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NEW GENERATION WATERSHED DEVELOPMENT PROJECT
WDC - PMKSY - 2

DETAILED PROJECT REPORT
KOZHIKODE WDC - 1/2021 - 22

Project Implementing Agency

KUNNUMMAL BLOCK PANCHAYATH
KOZHIKODE

Technical Support Organisation

KERALA STATE REMOTE SENSING AND ENVIRONMENT CENTRE
THIRUVANANTHAPURAM

KSREC

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Smt. K.P. Chandri
President
Block Panchayath
Kunnummal

Watershed development approach has evolved from the initial objectives of soil & water conservation alone to the current integrated approach of managing the biological, physical, and social elements in a landscape within the watershed boundary.

Objectives of the New Generation Watershed Development Projects WDC-PMKSY2.0 is to improve productive potential of the project area through integrated watershed management and to strengthen community based local institutions for promotion of livelihoods & watershed sustainability. The programme gives special emphasis for agriculture engineering measures for Natural Resource Management, effective use of rain water by constructing small water harvesting structures, diligent planning for crop system diversification for risk management, diversification of the watershed economy by adopting IFS– agronomic and horticulture crops, livestock, agro-forestry, fishery etc and most importantly establishing economically vibrant institutions like Farmers Producers Organization (FPO) for innovative sustainable livelihood development of the community.

High level of coordination is necessary between the various stakeholders involved along with forward and backward linkages between the various organizations like the Local Self Government Institutions, Development Departments, Watershed Committees, Neighborhood Groups for achieving the goal.

Kerala State Remote Sensing and Environment Centre (KSREC) , the Technical Support Organization has prepared the Detailed Project Report for the New Generation Watershed Development Project *Kozhikkode-WDC-1/2021-22* with the close involvement of all stakeholders. The plans included in the DPR reflects the perceptions and priorities of women, farmers and landless and will definitely encourage peoples participation in all stages of project implementation.

I thank State Level Nodal Agency, KSREC, three-tier people's representatives and officials of Development Departments for their active participation and valuable suggestions. I hope the recommendations will help in improving the agricultural, horticultural and livestock productivity, increase the livelihood opportunities for landless and marginal farmers and strengthen microenterprises in the project area.

CHAPTER-1

INTRODUCTION

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 principal 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. 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 interlinkages 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 sustainable production systems for natural resources management and livelihood options put forward in the New Generation Watershed Development projects (WDC-PMKSY2.0) needs to be seized and provided with socio political impetus in the above line for watershed management to take root in the state.

The New Generation Watershed Development projects (WDC - PMKSY 2.0) is planned with an aim of integrated sustainable eco-friendly development of the rural areas of the country. The objective of the New Generation Watershed Development projects (WDC - PMKSY 2.0) is to promote more agriculture engineering measures rather than mechanical/Engineering treatments with overwhelming focus on trees, cropping systems, soil moisture conservation & management. More emphasis is given on realizing effective use of rain water by relying more on water productivity along with Diligent planning for crop systems diversification for risk management; enhancing productivity by adopting water use efficient crops and opting for crop alignment as a principle. It also Emphasises on clear risk management plans for adaptation and mitigation of adverse impacts of climate

variability and change; diversification of the watershed economy by adopting integrated farming systems – agronomic and horticulture crops, livestock, agro-forestry, fishery, poultry etc.; enlarging livelihood portfolios; building climate change projections into water harvesting designs; precision based use of water for managing drought spells; and timely agro-met farm advisories to deal with climate induced uncertainties. It is also intended to establish economically vibrant institutions, like Farmers Producers Organization (FPO), to promote agri-business services and take up watershed activities for rejuvenation of springs.

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. Climate change issues and its impacts witnessed in the recent past have also adversely impacted ecology in general and agricultural production systems in particular, posing grave challenges to sustainable livelihoods,

1.1 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 the Integrated Watershed Management Programme and now the New Generation Watershed Development projects (WDC - PMKSY 2.0) implemented through the Department of Land Resources, Ministry of Rural Development. Departments like the Agricultural Department, Land Use Board & Soil Survey Department are also engaged in watershed development activities in the state. 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.

1.2 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 changes 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 non-agricultural 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 utilization and 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 requires 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.

1.3 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 localized 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.

1.4 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 waterrelated 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 (WDC - PMKSY 2.0) 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 forestry plantation, horticulture, tree plantation, homestead plantation etc.

1.5 MAIN OBJECTIVES OF THE WDC - PMKSY 2.0

Objectives of watershed development projects are to improve productive potential of rainfed degraded land through integrated watershed management; to strengthen community based local institutions for promotion of livelihoods & watershed sustainability, and to improve the efficiency of watershed projects through cross learning and incentive mechanism. At macro - level, the vision of WDC-PMKSY2.0 projects is to accelerate the economic growth rate of agriculture in the less endowed rainfed areas of the country. Moreover, this should be achieved by adopting harmony with ecological principles of development for ensuring sustained transformation of economy and ecology. The guiding principles shall be a better *Economy, Ecology* and *Equity* in the rainfed regions of the country.

At watershed level, the development plan shall be guided by the need to achieve higher incomes for farmers, expanded livelihood options for landless, equity in distribution of benefits, community ownership and management, and ecologically sustainable action plan.

1. Enhancing economic growth of village community dependent on watershed by:

a. Securing production and farmers‟ income against climate variability and its risks of drought spells through diversification of crop systems & animal husbandry, and varied livelihood portfolios; efficient water harvesting and retention of rainwater in soil profile; and entitling all project members to ground and surface water resources for life saving irrigation on equitable basis.

b. Improving intensity and productivity of various crops, livestock, fisheries and biomass production systems through optimal, integrated, sustainable and efficient use of natural resources in project areas.

c. Recognising the stake of non-land holding project members, and promoting alternate livelihood opportunities.

d. Building an ecosystem of enterprises for facilitating efficient scales of operations, access to credit, and market linkages; knowledge sharing; and resource convergence led by vibrant member managed farmers‟ institutions.

2. Ecological restoration and sustainable management of natural resources across the project area through:

a. Sustained community action in management of natural resources/assets such as groundwater, soil, community resources, etc. by way of building community organisations like User Groups (UG), and transferring maintenance responsibilities to them. Further, supporting UGs with regulatory norms that are institutionalized through the Gram Panchayats.

b. Promotion of simple, easy to use and affordable technologies and practices, that builds upon local knowledge and available materials.

3. Improving the economic and social conditions of the resource poor, asset-less, differently-abled and women in particular through:

a) Shared and equitable access to the land, water and biomass resources developed.

b) Greater access to income generating opportunities.

c) Facilitating co-option of members of these categories in various community institutions i.e., FPO, User Groups etc.

1.6 WATERSHED APPROACH TO WDC - PMKSY 2.0

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' (NWDPRA) 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 guidelines have been issued by the Government of India to implement the New Generation Watershed Development Projects (WDC-PMKSY 2.0) and agencieshave been identified at the State level as well as at the district level to effectively implement and monitor the programme.

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, land leveling, 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.

The contemporary and near future context warrants a paradigm shift in watershed development approach, that is largely describable by „biomass generation, crops- livestock system of production, and livelihood options" This suggests the need for rejuvenation of life in the watershed landscape, with its multiple dimensions of topography, soils, moisture regimes, water bodies, grasses, trees, diverse crop & livestock systems, and people depending on these resources.

Regeneration of landscapes implies regeneration of all these elements of the landscape and their inter-relationships. It also includes various ecosystem services such as

base flow in the streams, increased spring discharge, improved pest- predator complex etc., that contribute to enhanced productivity of all the dependent systems while minimizing the use of external inputs.

1.7 KEY FEATURES OF WDC - PMKSY 2.0

The New Watershed programme (WDC-PMKSY 2.0) is envisaged to result the following shifts:

a) A clear transition from the current predominant practice of mechanical/ engineering treatments to more agriculture engineering measures. This implies overwhelming focus on trees, cropping systems, soil moisture conservation & management and soil organic matter.

b) Emphasis on realizing effective use of rain water by relying more on water productivity. This involves integrated measures to enhance water percolation for storage of rainfall in the soil profile for longer periods; and supplementing of moisture deficits in crops with water that is harvested by constructing small water harvesting structures like field bunds, trench cum bunds, contour trenches, continuous contour trenches, farm ponds, diversion weirs, embankments, percolation tanks, check dams etc.

c) Diligent planning for crop systems diversification for risk management; enhancing productivity by adopting water use efficient crops (like nutri- cereals, pulses and oil seeds, besides dryland horticulture); and opting for crop alignment as a principle. An important initiative would include aligning crop growth phase with water availability, to provide a protective irrigation at critical stages of crop growth.

d) Clear risk management plans for adaptation and mitigation of adverse impacts of climate variability and change; diversification of the watershed economy by adopting integrated farming systems – agronomic and horticulture crops, livestock, agro-forestry, fishery, poultry etc.; enlarging livelihood portfolios; building climate change projections into water harvesting designs; precision based use of water for managing drought spells; and timely agro-met farm advisories to deal with climate induced uncertainties. Access to technology suite that forecasts events like pest & disease, price & demand etc. would further help in risk negotiation.

e) Economically vibrant institutions, like Farmers Producers Organization (FPO), to promote agri-business services and impart efficiency to transactions at both input and output management stages. Such organizations are to be people – owned, people – managed and people-centric approach.

f) Setting up and nurturing of community groups that will take interventions beyond mere creation of assets and promote responsible ownership and management. Formation of User Groups based on common identities and interests around natural resources and work consciously towards integrating the principle of sharing.

g) Focus on decentralization, flexibility, community empowerment and greater role for village-level institutions in the planning process with a view to accommodating the local social and traditional strengths.

h) Rejuvenation of springs by taking up appropriate watershed activities in the watershed development projects.

1.8 GUIDING PRINCIPLES OF WDC - PMKSY 2.0

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)

CHAPTER 2

WATERSHED DEVELOPMENT PLAN

The vision of the new generation of watershed development projects is achieved through PWDP prepared by the watershed community with technical guidance from the WDTs.

The following constitute broader components of the watershed development plan:

i. Ecosystem Regeneration and Production.

ii. Natural Resources Management and Governance.

iii. Services & Livelihoods.

These three are organically linked and relate to development, management and governance of natural resources. The plan should focus on effective and efficient use of natural resources to realize better income for the rural people.

