11359.7
13	Water harvesting structures	Nos.	18000	6	108000		10800	118800

	(wells)							
14	Supply of Terafil Water Filter	Nos.	650	36	23400		2340	25740
15	Well recharging	Nos.	5000	25	125000		12500	137500
16	Improvement of public wells	Nos.	12000	2	24000		2400	26400
17	Improvement of existing wells	Nos.	6000	12	72000		7200	79200
18	Renovation of drains	m				200000		200000
19	Mini drinking water scheme at Kaduvankuzhy	Nos.	700000	1	700000		70000	770000
20	Solar junction light at Chullalam Junction	Nos.	90000	1	63000	27000	3150	93150
21	Solar junction lights	Nos.	25000	4	70000	30000	5000	105000
22	Supply of Portable solar lamps	Nos.	2000	20	28000	12000	4000	44000
23	Bus shelters with solar panels	Nos.	40000	1	36000	4000	2000	42000
24	Biogas plant	Nos.	6500	1	6500		650	7150
25	Stream bank stabilisation using Geo textiles	m ²	191	10	1910		191	2101
26	Live hedges	50 m	1750	6	5700	4800	570	11070
27	Fodder cultivation	3 cents	600	45	27000		2700	29700
	Total				1570732	966091.20	145389.95	2682213.15

Ayanikuzhi Watershed (4V25a) - Action Plan

Table No. 16.10.3 –Sector-I- Natural Resources Conservation and Management –IIIrdYear Plan

No.	Activity	Unit	Unit cost	Target	IWMP	Convergence	WDF	Total
1	Stream bank protection – engineering structures (1.50 M height)	m	2290	36	82440		4122	86562
2	Stream bank protection – engineering structures (1.00 M height)	m	1609	25	40225		2011.25	42236.25
3	Stone pitched contour bunding	m2	100.46	500	50230		5023	55253
4	Earthen bunds	Rm	39.4	1800		70920		70920
5	Centripetal terracing with husk trenching and mulching	Nos.	278	1000		278000		278000
6	Strip terracing for rubber	Nos.	132	1200		158400		158400
7	Moisture collection pits	Nos.	49.82	160		7971.20		7971.20
8	Wasteland development (planting of horticultural plants)	cent	160	500	30000	50000	3000	83000
9	Planting horticultural crops as intercrops	cent	150	1200	60000	120000	6000	186000
10	Afforestation of school compounds and public buildings	cent	160	30	1800	3000	180	4980
11	Foot bridges	Nos.	10327	2	20654		2065.4	22719.4
12	Water harvesting structures (wells)	Nos.	18000	12	216000		21600	237600

13	Well recharging	Nos.	5000	25	125000		12500	137500
14	Improvement of existing wells	Nos.	6000	6	36000		3600	39600
15	Renovationof drains	m				200000		200000
16	Solar street lighting for colonies	Nos.	200000	1	140000	60000	10000	210000
17	Biogas plant	Nos.	6500	1	6500		650	7150
18	Stream bank stabilisation using Geo textiles	m2	191	20	3820		382	4202
19	Live hedges	50 m	1750	7	6650	5600	665	12915
	Total				819319	953891.20	71798.65	1845008.85

Ayanikuzhi Watershed (4V25a) - Action Plan

Table No. 16.10.4 –Sector-I- Natural Resources Conservation and Management –IVth Year Plan

No.	Activity	Unit	Unit cost	Target	IWMP	WDF	Total
1	Stream bank protection – engineering structures (1.50 M height)	m	2290	108	247320	12366	259686
2	Stream bank protection – engineering structures (1.00 M height)	m	1609	75	120675	6033.75	126708.75
3	Stone pitched contour bunding	m2	100.46	1500	150690	15069	165759
4	Foot bridges	Nos.	10327	2	20654	2065.40	22719.40
5	Water harvesting structures (wells)	Nos.	18000	12	216000	21600	237600

6	Stream bank stabilisation using Geo textiles	m2	191	20	3820	382	4202
Total					759159	57516.15	816675.15

Ayanikuzhi Watershed (4V25a) - Action Plan

Table No. 16.11.1 –Sector-II- Livelihood Support system for landless/ assetless - Ist Year Plan

Sl. No	Name of Activity	Unit	Unit Cost	Target	IWMP Fund	Beneficiary Contribution	Total
A	Enterprising individuals (10 %)						
1	Cow rearing	Nos.	22500	1	15750	6750	22500
2	Goat rearing	Nos.	10500	2	14700	6300	21000
3	Bee keeping	Nos.	10300	2	14420	6180	20600
4	Mushroom cultivation	Nos.	9000	1	6300	2700	9000
5	Tailoring	Nos.	10000	1	7000	3000	10000
Total					58170	24930	83100

Ayanikuzhi Watershed (4V25a) - Action Plan

Table No. 16.11.2 –Sector-II- Livelihood Support system for landless/ assetless- IInd Year Plan

Sl. No	Name of Activity	Unit	Unit Cost	Target	IWMP Fund	Beneficiary Contribution	Total
B	Revolving fund to SHGs (60 %)						
1	Carpet making						
2	Soap making		25000	1	18750	6250	25000

3	Curry powder		20000	3	45000	15000	60000
4	Bakery unit		15000	6	67500	22500	90000
5	Animal husbandry		10000	4	30000	10000	40000
6	Cloth bag making						
Total					161250	53750	215000

Ayanikuzhi Watershed (4V25a) - Action Plan

Table No. 16.11.3 –Sector-II- Livelihood Support system for landless/ assetless- IIIrd Year Plan

Sl. No	Name of Activity	Unit	Unit Cost	Target	IWMP Fund	Beneficiary Contribution	Total
B	Revolving fund to SHGs (60 %)						
1	Carpet making						
2	Soap making		25000	2	37500	12500	50000
3	Curry powder		20000	3	45000	15000	60000
4	Bakery unit		15000	5	56250	18750	75000
5	Animal husbandry		10000	5	37500	12500	50000
6	Cloth bag making						
					176250	58750	235000
C	Major livelihood activities (30 %)						
1	Vermi composting	Nos.	50000	1	25000	25000	50000
					25000	25000	50000
Total					201250	83750	285000

Ayanikuzhi Watershed (4V25a) - Action Plan

Table No. 16.11.4 –Sector-II- Livelihood Support system for landless/ assetless- IVth Year Plan

Sl. No	Name of Activity	Unit	Unit Cost	Target	IWMP Fund	Beneficiary Contribution	Total
C	Major livelihood activities (30 %)						
1	Poultry farm	Nos.	280000	1	140000	140000	280000
	Total				140000	140000	280000

Ayanikuzhi Watershed (4V25a) - Action Plan

Table No. 16.12.1 –Sector-III- Production system and Microenterprises - Ist Year Plan

Sl. No	Name of Activity	Unit	Unit Cost	Target	IWMP Fund	Convergence	WDF	Total
1	Vegetable cultivation in terrace	Nos.	1500	160	120000	120000	43200	283200
2	Planting of 5 banana plants	Nos.	170	750	37500	90000	22950	150450
	Total				157500	210000	66150	433650

Note: 20 percent of the beneficiaries will be SC/ST. Contribution to WDF is 20 % for General and 10 % for SC/ST

Ayanikuzhi Watershed (4V25a) - Action Plan

Table No. 16.12.2 –Sector-III- Production system and Microenterprises –IInd Year Plan

Sl. No	Name of Activity	Unit	Unit Cost	Target	IWMP Fund	Convergence	WDF	Total
1	Backyard poultry	Nos.	1200	276	207000	207000	37260	451260
2	Mushroom cultivation (10 beds)	Nos.	350	25	8750	16250	1575	26575
3	Bee keeping	Nos.	3500	8	32000	46400	5040	83440
4	Planting of 2 fruit plants	Nos.	80	200	6000	10000	2880	18880
5	Planting of 2 timber plants	Nos.	70	200	4000	10000	2520	16520
6	Planting of 10 pepper seedlings	Nos.	200	175	17500	17500	6300	41300
	Total				275250	307150	55575	637975

Note: 20 percent of the beneficiaries will be SC/ST. Contribution to WDF is 20 % for General and 10 % for SC/ST

Ayanikuzhi Watershed (4V25a) - Action Plan

Table No. 16.12.3 –Sector-III- Production system and Microenterprises –IIIrd Year Plan

Sl. No	Name of Activity	Unit	Unit Cost	Target	IWMP Fund	Convergence	WDF	Total
1	Cow rearing	Nos.	22500	6	94500	40500	17010	152010
2	Goat rearing	Nos.	10500	5	36750	15750	6615	59115
	Total				131250	56250	23625	211125

Note: 20 percent of the beneficiaries will be SC/ST. Contribution to WDF is 20 % for General and 10 % for SC/ST

Ayanikuzhi Watershed (4V25a) - Action Plan

Table No. 16.12.3 –Sector-III- Production system and Microenterprises –IVth Year Plan

Sl. No	Name of Activity	Unit	Unit Cost	Target	IWMP Fund	Convergence	WDF	Total
1	Organic banana cultivation	Nos.	30000	2	36000	24000	6480	66480
2	Planting of tuber crops	Nos.	20000	3	24000	36000	4320	64320
	Total				60000	60000	10800	130800

Note: 20 percent of the beneficiaries will be SC/ST. Contribution to WDF is 20 % for General and 10 % for SC/ST

MICRO WATERSHED BASED ACTION PLAN

MOOZHI MICRO WATERSHED (4V26a)

Moozhi micro watershed is the second largest watershed in the IWMP cluster (IWMP-I) with an area of 1892.12 ha (23.69 % of total geographical area). This micro watershed is spread over Pullampara&ManickalGramapanchayaths of Vamanapuram block and Vembayam, Panavoor and AnadGramapanchayaths of Nedumangadu block. The Vamanapuram River flows through the North West boundary of the watershed.

General Description

Table No. 17.1 - General Description of Moozhi micro watershed

Name of micro watershed	:	Moozhi
Micro watershed code	:	4V26a
River basin	:	Vamanapuram
District	:	Thiruvananthapuram
Block Panchayath	:	Vamanapuram, Nedumangadu
Gramapanchayath	:	Pullampara, Manickal, Vembayam, Panavoor&Anad
Villages	:	Pullampara, Manickal, Thekkada, Panavoor&Anad
Latitude	:	8 ^o 38'31" to 8 ^o 42'18" North
Longitude	:	76 ^o 55'54" to 76 ^o 58'50" East
Wards	:	PullamparaPanchayath- 3, 4, 9, 10, 11 (full), 5, 8, 15 (part) ManickalPanchayath – 7 (full), 8, 9 (part) VembayamPanchayath – PanavoorPanchayath – 12, 13, 14 (part) AnadPanchayath -1(part)
Total Area	:	1892.12 ha
% of area in the IWMP cluster	:	23.69 %

Socio economic profile

As per the information provided in the baseline survey conducted, Moozhi micro watershed has a total number of 3409 households with a total population of 9117. The micro watershed has a total male population of 4444 and a total female population of 4673. 1240 numbers of BPL families reside in the micro watershed area. A total number of 3014 persons have registered under MGNREGS. 517 households belong to Schedule Caste and 52 families belong to Schedule Tribe. Majority of the farmers are marginal farmers having only less than 1 ha of own land. Agriculture is the major source of livelihood in the micro watershed area. Apart from agriculture/horticultural practices,

animal husbandry is also a source of livelihood some families in the watershed area. The socio economic details of the Moozhi micro watershed are given below:

Table No. 17.2 - Socio economic details of Moozhi micro watershed

1.	Total number of households		3409
2.	Population	Male	4444
		Female	4673
		Total	9117
	Child population	Male	2000
		Female	1881
		Total	3881
3.	No. of BPL families		1240
4.	No. of persons enrolled under MGNREGS		3014
5.	Households	Scheduled Caste	517
		Scheduled Tribe	52
		General	2840
6.	Land holdings	Landless	42
		Very Marginal (less than 5 cents)	573
		Marginal (5 to 250 cents)	2545
		Small (250 to 500 cents)	220
		Large (more than 500 cents)	4

Methodology

In line with the guidelines of IWMP, as suggested by Government of India, the following methodology was adopted for NRM planning and resource mapping.

1. Prepared the cadastral maps pertaining to the project area.
2. Overlaid the micro watershed boundaries over cadastral maps and corrected the boundaries through ground truth verification
3. Project Fellows were appointed as animators. The animators assisted the People's representatives in the formation of Neighbour Hood Groups. They act as master trainers and collected primary and secondary field data. The animators worked as the interface between LSGI and NHGs
4. Training Coordinators were engaged at project level for organizing the series of trainings at Block and Grama Panchayat levels.
5. Overseers were engaged for taking field estimates of the proposed activities.
6. Induction training was given for the project staff on PRA techniques, concept of maps and Resource Mapping.
7. Printed posters, banners and notices for providing wide publicity regarding the programme.
8. Two block level seminars were conducted for People's representatives of District/Block/GramaPanchayats, line departments, Kudumbasree, and other functionaries.

9. This was followed by orientation seminars at GramaPanchayats.
10. Conducted transect walk with ward members and ADS.
11. During the transect walk, major drains, gullies and drainage lines are identified and marked in the cadastral map.
12. NHGs were formed at grass root level comprising of 40 to 50 neighbouring households.
13. Panchayat Level Watershed Committees were convened at Grama Panchayats for finalizing the modalities of work.
14. Trainer’s training for base line survey were conducted for two facilitators from each Neighbour Hood Group
15. Predefined questionnaire was prepared for data collection from each household.
16. A block level seminar was organized on drainage line treatment. Followed by Technical presentations, group discussions were held at Grama Panchayat level to draw out the requirements. The suggestions were presented by concerned Grama Panchayat Presidents.
17. Various resources like different water bodies, wells and farm ponds are identified and marked in the cadastral map with the help of the facilitators selected from the NHGs.
18. Focus Group Discussions were organised at Panchayat level for ward members & ADS Chairpersons, Presidents & Secretaries of NHGs, Padashekhara Samithi, Kera Samithi, Kudumbasree, MGNREGS, Officials of Agriculture, Veterinary& Soil Conservation Departments. Followed by technical sessions, group discussions at ward level were held and suggestions were presented by Grama Panchayat members.
19. New questionnaire for net plan preparation was prepared for data collection from each household and NHG.
20. The land resource maps already prepared were updated using high resolution satellite imagery and these interpreted maps were corrected with the help of NHGs and accordingly present land use map is prepared using different notions and symbols.
21. Trainer’s training for detailed survey for net plan preparation organized at Grama Panchayat level for ward members & ADS Chairpersons, Vice Presidents & Joint Secretaries of NHGs, MGNREGS officials, etc. The information gathered includes soil and water conservation activities to be taken up through MGNREGS and other schemes and list of agricultural/veterinary/fisheries activates to be taken up in each household. The list of drains/ponds/wells to be rejuvenated/renovated and the details of group activities/livelihood activities to be taken up in each NHG were also collected.
22. Thematic maps on geology and geomorphology were interpreted from the high resolution satellite imagery and were corrected through ground truth verification.

23. Panchayat Level Watershed Committees were convened at Grama Panchayats and the list of entry point activities suggested were discussed and finalized.
24. Trainer's training for taking people's estimates and consolidation of project proposals. This was organized at Grama Panchayat and NHG level. Elected representatives, ADS Chairpersons, Officer bearers of NHGs, MGNREGS officials, etc. attended this training. The information gathered on soil and water conservation activities to be taken up through MGNREGS and other schemes and list of agricultural/veterinary/fisheries activates to be taken up were finalized. The list of drains/ponds/wells to be rejuvenated/renovated and the details of group activities/livelihood activities to be taken up in each NHG were also finalized. The livelihood action plan and the activities under production system were also consolidated.
25. The suggestions were split for four years and four separate annual plans were also prepared.
26. Finally a proposed land use map, area treatment map and drainage line treatment map were so prepared which is treated as the strategic action plan on Natural Resources Management perspective for the micro watershed during the entire project period.
27. Major activities included in the watershed project are.
 - Soil and moisture conservation measures like centripetal and bench terracing, earthen and stone pitched contour bunding, trenching, vegetative barriers, etc.
 - Rain water harvesting activities like farm ponds, percolation tanks, check dams etc.
 - Well recharging and rain water harvesting structures like roof water harvesting and rain water collection pits.
 - Planting and sowing of multipurpose trees, shrubs, grasses, legumes and pasture land development.
 - Encouraging natural regeneration including fodder cultivation.
 - Promotion of agro-forestry and horticulture
 - Capacity building and creation of a greater degree of awareness among the participants.
 - Encouraging people's participation with the involvement of NHGs.
 - Livelihood activities for asset less people
 - Production system and Micro enterprises

Biophysical Resources

Physiography

The relief of the watershed ranges from 10 m above MSL to 310 m above MSL. The majority of the area falls in the relief category of 60 to 100 m above MSL which occurs in an area of 670.20 ha (35.42 %). An area of 59.66 ha is located above 200 m above MSL.

Slope

The watershed area is divided into six categories of slope classes. The majority of area is under the strongly sloping class having 10 – 15 % slope. The category spreads over an area of 673.51 ha (35.59 %), 524.02 ha of the watershed area is having very steeply sloping lands which requires urgent soil and water conservation measures.

Drains

The Vamanapuram River flowing through the north- west and south boundary of the watershed is the major drain of this watershed. A number of drains are originating from the different parts of this watershed which drains to the Vamanapuram River near Moozhi. The watershed also has the 7 numbers of ponds distributed throughout the watershed area. The details of the drains and ponds in the watershed area are given in table No. 17.3&17.4.

Table No. 17.3 Table showing the details of Drains in Moozhi micro watershed

Grama Panchayat	Drains	Length (m)	Breadth (m)	Depth (m)
Pullampara	Anakuzhi Thodu	1000	5	5
	Chararoad Ela Thodu	950	3	4
	Kaithodu(1)	250	1	1
	Kaithodu(2)	250	1	1
	Kunchiyiramalli Ela Thodu	1050	1.5	2
	Pullampara Mankuzhi Thodu	2900	5	3
	Pullampara Menkamala Ela Thodu	2250	10	3.5
	Sasthamnada Thodu	1000	5	2.4
	Thembakala Kidarakuzhi Thodu	3500	3	5
	Thoombarakonam Thodu	950	2	2
	Uruvittikonam Thodu	1050	5	1
Vellumannadi Thodu	3000	5	3	
Manikkal	Anakuzhi Thodu	1000	5	5
	Anamugham Kallupalam Thodu	750	1	0.5
	Ayakode Ovinmugham Thodu	600	1	0.5
	Nedunkani Kaithodu	250	1	0.5
	Puthuval Nedunkani Thodu	850	1	0.5
	Thalayil Kaithodu	575	1	0.5
	Thalayil Thodu	2825	4	0.5
	Udiyamcode Panamoodu Thodu	450	1	0.5
Vembayam	Pottanpara Madhapuram Thodu	550	1	0.5
	Katta Madapuram Thodu	350	1	0.5

Table No. 17.4 Table showing the details of Ponds in Moozhi micro watershed

Sl. No	Grama Panchayat	Pond	Survey No.	Length (m)	Breadth (m)	Depth (m)
1	Pullampara	Adithattu Para Kulam	163	5	4	2
2		Adithattu Para Kulam1	161	4	2	2
3		ChullalamVellanchiraKulam	199	3	4	2
4		MukkudilKarikkakamKulam	202	2	1	2
5		AnchamkalluKuttikaduKulam	225	2	2	3
6		KaduvankuzhiKulam	429	4	4	3
7	Manikal	ThalayilChira	278	6	5	4

Land use

Agriculture is one of the prime activities in the watershed area. The major land use category mapped in the watershed area is rubber plantation. It occurs in an area of 1336.03 ha (70.61 %). The second major category is the mixed crops, which is the typical homestead cultivation of Kerala wherein the different crop species are grown together that cannot be spatially mapped separately. This is mapped in an area of 408.82 ha. An area of 2.14 ha is under paddy cultivation and an area of 1.34 ha of paddy lands has been left as cultivable wasteland which can be brought to paddy cultivation by providing necessary labour and irrigation facilities. An area of 0.42 ha is mapped as cultivable wastelands which can be brought under horticulture. An area of 10.17 ha (0.53 %) is under the built up land and an area of 10.99 ha is under the rocky area. The details of the land use categories with spatial extent are given in table.