2.1 Ecosystem Regeneration and Production Plan

a. Crops and the land use vary in accordance with the topography. Its characteristics and tenurial relations also determine the land use. The watershed landscape is first zoned into relatively homogenous units based on its physical characteristics, usage (crops, grasses, trees) and tenurial status (such as private/ commons/ forest department owned lands). The types of zonation vary across different agro-ecologies.

b. In addition to the physical watershed treatment plan covering ridge to valley, the ecosystem regeneration plan should look at the land use crops grown or types of grass lands or vegetation in each of the zones and the status of groundwater/ aquifers etc.

c. The plan should indicate the measures taken up for improving soil health in terms of soil organic matter, regeneration of vegetation, mitigation of climate risks in crop production, crop diversification including horticulture, approach to improve crop (soil) cover for longer duration in a year, arresting land degradation, harvesting rainfall and protective irrigation.

d. An important aspect of this plan is integration and strengthening of livestock production systems, integration of livestock feed and fodder into crop systems, promotion of fodder trees and regeneration of grass lands, as the broad components.

e. The plan for each of the zones must show measurable indicators for assessing the ecosystem regeneration and projected improvement in production of various crop systems as a result of interventions made. The change can be appreciated only when the baseline index of these indicators is included in the plan.

f. For comprehensive ridge to valley treatment is the watershed development approach. The forests and common lands on the upper reaches will necessarily constitute the first candidates for watershed activities. Well-treated upper reaches impact the lower reaches including the arable lands positively. The additional benefit of such a treatment would result in improvement in quality of forest, besides augmenting forest produce adding to supplementary income of the community.

2.2 Natural Resources Management and Governance Plans

These plans will have three parts as discussed below:

a) Maintenance of natural resources related assets

Natural resources related physical works need maintenance, and the bio-works such as plantation require strong protection measures and care. The watershed committee responsible for undertaking treatment works and asset creation should maintain a Watershed Assets Register, and the list of completed works recorded and updated continuously. The completed assets should be transferred to the Gram Panchayat for their continued maintenance at the end of each year of implementation.

A system of annual audit of natural resource assets should be taken up by the GP to assess their status and maintenance needs. These can be integrated into the MGNREGS by a resolution of the Gram Panchayats. The WDT should ensure that these processes are institutionalized into the functioning of Gram Panchayat and followed regularly from 2nd year onwards. The activities planned to achieve this should be submitted as a part of the overall Project development plan.

b) Water Budgeting, Management/Regulatory Norms and Governance

It is crucial for the community to establish reference sites of wells/ bore wells, and regularly monitor groundwater along with local rainfall, so as to arrive at regulatory norms on water extraction, type of crops to be grown and area coverage. The groundwater monitoring exercise may be taken up twice a year (April- May & September-October / before the crop season), and results be placed after analysis, before the Gram Sabha. The purpose should be to build a common understanding and consensus in the project community for sustainable use of groundwater. The community should be brought to agree on potential restrictions on new extraction

structures, reducing area under water intensive crops and other such norms that economise on water use. These exercises are to be taken up twice a year and activities proposed should be part of the watershed development plan.A suitable arrangement for carrying out this exercise should be made by PIA in consultation with Watershed Committee and also provide requisite training for the same.

c) Protection and Regulation/Regeneration of Common Lands

Common lands that are typically in the upper reaches of the watershed slopes, including forests, pastures etc. should receive focused attention,along with identification of users, their needs and organizing them into user groups. The plan for regeneration and development should also enlist various products, usufructs arising out of the planned regeneration process, and their benefit sharing norms. Protection measures, norms and their enforcement mechanisms need to be arrived at and must have sanction of the Gram Panchayat.

2.3 Services and Livelihood Plan of FPOs

These are essentially economic growth plans of the watershed community building upon the social capital base and investments in natural resources. An FPO is formed from the beginning as a business entity that efficiently provides services, organizes inputs, promotes value added commodities produced by local enterprises, and undertakes aggregation and marketing, protecting the interests of small & marginal farmers, SC/ST members and women.

The FPO shall start with organizing the three regular components:

- **Custom Hiring Centre (CHC)**- renting out implements/ equipment/ small machines for use by small holder farmers, women and agriculture labour
- **Input Shop**- where inputs required for farming, small implements, quality seeds (produced by its farmers or procured from outside) are readily available within close proximity
- **Information Centre**- providing weather forecasts, weather advisories, crops and livestock related information, information on various schemes, hosting knowledge sources like videos, a library etc.

The plan for economic growth and livelihood activities ideally starts with assessment of the potential impact on crop, livestock, fish and other agricultural production system that comes from the investments made on natural resources. From the perspective of monetising the produce, attention is needed on post-production activities, including value addition & marketing. Hence, investments

for creating/upgrading infrastructure, building human resources and skills, and working capital are assessed, and included in the watershed development plan.

The FPO should be able to undertake these responsibilities by taking active support of Watershed Committees, Gram Sabha and Gram Panchayats.

2.4 Convergence Planning

Several government schemes can complement the watershed development initiatives. Once the overall project development plans is prepared, the WCDC will need to discuss with the PIA supported by its WDT and prioritise the activities. This should also involve exploration of scope for sourcing funds from various ongoing relevant schemes. The focus should be on supplementing project activities and funds by effecting convergence with relevant ongoing schemes.

2.5 Springshed Development

Springshed Development will be taken up as an activity under watershed projects. Any intervention attempting to develop springs as a natural resource must involve assessment of geological controls on springs, recharge potential of springs at micro level, maintenance and protection of springs, and effective monitoring of spring discharge and water quality. Spring conservation and management activities should use integrated landscape management approaches to synergize the positive linkages with livelihood practices, while also preventing practices that have negative impacts (overgrazing, deforestation, creation of artificial gullies, haphazard road construction, over-extraction of springs, etc

CHAPTER 3

PROJECT PERIOD AND PHASING

In view of the expanded scope and expectations under the new generation watershed; development program, the project duration would be three to five years. The phases and duration of each phase is shown in the table 1 below

Table: 1 Project Period and Phasing

Phase	Name	Duration	
I	Preparatory Phase	Upto 1	Year
II	Works Phase	2 to 3	Years
III	Consolidation and Withdrawal Phase	Up to 1	Year

3.1 PREPARATORY PHASE

The major objective of this phase is to create people-centric platform by mobilizing the project community and setting up institutions. Towards this, the main activities will include the following:

1. Mobilisation of Community and Promotion of Institutions

a) Mobilizing the local community, creating awareness, leading them into various User Groups around natural resources with a view to promote their sustainable usage, and initiating opportunities for livelihood activities. This also involves orientation of members belonging to GP, local institutions, various stakeholders, and other VLIs.

b) Formation of WCs.

c) Preparing farmers to organise themselves into an FPO, or strengthen the existing ones.

d) Finalising appointment of the Secretaries of WC and FPO, and taking them through the required orientation & training programs.

e) Overall orientation of the people, the local PRI members and the officials concerned to be oriented for executing a community-led watershed project.

f) Day to day functions and activities to ensure progress.

2. Mapping and Creating Watershed Databases

a) Compilation of basic demographic and spatial data - the data sets accumulating over several planning exercises need to be integrated with the base data/maps, both across households and space.

b) Building Land Resource Inventory (LRI) assessing soil characteristics of the watershed reaction along with hydrological and meteorological data and Socio-economic status.

c) Baseline surveys needed for preparation of the project development plan, along with that necessary for assessment of project success and end results to be completed. The data must be disaggregated, such that granular data and information are made available to appreciate the benefits that have accrued to different categories of the project stakeholders including the landless, small & marginal farmers, women and SC/ST members.

3. Participatory Watershed Development Plan (PWDP)

The overall responsibility for preparation of a PWDP for a watershed project, along with DPR is given to the PIA

a) Once a watershed has been assigned to a PIA, it becomes its responsibility to constitute project level committees, including the all-important watershed committee, and guide it to prepare a comprehensive development plan, by adopting participatory approach. The comprehensive plan for the project period shall show year-wise actions plan indicating various activities/ works. This shall be placed before the Gram Sabha, and with its approval sent up for consideration and approval of the WCDC.

b) At the time of submitting the plan for consideration of the WCDC, project level community institutions, namely, FPO, User Groupsand SHG etc. must be in place, and the profile must be incorporated into the Plan.

c) The Plan needs to detail out the potential benefits that will be generated from various interventions in favour of the project community as individuals and as a group, and also the positive impact on the ecology. The time schedules in respect of these varying benefits must also be reflected.

d) In the plan, the project area will need to be clearly delineated by mapping sub watersheds/landscape zones, and their characteristics. It must contain all baseline data in respect of all the parameters.

The Plan must identify the potential climate risks to production activities, through consultations with the farmers, and show the response mechanisms that will be implemented.

e) Hydro-geological assessment of the watershed includes an inventory of both surface and groundwater resources, identified locations of springs and their characteristics, including delineation of recharge and discharge areas.

f) In case of rejuvenation of springs in hilly areas, details of the aquifer profile and its recharge potential need to be studied for identifying both natural and artificial recharge interventions.

g) Groundwater monitoring and local weather monitoring systems needs to be established based on the hydro-geological assessment for use in participatory water budgeting exercise should to be taken up from the second year.

h) Workout and include detailed resource-use agreements (for surface water, groundwater and common/forest land usufructs) among User Group members in a participatory manner based on principles of equity and sustainability.

i) Common land properties are identified along with their users, the status of the lands is detailed, and the package of activities for regeneration and maintenance of the commons is finalised as a part of the Plan.

j) The WC should take up the responsibility of regular monitoring of groundwater.

k) The plan must also describe the proposed interventions (physical and financial, including the time schedule).

l) Based on the local priorities, the plan may detail the sequence of activities and their budget requirements such that implementation is spaced appropriately for realising the desired quality.

m) The project plan must be in alignment with the District Irrigation Plan. Water budgeting based on available water and the potential quantum that is proposed to be harvested in the project area, will help in determining an optimal crop plan.

n) Entry point activities are taken up by the WDT to build rapport with the village community and gain their confidence towards people-centric project development. The progress made in respect of the entry point activities like formation of FPO and establishment of custom hiring centre may be included in the plan being submitted. However, a few other activities that the local situation may demand, and the WDT finds it necessary may also be taken up by preferably sourcing funds from ongoing schemes like MGNREGS, RKVY etc.

Formation of FPO with about 300 shareholding members would be an optimal entry point activity for the program. Entry point related budget will be released to the FPO as soon as it has been registered with at least 50 paid shareholders and has a space to open its office. The FPO can then be supported to operationalize a CHC too as its initial activity.

o) The comprehensive project plan containing all details, forms the basis for the program‟s MIS. It must therefore be elaborate enough in terms of data, information, technical details, budget etc., so that its MIS can be linked with State and National Data Centres.

p) The plan must be flexible enough, so that necessary changes can be affected to accommodate emerging experiences/ learning and innovations felt useful. The plan can be reviewed and amended biannually, if necessary, with the approval of the WCDC.

q) Action plan must show a clearly demarcated project area boundary with specific details of survey numbers, ownership, as also year-wise sites for various works/activities that will be undertaken.

3.2 WATERSHED WORKS PHASE

This phase is the heart of the program during which the planned activities will be implemented. The main challenge of the new approach to watershed development arises from the need for taking up an integral view of multiple expectations and harmonising their realization.

The plan of implementation should parallelly address three streams namely

(a) Ecosystem regeneration and production enhancement

(b) Natural resources governance; and

(c) Services& livelihoods.

Some of the following activities are suggested that greatly emphasize agronomic, biological and livelihood activities, while not compromising on the needed mechanical measures for soil and water conservation.

a) Multi-purpose trees (fodder, nitrogen-fixing, biomass for incorporation into soils) to be promoted. Nursery rising for fodder, fuel, timber and horticultural species should form an important activity. As far as possible, local species may be given priority.

b) Land development including in-situ soil and moisture conservation, and drainage management measures like field bunds, contour and graded bunds fortified with plantation, terracing in hilly terrains etc.

c) Water budget-based promotion of Integrated Farming System (IFS) models that promote crops, horticulture, livestock and agro-forestry and facilitate deriving the benefits arising from supplementary and complementary relationships among these enterprises.

d) Pasture development to support livestock activities.

e) Exploring the scope for introducing fisheries by assessing the period & availability of water. The tanks/ponds/other water bodies may be designed and executed in accordance with hydro-geological assessment.

f) Veterinary services for promotion of livestock activities.

g) Agro-ecology based crop alignment and demonstrations for popularizing new crops/varieties, animal breeds, resource use efficient practices (soil health card-based soil health management, micro-irrigation systems etc.), and various agronomic practices that help in negotiating production risks (pests, diseases, weather variations etc.).

h) Climate risk management activities like Custom Hiring Centre, portable micro irrigation, drought/flood resistant varieties, protected cultivation, seed bank, fodder bank, tools for dissemination of agro advisories etc.

i) Thrust on secondary agriculture for increased farm income adding value to primary agriculture activities; taking up alternative enterprises that can utilise the available land and labour particularly the landless to take up activities like mushroom cultivation, bee keeping, back yard poultry, compost making, rearing of small ruminants & and rabbits etc.

j) Promotion and propagation of non-conventional energy saving devices, energy conservation measures, bio-fuel plantations etc. This intervention needs careful consideration after examining the local social and cultural milieu, including the critical livelihood options of the household(s) concerned.

3.3 CONSOLIDATION AND WITHDRAWAL PHASE

Around 3rd to 4th year of implementation of the Project, majority of the planned works would have been executed, and FPO shareholders would have risen to substantial numbers. As planned projects get executed, the role of WC diminishes and that of the FPO, User Groups and SHG increases. Sustainability of economic and ecological benefits from watershed investments is predicated upon effective functioning of these institutions. Sustainability after the completion of project work and withdrawal will also depend upon the quality of works executed. Hence, the phase of consolidation and respectful withdrawal

from project work assume importance. In this context, the scope of work during this phase is suggested as follows.

3.3.1 Project Implementation Related

a) Completion and consolidation of all the planned works and activities.

b) Documented experiences of the farmers and identified champion farmers during the 2nd and 3rd years of work can be used to scale up the practices to larger areas.

c) With two years of focus on productivity gains, production increase of targeted commodities can be expected. The FPO now needs to work for a robust post- harvest management by operationalizing basic agri-logistics, primary processing, aggregation and marketing. FPOs will need to prepare an integrated action plan and roll it out during the 4th and 5th years of the project. Promoting warehouse-based storage and electronic Negotiable Warehousing Receipts (eNWR) will address concerns of finances and allay distress sale by farmers.

   All such post- harvest issues need to be taken into account while planning production strategies itself, and further needed action plan readied simultaneously. This will make it possible to roll out by 3rd - 4th year of the project period, and exhibit stability as exit begins.

d) Documentation of successful experiences and lessons learnt are useful for course correction and continuous improvement in the quality of implementation. Social media can also be activated to achieve wider dissemination.

e) Prepare for and undertake terminal evaluation of project to evaluate the extent of expected outcomes realized successfully

f) Preparing for and operationalization of capacity building programs for all the community-based organizations (CBOs), so that they will be able to take over management of different tasks after the Project Team withdraws.

3.3.2 Consolidating the Strength of FPO

a) Building capacity of the FPO as a vibrant business organization of farmers is critical to management of the watershed post withdrawal. Annual business plans, linkages with financial institutions, regular updating of books of accounts, legal compliances and functional governance are key responsibilities of a well-functioning FPO.

   The outcomes of various capacity building activities and prescribed management processes undertaken as per annual action plans may be taken stock of, and additional support required to address the gaps provided.

b) Increasing the capital base of the FPO and linkages with financial agencies for credit are crucial for its healthy growth. The WCDC should now ascertain the status of FPO with respect to its areas of activities and annual turnover, bridge the gaps, if any, by offering support from various initiatives of the government. The importance of coordination and convergence cannot be over emphasized. Facilitating matching grant for the FPO is one such important support.

c) During the 4th and 5th years, FPO must focus on building various backward and forward linkages and infrastructures that will support practice of agriculture as an integrated value system. Convergence with other ongoing Government schemes should be the norm and guiding principle for the FPOs.

3.3.3 Auditing of Natural Resources

a) Natural resources developed need to be used in a sustainable manner by reconciling ecology, equity and economic considerations. The use of, and expected outcomes thereof must be viewed through the prism of balance and harmony. Over-emphasis on any one of these three factors to the neglect of other two should be avoided at any cost.

b) Regularizing the Annual Audit of Natural Resource Assets: All the natural resource assets created (along with the existing ones) should be visited and assessed by the WC. These assets are to be maintained by tapping different sources of funds – MGNREGS, such other infrastructure funds, and WDF for critical investments and even voluntary contributions in cash or kind.

c) The process of resource audit should also consider, i) implementation of the sharing agreements on usufruct rights; effectiveness of regulatory norms; and health of the natural resource.

d) During the consolidation phase, the core functions of the WC should be institutionalized. Also, the user groups should be active and stable.

During this phase, local-level institutions are expected to reach maturity, and exit protocols now become operative for the PIA. The WCs may begin to use the WDF for repair and maintenance of structures created in Phase II. However, accessing of the fund should preferably happen after exploring sourcing funds from other ongoing schemes.

3.4 FPOs, Farmers' Income and Value Addition

In contrast to production-centric agriculture, that has largely been practised in the country so far, the Government's vision of doubling farmer's income has shifted the attention to income – centric policy framework. This entails market- based production

decisions, and integrating farm-produce with markets, with a view to enabling the farmers to capture optimal value from his farm output.

This calls for mobilising farmers into FPOs, to impart efficiency to operations at both production and post-production stages.It further calls for effective post- harvest management by focussing on agri-logistics (storage and transportation), processing and marketing.The PWDP would do well build a robust FPO system that can take care of important issues as listed below:

a) The PWDP must incorporate mobilisation of farmers into a healthy FPO, to shoulder the responsibilities. It should become the foremost entry point activity.

b) The FPO should focus on providing inputs to farmers at reasonable price, and evacuating farmers‟ produce to markets by depending on alternate market channels, always preferring for direct sale options. It needs to put in place the needed infrastructure and management systems in place for this purpose.

c) It should support the farmers to undertake primary processing of the produce, so that it is able to command higher prices when put to price discovery mechanisms, including online trade platforms.

d) It should establish basic infrastructure that will enable assaying and aggregation of the small lots of the farmers; and further facilitate produce transportation through one or more of the markets now available under new market architecture, comprising Grameen Agricultural Markets (GrAMs), reformed Agriculture Produce Market Committees (APMCs)/ Agriculture Produce and Livestock Market Committees (APLMCs), Export platforms, Futures Trade platforms and the like.

e) Supporting the farmers to overcome distress sale, which is common after the harvest is critical to capture optimal value on their sales and realise better incomes. The FPO can play a crucial role by hand holding the farmers in adopting warehouse facilities. The farmers will stand to benefit from electronic Negotiable Warehouse Receipt (eNWR) system available in the country.

f) FPOs can provide/facilitate many other services like input supplies, farm advisories, custom hiring of farm machineries, credit, contract farming etc.

3.4.1FPO – Subsidiary Institutions and Services Offered

The FPOs can set up several subsidiary activities, create backward & forward linkages, and serve both, farmers and other non – farmer stakeholders of the project. Some of such services that an FPO can manage and deliver are indicated below:

a) **Custom Hiring Centre (CHC):** Farm machinery and associated services can be rented out to the farmers and landless labourersfor achieving higher productivity and reducing cost of cultivation. The FPO can run it on a revenue model by charging reasonable rates of rent. The FPO should try to avail itself of the ongoing CHC scheme.

b) **Community Seed and Planting Material Centre:** It can take up seed and planting material production of various agronomic, fodder and horticultural crops. The FPO must focus on providing seed and planting materials of varieties recommended for the local area, their timely delivery at reasonable rates. These can become the brand value of such an initiative.

c) **Integrated Farming System:** FPO can ideally focus on the strength of farmers and facilitate promoting integrated farming system by taking up suitable combination of sectors like -afforestation (agro-forestry), fishery, goatery, apiary, piggery, horticulture plants like moringa, amla, mango, cashew nut, floriculture etc through convergence with PDMC.

d) **Promote micro irrigation** like drip, sprinkler and pivot irrigation, drip cum mulch, small size green house and shadenet with foggers through convergence with PDMC.

e) **Post-harvest management**: FPO can develop facilities and capacity to aggregate the local produce and link to alternate market channels. These include both online and physical transactions, with preference for direct sale. The concomitant logistics for primary processing, aggregation, storage and transport may be set up by the FPO. It should attempt to benefit from several of ongoing relevant schemes.

f) **Creation of sale outlet and service centre**: FPO can create Centre from where the farmers can purchase various inputs and avail of services such as insurance, credit, vaccination for animals by levying service fee at a single place.

g) **Promoting secondary agriculture activities** by facilitating skill development, access to institutional credit besides assistance under government scheme.

h) Managing an information centre for disseminating weather based agro meteorological-advisories, package of practices for cultivation etc.

i) Any other social / business activity as per the local needs.

CHAPTER-4

WATERSHED DEVELOPMENT FUND (WDF)

4.1 Creation of Fund

Watershed Development Fund (WDF) shall be created at each watershed level in all the Watershed Development Project for ensuring post-project maintenance of so created community assets. One of the mandatory conditions as per the Guidelines for selection of villages for watershed projects is people‟s contribution towards the Fund.

The Guidelines envisage that a part of contribution of natural resource management (NRM) works shall be contributed by the owners of land, when executed on their land. This norm has been fixed at 10% for general category farmers, and 5% in case of SC/ST farmers. This can serve as the seed money for the Fund (Para 26.1 of the Guidelines).

4.2 Sources of Fund

The following sources may contribute towards this WDF:

a) Contributions made by the farmers against NRM works taken up on private lands @ 10 % and 5 % in case of general category and SC/ST category farmers respectively

b) Contributions made by the farmers when receiving benefits from individually livelihood activities (horticulture, animal husbandry, agro-forestry, aquaculture, water bodies and the like) on their privately owned lands

The contributions shall be @ 20 % and 10 % of the estimated cost of the farming system activity

c) Collections made by the Watershed Committee on account of user changes, sale proceeds and recurring incomes earned from the assets created in the project area (this includes existing ones too) over common properties (land, water, pastures etc).

d) Contributions received from philanthropic individuals and institutions.

4.3 Composition of WDF and Joint Bank Account

Composition of the Committee: The WDF will be handled by a Sub-committee approved by the Gram Sabha, comprising of members of the project area. All members of the Watershed Committee including its selected Chairperson and excluding the selected Secretary shall become ex-officio members of this Fund. The Chairperson of the Gram Panchayat and not the Chairperson of the WC shall serve as the Chairman of the Fund.