Table No. 17.5 - Table showing land use categories in Moozhi micro watershed

Sl. No.	Land use category	Area in ha	Percentage
1	Builtup land	10.17	0.54
2	Paddy	2.14	0.11
3	Paddy converted Banana	3.93	0.21
4	Paddy converted Builtup land	0.45	0.02
5	Paddy converted Coconut	4.12	0.22
6	Paddy converted Tapioca	5.69	0.30
7	Paddy converted Banana + Tapioca	2.81	0.15
8	Paddy converted Vegetables	0.80	0.04
9	Paddy converted cultivable waste land	1.34	0.07
10	Paddy converted Mixed Crops	43.28	2.29
11	Paddy converted Rubber	20.14	1.06
12	Mixed Crops	408.82	21.61
13	Plantation Rubber	1255.32	66.34
14	Plantation Rubber (Young)	80.71	4.27
15	Cultivable Waste Land	0.42	0.02

Sl. No.	Land use category	Area in ha	Percentage
16	River	4.44	0.23
17	River Bank	15.98	0.84
18	Road land	19.64	1.04
19	Waterbody	0.95	0.05
20	Rock	10.99	0.58
	Total	1892.12	100.00

Geology

The major geological unit in the watershed is Garnet-Biotite gneiss with Migmatite occurring in an area of 1696.59 ha (89.66 %). The remaining area has a geological formation of Garnetiferous Biotite. The majority of the area is under the rock group of Migmatite complex followed by Khondalite group of rocks. A small portion of the area has Charnokite group of rocks. There are four geomorphological units of which more than 90 % (1739.54 ha) of the area falls under the category viz. lower plateau (laterite). An area of 71.19 ha is mapped under the category, valley fill.

Soils

The major soil series mapped in the watershed area is Nedumangad series having a solum thickness of 150 cm with very dark brown to pale brown colour. The soil is very strongly acid and has a surface texture of gravelly sandy clay loam to gravelly sandy clay. This is distributed in an area of 1561.52 ha (82.52 %). The river bank area is mapped under Mudhakkal series (21.01 ha) which is alluvial in origin. The major wetland series is Amaravila which is mapped in an area of 25.55 ha. Soils in more than half of the watershed area are deep soils with a depth of 100-150 cm and 21.59 % of the area (408.62 ha) is having moderately shallow soils with a depth of 50- 75 cm. The major surface soil textures in the watershed area constitutes that of gravelly clay loam (794.86 ha) and gravelly loam (757.92 ha). Nearly 50 % of the watershed area is prone to severe soil erosion which calls for proper soil and water conservation measures in the area.

Capacity Building/Trainings

Extensive training programmes and user interaction meetings were organized for the stake holders as part of the preparation of detailed project report. The details are given below:

No.	Training	Participants
1.	Block level awareness training	Elected representatives of three tier
2.	Block level orientation training	Elected representatives and ADS chairpersons
3.	Training on Base line survey	Two facilitators from NHG.
4.	Training on Drainage line treatment	Elected representatives and one facilitator from NHG.
5.	Focus Group Discussion	Elected representatives, Presidents and Secretaries of the NHGs, ADS

		chairpersons and MGNREGS labour groups and progressive farmers
6.	Training for Net Plan Preparation	Elected representatives, Vice Presidents and Joint Secretaries from NHG, ADS chairpersons and MGNREGS labour groups.
7.	Training for People's Estimate and Project Report Consolidation	Elected representatives, Office bearers of NHGs, ADS chairpersons and MGNREGS labour groups.

Watershed Committee

Watershed Committee is constituted by Gram Sabha to implement the watershed project with technical support of WDT in the panchayat. Watershed committees are formed following the parameters of watershed committee, keeping the gender sensitive issues intact. Watershed committee members are briefed about the project objectives and a workshop is also conducted in this regard at every panchayat. The watershed committee has a pivotal role to play during and after the project implementation period.

The details of Watershed Committee for Moozhi watershed is given below:

Table No. 17.6 -Details of Watershed Committee for Moozhi watershed

Office bearers

No.	Name	Designation	Sex	Position held	Phone No.
1	Chullalam Rajan	Chairperson	M	President, Pullampara GP	9446979551
2	K. Thankappan Nair	Vice chairperson	M	President, Manikkal GP	9446103727
3	Unnikrishnan	Convenor	M	VEO	9544016464
4	Abdul Azeez	Joint Convenor	M	NHG representative	9447553803
5	Anjana	Secretary	F	Social Mobilizer, WDT	9447781073
6	Jayakumari S.	Joint Secretary	F	NHG representative	9745340239
7	Manjusha M.	Treasurer	F	NHG representative	904893663

Members

Zone	Name	Address
1	Jayakumari S.	Kunnumpurathu veedu, Ayyampara, Pullampara P. O.
2	Lalithamma	Shinu Bhavan, Vattikunnu, Mukkudil P. O.
3	Sujatha P.	Eravikkarikkakathil veedu Muttippara, Pullampara P. O.
4	Manjusha M.	Manju Bhavan, Chullalam, Kunnanvega P. O.

5	Vimala M.	Kunnilveedu, Chullalam, Kunanvega P. O.
6	V. Rajendran Nair	Paluvalli thadatharikathu Veedu, Mannayam
7	Abdul Azees	Randunilayil Veedu, Kunnikkodu, Thempamoodu P. O.
8	Rajendran Nair	Kunnathu veedu, Thalayil, Kuthirakulam P. O.
9		Vembayam

Ex Officio Members

No.	Name	Position held
1	Remani P. Nair	Members, District Panchayath
	M. S. Raju	
	R. G. Manju	
2	G. Purushothaman Nair	Members, Block Panchayath
	M. S. Shaji	
	Sumaira R.	
	Sunitha V. I.	
	Anand G. Chandran	
3	Dileep Kumar, Perumala ward	Members, Grama Panchayath
	Sujatha P.,Muthippara ward	
	Pulimoottukonam Salim, Pullampara ward	
	Komalavalli P., Mukkudil ward	
	Sheeba O,Mankuzhi ward	
	Kuttimoodu Rasheed, Thembamoodu ward	
	Bindhu K., Thalayil ward	
	Sheelaja A., Cheeranikkara ward	
	Ushakumari K., Vettupara ward	
	Shajahan S., Vellanchira ward	
	Sreedharan Pillai J., S. N. Puram ward	
	V. S. Shinukumar, Malamukal ward	
	Vinod Lopez, Theerthankara ward	
4	E. Abdul Azeez, Pullampara Service Co-operative Bank	President, Primary Service Co- operative Bank
	Rajendran, Manickal Service Co-operative Bank	
	Krishnan Nair, Vembayam Service Co-operative Bank	
5	Shobitha Rameshan, Perumala ward	Chairpersons, Kudumbhasree ADS
	Anitha Manikandan, Muttippara ward	
	Deepakumari, Chullalam ward	
	Vimala, Mukkudil ward	
	Vasantha,Mankuzhi ward	
	Saraswathi, Thembamoodu ward	

	Shyamala C.,Thalayil ward	
	Cheeranikkara ward	
	Vettupara ward	
	Vellanchira ward	
	S. N. Puram ward	
	Malamukal ward	
	Theerthankara ward	
6	Unnikrishnan, VEO	Nominating Officer for Grama Panchayath level Watershed Committee
7	Anjana. P. B, Social Mobiliser, WDT	WDT Member

Neighbour hood Groups

Neighbour hood Groups are constituted in the watershed area combining 40 to 50 adjacent households which are living in a cluster. These are further subdivided into seven sub groups and one person from each subgroup is selected to the Neighbour hood Group Committee. These seven members formed a Neighbour hood Group Committee with a President, Vice President, Secretary, Joint Secretary and Treasurer. Of these Treasurer and one Committee member is lady. The ward members and ADS Chairpersons of the wards are Ex-officio members in all the NHG Committees. These Committees are registered with the concerned Grama Panchayat. The Presidents and Secretaries of the NHG Committees are members of the Watershed Committee.

The details of the NHG Committees in Moozhi watershed is as follows:

Table No. 17.7 -Details of the NHG Committees in Moozhi watershed

Sl. No	Ayalkoottam Reg. No	Total House holds	Land Holdings (in cents)					
			BPL	Land less	0-5	6-250	250-500	>500
Pullampara Grama Panchayath								
1	IWMP/PP/3/1	48	9		2	43	3	
2	IWMP/PP/3/2	25		1	2	22		
3	IWMP/PP/3/3	44			11	32	1	
4	IWMP/PP/3/4	44		1	12	30	1	
5	IWMP/PP/3/5	27		2	11	14		
6	IWMP/PP/3/6	42		5	7	30		
7	IWMP/PP/3/7	23			12	11		
8	IWMP/PP/3/8	49		3	17	28	1	
9	IWMP/PP/3/9	56		2	5	47	2	
10	IWMP/PP/4/1	55	29		17	37	1	
11	IWMP/PP/4/2	65	21		29	35	1	
12	IWMP/PP/4/3	45	12		3	41	1	
13	IWMP/PP/4/4	54	16		2	47	5	
14	IWMP/PP/4/5	40	12		6	34		

Sl. No	Ayalkoottam Reg. No	Total House holds	Land Holdings (in cents)					
			BPL	Land less	0-5	6-250	250-500	>500
15	IWMP/PP/4/6	64	50	6	22	36		
16	IWMP/PP/4/7	42	18		8	34		
17	IWMP/PP/4/8	31	14		4	27		
18	IWMP/PP/4/9	68	34		12	55	1	
19	IWMP/PP/4/10	39	21	3	10	26		
20	IWMP/PP/5/3	53	30	2	5	46		
21	IWMP/PP/5/6	38	14		6	30	2	
22	IWMP/PP/8/1	41	15	1	9	30	1	
23	IWMP/PP/8/2	55	23	1	9	45		
24	IWMP/PP/8/4	45	8		6	38	1	
25	IWMP/PP/9/1	70	41		9	60	1	
26	IWMP/PP/9/2	36	6		16	20		
27	IWMP/PP/9/3	59	13		5	51	3	
28	IWMP/PP/9/4	54	30		17	37		
29	IWMP/PP/9/5	52	29		9	42	1	
30	IWMP/PP/9/6	62	23	2	16	43	1	
31	IWMP/PP/9/7	66	22	1	8	56	1	
32	IWMP/PP/10/1	85	59	4	52	29		
33	IWMP/PP/10/2	46	12	1	8	35	2	
34	IWMP/PP/10/3	43	11	1	6	36		
35	IWMP/PP/10/4	37	6		4	33		
36	IWMP/PP/10/5	48	15		12	34	2	
37	IWMP/PP/10/6	56	25		6	50		
38	IWMP/PP/10/7	60	24		7	52	1	
39	IWMP/PP/10/8	46	27	1	12	33		
40	IWMP/PP/10/9	30	4		2	28		
41	IWMP/PP/11/1	52	9	1	6	43	2	
42	IWMP/PP/11/2	61	21	1	4	55	1	
43	IWMP/PP/11/3	51	10		5	45	1	
44	IWMP/PP/11/4	55	7		5	46	4	
45	IWMP/PP/11/5	56	27	1	6	48	1	
46	IWMP/PP/11/6	37	9		1	35	1	
47	IWMP/PP/11/7	51	12		2	47	2	
48	IWMP/PP/11/8	58	19		1	54	3	
49	IWMP/PP/15/1	80	7			6	74	
Manickal GramaPanchayath								
50	IWMP/MKL/7/1	64	28		6	58		

Sl. No	Ayalkoottam Reg. No	Total House holds	Land Holdings (in cents)					
			BPL	Land less	0-5	6-250	250-500	>500
51	IWMP/MKL/7/2	44	18	2	6	36		
52	IWMP/MKL/7/3	41	24		13	28		
53	IWMP/MKL/7/4	39	19		6	33		
54	IWMP/MKL/7/5	53	29		12	41		
55	IWMP/MKL/7/6	49	22		4	45		
56	IWMP/MKL/7/7	35	10		5	30		
57	IWMP/MKL/7/8	47	7			46	1	
58	IWMP/MKL/7/9	75	35		19	56		
Vembayam GramaPanchayath								
59	IWMP/VP/7/1	67	13		5	34	26	2
60	IWMP/VP/7/2	35	25		2	30	3	
61	IWMP/VP/7/3	31	14		9	18	4	
62	IWMP/VP/7/4	49	19		8	32	9	
63	IWMP/VP/7/5	39	12		4	31	4	
64	IWMP/VP/8/1	48	23		1	40	5	2
65	IWMP/VP/8/2	28	15		7	17	4	
Panavoor GramaPanchayath								
66	IWMP/PR/13/1	67	35		6	48	13	
67	IWMP/PR/13/2	57	28		7	37	13	
68	IWMP/PR/13/3	53	28		4	36	13	
69	IWMP/PR/14/1	19	10		3	13	3	
		3384	1208	42	573	2545	220	4

Self Help Groups

In addition to this, the existing Self Help Groups formed under the Kudumbasree Mission and other SHGs which are performing at a satisfactory level will be promoted to take various programmes under the Livelihood activities and Production Systems and Micro enterprises. If required, additional SHGs will also be formed in the watershed area in the coming years.

Activities proposed

Based on the series of discussions held with the different stakeholders the following activities are suggested for the micro watershed.

Table No. 17.8 -Details of activities proposed

Entry Point Activities	
1	Rain water harvesting at Janatha HSS, Thempamood
2	Solar water heater for Govt. LPS Mukkudil
3	Solar LED lamp at ThempamoodJn

4	Solar street lighting of colonies
5	Crop demonstration (water melon)
6	Renovation and side protection of Thalayilthodu
7	Mini drinking water scheme for Vettuppara
8	Planting avenue trees with tree guard
9	Planting bamboo seedlings along banks of Vamanapuram River
Natural Resource Conservation Activities	
1	Stream bank protection – engineering structures (1.50 M height)
2	Stream bank protection – engineering structures (1.00 M height)
3	Stone pitched contour bunding
4	Earthen bunds
5	Centripetal terracing with husk trenching and mulching
6	Strip terracing for rubber
7	Moisture collection pits
8	Wasteland development (planting of horticultural plants)
9	Planting horticultural crops as intercrops
10	Afforestation of school compounds and public buildings
11	Gully plugs
12	Foot bridges
13	Bridges at Kattakkal, Kizhakkumkara (Moozhi thode, Pullampara)
14	Water harvesting structures (wells)
15	Supply of Terafil Water Filter
16	Well recharging
17	Improvement of public wells
18	Improvement of existing wells
19	Construction of check dam at Chavarode
20	Repair of check dam at Kuthirakulam
21	Renovation of drains
22	Renovation of ponds
23	Mini drinking water scheme at Chakkakad
24	Mini drinking water scheme at Madappuram
25	Renovation and repair of existing mini drinking water scheme at Valupara
26	Renovation and repair of existing mini drinking water scheme at Valikunnu
27	Solar electrification of Grama Panchayat
28	Solar street lighting for colonies
29	Solar street lights
30	Installation of solar junction light
31	Supply of Portable solar lamps

32	Bus shelters with solar panels
33	Biogas plant
34	Stream bank stabilisation using Geo textiles
35	Conservation of sacred grooves
36	Live hedges
37	Fodder cultivation

Budget

The distribution of budget for Moozhi micro watershed for the various components as per IWMP guidelines is given below:

Table No. 17.9 - Budget for Moozhi micro watershed

No.	Budget component	% age	Amount in Rs.
1.	Administrative cost	10	28,53,000
2.	Monitoring	1	2,85,300
3.	Evaluation	1	2,85,300
Preparatory phase			
4.	Entry point activities	4	11,41,200
5.	Institution and capacity building	5	14,26,500
6.	Detailed Project Report	1	2,85,300
Watershed works phase			
7.	Natural Resources Conservation works	56	1,59,76,800
8.	Livelihood activities for asset less	9	25,67,700
9.	Production system and micro enterprises	10	28,53,000
10.	Consolidation phase	3	8,55,900
	Total	100	2,85,30,000

Moozhi Watershed (4V26a) - Action Plan

Table No. 17.10.1 -Sector-I- Natural Resources Conservation and Management - Ist Year Plan

No.	Activity	Unit	Unit cost	Target	IWMP	Convergence	WDF	Total
1	Earthen bunds	Rm	39.4	2500		98500		98500
2	Centripetal terracing with husk trenching and mulching	Nos.	278	1500		417000		417000
3	Strip terracing for rubber	Nos.	132	1600		211200		211200
4	Moisture collection pits	Nos.	49.82	750		37365		37365
5	Wasteland development (planting of horticultural plants)	cent	160	600	36000	60000	3600	99600
6	Planting horticultural crops as intercrops	cent	150	1200	60000	120000	6000	186000
7	Afforestation of school compounds and public buildings	cent	160	200	12000	20000	1200	33200
8	Gully plugs	Nos.	1300	5	6500		650	7150
9	Supply of Terafil Water Filter	Nos.	650	60	39000		3900	42900
10	Well recharging	Nos.	5000	40	200000		20000	220000
11	Improvement of public wells	Nos.	12000	10	120000		12000	132000
12	Improvement of existing wells	Nos.	6000	30	180000		18000	198000
13	Renovation of drains	m				500000		500000
14	Renovation of ponds	Nos.	250000	1	250000		12500	262500
15	Solar street lights	Nos.	25000	20	350000	150000	25000	525000
16	Supply of Portable solar lamps	Nos.	2000	50	70000	30000	10000	110000
17	Conservation of sacred grooves	Nos.	10000	1	10000		500	10500

18	Live hedges	50 m	1750	20	19000	16000	1900	36900
19	Fodder cultivation	3 cents	600	70	42000		4200	46200
	Total				1394500	1660065	119450	3174015

Moozhi Watershed (4V26a) - Action Plan

Table No. 17.10.2 -Sector-I- Natural Resources Conservation and Management –IInd Year Plan

No.	Activity	Unit	Unit cost	Target	IWMP	Convergence	WDF	Total
1	Stream bank protection – engineering structures (1.50 M height)	m	2290	200	458000		22900	480900
2	Stream bank protection – engineering structures (1.00 M height)	m	1609	160	257440		12872	270312
3	Stone pitched contour bunding	m ²	100.46	1500	150690		15069	165759
4	Earthen bunds	Rm	39.4	5000		197000		197000
5	Centripetal terracing with husk trenching and mulching	Nos.	278	3000		834000		834000
6	Strip terracing for rubber	Nos.	132	3200		422400		422400
7	Moisture collection pits	Nos.	49.82	1500		74730		74730
8	Wasteland development (planting of horticultural plants)	cent	160	1200	72000	120000	7200	199200
9	Planting horticultural crops as intercrops	cent	150	2400	120000	240000	12000	372000

10	Afforestation of school compounds and public buildings	cent	160	400	24000	40000	2400	66400
11	Gully plugs	Nos.	1300	6	7800		780	8580
12	Foot bridges	Nos.	10327	2	20654		2065.40	22719.40
13	Bridge at Kattakkal	Nos.	100000	1	100000		10000	110000
14	Water harvesting structures (wells)	Nos.	18000	26	468000		46800	514800
15	Supply of Terafil Water Filter	Nos.	650	90	58500		5850	64350
16	Well recharging	Nos.	5000	70	350000		35000	385000
17	Improvement of public wells	Nos.	12000	14	168000		16800	184800
18	Improvement of existing wells	Nos.	6000	60	360000		36000	396000
19	Construction of check dam at Chavarode	Nos.	100000	1	100000		10000	110000
20	Renovation of drains	m			0	1000000		1000000
21	Renovation of ponds	Nos.	250000	1	250000		12500	262500
22	Mini drinking water scheme at Chakkakad	Nos.	1000000	1	1000000		100000	1100000
23	Mini drinking water scheme at Madappuram	Nos.	300000	1	300000		30000	330000
24	Solar electrification of Pullampara Grama Panchayat Office	Nos.	500000	1	350000	150000	25000	525000
25	Solar street lighting for colonies	Nos.	200000	1	140000	60000	10000	210000
26	Solar street lights	Nos.	25000	30	525000	225000	37500	787500

27	Installation of solar junction light	Nos.	90000	3	189000	81000	13500	283500
28	Supply of Portable solar lamps	Nos.	2000	75	105000	45000	15000	165000
29	Bus shelters with solar panels	Nos.	40000	3	108000	12000	6000	126000
30	Biogas plant	Nos.	6500	8	52000		5200	57200
31	Stream bank stabilisation using Geo textiles	m2	191	240	45840		4584	50424
32	Conservation of sacred grooves	Nos.	10000	2	20000		1000	21000
33	Live hedges	50 m	1750	40	38000	32000	3800	73800
34	Fodder cultivation	3 cents	600	106	63600		6360	69960
Total					5901524	3533130	506180.40	9940834.40

Moozhi Watershed (4V26a) - Action Plan

Table No. 17.10.3 -Sector-I- Natural Resources Conservation and Management –IIIrdYear Plan

No.	Activity	Unit	Unit cost	Target	IWMP	Convergence	Beneficiary	Total
1	Stream bank protection – engineering structures (1.50 M height)	m	2290	200	458000		22900	480900
2	Stream bank protection – engineering structures (1.00 M height)	m	1609	160	257440		12872	270312
3	Stone pitched contour bunding	m2	100.46	1500	150690		15069	165759
4	Earthen bunds	Rm	39.4	5000		197000		197000
5	Centripetal terracing with husk trenching and mulching	Nos.	278	3000		834000		834000