Joint bank account: An exclusive joint back account shall be opened in any of the scheduled commercial bank (public or private), or public sector cooperative bank or Regional Rural Bank (RRB) in the name of the Chairperson of the Gram Panchayat, and the PIA representative on the Fund Committee. In case of the PIA being a Non- Government Organization, the DLNA (District Level Nodal Agency) shall nominate one of the Block level Government officers to hold and operate the joint account. This too shall be placed before the Gram Sabha for its approval. Fund shall be used optimally and in a transparent manner. It may be invested in medium/long term deposits after assessing current and future the requirements.

4.4 Registration of WDF

The Committee constituted by the Gram Sabha in accordance may either be registered as an independent society under the provisions of the Societies Registration Act, 1860 or be considered as a Sub-committee of the already registered WS, by incorporating a specific provision to this effect. In the alternative, the Gram Sabha may consider recommending to the Gram Panchayat recognise this as one of its Sub-committees.

4.5 Utilisation of the Fund

The money from the Fund can be utilized for post-project activities, when the project implementation team has withdrawn at the end of completion of the developmental activities. The utilization shall be as follows:

a) A sum amounting to 50 % of the Fund shall be reserved for maintenance of assets created on community properties (land, water, pastures, etc.) or/and common uses under the project

b) The remaining 50 % may be used as „Revolving Fund“ for advancing loans

4.6 Operational Guidelines for WDF

Assets that need maintenance: Various types of engineering structures & biological interventions like water harvesting structures such as check dams, nala bunds, diversion drains, percolation tanks, vented dams, farms ponds, artificial recharge structures, equipment for natural resource governance, specific interventions for spring rejuvenation etc., created in the watershed are prone to damages by stray cattle, rain, sunshine, wind and unexpected natural calamities. Over the period there can also be natural damage or there may be need for its renovation for better results.

There may be need strengthen or rejuvenate biological activities like block plantations pastures etc.In such cases, if the assets exist on common properties, resources from WDF may be accessed and works taken up.Expenditure can be incurred also on assets

built on private land but serve the community, and an agreement to this effect has been created between the WC and the land owner, and this has been shared with the GP.

4.7 Monitoring of the Fund

The amount available in the WDF account can be spent for post-project maintenance activities in the manner as shown in the Table 2 below:-

Table: 2 Monitoring of the Fund

S.No.	Year	Principal amount	Interest accrued
1.	1st year	10%	30%
2.	2nd year	15%	25%
3.	3rd year	20%	20%
4.	4th year	25%	15%
5.	5th year	30%	Remaining interest

CHAPTER 5
DETAILED PROJECT REPORT

A Detailed Project Report (DPR) describe what a Watershed Project will try to achieve over a tenure of watershed project of **3 to 5** 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. **Mahe**watershed project (PMSKY) of **Kunnummal** and **Tuneri**block of **Kozhikode** district is proposed for **four** years duration (**2021-22 to 2025).**

5.1 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.

5.2 Methodology adopted

In line with the guidelines of WDC-PMKSY 2.0, as suggested by Government of India, the following methodology was adopted for Resource Mapping, NRM planning and preparation of Detailed Project Report.

- Prepared the cadastral maps pertaining to the project area.
- Overlaid the micro watershed boundaries over cadastral maps and corrected the boundaries through ground truth verification
- Project Fellows were appointed as animators. The animators assisted the People's representatives in the field for primary and secondary data collection. The animators worked as the interface between LSGI and TSO

- Engineers/Overseers were engaged for taking field estimates of the proposed activities.
- Induction training was given for the Project Fellows on concept of maps and Resource Mapping.
- Block level online discussions were conducted for People's representatives of District/Block/GramaPanchayats, Line departments, Kudumbasree, and other functionaries.
- This was followed by orientation meeting at Grama Panchayats.
- Conducted transect walk with ward members and ADS.
- During the transect walk, major drains, gullies and drainage lines are identified and marked in the cadastral map.
- A block level online meeting 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.
- Various resources like different water bodies, wells and farm ponds are identified and marked in the cadastral map.
- Focus Group Discussions were organised at Panchayat level forward members & ADS Chairpersons, Presidents& Secretaries of NHGs, Padashekhara Samithi, Kera Samithi, Kudumbasree, MGNREGS, Officials of Agriculture, Veterinary& Soil Conservation Departments.
- The land resource maps already prepared were updated using high resolution satellite imagery and these interpreted maps were corrected with the help of ward members.
- Detailed field survey was done for net plan preparation at Grama Panchayat level with the help of ward members & ADS Chairpersons, 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 micro watershed. 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.
- Thematic maps on geology and geomorphology were interpreted from the high-resolution satellite imagery and were corrected through ground truth verification.
- Panchayat Level online meetings convened at Grama Panchayats and the list of entry point activities suggested were discussed and finalized.

- 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 watershed were also finalised. The livelihood action plan and the activities under production system were also consolidated.
- The suggestions were split for three years and three separate annual plans were also prepared.
- 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.
- 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

CHAPTER 6
KOZHIKODE DISTRICT

6.1 Introduction

Kozhikode district came into existence on 1st January 1957. District is bounded on the North by Thalassery taluk of Kannur district, on the East by Mananthavady and Vythiri taluks of Wayanad district, on the South by Ernad and Tirur taluks of Malappuram district and on the West by Lakshadweep Sea. Kozhikode covers an area of 2345 sq km consisting of 12 blocks, 7 municipalities 1Corporation and 4 taluks.

As per census 2011 population of the district is 3059543, Out of this 1473028 are males while the females count 1616515 here. Kozhikode is a historical town with charming physical features and prosperity. The district has a population density of 1,318 inhabitants per square kilometre (3,410/sq mi). Its population growth rate over the decade 2001-2011 was 7.31%. Kozhikode has sex ratio of 1097 females for every 1000 males, and literacy rate of 95.24%.

Watershed hasbecome an acceptable unit of planning for optimum use and conservation of soiland water resources. Land use category is observed in this district are built-upland, forest, water bodies, agricultural land, wasteland and wetland and waterbody.Major categories of wasteland are Land with dense scrub, Barren rocky and scrubdominated forest. Kozhikode is a historical town with charming physical featuresand prosperity. The district houses Kappad beach (16 km north of Kozhikode) which is famous as the place where Vasco Da Gama the leader of a trade missionfrom Portugal first landed in Kerala in May 1498.

6.2 Geography

The district is situated between North latitudes at$11^0$07’23”– $11^0$48’18” and East longitudes$75^0$31’48” –$76^0$08’40”. Based on physiographic features district falls under three sub micro regions namely i) Kozhikode coast. ii) Nadapuram-Mavoor undulating plain iii) Kozhikode forested hills. District has a humid climate with oppressive summer and plentiful seasonal rainfall. District has 290.45 sq.km forest area with a break up of Reserve Forest/ Proposed Reserve (47.36Sq.Km), Vested Forest + Ecological Fragile Land (243.08 Sq.Km). Agriculture plays a vital role with total cropped area of 200842 ha during 2015-16. Large forest reserves favourably affect the climate and induce more rain in this district. Kozhikode

covers sandy, laterite and hilly or forest soil. The coastal area extends to 71Km consisting 42 fishing villages.

6.3Flora and fauna

The flora of Kozhikode district is characteristically tropical due to the heavy rainfall, moderate temperature and the high mountains in eastern border. The region is thickly populated and a greater part is under cultivation mainly of coconuts, paddy, plantain, and various tuber crops like tapioca, yams, Colocasia and other vegetables.

There is an abundance of wild and marine life here. Though wild elephants and bisons are occasionally seen in the forests, tigers and leopards are very few and rare. Barking deer, mouse deer, Monta lizards, Malabar squirrels, black and grey monkeys, hares and porcupines are found in the forests here. The avions are well represented by horn bills, peacocks, jungle fowls, thrushes, pigeons, sunbirds, kingfishers, wood peckers, paradise fly catchers, parrots, mynas, king crows, racquet tailed dragons etc. Snakes, poisonous and non-poisonous are seen in the forests in fairly large numbers. Pythons are also seen in many parts of Kozhikode.

6.4 Rivers

The district is drained by six rivers of which one is of medium nature and all others are minor ones namely Chaliyar, Kuttiyadi, Mahe, Kadalundi, Kallayi and Korapuzha. Among six rivers in the district, Kuttiadi river originates from Wayanad hills and flows through Thriuvallur, Muyipott, Maniyur, Karuvanchira etc. before it reaches Lakshadweep Sea at Kottakal port about 7 km south of Vadakara. The length of the river is 74 km and it flows through an area of 583 sq.kms. The total catchment area is about 430 km.

Korapuzha is formed by the confluence of two streams called Punnurpuzha and Agalapuzha. Punnurpuzha originates from ArikkanKunni hills at an elevation of 610 metres above sea level and Agalapuzha originates from Kodiyandumala at an elevation of 700 metres. Kallayi River has its origin from the midland village of Cherukulathur at an elevation of 45 metres above sea level.It is connected with Chaliyar and Korapuzha with artificial canals. The length of the river is 22 kms and it has a drainage area of 96 sq.kms.

Chaliyar river t originates from the Ilambilari hills in Gudalur taluk of Nilagiri district in Tamil Nadu. Chaliyarpuzha, Punnapuzha, Pandiyar, Karumpuzha, Vadapurampuzha, Iringapuzha and Iruthilpuzha are its important tributaries. Kadalundi River is formed by the confluence of its two main tributaries, the Olipuzha and Veiyar. This has a length of 130 km. This river joins Lakshadweep Sea at about 5 km. south of Chaliyar

river mouth. The Kadalundi River known also by the name Karumpuzha and Oravanpurampuzha is a navigable river.

The Mahe River also called the Mayyazhipuzha, orginates from the forests on the western slopes of the Wayanad hills, which form part of the Western Ghats. The length of the river is about 54 kms and it flows through an area of 394 sq.kms. There is only one major irrigation project in the district namely the Kuttiyadi irrigation project across the Kuttiyadi River. The important backwater in the district is Kuttiyadithura in Vadakara taluk. As a part of west coast canal system there is a continuous water route connecting Vadakara with Ponnani.The canal passing through Kozhikode is named as Canoly Canal.

6.5 Climate

The district has humid climate with a very hot season extending from March to May. The most important rainy season is during the southwest monsoon, which sets in the first week of June, and extents upto September. The northeast monsoon extends from the second half of October through November. During December to March, practically no rain is received and from October onwards, the temperature gradually increases to reach the maximum in May, which is the hottest month of the year. The maximum temperature in the month of May comes to 36ºC. The maximum temperature recorded at Kozhikode was 39.4ºC during the month of March 1975 and lowest temperature was 14ºC recorded on the 26th December 1975. Humidity is very high in the coastal region.

6.6 Agriculture

Kozhikode district has a rich heritage in agriculture as it was a port city famous for pepper & species trade. Good soil, timely rainfall and abundance of water resources are the important factors which help agriculture in the district.Rubber is the main crop of the highland region. Coconut and paddy are the predominant crops of the low land region while pepper, coconut, arecanut and tapioca are the important crops of the midland region. Paddy is cultivated under varying conditions viz. autumn, winter and summer crops.

During 2010-11 paddy was cultivated in 3003 ha. The production during the period was 3814 tonnes of rice while the state production was 522738 tonnes. The contribution of the district towards paddy production is less than 1% of the state production. Coconut is one of the major sources of income to the cultivators. It is cultivated in 121688 ha. Of land and its production during the period 2010-11 was 770 million nuts. Tapioca is cultivated mostly in the midland region. It is cultivated in 1806 ha with an annual production of 47770 tones. Rubber is largely grown in the eastern tract of the district. It is a fast-expanding cash crop in the district. The Rubber Board promotes plantations by introducing various schemes. About

21380 ha of land is under rubber cultivation with an annual production of 29920 tonnes. Another important cash crop is arecanut. It covers an area of 9662 ha with an annual production of 8774 tonnes. Pepper, ginger, turmeric, banana, cashew etc. are other important crops.

6.7 Development Blocks

There are 12 development blocks in the district, viz.Vadakara,Thuneri, Kunnummal, Thodannur, Melady, Perambra,Balussery, Panthalayani, Chelannur,Koduvally,KunnamagalamandKozhokode. The District Rural Development Agency co-ordinates the work in these blocks. Several welfare schemes are carried out in the blocks, suchas: Swarnajayanti Gram SwarozgarYojana (SGSY), SampoornaGrameenRozgarYojana (SGRY), Total Sanitation Scheme (TSS), Rural Infrastructure Development Fund (RIDF), Prime Minister's GramSadakYojana (PMGSY), Indira AwaazYojana (IAY), etc.

CHAPTER 7

MAHE WATERSHED

7.1 Location and Extent

The Mahewatershed lies between $11^0$35' to $11^0$50' North latitudes and $75^0$30' to $75^0$50'East Longitudes and is located in the districts of Kannur, Kozhikode and Wayanad of Kerala State.It is bounded by Thalassery taluk of Kannur district in the North, Vadakara taluk of Kozhikode in the South, Mananthavady taluk of Wayanad district in the East and Arabian Sea in the West. The watershed has a total area of 421.04 sq km covering 26 villages spread over 24 panchayats, 7 blocks and 3 districts. The watershed covers a part of the Union Territory of Mahe.

7.2 Physiography

The Mahe River also called the Mayyazhipuzha, orginates from the forests on the western slopes of the Wayanad hills, which form part of the Western Ghats, at Kandankalarimala, at an elevation of +1157 m above MSL. The general elevation ranges from 75 m to 1387 m in the Upper region, 8m to 75m in the middle region and less than 2m in the lower region.

7.3 Drainage

The major river draining through this watershed is the Mahe River which has a length of 54 km. The river is The River is west flowing and its tributaries are Vaniampuzha, Kavuadipuzha and Ottanipuzha.The drainage pattern appears to be dendritic.

7.4 Water resources

Surface Water Resources

The major river draining through this watershedis the Maheriver which has a total annual yield of 803mm^3 and is perennial in nature.The annual utilizable yield of this river is 445Mm^3. The river has three tributaries.

7.5 Ground water resources

Less than 65% of ground water is utilized in this area. There are no restrictions for further development. The upper region is suitable for domestic wells. The middle region has moderately shallow water table and is suitable for large diameter dug wells. The lower region has shallow water table and is suitable for large diameter dug wells.

7.6 Watershed Delineation

The Mahe watershed is divided into 35 sub watersheds and 81 micro-watersheds. The details of the area under study and their respective codes are given in Table.3

Table: 3 Details of Microwatersheds

No	Code of watershed	Area in ha	Treatable Area (in ha)
1	29M20a	110.57	108.00
2	29M21a	199.09	193.00
3	29M21b	277.40	274.00
4	29M21c	136.04	135.00
5	29M22a	350.97	343.00
6	29M23a	406.68	393.00
7	29M23b	218.56	211.00
8	29M23c	133.83	122.00
9	29M24a	620.99	579.00
10	29M28c	1689.74	1596.00
		4143.87	**3954.00**

7.7 Special Problems

1. Kunnummal panchayath of the Kunnummal Block is a water scarce area and mainly depends on the Kuttyadi irrigation canal on summer for both irrigation and the ground water quality are also worse due to high iron content in the area. People depend on KWA pipelines connections and other Jalanidhi projects for drinking and other daily needs.
2. The area is subjected to stream bank erosion along the river/Thodu courses. The severity of erosion is observed in the middle and lower regions and many areas along the sides of the KunnummalThodu is also flood prone.

7.8 KUNNUMMAL BLOCK

Kunnummal block is located in Vadakara taluk of Kozhikode district spread over an area of 24270.24 ha. Consisting of 7 grama panchayats and 13 block panchayat divisions bounded by Thuneri, Mananthavadi blocks in the north; Perambra block in the south; Kalpetta block in the east; Thuneri block in the west. As per census 2011

Kunnummalblock's population is 157926. Out of this 75267 are males while females count 82659 here. Major food crops cultivation covered an area of 15879.06 ha with production of 16211.23 tonnes. These block accounts 4537.93 ha forest area which is 18.69% of the geographical area of this block. Major geomorphology units identified are Lower plateau (lateritic) dissected, Piedmont zone, Denudational structural hills. Major land use categories observed are agricultural land, built-up, forest and wasteland. Kabani, Kuttiyadi and Mahe are the watershedsdrainingKunnummal Block.

7.9 THUNERI BLOCK

Thuneri is located in Vadakara taluk of Kozhikode district of Kerala State, India. Thuneri Block Head Quarters is Thuneri town. It belongs to North Kerala Division. PeringathurCity, ChockliCity, PanniyannurCity,Mahe City are the nearby Cities to Thuneri.Thuneri is a Block positioned in Kozhikode district in Kerala. Literacy rate in Thuneri block is 80%. 117811 out of total 145884 populations educated here.Placed in urban area of Kerala, it is one of the 12 blocks of Kozhikode district. As per Census2011, Thuneri'spopulation is 145884(Table 4).

Table: 4Demographic details of Kunnummal 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
Purameri	20.27	6185	1362.21	27612	12743	14869	530	250	280	43	23	20
Narippatta	50.63	6206	523.98	26529	12625	13904	416	193	223	227	101	126
Kavilumpara	84.81	5528	269.17	22828	11142	11686	323	174	149	280	143	137
Kayakkodi	28.14	5664	873.42	24578	11627	12951	612	302	310	54	31	23
Kuttiyadi	15.00	4511	1290.07	19351	9100	10251	434	208	226	49	20	29
Kunnummal	10.58	4303	1704.25	18031	8479	9552	392	183	209	24	10	14
Nadapuram	20.44	8455	1968.20	40230	18700	21530	572	278	294	73	39	34
Kunnummal Block												

GRAMA PANCHAYATS FALLING IN THE PROJECT AREA

Parts of seven Grama Panchayats coming under Kunnummal and Thuneri Block panchayats fall in the project area.

Table:5 Grama Panchayats falling in the project area

No.	Panchayat	Total Geographical Area (ha)	Watershed Area (ha)
1	Purameri	2027	10.06
2	Narippatta	5063	2041.87
3	Kavilumpara	8481	70.63
4	Kayakkodi	2814	22.44
5	Kuttiyadi	1500	15
6	Kunnummal	1058	752.43
7	Nadapuram	2044	1231.44

7.10 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 laborer's 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: 6 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 of the land	15	Lands with low production & where productivity can be significantly enhanced with reasonable efforts (15)	Lands with moderate production & where productivity can be enhanced with reasonable efforts (10)	Lands with high 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 micro watersheds in the project (10)	Contiguity within the micro watersheds in the project but noncontiguous to previously treated watershed (5)	Neither contiguous to previously treated watershed nor contiguity within the micro watersheds 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 micro watersheds in cluster (10)	2 to 4 micro watersheds 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 micro watersheds in cluster (10)	2 to 3 micro watersheds in cluster (5)	

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 WDC-PMSKY2.0 Watershed project as given in Table 7 below:

7.11 Weightage of the project

Table: 7 Weightage of the Project

Sl. No	Criteria	Weightage
1	Poverty index (% of poor to population)	7.5
2	% of SC/ ST population	3
3	Actual wages	0
4	% of small and marginal farmers	10
5	Ground water status	0
6	Moisture index DPAP/ DDP Block	0
7	Area under rain-fed agriculture	15
8	Drinking water	7.5
9	Degraded land	5
10	Productivity potential of the land	15
11	Contiguity to another watershed that has already been developed/ treated	10
12	Cluster approach in the plains (more than one contiguous micro-watersheds in the project)	0
13	Cluster approach in the hills (more than one contiguous micro-watersheds in the project)	15
	Total	**88**

Though a predominantly agro based economy, share of workers in this sector is decreasing steeply. Agricultural wage earners, small and marginal farmers, plantation workers and casual workers engaged in non-agricultural activities constitute the bulk of the rural poor. Middle and upper class are employed in government or large private enterprises.

For the poor families another major chunk is the income from MNREGS. Lower income people are also involved in animal husbandry with mixed results. Cluster approach was followed taking into consideration 10 micro-watersheds covering a total treatable area of 3954 Ha.

7.12 Watershed information

Table8: General features of project area

Name of Project	**WDC-PMSKY 2.0-KOZHIKKODE**
Name of Program	**New Generation Watershed Programme**
Location	Between $11^0$30' to $12^0$00' North latitudes and $75^0$45' to $76^0$30' East longitudes
Blocks	Kunnummal, Thuneri
District	Kozhikode
Type of project	Hilly
Total Villages	4
Total Gram Panchayats	7
No. of micro watersheds	10
Total Watershed Committees	10
Total Geographical Area	4143.87 Ha
Area available for treatment	3954.00 Ha
Sanctioned Area	3954.00 Ha
Total Sanctioned Cost	561.70
Proposed budget on Works	1107.16
Proposed budget on NRM	520.35
Proposed budget on Livelihood Enhancement	166.07
Proposed budget on Productivity Enhancement	166.07
Cost per Ha (PMKSY-WDCproject)	28000/- per Ha
From Project Cost	1107.12
From Convergence	
Agro climate zone	Northern High Hills, Northern Laterites

Major crops	Coconut, Rubber, mixed crops
Major slope range	
Major streams	First and second order
River Basin	Mahe
Major soil series	Chuduvalattur
Rainfall	3149 mm
Marginal and Small farmers	more than 60%
Major option of livelihoods	Agriculture, Animal husbandry, Wage employment
Water table	3 to 5 meter
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	
Name of PIA	Kunnummal Block Panchayath
Coordinating Person in PIA	Secretary, Block Panchayath
Address	Kunnummal Block Office, Kozhikkode, Kerala

7.13Budget

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

Table:9 Budget

No.	Budget component	% age	Amount in lakhs
1.	Administrative cost	10	110.712
2.	Monitoring &Evaluation	2	22.142
Preparatory Phase			
3.	Entry point activities	2	22.142
4	Detailed Project Report Institution and capacity building	1	11.07
5	Institution and capacity building	3	33.213
Watershed works phase			

6.	Natural Resource Management	47	520.35
7	Production System	15	166.07
8	Natural Resource Management & Governance	2	22.14
9	Livelihood activities for asset less persons micro enterprises& Business development	15	166.07
	Consolidation phase	3	33.21
		100	**1107.12**

7.14 Methodology

In line with the guidelines of WDC-PMKSY 2.0, as suggested by Government of India, the following methodology was adopted for Resource Mapping, NRM planning and preparation of Detailed Project Report.