6	Strip terracing for rubber	Nos.	132	3200		422400		422400
7	Moisture collection pits	Nos.	49.82	1500		74730		74730
8	Wasteland development (planting of horticultural plants)	cent	160	1200	72000	120000	7200	199200
9	Planting horticultural crops as intercrops	cent	150	2400	120000	240000	12000	372000
10	Afforestation of school compounds and public buildings	cent	160	400	24000	40000	2400	66400
11	Foot bridges	Nos.	10327	3	30981		3098.1	34079.1
12	Bridge at Kizhakkumkara	Nos.	100000	1	100000		10000	110000
13	Water harvesting structures (wells)	Nos.	18000	52	936000		93600	1029600
14	Well recharging	Nos.	5000	70	350000		35000	385000
15	Improvement of existing wells	Nos.	6000	60	360000		36000	396000
16	Repair of check dam at Kuthirakulam	Nos.	150000	1	150000		15000	165000
17	Renovation of drains	m			0	500000	0	500000
18	Renovation of ponds	Nos.	250000	2	500000		25000	525000
19	Renovation and repair of existing mini drinking water scheme at Valupara	Nos.	100000	1	100000		10000	110000
20	Renovation and repair of existing mini drinking water scheme at Valikunnu	Nos.	300000	1	300000		30000	330000

21	Solar street lighting for colonies	Nos.	200000	2	280000	120000	20000	420000
22	Installation of solar junction light	Nos.	90000	3	189000	81000	13500	283500
23	Supply of Portable solar lamps	Nos.	2000	50	70000	30000	10000	110000
24	Bus shelters with solar panels	Nos.	40000	3	108000	12000	6000	126000
25	Biogas plant	Nos.	6500	12	78000		7800	85800
26	Stream bank stabilisation using Geo textiles	m2	191	480	91680		9168	100848
27	Conservation of sacred grooves	Nos.	10000	1	10000		500	10500
28	Live hedges	50 m	1750	40	38000	32000	3800	73800
Total					4773791	2703130	400907.10	7877828.10

Moozhi Watershed (4V26a) - Action Plan

Table No. 17.10.4 -Sector-I- Natural Resources Conservation and Management –IVth Year Plan

No.	Activity	Unit	Unit cost	Target	IWMP	WDF	Total
1	Stream bank protection – engineering structures (1.50 M height)	m	2290	600	1374000	68700	1442700
2	Stream bank protection – engineering structures (1.00 M height)	m	1609	480	772320	38616	810936
3	Stone pitched contour bunding	m2	100.46	4500	452070	45207	497277
4	Foot bridges	Nos.	10327	3	30981	3098.10	34079.10
5	Water harvesting structures	Nos.	18000	52	936000	93600	1029600

	(wells)						
6	Well recharging	Nos.	5000	50	250000	25000	275000
7	Stream bank stabilisation using Geo textiles	m2	191	480	91680	9168	100848
Total					3907051	283389.10	4190440.10

Moozhi Watershed (4V26a) - Action Plan

Table No. 17.11.1 -Sector-II- Livelihood Support system for landless/ assetless - Ist Year Plan

Sl. No	Name of Activity	Unit	Unit Cost	Target	IWMP Fund	Beneficiary Contribution	Total
A	Enterprising individuals (10 %)						
1	Cow rearing	Nos.	22500	6	94500	40500	135000
2	Goat rearing	Nos.	10500	6	44100	18900	63000
3	Rabbit rearing	Nos.	8000	3	16800	7200	24000
4	Bee keeping	Nos.	10300	6	43260	18540	61800
5	Mushroom cultivation	Nos.	9000	4	25200	10800	36000
6	Tailoring	Nos.	10000	4	28000	12000	40000
Total					251860	107940	359800

Moozhi Watershed (4V26a) - Action Plan

Table No. 17.11.2 -Sector-II- Livelihood Support system for landless/ assetless- IInd Year Plan

Sl. No	Name of Activity	Unit	Unit Cost	Target	IWMP Fund	Beneficiary Contribution	Total
B	Revolving fund to SHGs (60 %)						
1	Carpet making						
2	Soap making		25000	6	112500	37500	150000
3	Curry powder		20000	14	210000	70000	280000
4	Bakery unit		15000	31	348750	116250	465000
5	Animal husbandry		10000	16	120000	40000	160000
6	Cloth bag making						
					791250	263750	1055000
C	Major livelihood activities (30 %)						
1	Vermi composting	Nos.	50000	1	25000	25000	50000
					25000	25000	50000
	Total				816250	288750	1105000

Moozhi Watershed (4V26a) - Action Plan

Table No. 17.11.3 -Sector-II- Livelihood Support system for landless/ assetless- IIIrd Year Plan

Sl. No	Name of Activity	Unit	Unit Cost	Target	IWMP Fund	Beneficiary Contribution	Total
B	Revolving fund to SHGs (60 %)						
1	Carpet making						
2	Soap making		25000	5	93750	31250	125000
3	Curry powder		20000	14	210000	70000	280000
4	Bakery unit		15000	31	348750	116250	465000
5	Animal husbandry		10000	16	120000	40000	160000
6	Cloth bag making						
					772500	257500	1030000
C	Major livelihood activities (30 %)						
1	Cow rearing	Nos.	500000	2	400000	600000	1000000
2	Goat rearing	Nos.	105000	1	52500	52500	105000
					452500	652500	1105000
	Total				1225000	910000	2135000

Moozhi Watershed (4V26a) - Action Plan

Table No. 17.11.4 -Sector-II- Livelihood Support system for landless/ assetless- IVth Year Plan

Sl. No	Name of Activity	Unit	Unit Cost	Target	IWMP Fund	Beneficiary Contribution	Total
C	Major livelihood activities (30 %)						
1	Mushroom cultivation	Nos.	150000	1	75000	75000	150000
2	Agricultural labour bank with implements	Nos.	500000	1	200000	300000	500000
	Total				275000	375000	650000

Moozhi Watershed (4V26a) - Action Plan

Table No. 17.12.1 -Sector-III- Production system and Microenterprises - Ist Year Plan

Sl. No	Name of Activity	Unit	Unit Cost	Target	IWMP Fund	Convergence	WDF	Total
1	Vegetable cultivation in terrace	Nos.	1500	640	480000	480000	172800	1132800
2	Planting of 5 banana plants	Nos.	170	2500	125000	300000	76500	501500
	Total				605000	780000	249300	1634300

Note: 20 percent of the beneficiaries will be SC/ST. Contribution to WDF is 20 % for General and 10 % for SC/ST

Moozhi Watershed (4V26a) - Action Plan**Table No. 17.11.2 -Sector-III- Production system and Microenterprises –IInd Year Plan**

Sl. No	Name of Activity	Unit	Unit Cost	Target	IWMP Fund	Convergence	WDF	Total
1	Backyard poultry	Nos.	1200	900	675000	675000	121500	1471500
2	Mushroom cultivation (10 beds)	Nos.	350	120	42000	78000	7560	127560
3	Bee keeping	Nos.	3500	40	160000	232000	25200	417200
4	Planting of 2 fruit plants	Nos.	80	2000	60000	100000	28800	188800
5	Planting of 2 timber plants	Nos.	70	2000	40000	100000	25200	165200
6	Planting of 10 pepper seedlings	Nos.	200	1490	149000	149000	53640	351640
	Total				1126000	1334000	261900	2721900

Note: 20 percent of the beneficiaries will be SC/ST. Contribution to WDF is 20 % for General and 10 % for SC/ST

Moozhi Watershed (4V26a) - Action Plan**Table No. 17.12.3 -Sector-III- Production system and Microenterprises –IIIrd Year Plan**

Sl. No	Name of Activity	Unit	Unit Cost	Target	IWMP Fund	Convergence	WDF	Total
1	Cow rearing	Nos.	22500	25	393750	168750	70875	633375
2	Goat rearing	Nos.	10500	25	183750	78750	33075	295575
3	Rabbit rearing	Nos.	8000	6	33600	14400	6048	54048
4	Carpet making	Nos.	22500	2	25000	25000	4500	54500
5	Cloth bag making	Nos.	22500	2	25000	25000	4500	54500
6	Mechanization support to livestock farmers	Nos.	45000	2	50000	40000	9000	99000

7	Support to women SHG for livestock rearing	Nos.	50000	2	50000	50000	9000	109000
8	Tailoring unit	Nos.	10000	2	16000	4000	2880	22880
	Total				777100	405900	139878	1322878

Note: 20 percent of the beneficiaries will be SC/ST. Contribution to WDF is 20 % for General and 10 % for SC/ST

Moozhi Watershed (4V26a) - Action Plan

Table No. 17.12.4 -Sector-III- Production system and Microenterprises –IVth Year Plan

Sl. No	Name of Activity	Unit	Unit Cost	Target	IWMP Fund	Convergence	WDF	Total
1	Organic vegetable cultivation	Nos.	25000	10	100000	150000	18000	268000
2	Planting of tuber crops	Nos.	20000	10	80000	120000	14400	214400
3	Jasmine cultivation	Nos.	15000	3	21600	23400	3888	48888
4	Organic banana cultivation	Nos.	30000	8	144000	96000	25920	265920
	Total				345600	389400	62208	797208

Note: 20 percent of the beneficiaries will be SC/ST. Contribution to WDF is 20 % for General and 10 % for SC/ST

MICRO WATERSHED BASED ACTION PLAN

NELLANAD MICRO WATERSHED (4V29b)

Nellanadmicro watershed is the largest watershed in the IWMP cluster (IWMP-I) with an area of 3029.03 ha (37.94% of total geographical area). This micro watershed is spread over Nellanad, Manickal, Pullampara, Vamanapuram GramaPanchayaths of Vamanapuram Block, Mudhakkal GramaPanchayath of Chirayinkeezhu Block and very small portion in the Mangalapuram and Pothencode Grama Panchayaths of Pothencode Block Panchayath also comes under this micro watershed.

General Description

Table No. 18.1 - General Description of Nellanad micro watershed

Name of micro watershed	: Nellanad
Micro watershed code	: 4V29b
River basin	: Vamanapuram
District	: Thiruvananthapuram
Block Panchayath	: Vamanapuram, Chirayinkeezhu, Pothencode
GramaPanchayath	: Nellanad, Manickal, Pullampara, Vamanapuram Mudhakkal, Mangalapuram&Pothencode
Villages	: Nellanad, Manickal, Koliyakode, Pullampara, Vamanapuram, Mudhakkal, Melthonakkal
Latitude	: 8 ^o 38'39" to 8 ^o 42'30" North
Longitude	: 76 ^o 51'01" to 76 ^o 56'40" East
Wards	: PullamparaPanchayath- 12, 13, 14 (full) MudhakkalPanchayath- 9,10,11,12,14 (full), 7,8,13,15 (part) NellanadPanchayath - 6, 7, 8, 9, 10, 11, 12, 13, 14, 16 (full), 1,2,4,5,15 (part) ManickalPanchayath – 4,5,6 (full), 7,13,14 (part) MangalapuramPanchayath – 6 (part) PothencodePanchayath –(part)
Total Area	: 3029.03 ha
% of area in the IWMP cluster	: 37.94%

Socio economic profile

As per the information provided in the baseline survey conducted, Nellanad micro watershed has a total number of 4480 households with a total population of 25146. The micro watershed has a total male population of 11983 and a total female population of 13163. 3092numbers of BPL families reside in the micro watershed area. A total number

of 4573 persons have registered under MGNREGS. 1089 households belong to Schedule Caste and 78 families belong to Schedule Tribe. Majority of the farmers are marginal farmers having only less than 1 ha of own land. Agriculture is the major source of livelihood in the micro watershed area. Apart from agriculture/horticultural practices, animal husbandry is also a source of livelihood some families in the watershed area. The socio economic details of the Nellanad micro watershed are given below:

Table No. 18.2 - Table showing the socio economic details of Nellanad micro watershed

1.	Total number of households		10304
2.	Population	Male	11983
		Female	13163
		Total	25146
	Child population	Male	5107
		Female	4871
		Total	9978
3.	No. of BPL families		3290
4.	No. of persons enrolled under MGNREGS		4573
5.	Households	Scheduled Caste	1089
		Scheduled Tribe	78
		General	9137
6.	Land holdings	Landless	113
		Very Marginal (less than 5 cents)	1854
		Marginal (5 to 250 cents)	7718
		Small (250 to 500 cents)	53
		Large (more than 500 cents)	22

Methodology

In line with the guidelines of IWMP, as suggested by Government of India, the following methodology was adopted for NRM planning and resource mapping.

1. Prepared the cadastral maps pertaining to the project area.
2. Overlaid the micro watershed boundaries over cadastral maps and corrected the boundaries through ground truth verification
3. Project Fellows were appointed as animators. The animators assisted the People's representatives in the formation of Neighbour Hood Groups. They act as master trainers and collected primary and secondary field data. The animators worked as the interface between LSGI and NHGs
4. Training Coordinators were engaged at project level for organizing the series of trainings at Block and Grama Panchayat levels.
5. Overseers were engaged for taking field estimates of the proposed activities.
6. Induction training was given for the project staff on PRA techniques, concept of maps and Resource Mapping.

7. Printed posters, banners and notices for providing wide publicity regarding the programme.
8. Two block level seminars were conducted for People's representatives of District/Block/GramaPanchayats, line departments, Kudumbasree, and other functionaries.
9. This was followed by orientation seminars at GramaPanchayats.
10. Conducted transect walk with ward members and ADS.
11. During the transect walk, major drains, gullies and drainage lines are identified and marked in the cadastral map.
12. NHGs were formed at grass root level comprising of 40 to 50 neighbouring households.
13. Panchayat Level Watershed Committees were convened at Grama Panchayats for finalizing the modalities of work.
14. Trainer's training for base line survey were conducted for two facilitators from each Neighbour Hood Group
15. Predefined questionnaire was prepared for data collection from each household.
16. A block level seminar was organized on drainage line treatment. Followed by Technical presentations, group discussions were held at Grama Panchayat level to draw out the requirements. The suggestions were presented by concerned Grama Panchayat Presidents.
17. Various resources like different water bodies, wells and farm ponds are identified and marked in the cadastral map with the help of the facilitators selected from the NHGs.
18. Focus Group Discussions were organised at Panchayat level for ward members & ADS Chairpersons, Presidents & Secretaries of NHGs, Padashekhara Samithi, Kera Samithi, Kudumbasree, MGNREGS, Officials of Agriculture, Veterinary& Soil Conservation Departments. Followed by technical sessions, group discussions at ward level were held and suggestions were presented by Grama Panchayat members.
19. New questionnaire for net plan preparation was prepared for data collection from each household and NHG.
20. The land resource maps already prepared were updated using high resolution satellite imagery and these interpreted maps were corrected with the help of NHGs and accordingly present land use map is prepared using different notions and symbols.
21. Trainer's training for detailed survey for net plan preparation organized at Grama Panchayat level for ward members & ADS Chairpersons, Vice Presidents & Joint Secretaries of NHGs, MGNREGS officials, etc. The information gathered includes soil and water conservation activities to be taken up through MGNREGS and other schemes and list of agricultural/veterinary/fisheries activates to be taken up in each household. The list of drains/ponds/wells to be rejuvenated/renovated and

the details of group activities/livelihood activities to be taken up in each NHG were also collected.

22. Thematic maps on geology and geomorphology were interpreted from the high resolution satellite imagery and were corrected through ground truth verification.
23. Panchayat Level Watershed Committees were convened at Grama Panchayats and the list of entry point activities suggested were discussed and finalized.
24. Trainer's training for taking people's estimates and consolidation of project proposals. This was organized at Grama Panchayat and NHG level. Elected representatives, ADS Chairpersons, Officer bearers of NHGs, MGNREGS officials, etc. attended this training. The information gathered on soil and water conservation activities to be taken up through MGNREGS and other schemes and list of agricultural/veterinary/fisheries activities to be taken up were finalized. The list of drains/ponds/wells to be rejuvenated/renovated and the details of group activities/livelihood activities to be taken up in each NHG were also finalized. The livelihood action plan and the activities under production system were also consolidated.
25. The suggestions were split for four years and four separate annual plans were also prepared.
26. Finally a proposed land use map, area treatment map and drainage line treatment map were so prepared which is treated as the strategic action plan on Natural Resources Management perspective for the micro watershed during the entire project period.
27. Major activities included in the watershed project are.
 - Soil and moisture conservation measures like centripetal and bench terracing, earthen and stone pitched contour bunding, trenching, vegetative barriers, etc.
 - Rain water harvesting activities like farm ponds, percolation tanks, check dams etc.
 - Well recharging and rain water harvesting structures like roof water harvesting and rain water collection pits.
 - Planting and sowing of multipurpose trees, shrubs, grasses, legumes and pasture land development.
 - Encouraging natural regeneration including fodder cultivation.
 - Promotion of agro-forestry and horticulture
 - Capacity building and creation of a greater degree of awareness among the participants.
 - Encouraging people's participation with the involvement of NHGs.
 - Livelihood activities for asset less people
 - Production system and Micro enterprises

Biophysical Resources

Physiography

The relief of the watershed ranges from 10 m above MSL to 200 m above MSL. The majority of the area falls in the relief category of 40 to 60 m above MSL which occurs in an area of 1507.56 ha (49.77 %). An area of 11.12 ha is located above 150m above MSL.

Slope

The watershed area is divided into six categories of slope classes. The majority of area is under the strongly sloping class having 10 – 15 % slope. The category spreads over an area of 1355.79 ha (44.10%), 754.57ha of the watershed area is having moderately steep to steeply sloping lands and 98.31 ha is having very steeply sloping lands which requires urgent soil and water conservation measures.

Drains

The Nagaraukuzhy-Thycaud-Mudakkal thodu, one of the major tributary of Vamanapuram River flowing through the south boundary of the watershed is the major drain of this watershed. A number of drains are originating from the different parts of this watershed reaches to this drain which joins to the Vamanapuram River. The watershed also has 25 numbers of ponds distributed throughout the watershed area. The details of the drains and ponds in the watershed area is given in table No. 18.3 & 18.4

Table No. 18.3 - Table showing the details of Drains in Nellanad micro watershed

Grama Panchayat	Drains	Length (m)	Breadth (m)	Depth (m)
Nellanad	Taikkadu Makkamkonam	2750	5	1.5
	Makkamkonam Panikkarukonam thodu	1250	3	1
	Puthukulangara mailathukavu thodu	750	5	1
	Thallu Vattakonathu thodu	450	3	1
	Kannakkodu Ela thodu	250	2	2
	Kariyakonam thodu	750	2	3
	Kaithodu 1	100	2	2
	Kaithodu 2	250	2	4
	Parameswaram kizhakkemudakkal ela thodu	2050	5	4
	Pinantharakonam kanjirampara thodu	2950	5	4
	Kaithodu 2	1050	5	3
	Kuruvallikonam thodu 2	700	5	3
	Kuruvallikonam Ela thodu 1	1050	5	3
	Vettuvila kaikkad thodu	4300	10	5
	Chanelil Ela thodu	1500	6	5
	Mudakkal Kaithodu	600	3	3
	Puthoor thodu	600	2	3
Manickal	Chettakavu Thodu	350	1.5	0.5

Grama Panchayat	Drains	Length (m)	Breadth (m)	Depth (m)
	Kaithodu	250	1.5	0.5
	Kalkudi Thodu	550	1	0.5
	Kunchikuzhi Thodu	425	2	0.5
	Kuthirakulam Ela Thodu	775	3	0.5
	Kuthirakulam Thodu	573	3	0.5
	Mulayam Thodu	950	2	0.5
	Panayil Thodu	300	1.5	0.5
	Ponnambi Nada Thodu	650	3	0.5
	Thozhunthur Thodu	1025	1	0.5
	Udiyancode Edanadu Thodu	260	3	0.5
Pullampara	Karijamkonath Ela Thodu	450	1.5	2
	Kavathiyottu Ela Kaithodu	650	1.5	2
	Mullamangalam Kaithodu	600	2	2
	Nagarukuzhi Kaithodu	650	1.5	0.5
	Nagarukuzhi Palamkonam Thodu	3300	3	1.5
	Palamkonathu Kaithodu	450	1.5	1.5
	Pattayanikonath Ela Thodu	2000	3	1.5
	Pennambi Nada Thodu	650	3	0.5
	Thevarukonathu Kaithodu	600	2	2
	Udiyancode Edanadu Thodu	260	3	0.5
	Villyamangalam Kaithodu	200	2	1

Table No. 18.4 - Table showing the details of Ponds in Nellanad micro watershed

Sl. No	Grama Panchayat	Pond	Survey No.	Length (m)	Breadth (m)	Depth (m)
1	Nellanad	Chullakulam	391	35	10	30
2		MariyamKulam	436	10	8	0.5
3		MariyamAmbalakulam	427	20	5	1
4		MariyamThodikulam	435	17	10	1
5		MariyamKavukulam	434	7	4	4
6		ParavilakonamChira	536	140	70	6
7		ChirathalakkalKulam	459	50	25	12
8		ParavilakonamCherukulam	523	20	10	4
9		KottaramKulam	456	20	10	25
10		MakkamkonamKulam	245	25	25	10
11		PanikkarukonamChira	229	25	15	25
12		KannankottuChira	290	20	20	75
13		MulavettuParambuKulam	145	5	4	7
14		ChengazhattuKulam	149	17	5	2

Sl. No	Grama Panchayat	Pond	Survey No.	Length (m)	Breadth (m)	Depth (m)
15	Nellanad	PlatharakonathuChira	168			
16		ParameswaramAmbalakulam	175	45	45	5
17		ParayarukonathuChira	317	30	25	3
18		ParayarukonathuKulam	335	25	20	5
19		MukkunnoorAmbalakulam	344	40	32	2
20		CherukottukavuAmbalakulam	356	18	17	1
21	Pullampara	ManikkanValliChira	344	25	20	4
22		PalamkonamKulam	388	20	10	5
23	Manikal	PirappancoduKshethraKulam	67	100	65	3
24		KunjikuzhiChira	145	35	25	1
25		ChelakkadKulam	44	25	25	3

Land use

Agriculture is prime activity in the watershed area. The major land use category mapped in the watershed area is rubber plantation. It occurs in an area of 1500.70 ha (49.54%). The second major category is the mixed crops which are the typical homestead cultivation of Kerala wherein the different crop species are grown together that cannot be spatially mapped separately. This is mapped in an area of 939.77 ha. An area of 70.27 ha is under coconut plantation. This area can be brought under intensive agriculture through multi-tier cropping. An area of 17.42 ha is under paddy cultivation and 18.16 ha of paddy lands has been left as cultivable wasteland which can be brought to paddy cultivation by providing necessary labour and irrigation facilities. An area of 7.62 ha is mapped as cultivable wastelands which can be brought under horticulture. An area of 81.75 ha (2.69 %) is under the built up land and an area of 9.45 ha is under the rocky area. The details of the land use categories with spatial extent are given in table.