- Prepared the cadastral maps pertaining to the project area.
- Overlaid the micro watershed boundaries over cadastral maps and corrected the boundaries through ground truth verification
- Project Fellows were appointed as animators. The animators assisted the People's representatives in the field for primary and secondary data collection. The animators worked as the interface between LSGI and TSO
- Engineers/Overseers were engaged for taking field estimates of the proposed activities.
- Induction training was given for the Project Fellows on concept of maps and Resource Mapping.
- Block level online discussions were conducted for People's representatives of District/Block/GramaPanchayats, line departments, Kudumbasree, and other functionaries.
- This was followed by orientation meeting at Grama Panchayats.
- Conducted transect walk with ward members and ADS.
- During the transect walk, major drains, gullies and drainage lines are identified and marked in the cadastral map.

- A block level online meeting 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.
- Various resources like different water bodies, wells and farm ponds are identified and marked in the cadastral map.
- 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.
- The land resource maps already prepared were updated using high resolution satellite imagery and these interpreted maps were corrected with the help of ward members.
- Detailed field survey was done for net plan preparation at Grama Panchayat level with the help of ward members & ADS Chairpersons, 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 micro watershed. 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.
- Thematic maps on geology and geomorphology were interpreted from the high resolution satellite imagery and were corrected through ground truth verification.
- Panchayat Level online meetings convened at Grama Panchayats and the list of entry point activities suggested were discussed and finalized.
- 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 watershed were also finalised. The livelihood action plan and the activities under production system were also consolidated.
- The suggestions were split for three years and three separate annual plans were also prepared.
- 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.

- 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

Table 10:Details of Scientific Planning and Inputs in PMSKY Projects

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 Remote Sensing &Environment Centre
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

7.15Usage 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 populace 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.

7.16Preparation of Action Plan

Data was analysed and based on the identified needs and problems in the watershed area, a draft action plan was prepared after detailed deliberations and incorporation of relevant suggestions.

CHAPTER 8

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:

8.1 Strengths:

(1) Strong linkages with line departments for technical guidance.

(2) Scientific planning with the help of Kerala State Land Use Board &KSREC.

(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.

8.2 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.

8.3 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 PMKSY-WDC, 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

8.4 Threats:

(1) Rainfall being unreliable in the project area, the activities planned to be taken up may yield limited impact.

(2) Poor adaptation to climate change

(3) Low productivity of land

(4) Overloaded work may mislead the watershed project or may divert the vision at the time of implementation of the projects of PMSKY

(5) Agrarian distress is inducing farmers to search for better employment alternatives.

(6) Options in production system are limited due to the lack of sufficient natural resources and due to limited resource base.

(7) Irregularities in fund flow can derail the smooth functioning.

(8) Political interference can dissatisfy the team to work properly.

Sl. No	Area of Intervention	Strengths	Weaknesses	Opportunities	Threats
1	Agriculture	• Provides income and employment • Area potential to increase productivity • Availability of natural/man-made resources	• Lack of irrigation facilities • Lack of organic farming practices	• If provided with proper irrigation, considerable increase in agriculture production can be assured. • Minimal migration in search of jobs. • Increasing demand for organic products.	• Rainfall being very unreliable. • Landslide • Wild animal interphase
2	Horticulture	• Favorable climate for horticultural activities • Good vegetable and banana production	• Lack of advanced varieties. • Lack of marketing facilities. • Lack of storage facilities	• Availability of Land. • Interest of the villagers to expand horticulture activities. • Increasing price level • Food processing.	• Rapid Climate Change.
3	Animal Husbandry	• Favourableenvironment to raise cow and goats. • Manyhouseholds engaged in Animal Husbandry activities. • Provides income and employment	• Lack of good quality fodder availability. • Lack of advanced cattle bread. • Low level of Milk production. • Lack of Knowledge base regarding scientific cattle management.	• 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.	• 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	• Extensive natural drainage system	• No direct water distribution mechanisms. • Prevalence of soil	• If used advanced techniques like bench terracing more land can be converted into cultivable land.	• Rainfall being unreliable.

			erosion. • No water storage body present.	• Construct water storage tank for irrigation. • Provides income and employment for MGNREGS.	
5	BPL Household's Livelihoods	• Most of them are small and marginal farmers. • Some households are having livestock	• Less income and limited livelihood options. • Lack of knowledge base.	• 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.	• Due to adverse weather conditions the normal working days are very less.
6	Micro-Enterprises and Production systems.	• People having the basic skills. • Organized micro-enterprise activities existing in the area • Availability of natural/man-made resources	• Lack of Management skills. • Lack of technical support. • Lack of organized marketing facilities.	• If provided good technical support and motivation, they can run the units in an organized way • Income level will increase.	• Due to adverse weather conditions the normal working days are very less.

CHAPTER 9
BIO PHYSICAL RESOURCES

9.1 Location of the project

Maheproject area is mainly located in Vadakara Taluk of Kozhikode district of Kerala State.TheMahe River has a length of54 km. It originates at a height of 910 m MSL at Vanchimagate hills of Wayanadin Western Ghats and flows in the northeastern corner of the district. The river courseis forming northern boundary of the district. Near its lower reaches it bends andturns at Kariyad and flow in northwesterly direction and join the sea at Mahe. The project is a cluster of ten micro watersheds viz.29M20a (**Mudikkal**), 29M21a (**Mandokandy**), 29M21b (**Irumbathadam**), 29M21c (**Peruvankuni**), 29M22a (**Mullambath**), 29M23a (**Cheekkonnu west**), 29M23b (**Pathiripatta**), 29M23c (**Kizhakkedathvayal**), 29M24a (**Chiyyoor**)&29M28c (**Kummamkode**)(Fig.1). The total area of the project is 4143.87ha (Fig.2).

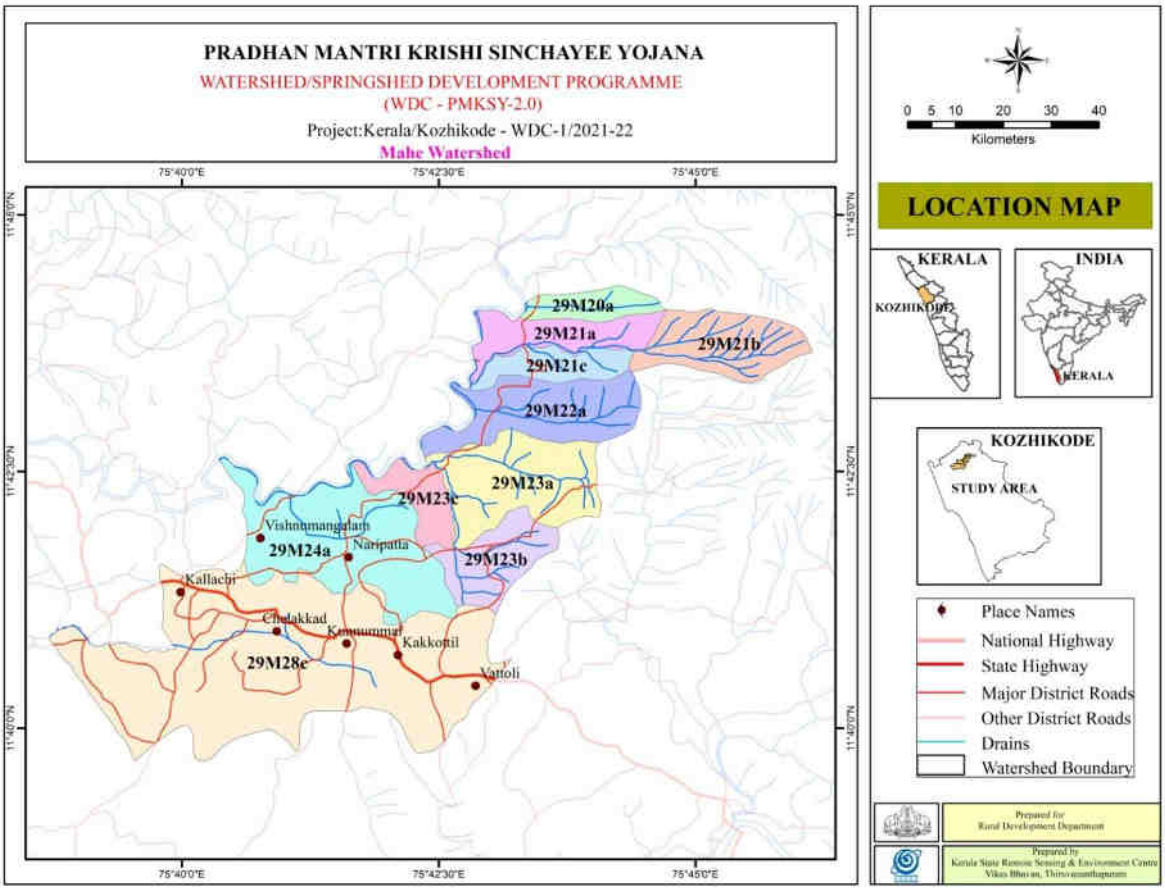


Fig.1 : Location map

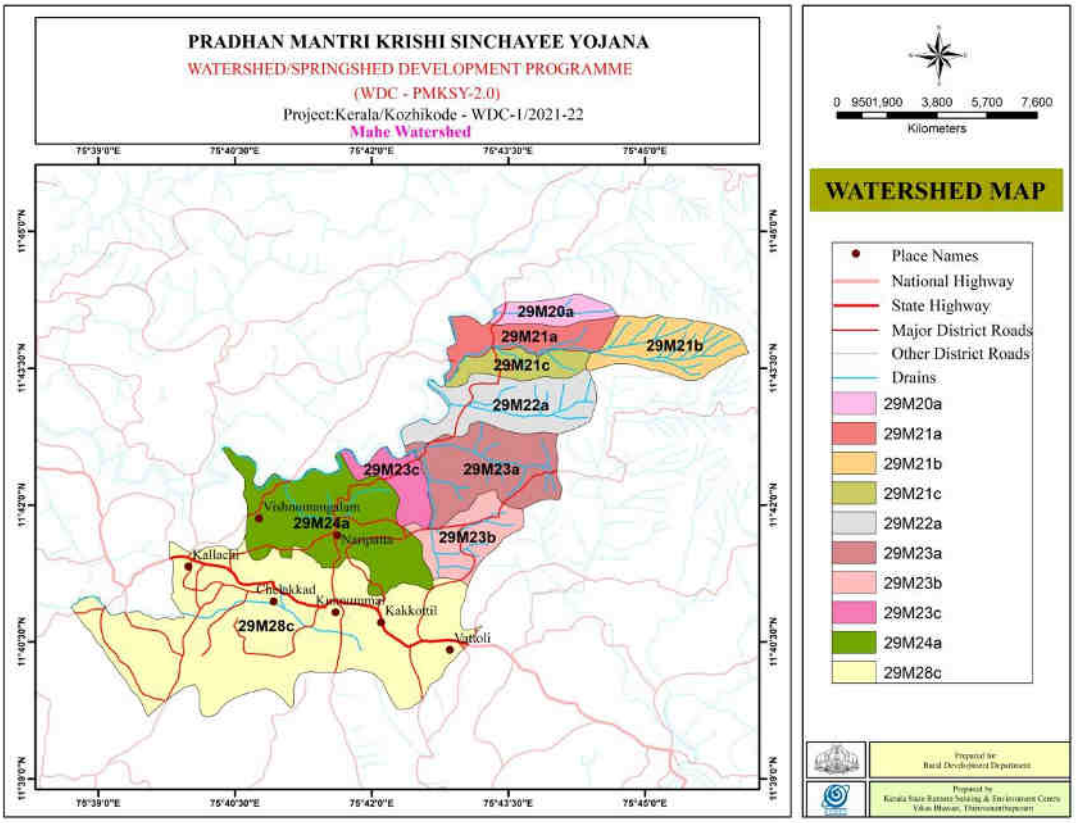


Fig.2: Watershed

Table:12 Details of Watershed code, name and area

No	Code of watershed	Name of watershed	Area in ha	Treatable Area (in ha)
1	29M20a	Mudikkal	110.57	108.00
2	29M21a	Mandokandy	199.09	193.00
3	29M21b	Irumbathadam	277.40	274.00
4	29M21c	Peruvankuni	136.04	135.00
5	29M22a	Mullambath	350.97	343.00
6	29M23a	Cheekkonnu west	406.68	393.00
7	29M23b	Pathiripatta	218.56	211.00
8	29M23c	Kizhakkedathvayal	133.83	122.00
9	29M24a	Chiyyoor	620.99	579.00
10	29M28c	Kummamkode	1689.74	1596.00
		Total	**4143.87**	**3954.00**

The project area falls in sevenGramaPanchayats viz. Purameri, Narippatta, Kavilumpara, Kayakkodi, Kunnummal and Nadapuram coming under Kunnummal Block Panchayat and Purameri panchayath under Tuneri Block.

Table: 13 Details of Watersheds, Grama Panchayats and area

No.	Watershed code	Name of Grama Panchayat	Name of Block Panchayat	Area (ha)
1	29M20a	Narippatta	Kunnummal Block	110.57
2	29M21a	Narippatta		199.09
3	29M21b	Narippatta		277.40
		Kavilumpara		
4	29M21c	Narippatta		136.04
5	29M22a	Narippatta		350.97
6	29M23a	Narippatta		406.68
		Kayakkodi		
7	29M23b	Narippatta		218.56
		Kunnummal		
8	29M23c	Narippatta		133.83
9	29M24a	Narippatta		620.99
		Kunnummal		
		Nadapuram		
10	29M28c	Narippatta		1689.74
		Kunnummal Nadapuram		
		Kuttiyadi Purameri		
Total Project Area				**4143.87**

The major towns of Kozhikode district in the project area are Vilangad, Vanimel, Valayam, Avolam,Eramala and Nadapuram and also in Malabar plains and the northern boundary of the Union Territory of Mahé. Maheriver has been used for inland navigation and for transporting both men and material. Tourism Water Sports Complex is located on the river banks. Pondicherry government plans to construct a fishing harbor and a Riverside Walkway.

9.2 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 in rich in crops like paddy, coconut, tapioca, vegetables, banana, spices etc. The lowlands are the valley fills located in the project area. The Miduplands region comprises mainly of mountains. The general elevation ranges from 75 m to 1387 m in the upper region, 8 m to 75 m in the middle region and less than 2 m in the lower region (Fig.3).

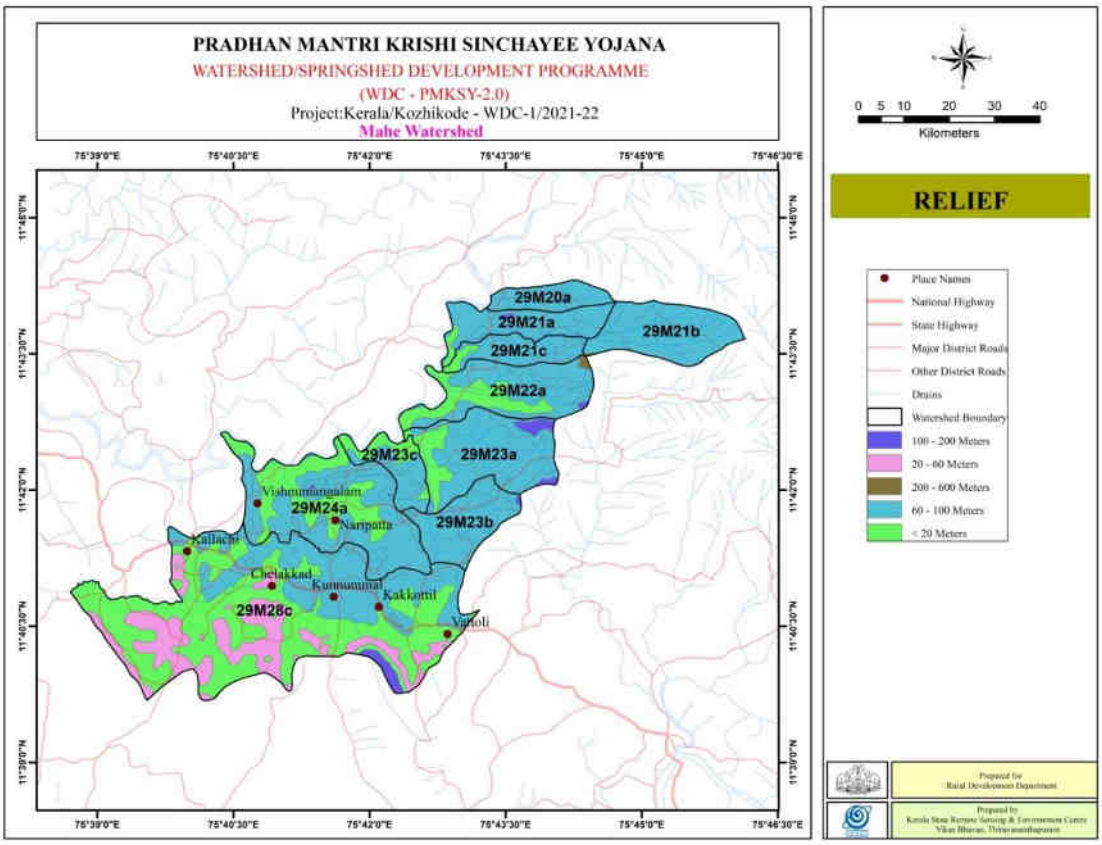


Fig.3: Relief

9.3 Climate

The project area has a humid tropical climate. The maximum temperature experienced during the month of March and minimum during the month of December.

9.4 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.

Annual Rainfall distribution (2020)

The annual rainfall received for the year 2020 is 4158.79mm The district received 3440.49mm of rainfall during the south west monsoon, and 240 mm of rainfall during north east monsoon period. The monthly annual rainfall distribution during 2020 is given in table below

Table: 14Monthly Rainfall distribution

Month	Rainfall (mm)	Month	Rainfall (mm)
Jan	0	July	735.9
Feb	0	Aug	676.1
Mar	1.9	Sep	861.79
Apr	96	Oct	236.4
May	241.8	Nov	91.8
June	1166.7	Dec	50.4
Total annual rainfall			**4158.79**

Table: 15Normal Rainfall Vs Seasonal Rainfall -2021

Season	Period 2021	Seasonal	Normal	% Dep
Winter	January- March	170.5	6.4	2565
Premonsoon	March- May	686.4	349.6	96
South West Monsoon	June- September	2287.9	2577.4	-11
North East Monsoon	October-December	1032.9	450.1	129

Seasonal rainfall Contribution to the total rainfall percentage-2021

The seasonal rainfall contribution to the total rainfall in percentage in worked out and given in table 16.

Table 16:Seasonal rainfall Contribution to the total rainfall percentage

Season	Period-2021	Rainfall	Percentage
Winter	January- February	170.5	4.08
Pre-monsoon	March- May	686.4	16.43
South West Monsoon	June- September	2287.9	54.76
North East Monsoon	October- December	1032.9	24.73
Total		**4177.7**	**100**

The South West monsoon received from June to September records the major contribution of the rainfall received during 2021. 54.76 % (2287.9 mm) of the total rainfall is recorded during this season. The north east monsoon contributes 24.73 % and the Pre-monsoonrains contribute16.43 %. Only 4.08 % of actual rainfall is received during January to February.

Comparison of 2021 seasonal rainfall with previous year (2020) rainfall

The rainfall in the various seasons of 2021 have been compared with previous year rainfall to understand the pattern of rainfall received and to have better assessment of the charge in the ground water region.

Table:17Comparison of 2021 seasonal rainfall with previous year

Season	Period	2021	2020	% Dep
Winter	January- February	170.5	0	-
Pre-monsoon	March- May	686.4	339.7	102.06
South- West monsoon	June- September	2287.9	3440.49	-33.53
North- East monsoon	October- December	1032.9	378.6	172.82
Total		**4177.7**	**4158.79**	

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 172.82 and during South- West monsoon, Premonsoon a departure of -33.53% and102.06% is noticed respectively.

Table: 18Distribution of Rainfall and Departure from long period Averages (Normal RF) of last five Years

Month	January		February		March		April		May		June	
Year	RF	% Dep.	RF	% Dep.	RF	% Dep	RF	% Dep.	RF	% Dep.	RF	% Dep
2016	0	-100	0	-100	32.4	115	5.7	115	260.1	1	916.4	2
2017	7.7	235	0.1	-97	21.3	41	68.1	41	251.8	-2	822.5	-8
2018	7.7	233	0.9	-78	36.9	144	79	144	563	119	1081.8	21
2019	0	-100	0	-100	1.9	-90	43.4	-90	42.9	-83	634.2	-26
2020	0	-100	0	-100	1.9	-91	96	-91	241.8	-3	1166.7	36

Month	July		August		September		October		November		December	
Year	RF	% Dep.	RF	% Dep.	RF	% Dep	RF	% Dep.	RF	% Dep.	RF	% Dep
2016	**604.2**	-37	268.5	-46	98.2	-61	42.5	-84	8.9	-93	23.2	-23
2017	662.9	-31	544.6	9	491.6	96	216.2	-17	46.1	-65	9.1	-70
2018	1037.4	9	836	67	29.3	-88	267.8	2	57.5	-56	35	17
2019	959	3	1407.8	176	468.8	70	568.5	100	100.3	-28	28.3	1
2020	735.9	-21	676.1	32	861.7	213	236.4	-17	91.8	-34	50.4	79

9.5 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 inelevation 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 45^0 is a slope of 100%, because the difference in elevation between two points 100 m apart horizontally is 100 m on a 45^0slope (Fig.4).