Table No. 18.5 - Table showing land use categories in Nellanad micro watershed

Sl. No.	Land use category	Area in ha	Percentage
1	Builtup land	81.74	2.70
2	Paddy	17.42	0.57
3	Paddy converted Banana	41.82	1.38
4	Paddy converted Tapioca	34.78	1.15
5	Paddy converted Banana + Tapioca	38.29	1.26
6	Paddy converted Banana + Vegetables	2.74	0.09
7	Paddy converted Builtup land	3.36	0.11
8	Paddy converted Coconut	30.02	0.99
9	Paddy converted Coconut + Tapioca	7.59	0.25
10	Paddy converted Mixed Crops	73.46	2.43
11	Paddy converted Rubber	82.83	2.73
12	Paddy land left as cultivable waste land	18.16	0.60

Sl. No.	Land use category	Area in ha	Percentage
13	Coconut	70.27	2.32
14	Mixed Crops	939.77	31.03
15	Plantation Rubber	1443.18	47.64
16	Plantation Rubber (Young)	57.51	1.90
17	Playground	1.19	0.04
18	Cultivable Waste Land	7.62	0.25
19	Wasteland	1.30	0.04
20	Quarry Abandoned	4.60	0.15
21	Quarry	6.77	0.22
22	Rock	9.45	0.31
23	Road land	34.57	1.14
24	River Bank	19.21	0.63
25	Water body	1.38	0.05
	Total	3029.03	100.00

Geology

The major geological unit in the watershed is Garnetiferous Biotite occurring in an area of 1840.09 ha (60.74 %). The remaining area has a geological formation of Garnet-Biotite gneiss with Migmatite. The majority of the area in the watershed has Migmatite complex of rocks, followed by Khondalite and Charnokite group of rocks. A very small portion is having sand and silt group of rocks. There are four geomorphological units, of which more than 85 % (2630.15 ha) of the area falls under the category viz. lower plateau (laterite). An area of 341.56 ha is mapped under the category viz. valley fill.

Soils

The major soil series mapped in the watershed area is Trivandrum series having moderately deep to deep medium textured and well drained soils. The soils are acidic in nature having dark reddish brown colour with gravelly sandy loam texture. This occurs in an area of 1216.49 ha. This is followed by Nedumangad series having a solum thickness of 150 cm with very dark brown to pale brown colour. The soil is very strongly acid and has a surface texture of gravelly sandy clay loam to gravelly sandy clay. This is distributed in an area of 662.11 ha (21.87 %). The major low land series mapped in the area are Manickal and Vembayam which are alluvial in origin. Soils in more than one third of the watershed area (1236.55 ha) are moderately deep soils with a depth of 75- 100 cm and 36.11 % of the area (1094.15 ha) is having deep soils with a depth of 100- 150 cm. The major surface soil textures in the watershed area constitutes that of gravelly clay loam (1401.92 ha) and gravelly loam (542.78 ha) and clay (381.81 ha). Nearly 50 % of the watershed area is prone to moderate soil erosion and 943.69 ha is affected by severe erosion which calls for proper soil and water conservation measures in the area.

Capacity Building/Trainings

Extensive training programmes and user interaction meetings were organized for the stake holders as part of the preparation of detailed project report. The details are given below:

No.	Training	Participants
1.	Block level awareness training	Elected representatives of three tier
2.	Block level orientation training	Elected representatives and ADS chairpersons
3.	Training on Base line survey	Two facilitators from NHG.
4.	Training on Drainage line treatment	Elected representatives and one facilitator from NHG.
5.	Focus Group Discussion	Elected representatives, Presidents and Secretaries of the NHGs, ADS chairpersons and MGNREGS labour groups and progressive farmers
6.	Training for Net Plan Preparation	Elected representatives, Vice Presidents and Joint Secretaries from NHG, ADS chairpersons and MGNREGS labour groups.
7.	Training for People’s Estimate and Project Report Consolidation	Elected representatives, Office bearers of NHGs, ADS chairpersons and MGNREGS labour groups.

Watershed Committee

Watershed Committee is constituted by Gram Sabha to implement the watershed project with technical support of WDT in the panchayat. Watershed committees are formed following the parameters of watershed committee, keeping the gender sensitive issues intact. Watershed committee members are briefed about the project objectives and a workshop is also conducted in this regard at every panchayat. The watershed committee has a pivotal role to play during and after the project implementation period.

The details of the Watershed Committee for Nellanad watershed is given below:

Table No. 18.6 – Details of the Watershed Committee

Office bearers

No.	Name	Designation	Sex	Position held	Phone No.
1	Anitha Maheshan	Chairperson	F	President, Nellanad GP	9846685637
2	Adv. S. Lenin	Vice chairperson	M	President, Mudhakkal GP	9946178898
3	Chithra	Convener	F	VEO, Nellanad GP	9645075176
4	Mohanan	Joint Convener	M	NHG representative	9656173474

5	Anjana. P. B	Secretary	F	Social Mobilizer, WDT	9447781073
6	Rajendran Nair	Joint Secretary	M	NHG representative	9745722704
7	Sreeja	Treasurer	F	NHG representative	

Members

Zone	Name	Address
1	Varghese Koshi	Bhagavathikonam, Venjaramoodu
2	K. Soman	Valiyaveedu, Vayyettu, Venjaramoodu
3	Rameshan Nair	Kalabavan, Venjaramoodu
4	Sreeja	Vilayilveedu Mururkonam
5	Manoj	Charuvila Puthen Veedu Oorupoika
6	Hair	Lalitha Bhavan, Poikamukku
7	Mohanan	Mohanam, Thaikkadu, Pirappancode
8	Sujith	Sujith Bhvan, Kuthirakulam, Pirappancode
9	Rajendran Nair	R. S. Mandiram, Palamkonam

Ex Officio Members

No.	Name	Position held
1	Remani P. Nair	Members, District Panchayath
	Satheeshan Nair	
	Sukhi Rajan	
2	Baby Sulekha	Members, Block Panchayath
	G. Purushothaman Nair	
	M. S. Binu	
	Kalakumari G.	
	O. S. Ambika	
3	Karunakaran Nair	Members, Grama Panchayath
	Bhasi, Kottukunnam ward	
	Abhilash R. Nellanad ward	
	Vijayan C. Kizhazhikonam Ward	
	Saji Varghese, Thottupuram Ward	
	Sarala Kumari S., Mailaykkal Ward	
	Ushakumar R., Venjaramood Ward	
	Sunil D., Manikkamangalam Ward	
	Nisha S., Puthoor Ward	
Sudheer S., Valiyakattakkal Ward		

No.	Name	Position held
	Vilasini S. Kavara Ward	Members, Grama Panchayath
	Appukuttan Pillai R. Mukkunnur Ward	
	Beena Rajendran, Aalanthara Ward	
	Mahesh J. S., Mandapakunnu Ward	
	Shailaja S. Kurup, Parameswaram Ward	
	Baburajan K. Valakkad Ward	
	Usha Anithakumar, Pirappankkottukonam Ward	
	Vijayakumari R. S., Parayadi Ward	
	Anitha Harikumar Poikamukku Ward	
	Anitha Rajanbabu Mudakkal Ward	
	Soman N. Chempoor Ward	
	Surendran Nair Kattiyade Ward	
	Bipin S. R. Kaipalukonam Ward	
	Sreedharan Nair G., Thaikkad Ward	
	Anitha R. Pirappancode Ward	
	Jayan K., Kuthirakkulam Ward	
	Sudhakumari R., Koppam Ward	
	Rema S., Annal Ward	
	Santhakumari D. Plakkeezhu Ward	
	Vijayakumari R. Velavoor Ward	
	Vilasini, Aattukal Ward	
	Shylakumari K. Palamkonam Ward	
	Suhara Salim Nagarukuzhi Ward	
	Nafeesathu Beevi Gafur Aanachal Ward	
	Bindu Babu., Muringaman Ward	
4	Rice. A. M, Venjaramood Service Cooperative Bank	President, Primary Service Co-operative Bank
	Rajan Babu, Mudakkal Service Coperative Bank	
	Rajendran, Manickal Service Coperative Bank	
	Abdul Azeez, Pullampara Service Coperative Bank	
5	Sumathi P., Kottukunnam Ward	Chairpersons, Kudumbhasree ADS
	Aishathu, Nellanad Ward	
	Geetha, Kizhazhikonam Ward	
	Thulasi, Thottupuram Ward	
	Baby P., Mailaykkal Ward	
	Venjaramoode Ward	
	Ushakumari R.Manikkamangalam Ward	
	Leela, Puthoor Ward	
	Saji, Valiyakattakkal Ward	
	Sheela, Kavara Ward	
	Sujatha, Mukkunnur Ward	
	Suja Suresh, Kuruvakonam Ward	
	Chithra, Aalanthara Ward	

No.	Name	Position held
	Saji, Mandapakunnu Ward	Chairpersons, Kudumbhasree ADS
	Soumya, Parameswaram Ward	
	Valakkad Ward	
	Pirappankottukonam Ward	
	Vasantha, Ward	
	Subadra, Poikamukku Ward	
	Nimmi, Mudakkal Ward	
	Chandrika, Chempoor Ward	
	Leelamani, Kattiyade Ward	
	Simi, Kurikkakam Ward	
	Kaipalukonam Ward	
	Manju, Thaikkad Ward	
	Kaladevi S, Pirappancode Ward	
	Vasumathi, Kuthirakkulam Ward	
	Sakunthala, Koppam Ward	
	Radhamani, Annal Ward	
	Suma. S, Plakkeezhu Ward	
	Sheeja, Velavoor Ward	
	Jayasree, Aattukal Ward	
	Omana, Palamkonam Ward	
	Sreedevi Amma, Nagarukuzhi Ward	
	Aanachal Ward	
	Ammini Mahendran, Muringaman Ward	
6	Chithra, VEO, Nellanad	Nominating Officer for Grama Panchayat level Watershed Committee
7	Anjana. P. B, Social Mobilizer	Nominated WDT Member for PIA

Neighbour hood Groups

Neighbour hood Groups are constituted in the watershed area combining 40 to 50 adjacent households which are living in a cluster. These are further subdivided into seven sub groups and one person from each subgroup is selected to the Neighbour hood Group Committee. These seven members formed a Neighbour hood Group Committee with a President, Vice President, Secretary, Joint Secretary and Treasurer. Of these Treasurer and one Committee member is lady. The ward members and ADS Chairpersons of the wards are Ex-officio members in all the NHG Committees. These Committees are registered with the concerned Grama Panchayat. The Presidents and Secretaries of the NHG Committees are members of the Watershed Committee.

The details of the NHG Committees in Nellanad watershed is as follows:

Table No. 18.6 –Details of the NHG Committees

Sl. No	Ayalkoottam Reg. No	Total House holds	Land Holdings (in cents)					
			BPL	Land less	0-5	6-250	250-500	>500
Nellanad GramaPanchayath								
1	IWMP/NP/1/1	65	22		8	57		
2	IWMP/NP/1/2	53	21		6	47		
3	IWMP/NP/2/1	109	41		9	99	1	
4	IWMP/NP/4/1	66	43		17	48		1
5	IWMP/NP/4/2	42	15		8	34		
6	IWMP/NP/4/3	61	35		11	50		
7	IWMP/NP/5/1	57	18		12	44	1	
8	IWMP/NP/5/2	39	27		14	25		
9	IWMP/NP/5/3	54	38		11	43		
10	IWMP/NP/5/4	55	21	1	13	41		
11	IWMP/NP/5/5	45	7	4	6	33	1	1
12	IWMP/NP/5/6	86	52		36	50		
13	IWMP/NP/6/1	42	7		6	36		
14	IWMP/NP/6/2	70	17		14	56		
15	IWMP/NP/6/3	46	11		7	39		
16	IWMP/NP/6/4	77	20		15	62		
17	IWMP/NP/6/5	67	22		6	59		2
18	IWMP/NP/6/6	64	10	3	10	51		
19	IWMP/NP/6/7	40	5	1	8	31		
20	IWMP/NP/6/8	63	17	1	15	47		
21	IWMP/NP/6/9	66	20		10	56		
22	IWMP/NP/7/1	37	11	4	6	27		
23	IWMP/NP/7/2	63	28	2	13	48		
24	IWMP/NP/7/3	44	11	2	13	24	5	
25	IWMP/NP/7/4	52	18	15	35	2		
26	IWMP/NP/7/5	41	5	3	5	33		
27	IWMP/NP/7/6	33	1	2	24	7		
28	IWMP/NP/7/7	34	4		4	30		
29	IWMP/NP/7/8	42			7	34	1	
30	IWMP/NP/8/1	52	15	7	11	34		
31	IWMP/NP/8/2	58	8		3	55		
32	IWMP/NP/8/3	47	13	1	9	37		
33	IWMP/NP/8/4	48	13		7	41		
34	IWMP/NP/8/5	51	20		37	14		
35	IWMP/NP/9/1	65	15		15	49	1	
36	IWMP/NP/9/2	64	8	1	6	57		

Sl. No	Ayalkoottam Reg. No	Total House holds	Land Holdings (in cents)					
			BPL	Land less	0-5	6-250	250-500	>500
37	IWMP/NP/9/3	74	15	2	21	51		
38	IWMP/NP/9/4	69	9	1	10	58		
39	IWMP/NP/9/5	49	15	5	13	31		
40	IWMP/NP/9/6	52	4		6	46		
41	IWMP/NP/9/7	60	14	1	11	48		
42	IWMP/NP/9/8	67	47		35	32		
43	IWMP/NP/9/9	86	30	1	23	62		
44	IWMP/NP/9/10	39	18	1	9	29		
45	IWMP/NP10/1	60	11		10	47	3	
46	IWMP/NP10/2	67	11		11	56		
47	IWMP/NP10/3	57	21		13	44		
48	IWMP/NP10/4	56	13	1	41	14		
49	IWMP/NP10/5	60	12		10	47	3	
50	IWMP/NP/11/2	44	8	1	1	40	2	
51	IWMP/NP/11/3	58	21	1	8	49		
52	IWMP/NP/11/4	54	24	1	12	41		
53	IWMP/NP/11/5	25	2			25		
54	IWMP/NP/11/6	91	35		14	77		
55	IWMP/NP/12/1	0						
56	IWMP/NP/12/2	60	14	1	7	52		
57	IWMP/NP/12/3	73	23		14	59		
58	IWMP/NP/12/4	52	18		8	44		
59	IWMP/NP/12/5	52	9		6	45	1	
60	IWMP/NP/12/6	50	14		7	41	2	
61	IWMP/NP/12/7	61	25		3	58		
62	IWMP/NP/12/8	75	57		41	34		
63	IWMP/NP/13/1	39	20	1	10	28		
64	IWMP/NP/13/2	32	12	1	7	23	1	
65	IWMP/NP/13/3	46	25	2	6	38		
66	IWMP/NP/13/4	47	23		10	37		
67	IWMP/NP/13/5	44	15		7	36	1	
68	IWMP/NP/13/6	89	44		20	68	1	
69	IWMP/NP/14/1	68	37		22	46		
70	IWMP/NP/14/2	66	9		7	59		
71	IWMP/NP/14/3	56	12		6	48	2	
72	IWMP/NP/14/4	73	25		7	65		1
73	IWMP/NP/14/5	45	15		1	43	1	
74	IWMP/NP/14/6	65	25		10	54	1	

Sl. No	Ayalkoottam Reg. No	Total House holds	Land Holdings (in cents)					
			BPL	Land less	0-5	6-250	250-500	>500
75	IWMP/NP/15/1	74	18	1	19	53	1	
76	IWMP/NP/15/2	17	4		5	12		
77	IWMP/NP/15/3	15	7		9	6		
78	IWMP/NP/16/1	68	21		7	61		
79	IWMP/NP/16/2	54	19		10	44		
80	IWMP/NP/16/3	43	22	1	5	36		1
81	IWMP/NP/16/4	50	18		10	40		
82	IWMP/NP/16/5	48	23		5	43		
83	IWMP/NP/16/6	57	26		20	37		
84	IWMP/NP/16/7	48	3		22	26		
Mudakkal GramaPanchayath								
1	IWMP/MP/7/1	28	5	1	3	24		
2	IWMP/MP/9/1	53	15		2	51		
3	IWMP/MP/9/2	61	25		13	46	2	
4	IWMP/MP/9/3	63	27		2	61		
5	IWMP/MP/9/4	56	10		4	52		
6	IWMP/MP/9/5	76	24		3	70		3
7	IWMP/MP/9/6	56	25		11	44		1
8	IWMP/MP/9/7	55	9		2	51		2
9	IWMP/MP/10/1	53	15		4	49		
10	IWMP/MP/10/2	50	29		11	38		1
11	IWMP/MP/10/3	43	18		1	42		
12	IWMP/MP/10/4	49	20		8	41		
13	IWMP/MP/10/5	54	25	1	11	42		
14	IWMP/MP/10/6	51	8		6	45		
15	IWMP/MP/10/7	55	17		6	49		
16	IWMP/MP/10/8	37	3	1	1	35		
17	IWMP/MP/10/9	40	23		8	32		
18	IWMP/MP/10/10	57	27		7	50		
19	IWMP/MP/10/11	42	20	1	7	34		
20	IWMP/MP/11/1	70	16		9	59		2
21	IWMP/MP/11/2	47	7		2	45		
22	IWMP/MP/11/3	41	4	1	3	36		1
23	IWMP/MP/11/4	49	9		2	47		
24	IWMP/MP/11/5	43	14		15	27		1
25	IWMP/MP/11/6	76	39		12	64		
26	IWMP/MP/11/7	47	17		18	28		1

Sl. No	Ayalkoottam Reg. No	Total House holds	Land Holdings (in cents)					
			BPL	Land less	0-5	6-250	250-500	>500
27	IWMP/MP/11/8	39	12		5	34		
28	IWMP/MP/11/9	42	6		3	38		1
29	IWMP/MP/12/1	58	9		6	51	1	
30	IWMP/MP/12/2	51	10		5	46		
31	IWMP/MP/12/3	44	9		0	44		
32	IWMP/MP/12/4	50	23		9	41		
33	IWMP/MP/12/5	30			2	28		
34	IWMP/MP/12/6	44	16		2	42		
35	IWMP/MP/12/7	53	13	1	10	42		
36	IWMP/MP/12/8	38	2		2	35	1	
37	IWMP/MP/12/9	41	5		5	36		
38	IWMP/MP/13/1	62	15	2	5	55		
39	IWMP/MP/13/2	56	20		5	51		
40	IWMP/MP/13/3	50	21	1	2	47		
41	IWMP/MP/14/1	63	13		5	57	1	
42	IWMP/MP/14/2	55	17	1	12	39	3	
43	IWMP/MP/14/3	16	5	12	3	1		
44	IWMP/MP/14/4	36	12		1	34	1	
45	IWMP/MP/14/5	47	23		2	44	1	
46	IWMP/MP/14/6	70	23	2	9	57	2	
Manickal GramaPanchayath								
1	IWMP/MKL/4/1	52	21	2	7	42	1	
2	IWMP/MKL/4/2	26	19		2	23	0	1
3	IWMP/MKL/4/3	33	10		8	25		
4	IWMP/MKL/4/4	30	9		3	27		
5	IWMP/MKL/4/5	78	22		39	39		
6	IWMP/MKL/4/6	39	8		11	28		
7	IWMP/MKL/4/7	25	18		16	9		
8	IWMP/MKL/5/1	52	18		1	51		
9	IWMP/MKL/5/2	57	13		14	43		
10	IWMP/MKL/5/3	27	10	2	5	20		
11	IWMP/MKL/5/4	32	12	1	6	25		
12	IWMP/MKL/5/6	27	10		5	22		
13	IWMP/MKL/5/7	40	14		8	32		
14	IWMP/MKL/5/8	19			2	17		
15	IWMP/MKL/5/9	32	12		4	28		
16	IWMP/MKL/5/10	38	10		6	32		

Sl. No	Ayalkoottam Reg. No	Total House holds	Land Holdings (in cents)					
			BPL	Land less	0-5	6-250	250-500	>500
17	IWMP/MKL/6/1	41	21		2	38	1	
18	IWMP/MKL/6/2	42	18		3	37	2	
19	IWMP/MKL/6/3	57	26		11	45	1	
20	IWMP/MKL/6/4	73	19		12	59	2	
21	IWMP/MKL/6/5	26	6		2	24		
22	IWMP/MKL/6/6	56	33		12	44		
23	IWMP/MKL/6/7	42	39		4	37		1
24	IWMP/MKL/6/8	55	8		13	42		
25	IWMP/MKL/6/9	47	33		14	33		
26	IWMP/MKL/12/1	37	8	1	2	34		
27	IWMP/MKL/12/2	32	6		5	26		1
28	IWMP/MKL/12/3	24			1	23		
29	IWMP/MKL/12/4	34	25		24	10		
30	IWMP/MKL/12/5	32	13		3	29		
31	IWMP/MKL/13/1	58	26	1	12	45		
32	IWMP/MKL/13/2	12		1	1	10		
33	IWMP/MKL/14/1	35	14	2	4	29		
34	IWMP/MKL/15/1	70	31		16	54		
35	IWMP/MKL/15/2	41	8		2	38	1	
36	IWMP/MKL/15/3	42	23		5	37		
37	IWMP/MKL/15/4	43	16		11	32		
38	IWMP/MKL/15/5	36	9		4	32		
Pullampara Grama Panchayath								
1	IWMP/PP/12/1	49	17	7	42			
2	IWMP/PP/12/2	61	19		15	46		
3	IWMP/PP/12/3	46	14		6	40		
4	IWMP/PP/12/4	50	34	2	17	31		
5	IWMP/PP/12/5	56	32		5	51		
6	IWMP/PP/12/6	49	21		13	36		
7	IWMP/PP/12/7	49	21		11	38		
8	IWMP/PP/13/1	60	35		29	31		
9	IWMP/PP/13/2	59	9	1	4	54		
10	IWMP/PP/13/3	55	21		18	37		
11	IWMP/PP/13/4	53	26		1	52		
12	IWMP/PP/13/5	62	41		23	39		
13	IWMP/PP/13/6	51	15		8	43		
14	IWMP/PP/13/7	46	18		12	34		

Sl. No	Ayalkoottam Reg. No	Total House holds	BPL	Land Holdings (in cents)				
				Land less	0-5	6-250	250-500	>500
15	IWMP/PP/13/8	56	16		10	46		
16	IWMP/PP/13/9	43	15		2	41		
17	IWMP/PP/14/1	49	10		3	46		
18	IWMP/PP/14/2	48	1		2	44	2	
19	IWMP/PP/14/3	86	15		14	72		
20	IWMP/PP/14/4	60	29		30	28	2	
21	IWMP/PP/14/5	50	23		14	36		
22	IWMP/PP/14/6	46	13		5	41		
23	IWMP/PP/14/7	47	9		6	41		
24	IWMP/PP/14/8	57	11		4	53		
Mangalapuram GramaPanchayath								
1	IWMP/MgP/6/1	36	4	1	2	33		

The households in Vamanapuram and Pothencode Grama Panchayats falling in the watershed area are included in the adjacent NHGs in Mudakkal Grama Panchayat.

Self Help Groups

In addition to this, the existing Self Help Groups formed under the Kudumbasree Mission and other SHGs which are performing at a satisfactory level will be promoted to take various programmes under the Livelihood activities and Production Systems and Micro enterprises. If required, additional SHGs will also be formed in the watershed area in the coming years.

Activities proposed

Based on the series of discussions held with the different stakeholders the following activities are suggested for the micro watershed.

Table No. 18.8 – Details of activities suggested

Entry point Activities	
1	Renovation of ParameswaramChira
2	Crop Demonstration (Vegetable) at Care Home for Aged, Venjaramood
3	Renovation of KottayathukonamVettiaramoozhiThodu
4	Solar street lighting for KoloorMichaBhumi Colony
5	Solar lamp for 8 colonies
6	Crop demonstration (fruit plants) at GHSS, Pirappancode
7	Renovation of VadhyarukonamChira
8	Planting avenue trees with tree guard
Natural Resources Conservation Activities	
1	Stream bank protection – engineering structures (1.50 M height)

2	Stream bank protection – engineering structures (1.00 M height)
3	Stone pitched contour bunding
4	Earthen bunds
5	Centripetal terracing with husk trenching and mulching
6	Strip terracing for rubber
7	Moisture collection pits
8	Paddy cultivation in fallow lands
9	Low cost aerobic compost pit using hollow bricks
10	Wasteland development (planting of horticultural plants)
11	Planting horticultural crops as intercrops
12	Afforestation of school compounds and public buildings
13	Rain (roof) water harvesting at Govt. LPS Chemboor
14	Gully plugs
15	Foot bridges
16	Bridges at Mulankunu, Medathil vila (Manickal GP)
17	Water harvesting structures (wells)
18	Supply of Terafil Water Filter
19	Well recharging
20	Improvement of public wells
21	Improvement of existing wells
22	Renovationof drains
23	Renovation of ponds
24	Mini drinking water scheme
25	Solar electrification of Grama Panchayat
26	Solar street lighting for colonies
27	Solar electrification of Anganavadis
28	Solarstreet lights
29	Installation of solar junction lights
30	Supply of Portable solar lamps
31	Bus shelters with solar panels
32	Biogas plant
33	Stream bank stabilisation using Geo textiles
34	Conservation of sacred grooves
35	Live hedges
36	Fodder cultivation

Budget

The distribution of budget for Nellanad micro watershed for the various components as per IWMP guidelines is given below:

Table No. 18.9 – Budget for Nellanad micro watershed

No.	Budget component	% age	Amount in Rs.
1.	Administrative cost	10	39,28,500
2.	Monitoring	1	3,92,850
3.	Evaluation	1	3,92,850
Preparatory phase			
4.	Entry point activities	4	15,71,400
5.	Institution and capacity building	5	19,64,250
6.	Detailed Project Report	1	3,92,850
Watershed works phase			
7.	Natural Resources Conservation works	56	2,19,99,600
8.	Livelihood activities for asset less	9	35,35,650
9.	Production system and micro enterprises	10	39,28,500
10.	Consolidation phase	3	11,78,550
		100	3,92,85,000

Nellanad Watershed (4V29b) - Action Plan

Table No. 18.10.1 –Sector-I- Natural Resources Conservation and Management - Ist Year Plan

No.	Activity	Unit	Unit cost	Target	IWMP	Convergence	WDF	Total
1	Earthen bunds	Rm	39.4	3700		145780		145780
2	Centripetal terracing with husk trenching and mulching	Nos.	278	1900		528200		528200
3	Strip terracing for rubber	Nos.	132	2150		283800		283800
4	Moisture collection pits	Nos.	49.82	750		37365		37365
5	Paddy cultivation in fallow lands	ha	65000	4	60000	200000	13000	273000
6	Low cost aerobic compost pit using hollow bricks	No.	4000	10	35000	5000	2000	42000
7	Wasteland development (planting of horticultural plants)	cent	160	450	27000	45000	2700	74700
8	Planting horticultural crops as intercrops	cent	150	1000	50000	100000	5000	155000
9	Afforestation of school compounds and public buildings	cent	160	100	6000	10000	600	16600
10	Gully plugs	Nos.	1300	7	9100		910	10010
11	Supply of Terafil Water Filter	Nos.	650	100	65000		6500	71500
12	Well recharging	Nos.	5000	100	500000		50000	550000
13	Improvement of public wells	Nos.	12000	30	360000		36000	396000
14	Improvement of existing wells	Nos.	6000	70	420000		42000	462000
15	Renovation of drains	m				500000		500000
16	Renovation of ponds	Nos.	350000	3	735000	315000	52500	1102500

No.	Activity	Unit	Unit cost	Target	IWMP	Convergence	WDF	Total
17	Solarstreet lights	Nos.	25000	18	315000	135000	22500	472500
18	Supply of Portable solar lamps	Nos.	2000	160	224000	96000	32000	352000
19	Conservation of sacred grooves	Nos.	10000	1	10000		500	10500
20	Live hedges	50 m	1750	25	23750	20000	2375	46125
21	Fodder cultivation	3 cents	600	60	36000		3600	39600
	Total				2875850	2421145	272185	5569180

Nellanad Watershed (4V29b) - Action Plan

Table No. 18.10.2 –Sector-I- Natural Resources Conservation and Management –IInd Year Plan

No.	Activity	Unit	Unit cost	Target	IWMP	Convergence	WDF	Total
1	Stream bank protection – engineering structures (1.50 M height)	m	2290	200	458000		22900	480900
2	Stream bank protection – engineering structures (1.00 M height)	m	1609	160	257440		12872	270312
3	Stone pitched contour bunding	m ²	100.46	2100	210966		21096.60	232062.60
4	Earthen bunds	Rm	39.4	7400		291560		291560
5	Centripetal terracing with husk trenching and mulching	Nos.	278	3800		1056400		1056400
6	Strip terracing for rubber	Nos.	132	4300		567600		567600
7	Moisture collection pits	Nos.	49.82	1500		74730		74730
8	Paddy cultivation in fallow lands	ha	65000	4	60000	200000	13000	273000

No.	Activity	Unit	Unit cost	Target	IWMP	Convergence	WDF	Total
9	Low cost aerobic compost pit using hollow bricks	No.	4000	20	70000	10000	4000	84000
10	Wasteland development (planting of horticultural plants)	cent	160	900	54000	90000	5400	149400
11	Planting horticultural crops as intercrops	cent	150	2000	100000	200000	10000	310000
12	Afforestation of school compounds and public buildings	cent	160	200	12000	20000	1200	33200
13	Rain (roof) water harvesting at Govt. LPS Chemboor	Nos.	330000	1	330000		33000	363000
14	Gully plugs	Nos.	1300	8	10400		1040	11440
15	Foot bridges	Nos.	10327	2	20654		2065.40	22719.40
16	Bridge at Mulankunnu, Manickal	Nos.	150000	1	150000		15000	165000
17	Water harvesting structures (wells)	Nos.	18000	35	630000		63000	693000
18	Supply of Terafil Water Filter	Nos.	650	150	97500		9750	107250
19	Well recharging	Nos.	5000	150	750000		75000	825000
20	Improvement of public wells	Nos.	12000	45	540000		54000	594000
21	Improvement of existing wells	Nos.	6000	140	840000		84000	924000
22	Renovation of drains	m				1500000		1500000
23	Renovation of ponds	Nos.	350000	3	735000	315000	52500	1102500
24	Mini drinking water scheme at Puthuval, Pullampara	Nos.	800000	1	800000		80000	880000

No.	Activity	Unit	Unit cost	Target	IWMP	Convergence	WDF	Total
25	Solar electrification of NellanadGrama Panchayat Office	Nos.	500000	1	350000	150000	25000	525000
26	Solar street lighting for colonies	Nos.	200000	1	140000	60000	10000	210000
27	Solar electrification of Anganavadis	Nos.	50000	1	35000	15000	2500	52500
28	Solar street lights	Nos.	25000	27	472500	202500	33750	708750
29	Installation of solar junction lights	Nos.	90000	3	189000	81000	13500	283500
30	Supply of Portable solar lamps	Nos.	2000	160	224000	96000	32000	352000
31	Bus shelters with solar panels	Nos.	40000	5	180000	20000	10000	210000
32	Biogas plant	Nos.	6500	12	78000		7800	85800
33	Stream bank stabilisation using Geo textiles	m2	191	274	52334		5233.40	57567.40
34	Conservation of sacred grooves	Nos.	10000	2	20000		1000	21000
35	Live hedges	50 m	1750	50	47500	40000	4750	92250
36	Fodder cultivation	3 cents	600	90	54000		5400	59400
	Total				7968294	4989790	710757.40	13668841.40

Nellanad Watershed (4V29b) - Action Plan

Table No. 18.10.3 –Sector-I- Natural Resources Conservation and Management –IIIrdYear Plan

No.	Activity	Unit	Unit cost	Target	IWMP	Convergence	WDF	Total
1	Stream bank protection – engineering structures (1.50 M height)	m	2290	200	458000		22900	480900

No.	Activity	Unit	Unit cost	Target	IWMP	Convergence	WDF	Total
2	Stream bank protection – engineering structures (1.00 M height)	m	1609	160	257440		12872	270312
3	Stone pitched contour bunding	m2	100.46	2100	210966		21096.6	232062.6
4	Earthen bunds	Rm	39.4	7400		291560		291560
5	Centripetal terracing with husk trenching and mulching	Nos.	278	3800		1056400		1056400
6	Strip terracing for rubber	Nos.	132	4300		567600		567600
7	Moisture collection pits	Nos.	49.82	1500		74730		74730
8	Paddy cultivation in fallow lands	ha	65000	2	30000	100000	6500	136500
9	Low cost aerobic compost pit using hollow bricks	No.	4000	20	70000	10000	4000	84000
10	Wasteland development (planting of horticultural plants)	cent	160	900	54000	90000	5400	149400
11	Planting horticultural crops as intercrops	cent	150	2000	100000	200000	10000	310000
12	Afforestation of school compounds and public buildings	cent	160	200	12000	20000	1200	33200
13	Foot bridges	Nos.	10327	5	51635		5163.5	56798.5
14	Bridge at Medathil vila, Manickal	Nos.	150000	1	150000		15000	165000
15	Water harvesting structures (wells)	Nos.	18000	70	1260000		126000	1386000
16	Well recharging	Nos.	5000	150	750000		75000	825000

No.	Activity	Unit	Unit cost	Target	IWMP	Convergence	WDF	Total
17	Improvement of existing wells	Nos.	6000	140	840000		84000	924000
18	Renovation of drains	m				1000000		1000000
19	Renovation of ponds	Nos.	350000	3	735000	315000	52500	1102500
20	Mini drinking water scheme at Parandaman Colony, Mudakkal	Nos.	800000	1	800000		80000	880000
21	Solar electrification of Grama Panchayat	Nos.	500000	1	350000	150000	25000	525000
22	Solar street lighting for colonies	Nos.	200000	1	140000	60000	10000	210000
23	Solar electrification of Anganavadis	Nos.	50000	2	70000	30000	5000	105000
24	Installation of solar junction lights	Nos.	90000	3	189000	81000	13500	283500
25	Bus shelters with solar panels	Nos.	40000	4	144000	16000	8000	168000
26	Biogas plant	Nos.	6500	18	117000		11700	128700
27	Stream bank stabilisation using Geo textiles	m2	191	545	104095		10409.05	114504.50
28	Conservation of sacred grooves	Nos.	10000	2	20000		1000	21000
29	Live hedges	50 m	1750	50	47500	40000	4750	92250
	Total				6960636	4102290	610991.60	11673917.60

Nellanad Watershed (4V29b) - Action Plan

Table No. 18.10.4 –Sector-I- Natural Resources Conservation and Management –IVth Year Plan

No.	Activity	Unit	Unit cost	Target	IWMP	WDF	Total
1	Stream bank protection – engineering structures (1.50 M height)	m	2290	600	1374000	68700	1442700
2	Stream bank protection – engineering structures (1.00 M height)	m	1609	480	772320	38616	810936
3	Stone pitched contour bunding	m2	100.46	6300	632898	63289.80	696187.80
4	Foot bridges	Nos.	10327	5	51635	5163.50	56798.50
5	Water harvesting structures (wells)	Nos.	18000	70	1260000	126000	1386000
6	Stream bank stabilisation using Geo textiles	m2	191	545	104095	10409.50	114504.50
	Total				4194948	312178.80	4507126.80

Nellanad Watershed (4V29b) - Action Plan

Table No. 18.11.1 –Sector-II- Livelihood Support system for landless/ assetless - Ist Year Plan

Sl. No	Name of Activity	Unit	Unit Cost	Target	IWMP Fund	Beneficiary Contribution	Total
A	Enterprising individuals (10 %)						
1	Cow rearing	Nos.	22500	8	126000	54000	180000
2	Goat rearing	Nos.	10500	6	44100	18900	63000

3	Rabbit rearing	Nos.	8000	4	22400	9600	32000
4	Bee keeping	Nos.	10300	8	57680	24720	82400
5	Mushroom cultivation	Nos.	9000	10	63000	27000	90000
6	Tailoring	Nos.	10000	6	42000	18000	60000
	Total				355180	152220	507400

Nellanad Watershed (4V29b) - Action Plan

Table No. 18.11.2 –Sector-II- Livelihood Support system for landless/ assetless- IInd Year Plan

Sl. No	Name of Activity	Unit	Unit Cost	Target	IWMP Fund	Beneficiary Contribution	Total
B	Revolving fund to SHGs (60 %)						
1	Carpet making						
2	Soap making		25000	9	168750	56250	225000
3	Curry powder		20000	18	270000	90000	360000
4	Bakery unit		15000	45	506250	168750	675000
5	Animal husbandry		10000	16	120000	40000	160000
6	Cloth bag making						
					1065000	355000	1420000
C	Major livelihood activities (30 %)						
1	Small restaurant	Nos.	100000	2	100000	100000	200000
2	Vermi composting	Nos.	50000	2	50000	50000	100000
					150000	150000	300000
	Total				1215000	505000	1720000

Nellanad Watershed (4V29b) - Action Plan

Table No. 18.11.3 –Sector-II- Livelihood Support system for landless/ assetless- IIIrd Year Plan

Sl. No	Name of Activity	Unit	Unit Cost	Target	IWMP Fund	Beneficiary Contribution	Total
B	Revolving fund to SHGs (60 %)						
1	Carpet making						
2	Soap making		25000	9	168750	56250	225000
3	Curry powder		20000	18	270000	90000	360000
4	Bakery unit		15000	45	506250	168750	675000
5	Animal husbandry		10000	16	120000	40000	160000
6	Cloth bag making						
					1065000	355000	1420000
C	Major livelihood activities (30 %)						
1	Cow rearing	Nos.	500000	2	400000	600000	1000000
2	Goat rearing	Nos.	105000	2	105000	105000	210000
					505000	705000	1210000
	Total				1570000	1060000	2630000

Nellanad Watershed (4V29b) - Action Plan

Table No. 18.11.4 –Sector-II- Livelihood Support system for landless/ assetless- IVth Year Plan

Sl. No	Name of Activity	Unit	Unit Cost	Target	IWMP Fund	Beneficiary Contribution	Total
C	Major livelihood activities (30 %)						
1	Cover making unit	Nos.	250000	1	125000	125000	250000

2	AgriHorti Collection centre	Nos.	500000	1	200000	300000	500000
3	Mushroom cultivation	Nos.	150000	1	75000	75000	150000
					400000	500000	900000

Nellanad Watershed (4V29b) - Action Plan

Table No. 18.12.1 –Sector-III- Production system and Microenterprises - Ist Year Plan

Sl. No	Name of Activity	Unit	Unit Cost	Target	IWMP Fund	Convergence	WDF	Total
1	Vegetable cultivation in terrace	Nos.	1500	800	600000	600000	216000	1416000
2	Planting of 5 banana plants	Nos.	170	4000	200000	480000	122400	802400
	Total				800000	1080000	338400	2218400

Note: 20 percent of the beneficiaries will be SC/ST. Contribution to WDF is 20 % for General and 10 % for SC/ST

Nellanad Watershed (4V29b) - Action Plan

Table No. 18.12.2 –Sector-III- Production system and Microenterprises –IInd Year Plan

Sl. No	Name of Activity	Unit	Unit Cost	Target	IWMP Fund	Convergence	WDF	Total
1	Backyard poultry	Nos.	1500	1400	1050000	1050000	189000	2289000
2	Mushroom cultivation (10 beds)	Nos.	350	100	35000	65000	6300	106300
3	Bee keeping	Nos.	10300	70	280000	406000	44100	730100
4	Planting of 2 fruit plants	Nos.	80	3000	90000	150000	43200	283200
5	Planting of 2 timber plants	Nos.	70	2500	50000	125000	31500	206500
6	Planting of 10 pepper seedlings	Nos.	200	1250	125000	125000	45000	295000
	Total				1630000	1921000	359100	3910100

Note: 20 percent of the beneficiaries will be SC/ST. Contribution to WDF is 20 % for General and 10 % for SC/ST

Nellanad Watershed (4V29b) - Action Plan

Table No. 18.12.3 –Sector-III- Production system and Microenterprises –IIIrd Year Plan

Sl. No	Name of Activity	Unit	Unit Cost	Target	IWMP Fund	Convergence	WDF	Total
1	Cow rearing	Nos.	22500	40	630000	270000	113400	1013400
2	Goat rearing	Nos.	10500	30	220500	94500	39690	354690
3	Rabbit rearing	Nos.	8000	5	28000	12000	5040	45040
4	Carpet making	Nos.	22500	3	37500	37500	6750	81750
5	Cloth bag making	Nos.	22500	3	37500	37500	6750	81750
6	Mechanization support to livestock farmers	Nos.	45000	3	75000	60000	13500	148500
7	Support to women SHG for livestock rearing	Nos.	50000	3	75000	75000	13500	163500
8	Tailoring unit	Nos.	10000	6	48000	12000	8640	68640
	Total				1151500	598500	207270	1957270

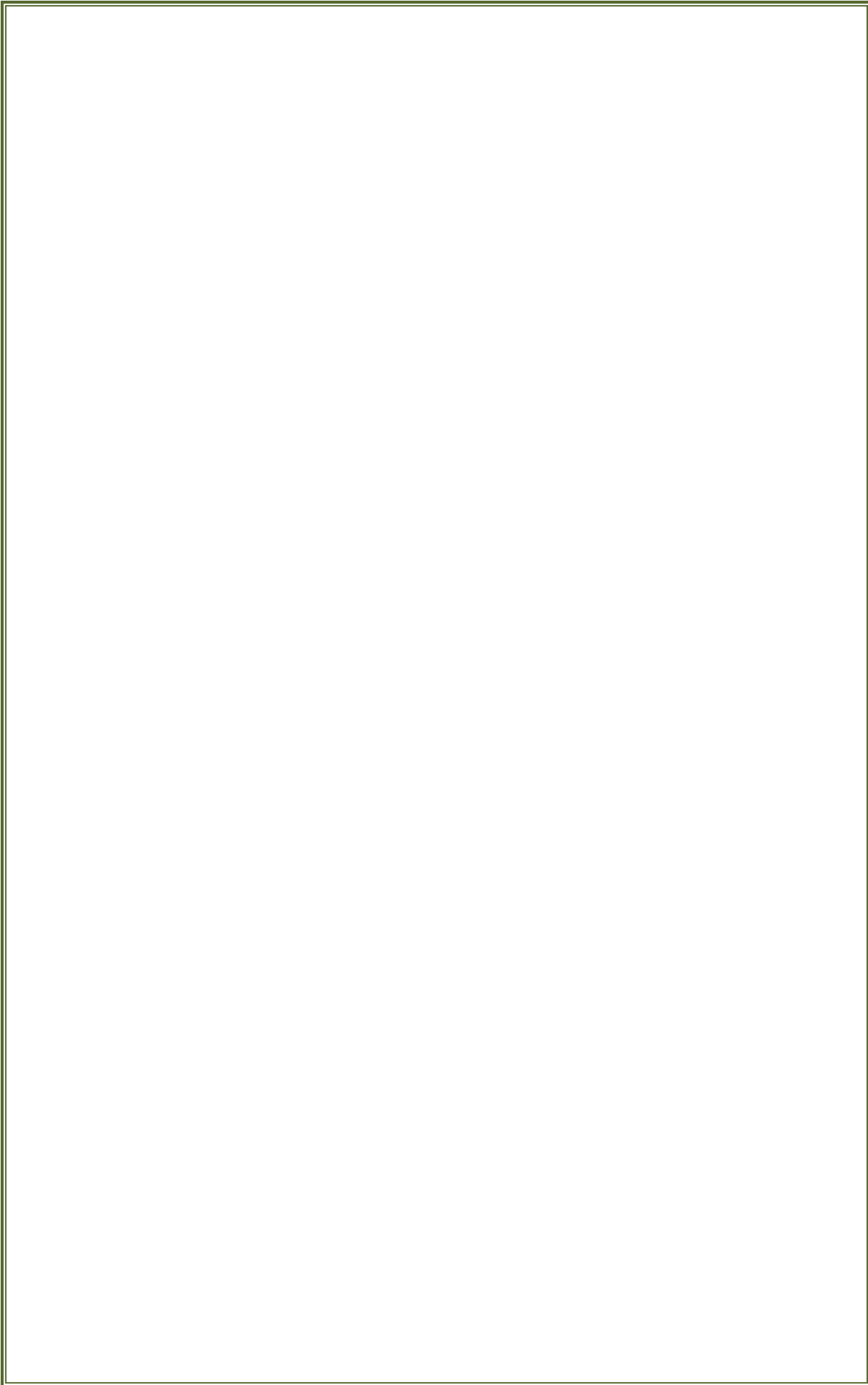
Note: 20 percent of the beneficiaries will be SC/ST. Contribution to WDF is 20 % for General and 10 % for SC/ST

Nellanad Watershed (4V29b) - Action Plan

Table No. 18.12.4 –Sector-III- Production system and Microenterprises –IVth Year Plan

Sl. No	Name of Activity	Unit	Unit Cost	Target	IWMP Fund	Convergence	WDF	Total
1	Organic vegetable cultivation	Nos.	25000	12	120000	180000	21600	321600
2	Planting of tuber crops	Nos.	20000	12	96000	144000	17280	257280
3	Jasmine cultivation	Nos.	15000	3	21600	23400	3888	48888
4	Organic banana cultivation	Nos.	30000	6	108000	72000	19440	199440
	Total				345600	419400	62208	827208

Note: 20 percent of the beneficiaries will be SC/ST. Contribution to WDF is 20 % for General and 10 % for SC/ST



CONVERGENCE

The Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), notified on September 7, 2005, marked a paradigm shift from the previous wage employment programme with its rights-based approach that makes the Government legally accountable for providing employment to those who demand it. The act aims at enhancing livelihood security households in rural areas of the country by providing at least one hundred days of guaranteed wage employment in a financial year to every household whose adult members volunteer to do unskilled manual work.

Such inter sectorial convergence becomes instrumental towards.

- Establishing synergy among different government programme in planning and implementation to optimize use of public investments.
- Enhancing economic opportunities.
- Strengthening democratic processes.
- Mitigating the effects of Climate change
- Creating conditions for sustainable development.

One of the significant areas for convergence is the watershed management programme of the Development of Land Resource (DoLR) in the Ministry of Rural Development (MoRD).

Convergence is an evolving process and while broad principles can be laid out at the centre, the actual contours of convergence will be determined by the resources at the Central, State, District and the project level. Also, to identify the possibilities of convergence, it may be necessary to make a beginning with select programmes, so that the experience of implementation may further inform and refine strategies for convergence.

Convergence between MGNREGS and Watershed Programmes

Under MGNREGA almost all the activities required for watershed development are permitted. Convergence between NREGA and watershed Programme of DoLR will be mutually beneficial for rainfed areas.

Non-Negotiable for works executed under MGNREGS:

- Only Job Card holders to be employed for MGNREGS component.
- Muster rolls will be maintained on work site, with copies in the Gram Panchayat and to be electronically maintained on nrega.nic.in
- Wage payments will be through no-frills accounts in banks/post offices.

Need for convergence:

Since more than 50% of activities related to Watershed development can be done under MGNREGA, there is need for convergence to meet gap in funds requirements under IWMP. Detailed survey had been conducted in Watershed villages and it has emerged that there is need for more funds to augment and strengthen the activities under IWMP. Out of 6 sub watersheds, all sub watersheds need more funds to meet the

gap. Therefore, some of the works have been converged with MGNREGA. The labour component would be met out of funds made available under MGNREGA.

Convergence between Non Conventional Energy Sources and Watershed Programmes

MNRE (Ministry of Natural Renewable Energy) subsidies are available for renewable energy products. These subsidies will be availed for activities such as supply of solar lantern, solar street lighting, solar electrification, etc. The activities will be implemented with the assistance of M/s ANERT.

Convergence between Agriculture and Watershed Programmes

The proposed agricultural/horticultural activities proposed in the DPR will be implemented with the assistance of Department of Agriculture, Vegetable and Fruit Promotion Council of Kerala, State Horticulture Mission, Cashew Development Corporation, etc.

Convergence in Livelihood Support System

In the proposed Livelihood Support System, a minimum amount is met from the project fund and the remaining funds will be converged through beneficiary contribution or through bank loan.,

The details of such fund requirements from convergence are given in the lists for estimates for each sub watershed. However for ready reference, the summary is given in following table:

GAPS IN FUNDS REQUIREMENT –WATERSHED WISE

Sl. No.	Name of Sub watershed	Total Cost requirement for works	Total Funds available under IWMP for works	Gap in Funds requirement for works	Fund through Convergence
1	Aruvippuram	33466060.50	19081820	14384240.50	12779602
2	Cheruvalam	3372129.25	1483775	1888354.25	1751816
3	Kanchinada	13871305.70	8180402	5690903.70	4928007
4	Ayanikuzhi	8467797.75	4679430	3788367.75	3323358
5	Moozhi	35909203.60	21398676	14510527.60	12487315
6	Nellanad	50089443.80	29467008	20622435.80	17749345
Total		145175940.60	84291111.00	60884829.60	53019443

TRAINING PLAN

The proposed training plan aims in strengthening the skills, competencies and abilities of people and communities in developing societies in order to overcome the causes of their exclusion and suffering. This will help to guide their internal development and activities. It is proposed to carry out the following institutional based training and capacity building programmes during the project period in order to equip various stakeholders for successful participation and implementation of the project

Programme No. 1

Title of the Programme	Orientation Programme on Participatory Watershed Development
Training Objectives	To orient the participants on different dimensions of participatory watershed management
Coverage/ topic	<ul style="list-style-type: none"> • Features and process of watershed programme • Institutional and financial arrangements • Managerial skills • Coordination and linkages with Line-department and LSGIs • Convergence of programmes • Implementation process
Training Methodology	<ul style="list-style-type: none"> • Interactive sessions • Group exercises • Task Analysis • Panel discussions
Target Groups	Members of District Level Coordination Committee
Duration	2 days
No. of expected participants	15 participants
Implementing Agency	SLNA
Expected Outcome	Ensure smooth implementation of the project with full participation and coordination of line departments and LSGIs

Programme No. 2

Title of the Programme	Orientation & Capacity building on conceptual, technical and Managerial aspects
Training Objectives	To familiarize the participants about various dimensions of participatory watershed development
Coverage/ topic	<ul style="list-style-type: none"> • Fundamentals of watershed • Participatory approach in watershed management • Roles and responsibilities • Institutional and financial arrangements • Coordination and linkages Convergence of

	programmes
	<ul style="list-style-type: none"> • GIS, MIS training
Training Methodology	<ul style="list-style-type: none"> • Lecture - cum - discussion • Group exercises • Case Analysis • Group discussions • Field visit
Target Groups	Members of WCDC
Duration	4 days
No. of expected participants	3 persons
Implementing Agency	SLNA
Expected outcome	Ensure smooth implementation of the project

Programme No. 3

Title of the Programme	Orientation & capacity building on IWMP
Training Objectives	To orient the participants on different dimensions of participatory watershed management
Coverage/ topic	<ul style="list-style-type: none"> • Fundamentals of watershed • Participatory approach in watershed management • Roles and responsibilities • Institutional and financial arrangements • Coordination, linkages Convergence of programmes
Training Methodology	<ul style="list-style-type: none"> • Lecture - cum - discussion • Group exercises • Case Analysis • Group discussions
Target Groups	District, Block and Grama Panchayat level department officials
Duration	1 day
No. of expected participants	120 persons (40 x 3 batch)
Implementing Agency	PAU
Expected outcome	Ensure smooth implementation of the project with full participation and coordination of line departments and LSGIs

Programme No. 4

Title of the Programme	Orientation & capacity building on conceptual, technical and Managerial aspects
Training Objectives	To familiarize the participants about various dimensions of participatory watershed development
Coverage/ topic	<ul style="list-style-type: none"> • Fundamentals of watershed • Participatory approach in watershed management

	<ul style="list-style-type: none"> • Roles and responsibilities • Institutional and financial arrangements • Coordination, linkages Convergence of programmes • Documentation • Community organization
Training Methodology	<ul style="list-style-type: none"> • Lecture - cum - discussion • Group exercises • Case Analysis • Group discussions
Target Groups	Block presidents, GP Presidents, Block and Grama Panchayat members, BLWC, PLWC
Duration	1 day
No. of expected participants	120 persons (40 x 3 batch)
Implementing Agency	PAU
Expected outcome	Ensure smooth implementation of the project with full participation and coordination

Programme No. 5

Title of the Programme	Empowering people's representatives for IWMP
Training Objectives	The need for watershed based development programs, concepts involved in watershed development, IWMP its objectives, steps involved in the implementation of the program, financial management etc.
Coverage/topic	<ul style="list-style-type: none"> • To create awareness among the peoples representatives regarding the need for watershed based development programs. • Concepts of IWMP • Projects involved in the programs • Scope of the project. • Role and responsibilities. • Financial management.
Training Methodology	<ul style="list-style-type: none"> • Lecture - cum - discussion • Group exercises
Target Groups	District, Block and Grama Panchayath members
Duration	2 days
No. of participants	100
Implementing Agency	PIA
Expected outcome	Ensure smooth implementation of the projects, interfere with issues if any while implementation, financial transparency, and ensure peoples participation.

Programme No. 6

Title of the Programme	Orientation & Capacity building on conceptual, technical, non-technical and Managerial aspects
Training Objectives	To empower the technical knowledge regarding watershed development
Coverage/ topic	<ul style="list-style-type: none"> • Measurement and valuation • Fundamentals of watershed • Roles and responsibilities • GIS & MIS • Documentation • Community organization
Training Methodology	<ul style="list-style-type: none"> • Lecture - cum - discussion • Group exercises • Case Analysis • Group discussions • Field visit
Target Groups	WDT members , Watershed Committee members
Duration	3 days
No. of expected participants	90 persons (30 x 3 batch)
Implementing Agency	SLNA
Expected outcome	Ensure smooth implementation of the project by empowering on technical knowhow.

Programme No. 7

Title of the Programme	Orientation & capacity building on conceptual and Managerial aspects
Training Objectives	To familiarize the participants about various dimensions of participatory watershed development
Coverage/ topic	<ul style="list-style-type: none"> • Participatory approach in watershed management • Fundamentals of watershed • Roles and responsibilities • Institutional and financial arrangements • Coordination and linkages Convergence of programmes
Training Methodology	<ul style="list-style-type: none"> • Lecture - cum - discussion • Group exercises • Case Analysis • Group discussions
Target Groups	BDO/J.BDO, HSC, UDC
Duration	2 days
No. of expected participants	30 persons
Implementing Agency	SLNA
Expected outcome	Ensure smooth implementation of the project

Programme No. 8

Title of the Programme	Participatory approach in Planning and implementation of IWMP
Training Objectives	To orient the participants on different dimensions of participatory watershed management
Coverage/ topic	<ul style="list-style-type: none"> • Fundamentals of watershed • Participatory approach in watershed management • Roles and responsibilities • Institutional and financial arrangements • Coordination, linkages Convergence of programmes
Training Methodology	Lecture - cum – interactive sessions
Target Groups	NHGs
Duration	1 day
No. of expected participants	20,000 participants (50x 400 batch)
Implementing Agency	PIA
Expected outcome	Ensure full participation of users for the smooth implementation of the project

Programme No. 9

Title of the Programme	Concept of watershed management, roles and responsibilities.
Rationale	Impart awareness among the watershed committees regarding the concept of watershed management, roles and responsibilities, operational guidelines, financial management etc.
Training Objectives	<ul style="list-style-type: none"> • To create awareness among the WCs regarding the concept of watershed management. • To define the roles and responsibilities of WC. • Financial management of the project. • Management of WDF.
Training Methodology	<ul style="list-style-type: none"> • Interactive sessions • Group exercises • Task Analysis • Panel discussions
Target Groups	WCs
Duration	2 days
No. of participants	90 participants (30 x 3 batch)
Implementing Agency	PIA
Expected outcome	Empowerment of WCs for effective implementation of the project and proper maintenance of commonly created asset.

Programme No. 10

Title of the Programme	Operational Strategies and financial management of implementation of watershed projects in IWMP
Training Objectives	To orient the participants on operational strategies and financial management in participatory watershed management
Coverage/ topic	<ul style="list-style-type: none"> • Leadership • Implementation • Management • Roles and responsibilities • Fundamentals of watershed • Participatory approach in watershed management • Institutional and financial arrangements • Coordination, linkages Convergence of programmes
Training Methodology	<ul style="list-style-type: none"> • Lecture - cum - discussion • Group exercises • Case Analysis • Group discussions
Target Groups	Watershed Committee Members
Duration	3 days
No. of expected participants	90 participants (30 x 3 batch)
Implementing Agency	PIA
Expected outcome	Empowerment of WCs on operational Strategies and financial management for effective implementation of the project and proper maintenance of records.

Programme No. 11

Title of the Programme	Operational guidelines for Watershed Committees in IWMP
Training Objectives	To orient the participants on operational guidelines for Watershed Committees in IWMP
Coverage/ topic	<ul style="list-style-type: none"> • Leadership • Institutional and financial arrangements • Conducting meetings • Recording the proceedings • Office management • Accounting procedures • Book keeping
Training Methodology	<ul style="list-style-type: none"> • Lecture - cum - discussion • Group exercises • Case Analysis • Group discussions

Target Groups	Watershed Committee Members
Duration	1 day
No. of expected participants	90 participants (30 x 3 batch)
Implementing Agency	PIA
Expected outcome	Empowerment of WCs on operational guidelines in IWMP for effective implementation of the project and proper maintenance of records.

Programme No. 12

Title of the Programme	Awareness programme on production system and Micro Enterprises (PS & M) and livelihood support system (LSS)
Training Objectives	The watershed community must be made aware of the various PS & M and LSS programmes envisaged in the project, group formation, credit support through banks, Accounting procedures etc.
Coverage/topic	<ul style="list-style-type: none"> • Various PS & M. • Generating additional income from such activities. • Self sustainability. • Women empowerment.
Training Methodology	<ul style="list-style-type: none"> • Lecture - cum - discussion • Group exercises • Case Analysis • Group discussions
Target Groups	SHGs : rearing cattle, fodder cultivation, Pisciculture, Apiculture, Horticulture, Mushroom cultivation, Food processing etc.
Duration	1 day
No. of participants	10000 participants (50 x 200 batches)
Implementing Agency	PIA
Expected outcome	Increase the standard of living through increase in percapita income, attain self sustainability etc.

Programme No. 13

Title of the Programme	Develop action plan for PS&M and LSS
Training Objectives	More than 50% of the communities are often land less agri labourers. For attain self sustainability LSS is the main option.
Coverage/topic	<ul style="list-style-type: none"> • Various LSS activities envisaged in the project. • Operational guidelines • Action plan for each watershed depending upon their suitability.
Training Methodology	<ul style="list-style-type: none"> • Interactive sessions • Group exercises • Task Analysis • Panel discussions

Target Groups	Members of District, Block and Grama Panchayat members, Watershed Committees
Duration	1 day
No. of participants	10
Implementing Agency	PIA
Expected outcome	A need based location specific, economically feasible and communally acceptable action plan.

Programme No. 14

Title of the Programme	Planning and implementation of projects related to creation of common assets.
Training Objectives	To create awareness among UGs regarding the mode of creation of common assets.
Coverage/topic	<ul style="list-style-type: none"> • Responsibility of UGs • Establishing common assets. • Mode of operation in establishing common assets. • Financial procedures involved.
Training Methodology	<ul style="list-style-type: none"> • Interactive sessions • Group exercises • Task Analysis • Panel discussions
Target Groups	UGs
Duration	1 day
No. of participants	1-2 persons from each UG
Implementing Agency	PIA
Expected outcome	Empower the UGs to take up the responsibility of creating common assets as well as their future maintenance.

Programme No. 15

Title of the Programme	Training of Trainers (ToT) in IWMP
Training Objectives	To build a team of faculties for imparting training, monitoring and evaluation
Coverage/topic	<ul style="list-style-type: none"> • Fundamentals of watershed • Leadership • Managerial skills • Effective communication • Implementation • Management • Roles and responsibilities • Monitoring and evaluation.
Training Methodology	<ul style="list-style-type: none"> • Lecture – cum - discussions • Interactive sessions • Group exercises

	<ul style="list-style-type: none"> • Task Analysis • Role play • Panel discussions
Target Groups	Officials from various departments and extension faculty members, One facilitator from each NHG.
Duration	2 day
No. of participants	400 (20 x 20 batch)
Implementing Agency	PIA
Expected outcome	A well trained faculty team who are capable of disseminating the concept of watershed and other activities related to watershed management.

Programme No. 16

Title of the Programme	Exposure visit
Training Objectives	To visit other states to understand different methodology used in watershed management
Coverage/ topic	<ul style="list-style-type: none"> • Methodology • Techniques • People participation • Implementation • Documentation
Training Methodology	<ul style="list-style-type: none"> • Field visit
Target Groups	Block presidents, GP Presidents, Block and Grama Panchayat members, Watershed Committee
Duration	3 days
No. of expected participants	150 participants (50 x 3 batch)
Implementing Agency	PIA
Expected outcome	Understanding various innovative and cost effective techniques adopted in watershed management

Skill Development Training Programmes

Title of the Programme	<ol style="list-style-type: none"> 1. Agriculture 2. Horticulture 3. Animal Husbandry 4. Pisci Culture 5. Rain water harvesting 6. Well recharging 7. Soil and Water conservation methods 8. Livelihood 9. Entrepreneurship development
Training Objectives	To provide skills and techniques of various activities
Coverage/ topic	<ul style="list-style-type: none"> • Organic Vegetable cultivation • Organic Banana cultivation • Post-harvest technologies

	<ul style="list-style-type: none"> • Cow rearing • Goat rearing • Fodder cultivation • Pisci culture • Different types of rain water harvesting • Recharging of open wells • Mushroom cultivation • Beekeeping • Biogas • Cottage industries • Trading of products • Value addition
Training Methodology	<ul style="list-style-type: none"> • Lecture - cum - discussion • Demonstration • Video Film show
Duration	1 – 2 days
Target Groups	Selected Beneficiaries
No. of expected participants	10,000 (200 trainings x 50 persons in each batch)
Implementing Agency	PIA
Expected outcome	Acquire necessary skills. A need based location specific, economically feasible and communally acceptable action plan.

LIST OF TRAINING INSTITUTES FOR CAPACITY BUILDING

Sl. No.	Name of Institute/Organization	Full Address	Type of Institute/Organization	Area of Specialization
1	State Institute of Rural Development (SIRD)	Director SIRD, ETC. P.O. Kottarakkara Kollam District, Pin 691531	Government	Rural Development
2	Kerala Institute of Local Administration (KILA)	Director, KILA, Mulankunnathukavu P.O., Thrissur District. Pin 680581	Government	Decentralized Administration
3	Centre for Earth Science Studies (CESS)	Director CESS, Akkulam, Thiruvananthapuram	Government	Resource Mapping and planning
4	Centre of Water Resources Development and Management (CWRDM)	Director, CWRDM, Kunnamangalam Kozhikode	Government	Water resources management watershed management
5	Kerala Agricultural University (KAU) and its various research station.	Vice Chancellor KAU Vellanikkara, Thrissur	Government	Crop management, improved varieties, innovative technologies, Economic planning etc.
6	NARP Research Stations of various Zones	Director Regional Agronomic Research Station (RARS) Vellayani, Kayamkulam	Government	Location specific crop management, Adoption of improved and innovative technologies for crop improvement suited to each locality.
7	Mahatma Gandhi University (M G University)	Vice Chancellor MG University Kottayam	Government	GIS Environmental impacts, Eco preservation.

Sl. No.	Name of Institute/Organization	Full Address	Type of Institute/Organization	Area of Specialization
8	Tropical Botanical Garden and Research Institute (TBGRI)	Director TBGRI, Palode, Thiruvananthapuram	Government	Bio diversity Eco restoration
9	Social Conservation Training Institute under the soil conservation dept.	Additional Director of soil Conservation, Thiruvananthapuram	Government	Various soil and water conservation techniques, watershed management etc.
10	Krihi Vijnan Kendras (KVK)	Director KVK All Districts	Government	Modern Agricultural practices.
11	Extension Training Centre (ETC)	Principal ETC, Kottarakkara, Kollam	Government	Participatory Planning, Extension techniques, PRA, RRA, Poverty alleviation, Watershed management etc.
12	Land Use Board (LUB)	Commissioner LUB, Vikas Bhavan, Thiruvananthapuram	Government	Resource Mapping, Watershed Management, GIS etc.
13	Institute of Management in Government (IMG)	Director IMG Trivandrum	Government	Administration
14	Socio Economic Unit Foundation (SEUF)	Director SEUF Thiruvananthapuram	NGO	Sanitation and Gender Development.

EXPECTED OUTCOMES

This project is a need based project which aims to increase the individual income, to generate self-employment and to increase the agricultural productivity in the villages of Vamanapuram, Nedumangad, Chirayinkeezhu and Pothencode blocks under the IWMP. This project will be focused on multi approach activities which create an employment opportunity in their native villages for sustaining their income and check the migration, which became a key to defeat the present problems. Project will not only focus on create employment opportunity but also focus on the sustainable use of natural resources by using latest appropriate technology and strengthening the local leaders through capacity building and training, which ultimately ensure the sustainable livelihood of the people of the project area. The details of expected outcomes are given below.

Employment

One of the prominent features of watershed program is to create self sustenance to stake holder in terms of livelihood and increase in employment opportunities is one of the benchmark that can unravel the effect of watershed. Watershed creates employment opportunities during the work phase for labour intensive activities like construction of gully plug, earthen dam, farm bund, check dam, check wall and through the asset created under watershed program have a direct impact on agriculture and natural resource development. Livelihood for self-employed, wage labour and income generating activities have ample scope for employment generation. As the net employment increases, the per capita income of agriculture, animal husbandry and other allied activities will also increase.

Expected Migration Checked

Watershed development works can generate new opportunities in local area through the physical treatments of the watershed activities and increase the production of agriculture produces through adopting updated/ new techniques. The number of seasons under cultivation will increase as sufficient ground water level is available to the farmers in the winter and summer season. The farmers will be able to take second and third crop in their agriculture land. Hence the watershed development increased demands for labour. This will lead to decrease in the number of seasonal migration from the area.

Ground water table

In the presence scenario the ground water level of open wells varies from 10 meter to 16 meter, from village to village. The groundwater has gone down due to rapid urbanization and maximum ground water harvesting without any sustainable measure. The watershed activities like roof water harvesting, well recharging, rain water harvesting pits, staggered trenches, etc. will help in ground water recharging under this project and it is expected that the ground water level will come up and reach at 8 to 12 meter.

Drinking water

The villages in the project area totally depend upon hand pump and open well for drinking and other domestic activities. The availability of water is only for 10 months at maximum. The activities of watershed and the linkage with the Jananidhi will increase the ground water table so that the expected status of drinking water will increase. Comparative status of drinking water between pre-project and expected post project are furnished as under.

Expected Crop Yield.

Due to additional availability of water, farmers of the project area will be able to take more crops in their available land. Even after taking rainy season and post-rainy season crops into consideration, they will get a good price for vegetables in summer also. The productivity will also increase due to the use of updated techniques.

Horticulture

The watershed area holds good potential for horticultural activities. It is expected that due to increase in horticulture plantation area, the production will go up fetching more money in the hands of the farmers which will add to the other allied economic activities. It is also proposed to diversify horticulture activity by bringing more area under money fetching horticulture plants like Rambutan, etc. The expansion of horticulture in the area will directly increase the income levels of all the household engaged in the horticulture activities. There will be significant increase in the area covered under horticulture.

Livestock

Milch-animals include cow and buffalo in the project area. Productivity of the cow is 3 liters per day whereas the buffalo give 4 liters of milk per day. Advanced breeds like Jersey and other improved species will be promoted in the watershed area in order to enhance the milk production. The introduction of the nature fresh model is expected to increase the quality and quantity of milk production. Due to the various interventions, the productivity will be increased to 5 and 6 liters respectively.

Quality and quantity of fodder

With the distribution of good quality fodder seeds and fodder plants to all households involved in livestock activities, the farmers will be able to produce the required fodder in their own lands and attain self-sufficiency in fodder. This will ensure fodder throughout the year encouraging the farmers to take up animal husbandry activities on a broader scale to improve their living conditions. .

EXPECTED OUTCOMES OF THE PROJECT

Sectors	Expected outcomes	Indicators
Agriculture	improved irrigation	Increment in gross irrigated area
	Enhancement in agriculture production	Increment in quantity of agriculture produces.
	Good organic farming	Number of functional vermi compost units

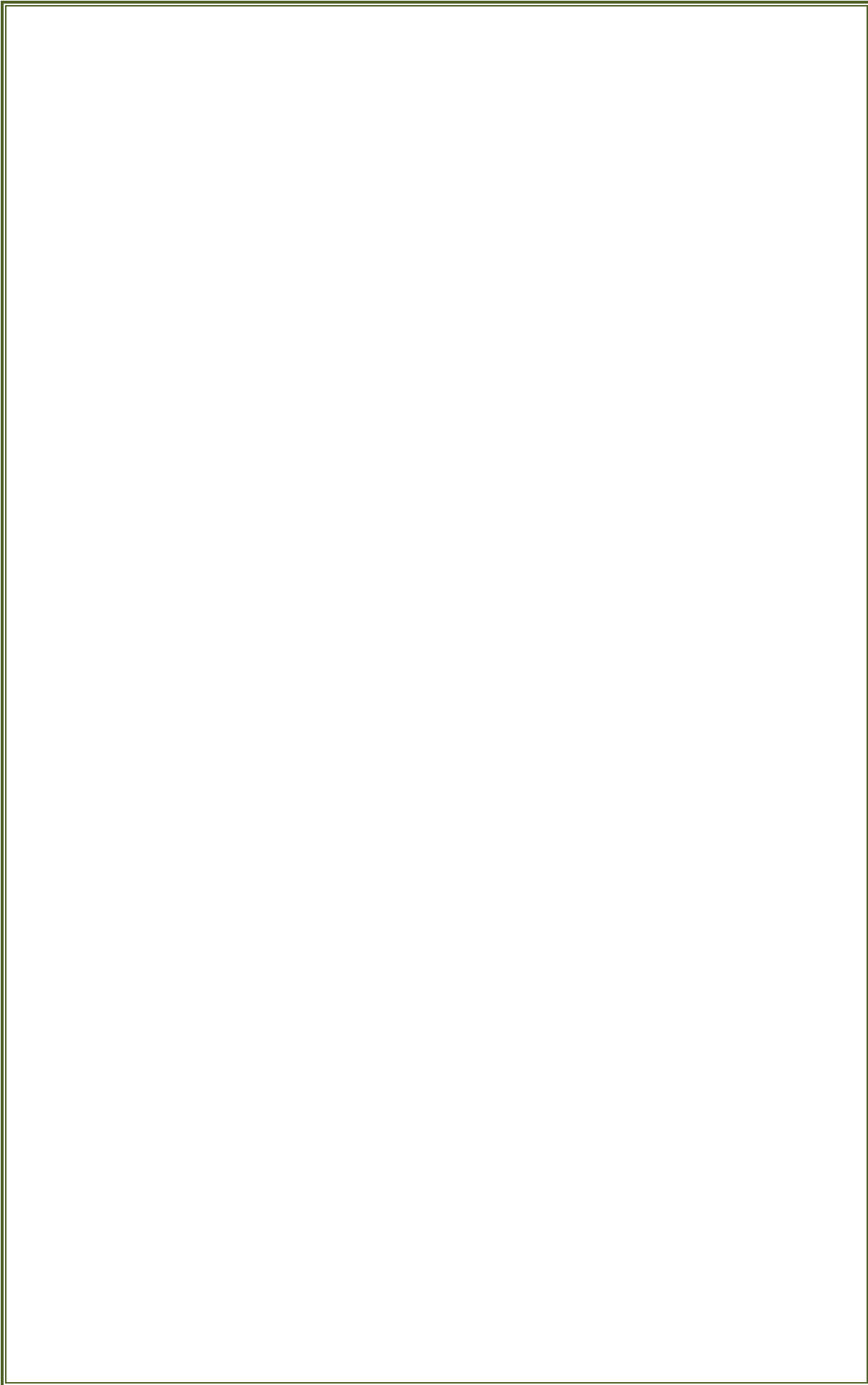
Horticulture	Enhancement in crop production	Rise in quantity produced
Natural resources	Pasture land development	Increment in pasture land area
	Improvement in water resources	Physical existence of the water bodies.
Animal husbandry	Dairy development	Number of dairy farming units
	Improved bee keeping practices	Number of farmers with commercial production of honey
Micro enterprises	Improvement in women’s status	Increment in income of women and their institutions (SHGs)
	Nursery Rising	Physical existence of new nurseries
	Honey and fruit processing and unit	Well-functioning honey and fruit processing units
	Better market facility	Number of well-functioning vegetable and fruit collection centers, milk and honey preservation units
	DTP centres	Physical existence of DTP centres
Development of BPL families	Improvement in economic status of BPL HHs	Increment in the income of BPL families.
	Improvement in social status	BPL families will have ownership over the generated resources.

PRE-INTERVENTION AND EXPECTED POST INTERVENTION STATUS

Sectors	Present Status	Post Intervention Status
Agriculture	Agricultural products are being practiced as a major livelihood option for the watershed population	Sharp increase in the area under agriculture cultivation and increase the socio-economic status of the population in the watershed area.
Horticulture	Horticulture is the major livelihood activity of the villagers, which is dominated by banana and vegetable production.	The cultivation area under horticulture production will be increased with diversification of crops and quality. It will also increase the economic status of the population.
Processing and Marketing	Right now there is no structured marketing procedure for the products. Also there is no collection	The marketing system will be strengthened, and linkage will be established with corporate houses and as a result of the collection

	centre to store and gradation of the products.	centre available, which further prevents loss of products. Farmers will get competitive price also.
Cattle Management	Low level of awareness and expertise in cattle management.	Increased awareness and expertise about cattle management.
Milk production	Current Milk Production per cow is 3 litres per day.	Milk production will be increased to 5 – 6 litres per cow as a result of increased fodder availability and balanced food and scientific Technique.
Milk Marketing	Milk Production is not an income generation activity. Only for self consumption.	Milk production will become a commercial activity and the people will form a co-operative & SHG with the help of Govt. and access to the organized Markets.
Fodder Availability	There is not enough good quality fodder available in the watershed area throughout the area.	Increased availability of cattle balanced fodder production. The households who practice animal husbandry will be able to meet the fodder requirement locally throughout the years.
Irrigation	No Irrigation systems prevalent in the water shed area at present	All the cultivated lands will be covered by digging new wells and renovating the existing ones.
Soil Erosion and Landslides and Rain Water Harvesting	Soil erosion and landslide are very prevalent in the watershed area.	The soil erosion will be checked through the creation of stone pitched contour bunds and other measures. Landslide will be minimized.
Nursery Raising	Activity being practiced not in a systematic manner.	Nursery Raising will be carried out in an organized way and it will improve the economic condition of the people under the watershed area.
Bee keeping	Activity being practiced not in a systematic manner	Bee keeping will be carried out in an organized way and it will increase the income level of the community.
Mushroom	Activity being practiced not in a systematic manner	Mushroom cultivation will be carried out in an organized way and it will increase the income level of the community.

Vermi compost	Vermi Compost is not practiced. The knowledge base of the community regarding organic farming is not sufficient	Vermi Compost will be carried out in a planned manner and income level will be increased. Community will get knowledge about organic farming. Over time, more people will go for organic farming in the watershed area.
Interventions for BPL families	There are only limited interventions which are exclusively aimed at BPL families of that area.	The livelihood enhancement programmes under the IWMP will directly benefit all the BPL families in the area and bring remarkable changes in their standard of living by creating sustainable livelihoods options.
BPL Status	At present there are 65 % BPL families in the watershed area.	The BPL status of the families will be improved and they are expected to attain the status of APL over time after the proper implementation of watersheds projects.



CONSOLIDATION AND WITHDRAWAL PHASE

The last two years are the Consolidation and Withdrawal Phase of the Watershed development programme. This is the crucial phase of the project as the local institutions will be trained to manage the project independently after withdrawal of the Government Institutions from the project area.

The main purpose of this phase is to create innovative nature based, sustainable livelihoods and raise productivity levels of the augmented resources and local economic development plans developed during the watershed works phase.

The activities those will be under taken during this phase are:

1. Completion of various works under taken during work phase.
2. Consensus among the villagers to take up any new works out of any unspent amount.
3. Preparation of Project completion report with details about status of each asset.
4. Documentation of successful experiences as well as lessons learnt for future use.
5. Evolving mechanisms to improve the sustainability of various interventions made in the project area.
6. Formulation of mechanisms for allocation of user right over common property resources.
7. Formulation of mechanisms to collect user charges for common property resources.
8. Creation of awareness and building capacity of the community to repair, maintain and protection of common property resources.
9. Training the user groups for optimum utilization of the developed natural resources.
10. Up scaling of successful experiences related to farm production system and off-farm livelihood activities undertaken through revolving fund under the project as well as credit and technical support from external institutions.
11. Evolving marketing arrangements of the farm produce as well as the off-farm and other micro enterprises.
12. Formation of Farmers' Federation for credit, input procurement, sale of local produce etc.
13. Forward and backward linkage of the SHGs and User groups for sustainable livelihoods.
14. Formulating mechanisms for empowering Watershed Committee and its smooth management in a long run.
15. Formulating mechanism for utilizing the Watershed Development Fund

The subsequent activities are planned to be carried out during this stage.

1. **Documentation** : It is proposed to document the activities carried out during the watershed implementation period. It will help to maintain the records and identify and propagate the successful activities carried out under the project.

2. **Up-Scaling of successful experiments** : It is proposed to identify the best practices carried out during the project period and up-scaling the same as per feasibility and propagate the same among others members of the watershed area.
3. **Evaluation**: Evaluation is a very important activity to assess the success of implementation of the project. It is proposed to carry out evaluation at the following levels.
 - a. *Social Audit* : It is proposed to conduct the social audit of the programme at the watershed level where the Gram Sabha will evaluate the programme where the beneficiaries should explain their benefits and current status of the activity. The watershed committee should place the books of accounts of watershed programmes for approval.
 - b. *Evaluation by external agency* : An external agency with experience in implementation and monitoring and evaluation of watershed projects should be assigned for the evaluation of the watershed programme

The proper and regular monitoring and evaluation of the project can trim down the improper implementation of activities so that the quality can be controlled at the right time. The chapter extends with the appropriate post-project techniques for project sustainability and research and documentation for maintaining the records, locate the loop falls in implementing and follow up the project with a new and suitable adaptation for the area development.

Plans for Monitoring

To control the activities at the stage of implementing, proper plans was formed for monitoring and Evaluation. Project monitoring is one of the important components in watershed development programmes. The broad objectives of a watershed project demand good monitoring framework. A monitoring framework is suggested within the capacity of watershed development teams and watershed committees. No great deal of training, human resources or instruments are expected to be employed. The monitoring should actually assist the project team to provide a guideline for improvement in the activities and output the project. Selection of an appropriate measure for the given area and ensuring the quality of project measures are to be given great attention at the time of monitoring.

Three Tiers of Monitoring:

The following three tiers of monitoring are planned:

First Tier (Monitoring of activities):

This will be carried out by PIA along with WDT and WC to monitor the implementation of all activities as per the action plan. The monitoring also aims at ensuring that the quality of work is as per the guidelines prescribed for each activity.

Second Tier (Monitoring of outputs):

To check the outputs of the activities, PIA along with WDT monitors as per the logical frame work. The indicators are selected considering the broad objectives of the project. One can adopt or modify these as per requirement at the time of implementation. The output level indicators needs to be devised by the project team based on the outcome level indicators on. Outputs need to be monitored frequently, may be once in a quarter/ six months.

Third Tier (Monitoring of Outcomes):

Project Implementation Agency along with the WC will monitor the overall outcomes of the objectives as per the logical frame. The outcomes level monitoring will start in the second year and continue on an annual basis. Most of the information can be available from the sets of output level indicators. Participatory methods will be used at the time of monitoring the activities.

The methods of collecting sample data for the monitoring activities will be clearly documented in the monitoring report. The detail of the monitoring system is presented in the table as under.

Tiers of Monitoring	Basis of monitoring	Frequency of monitoring	Orientation of the Indicator	Monitoring by
First tier	Immediate result basis	Regular Monthly Monitoring	Activity oriented	Local People organizations
Second Tier	Monitoring of Outputs	Regular monitoring (Quarterly, half yearly and annually)	Objective oriented	Internal project team (WDT, PIA & Experts)
Third Tier	Monitoring of Outcomes	Annually but monitoring start from second year onwards.	Goal Oriented	<ul style="list-style-type: none"> • Specified monitoring team formed by WCDC, • External Monitoring team by PIA

Vigilance and Monitoring Committees

1. For every work sanctioned under the Scheme, there should be a local vigilance and monitoring committee, composed of members of the locality or village where the work is undertaken, to monitor the progress and quality of work while it is in progress. The Gram Sabha will elect the members of this committee and ensure that SC/STs and women are represented on it.
2. The Implementing Agency should apprise this committee of estimates regarding the work, time frame and quality parameters. The final report of the committee should be attached along with the Completion Certificate of the work, and should also be placed at the next meeting of the Gram Sabha in the Panchayat where work has been executed.

3. Local beneficiary committees may also be constituted for effective articulation of their entitlements and their access to them. The PIA members will be responsible for ensuring that local monitoring committees/beneficiary committees are constituted.

Research support in watershed management:

Watershed management requires the support of research. Watershed projects will be used as on-farm sites for research designed and implemented with significant involvement of farmers and extension workers to produce site-specific technological solutions. This leads to problems in adoption and up-scaling of research findings within specific watersheds. There is also the question of up-scaling technologies and approaches beyond a designated watershed. At the same time, researchers will be able to relate research activities to the real problems facing farmers or to capture the locally developed or modified technologies. Yet there is a need to give technologies appropriate technical and scientific definition and to disseminate them widely.

Farmer organization and empowerment:

The management of natural resources requires strong and effective farmer organizations. Such organizations empower farmers and create a good foundation for the transfer, adoption and use of information on new technologies. They also help in negotiating for inputs at favorable prices. Strong farmers' organizations can be a conduit for services that meet felt needs. These needs include information to improve production and marketing, credit, and demand driven approaches that ensure ownership and sustainability of interventions. Farmers' organization allows the use of participatory approaches that recognize local capacity and indigenous knowledge. It incorporates the aspirations and perceptions that influence decision-making, while giving farmers an important role in planning and implementation of watershed management activities. Such participation is important for the success, continuity and sustainability of the resource management programmes. Often a successful watershed knits together many aspects of the people's lives apart from purely technical issues. Many conservation and basic group production initiatives have widened into a social movement dealing with matters such as weddings, funerals, care for the elderly and the disadvantaged, and other issues in the community. The initial natural resources focus also widens into a set of integrated activities such as the improvement of houses, provision of water and electricity, acquisition of improved tools, seeds and livestock, all in the name of watershed management. Empowerment of farmers therefore allows farmers to demand services and to ensure the continued role of the state in supporting watershed development.

Use of traditional institutions and indigenous knowledge:

Experience has shown that to effectively reach the farmers and to create viable watershed management options, it is important to respect indigenous knowledge and combine it with the formal modern science and technology. Local traditional institutions should be part and parcel of the process. For instance, there is a lot of under-used

indigenous knowledge about climate, soils, biodiversity and other production conditions that confront farmers. A lot of research findings are abstract to extension providers and farmers alike. Such findings need to be married with indigenous knowledge and disseminated in a language that farmers and members of traditional institutions can understand.

Withdrawal Mechanism:

1. At the end of the project, The Watershed Committee is to take the responsibility for post project management .For which the Memorandum of Agreement is to be formulated between the PIA and Watershed Committee basing on the following terms and conditions.
2. The list of assets created under EPA, NRM, Farm production system and Livelihood support system is to be prepared with joint signature of the Chairman, Secretary of the Watershed committee and PIA. The Watershed Committee will retain one copy of the list for future reference.
3. The amount lying unspent as on closing date will be transferred to the Watershed Development Fund.
4. Watershed Committee will be authorized to use only one Bank account i.e. WDF account.
5. Yearly auditing of the accounts by the Chartered Accountant will be mandatory and to be adhered strictly.
6. The office bearer of the Watershed Committee shall involve all the community irrespective of caste, creed and religion.
7. The Gram Sabha shall have the right to decide the user charges to be collected from the beneficiaries which shall be deposited under the watershed development fund.
8. The cost of repair and maintenance of the assets created out of NRM component shall be borne out of Watershed development fund by using maximum 50% of the amount collected in a year.
9. The WDF account will primarily run as revolving fund.
10. No individual beneficiary should be granted any sort of grant or financial assistance in any form.
11. The SHGs and UGs shall have the eligibility to take loan from the WDF with marginal interest as decided by Gram Sabha.
12. The Watershed Committee is also at their liberty to start new profit making ventures by utilizing WDF as security deposit and the profit earned should go to the WDF.
13. The remuneration for the Watershed secretary will be finalized in the Gram Sabha.
14. The Watershed Committee may collect financial assistance from any other sources to augment the WDF. All donations, interests, fines and fees shall be deposited in the WDF.

15. The WDF shall be jointly operated by the Chairman and Secretary of the watershed committee.
16. All the expenditure shall be authenticated by the Watershed committee.
17. Annual meeting of the Gram Sabha is mandatory. However it may meet at any time if required.
18. The Watershed Committee should meet in every quarter to review the income and expenditure.
19. Any change in the Watershed Committee or its office bearer shall be made once it is resolved in the Gram Sabha. The Gram Sabha should believe in rotational leadership.
20. All the group representatives, at least one from each group shall be ensured in the Watershed Committee.
21. The decision approved and resolved in the Gram Sabha will only be implemented by the Watershed Committee.
22. In case of any embezzlement of fund, the Administrative system shall proceed according to Rules and Laws.
23. In the event of Gram Sabha and watershed Committee become defunct, the assets created under the project and WDF will be transferred to the Panchayat.

PLANS FOR POST-PROJECT MANAGEMENT/SUSTAINABILITY APPROACH

The Project management of any watershed programme is very important. It mainly depends upon the community organization and the village level institutes. In all villages, watershed committee and various self-help & user groups have been formulated for post project operation and maintenance of assets created during project period. Major emphasis will be on equity and sustainable benefit of the project even after implementation stage. A proper link-up will be built during project period with various institutes and capacity building organization. They will act as a major kingpin during post implementation for scaling up the successful experience during project.

Watershed development project can be rendered sustainable through an appropriate combination of environmental balance, community participation and institutionalization of process. So the detail plans for the post project management are described as under:

Adopting Environment friendly conservation measures

The measures taken up will be long lasting. Along with engineering measures, efforts will also be made to establish tree cover in the upper catchment areas and on the slopes. The downstream area will have prolonged stream flows. The stream banks will be vegetated to create a buffer between land and water bodies. Such vegetation helps in stabilizing streams, enhancing recharge and improving the riparian habitat.

Appropriate species of trees and grasses will be selected for developing a vegetative cover at the time of implementation of IWMP-1 project of Vamanapuram. The diversity of vegetative measures is the key to sustainability. Combination of shallow and deep-rooted plants, fast and slow growing plants, productive and medical plants and herbs will be encouraged. The vegetation created will ultimately help to recharge the rainwater, use the soil moisture optimally and provide direct and indirect benefits to the community and environment as a whole.

Land use pattern will go hand in hand with carrying capacity of the watershed. Optimum use of water and increased use of organic fertilizers is the key to conserve the precious land source. Water overuse and excessive fertilization leads to permanent damage of lands and groundwater. It is important to maintain soil quality through crop management. Crop diversity and crop rotation helps in improving the micro flora and fauna present in the soil and maintaining the healthy symbiotic subsystems relationship.

Participation of local community in development and management

During the planning phase, the local people's participation were involved and it is planned that the involvement during implementation and post project maintenance will enhance the impact of project and maintain the structures. However, participation without empowerment does not help in achieving sustainable development. So people will be made aware of different concepts and options for their livelihood and natural resource management. Local wisdom is important in understanding rural dynamics that

includes the interface between human behavior and its economic / ecological implications. The interests of a community will be created and maintained by adopting the measures in such a manner that they provide immediate, medium term and long term benefits to the community.

Institutionalization for post project management

A dynamic institutional arrangement is necessary for project management, facilitation of benefit sharing and maintenance of the resources. This usually includes small user groups for different resources / assets as well as village level organizations. In-built system and mechanisms will be developed for qualitative growth and dynamisms of the organizations. The community organizations will be linked to other Government and Non-Government institutes of interest. The potential people's organizations formed in the project area include Watershed Committees, Neighbour Hood Groups and Users Groups.

Watershed Committee

Watershed level organization is established right from the beginning of the project. The overall planning, coordination, management and maintenance are possible through this representative body. This clearly implies representation from different sections of the community – landholders and landless, upper reach and lower reach, men and women, lower and upper castes, Gram Panchayat and other existing political or nonpolitical organizations.

Neighbour Hood Groups

Neighbour Hood Groups are established in every micro watershed combining 40 to 50 households living as clusters. The overall planning, coordination, management and maintenance of the activities pertaining to the area are done through this Group with people's participation. These families are further subdivided into clusters of 7-8 houses and a person is selected to represent this cluster in the Neighbour Hood Committee ensuring proper representation on different sections.

User Groups

The other categories of institutions are formed of various groups with common areas of interest in the project area named user groups. These include, depending upon necessity, Self Help Groups of women and men, User Groups for common assets, Natural Clubs, etc. The capacities of different groups will be developed time to time for effective functioning of these groups. A mechanism will be developed to ensure continuity, both in learning, functioning and actions that from responsibilities of such groups during the implementation project activities.

Watershed Development Fund:

Such contributions will promote feeling of "ownership" of the programme among stakeholders. This will contribute to sustainable outcomes in the long-term. The voluntary contributions are saved in the Watershed Development Fund (WDF) that is to be used for repair, maintenance and use of assets created on common land. The contribution of it will come mainly from the following:

Sl. No.	Financial Details	Minimum contribution
1.	Natural Resource management	
	General	10 percent
	SC/ST	5 percent
2.	Production system and Micro enterprises	
	General	20 percent
	SC/ST	10 percent

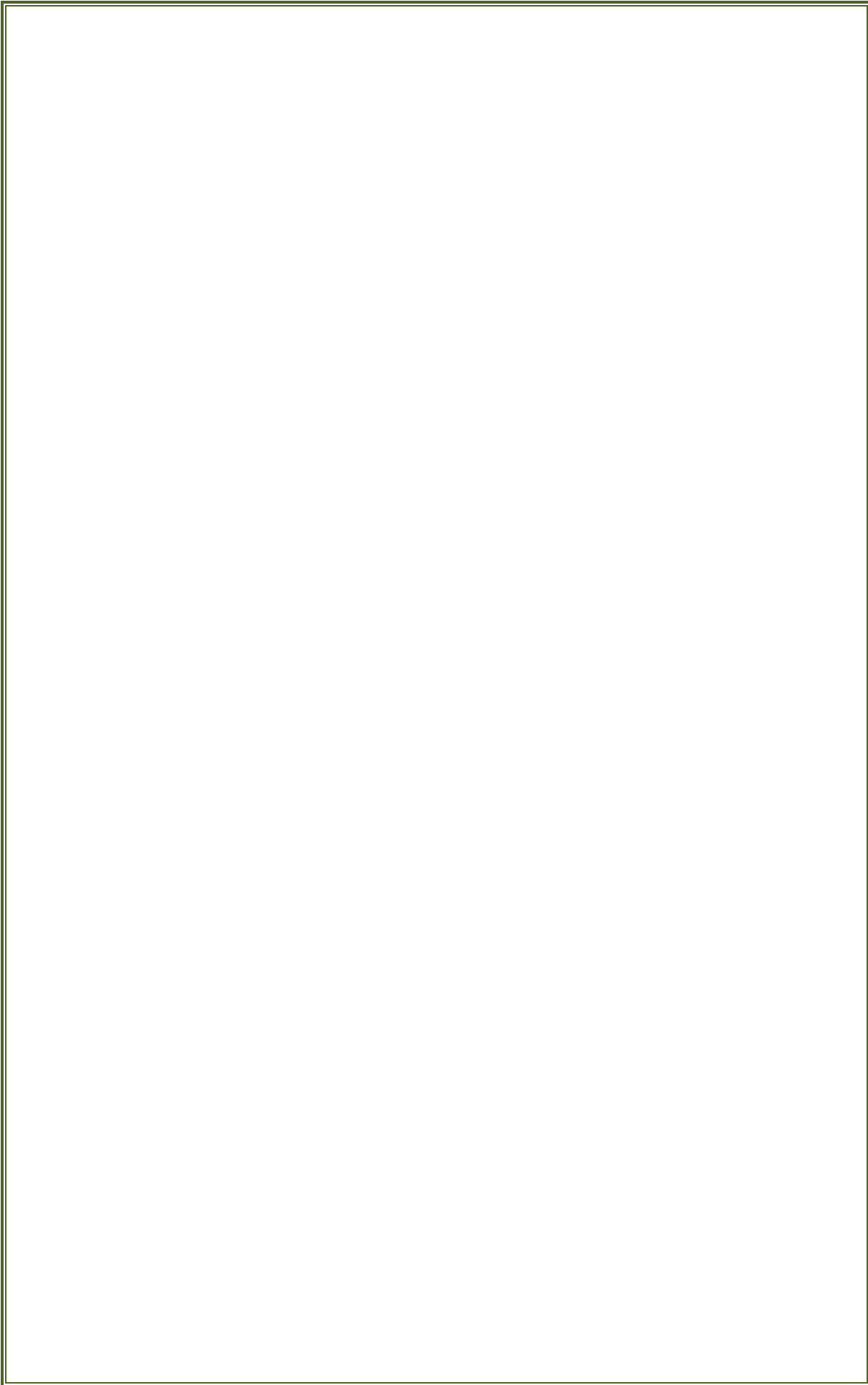
It is planned that for SC/ST, BPL population the contribution will be taken in form of voluntary labour and the fund for labour will be diverted to the WDF.

Details of Watershed Development Fund expected

No.	Name of microwatershed	Amount in Rs.
1	Aruvippuram	1604638.05
2	Cheruvallam	136538.25
3	Kanchinada	762896.70
4	Ayanikuzhi	465009.75
5	Moozhi	2023212.60
6	Nellanad	2873090.80
	Total	7865386.60

User Charges:

Various user groups will be formed in village. These user groups will collect user charges according to the designated rules formed during the formation of user group. These funds will be transferred to the WDF funds as per these formulated rules. The secretary of watershed committee (WC) will maintain the records of all activities.



KERALA STATE LAND USE BOARD – TECHNICAL SUPPORT ORGANISATION

Kerala State Land Use Board was established in 1975 under Department of Planning and Economic Affairs, Government of Kerala and is functioning as a full-fledged department. The Department is functioning as an agency to assist the State Government to frame policies for optimum land use and natural resource management in the State, with the basic objective of providing necessary advisory support on matters related to the optimum use of land and land resources viz; soil, water, plant, animal system. The Department also uses the technology of remote sensing and GIS to cater its requirement.

- The major **objectives** of Land Use Board are review of existing land uses in the State and exploring possibilities of effective land use in a sustainable manner. The objectives includes, taking effective measures to protect good agricultural lands against (i) depletion on account of soil erosion due to wind, water, sea. (ii) water logging and salinity (iii) loss of fertility (iv) urbanization and industrialization. The department advises the government regarding land use policy in general with particular references to the problems relating to conservation, development and management of lands.
- The main **functions** of the department are (i) to collect and collate data on land resources and land use (ii) to undertake surveys on current land resources and land use (iii) to initiate studies on appropriate land use and related aspects (iv) recommend appropriate policy framework to help the Government to arrive at correct decisions on land and (v) to administer and co-ordinate the implementation of the decisions of the Govt. related to land use without displacing the existing agencies.
- State Land Use Board has a niche of natural **database** on land resources and many organizations are making use of these facilities available in the department. The department organizes awareness among students, youths, farmers, planners and men of all walks of life on need for conservation, development and management of our most precious land resources. The available database includes (i)land use, geomorphology, structural geological map, proposed land use and soil conservation map of Idukki district, (ii) land use, geomorphology, transport network, drainage network, settlements, watersheds of Kerala in 1:50,000 and 1:12,500 scale, (iii) wasteland map of Kerala in 1:50,000 scale, (iv) soil series, depth, erosion, drainage, AWC, texture, land capability and irrigability in 1:250,000 scale, (v) PRM maps (hardcopy & softcopy) in cadastral scale, (vi) agro ecological zonation map of ten districts in1:50,000 scale and (vii) wetland (Paddy land) map of Kerala in 1:12,500 scale.
- The important **services** provided by the department includes (i) preparation of land and water related thematic resource maps, (ii) delineation of watersheds, (iii) agro-ecological zonation, (vi) recommendation of suitable land use, (v)

preparation of watershed based master plans for LSGIs, (vi) studies on land resources, (vii) awareness on land resource conservation and management (viii) consultancy service on land use planning & GIS for various line departments, LSGIs, etc.

Organisational Set Up & Infrastructure

The department has its State office (Headquarters) at Vikas Bhavan Complex, Thiruvananthapuram. There is a Regional Office for the department functioning at the Municipal Shopping Complex, 2nd Floor, D- Block, Patturaickal, Thrissur – 680 022. The department is presently working with the following sections for carrying out the administrative and technical responsibilities entrusted with it. Land Use Commissioner is the Head of the Department.

Technical Wing

Technical Officers in the cadre of Joint Directors, Deputy Directors, Assistant Directors and Agricultural Officers from disciplines of Agriculture, Soil Conservation, Soil Survey & Statistics is entrusted with the planning and implementation of the technical programme as per the mandate of the department and also for the implementation of the different plan schemes as envisaged in the plan document of Government. The Regional Office at Thrissur is set up for the implementation of the Plan Scheme “Resource Survey at Panchayat Level” i.e. Panchayat Resource Mapping Programme (PRM). The Regional Office is headed by an Assistant Director with supporting technical & administrative staff, created as temporary plan posts and project mode staff for carrying out the PRM programme.

Cartography, RS & GIS

Toposheets, cadastral maps, aerial photographs, satellite data, land resources data at macro and micro level generated through the projects are maintained by this wing. The Cartographic wing of the department is headed by a Cartographer with Draftsman, Planning Surveyors, Laboratory Assistants and Cartographic Assistant as supportive staff.

Administrative Section

Headed by the Senior Superintendent with supporting ministerial staff in various cadre.

Geoinformatics laboratory

It is equipped with computers and softwares capable of analyzing remote sensing data and resource maps for land resource management and planning. The Geoinformatics lab provides a new environment in natural resources planning by meeting the challenges of implementing the new IT paradigm in all aspects of land resource planning. The lab's hardware's include high end workstations, server, scanner and other packages for digital data analysis and for interpretation of digital imageries. The customization packages are developed for preparing user friendly information systems for different users. The service of this lab is provided to all line departments and

LSGIs. The Lab also imparts on-going program of training staff on GIS technology required to the operation of the lab.

Major Projects

- One of the major plan schemes implemented by the Department is generation of resource maps at cadastral level through the Panchayat Resource Mapping Programme (PRM). Comprehensive data base on land and water resources required for local level planning has been generated. The State Planning Board (SPB) has recommended for digital updation of the data base already created through PRM and for creating awareness and training in utilizing these data base at LSGI level for meaningful planning, as a follow up action. The SPB has also recommended that the State Land Use Board should initiate action programmes for formation of data base.
- One of the major consultancy projects implemented by the Department is the preparation of watershed based action plans for the Local Self Governments. Many line departments are demanding for the digital output of the already created the data base under this project. There is also great demand from LSGIs for creating awareness and training in utilizing these data base at LSGI level for meaningful planning, as a follow up action.
- Presently the department is functioning as the Technical Support Organization for preparing the Detailed Project Report for Block Panchayats under the Integrated Watershed Management Programme. The State Level Nodal Agency of IWMP has entrusted the department with the preparation of Preliminary Project Reports for Thiruvananthapuram and Kollam districts. Airport Authority of India, Town Planning Department, Local Self Governments and several other agencies has awarded consultative GIS projects.

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