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-transipration 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:19 Slope class, description, area and percentage

No.	Slope Class	Description	Area in Ha	Percentage
1	0-3 percent	Very gentle slope	725.18	17.5
2	3-5 percent	Gentle slope	401.35	9.7
3	5-10 percent	Moderately sloping	996.9	24.05
4	10-15 percent	Strongly sloping	603.05	14.55
5	15-35 percent	Moderately steep to steep	984.22	23.75
6	> 35 percent	Very steep	433.17	10.45
	Total area		**4143.87**	**100**

Majority of the area (996.9 ha, 24.05 % of TGA) comes under the moderately sloping class of 5-10 %. The second major category is moderately steep to steep class with

15-35 % slope. This occurs is 984.22 ha (23.75 % of TGA). An area of 433.17ha (10.45 % of TGA is having slope more than 35 %, which requires proper management and conservation measures.

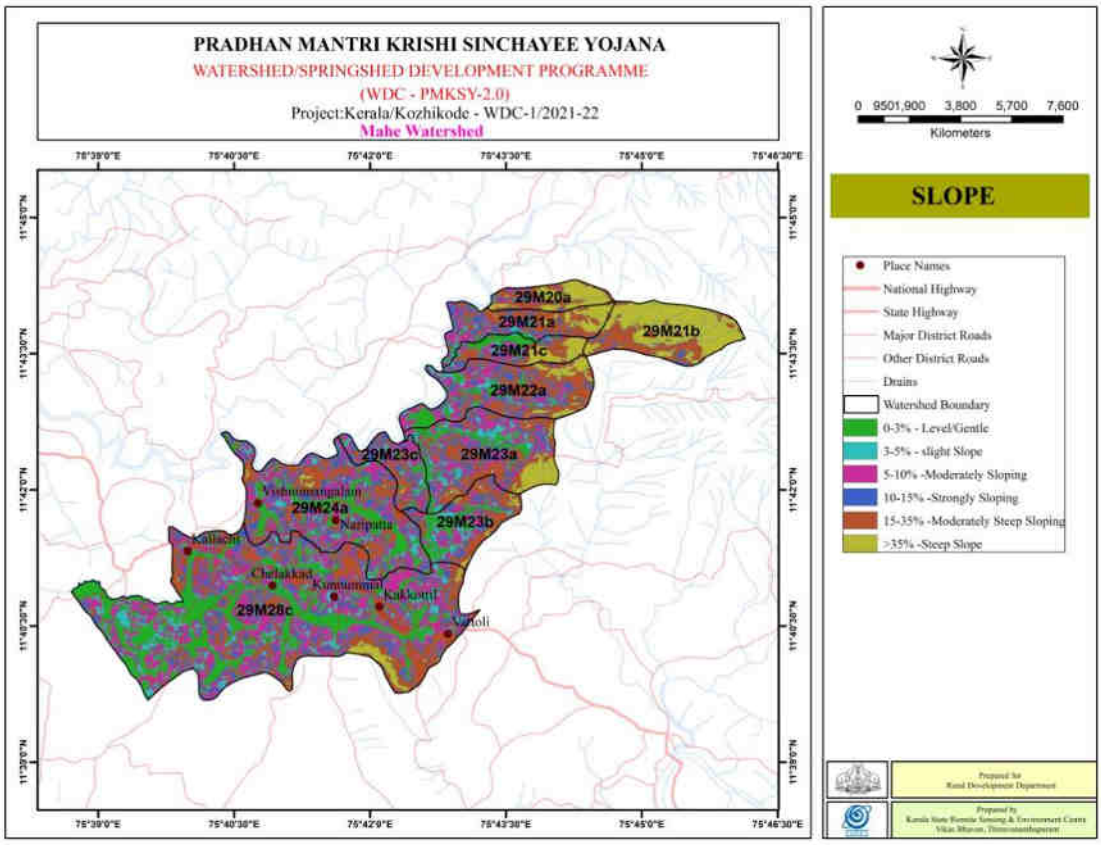


Fig.4: Slope

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

Table: 20 Distribution of slope classes in micro watersheds

Slope	29M20a	29M21a	29M21b	29M21c	29M22a
1	0.61	10.82	-	25.51	39.89
2	2.10	12.19	-	11.72	28.89
3	8.11	37.52	0.85	22.55	79.15
4	5.58	33.18	6.45	13.23	53.11
5	39.75	72.08	79.39	31.26	119.17
6	54.43	33.29	190.7	31.78	30.76
Total	**110.58**	**199.08**	**277.39**	**136.05**	**350.97**

Slope	29M23a	29M23b	29M23c	29M24a	29M28c
1	52.48	47.44	16.54	114.12	417.76
2	48.56	28.61	12.45	64.63	192.19
3	101.04	46.53	43.13	181.8	476.24
4	56.19	26.51	30.97	119.73	258.10
5	102.07	60.59	29.88	135.17	314.86
6	46.33	8.89	0.86	5.55	30.58
Total	**406.67**	**218.57**	**133.83**	**621**	**1689.73**

9.6 GEOLOGY

The project area falls in the geological division viz. Archean Crystalline rock. This comprises of Charnockite Group and Migmatite Group. Charnockite are acidic to intermediate in composition. Migmatite are evenly distributed in the major part of the area as narrow zones within basic rocks. The tertiaries and the basement rocks of the midland are extensively laterised (Fig.5&Table 9).

More than half of the project area is underMigmatite Complex (59.29%) and the remaining area is underCharnockite Group of rocks(37.04%) and basic rocks (3.05%). The table showing the distribution of geology in the ten watersheds is given below:

Table:21 Distribution of Geological unit

Geology	29M20a	29M21a	29M21b	29M21c	29M22a	29M23a
Basic rocks	-	-	-	-	-	-
Charnockite Group of rocks	109.09	186.65	277.40	134.13	87.81	241.88
Migmatite Complex	0.79	6.51	-	1.56	258.04	163.98
Waterbody	0.69	5.93	-	0.36	5.12	0.81
Total						

Geology	29M23b	29M23c	29M24a	29M28c	Area (in Ha)	%
Basic rocks	-	-	59.16	67.34	126.5	3.05
Charnockite Group of rocks	63.65	44.04	313.78	76.49	1534.92	37.04
Migmatite	154.91	85.81	240.09	1544.99	2456.69	59.29

Complex						
Waterbody	-	3.97	7.96	0.92	25.76	0.62
Total					**4143.87**	**100.00**

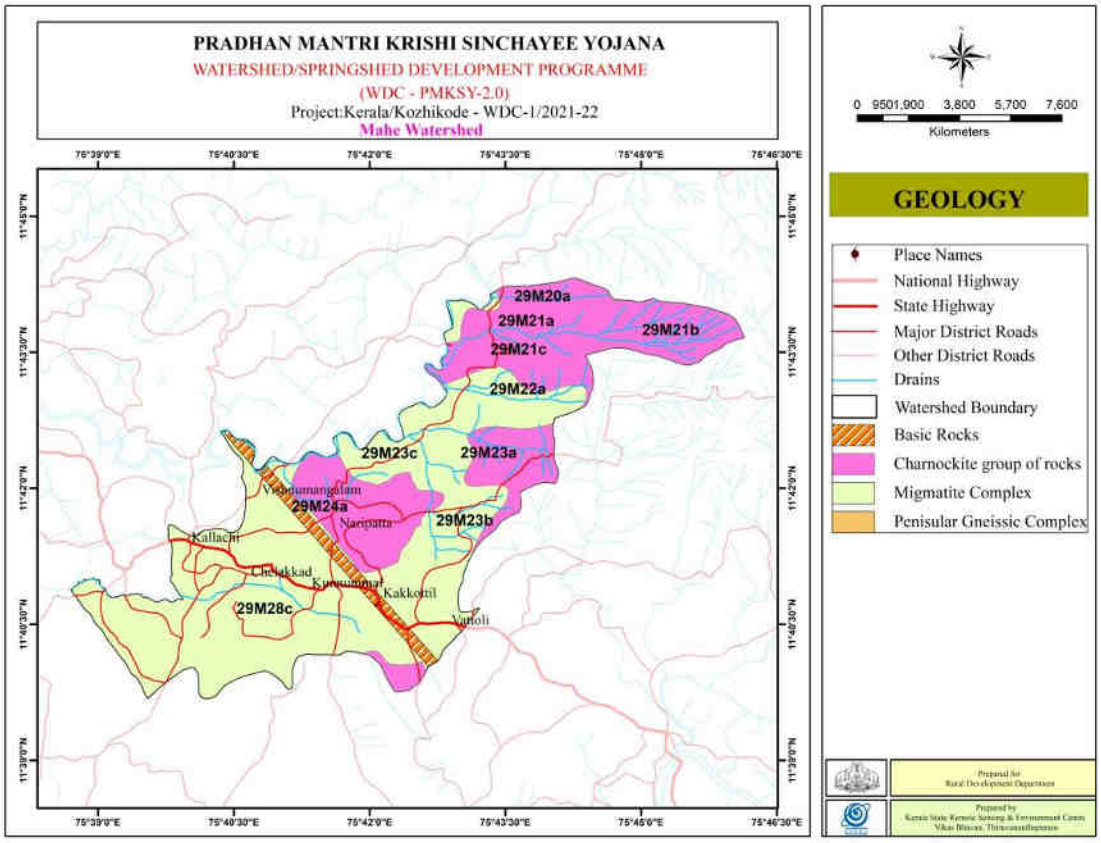


Fig.5: Geology

9.7 GEOMORPHOLOGY

The thematic map on geomorphology revels that there are four geomorphological units in the project area. Terrain basement rocks like Charnockite and Migmatite has an undulating to rolling topography and is characterized by undulating spurs. Thick columns of laterite soils in the area support the growth of coconut. A quantitative analysis of the ground water potential of these units is also made through interpretation of lineaments supported by necessary ground truth (Fig.6&Table 22). The various geomorphological units identified in the project area and their spatial extent is given below:

Table: 22 Geomorphological units description, area and percentage

Sl. No.	Geomorphological unit	Area (in ha)	Percentage (%)
1	Denudational Structural Hills	535.57	12.92
2	Piedmont Zone	962.71	23.23
3	Water body	25.76	0.62
4	Valley Fill	466.70	11.27
5	Rock exposure	8.38	0.20
6	Residual Mount(Pediment)	127.17	3.07
7	Lower Plateau (Lateritic) - Dissected	1912.81	46.16
8	Residual Hill	27.68	0.67
9	Linear ridge(Piedmont Zone)	21.48	0.52
10	Linear ridge(Lower Plateau)	55.61	1.34
Total		**4143.87**	**100.00**

The majority of the area is under Lower plateau laterite and it occupies an area of 1912.81 ha (46.16% of the total geographical area) followed by Piedmont Zone with an area of 962.71 ha (23.23 % of total geographical area).

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

Table: 22a Distribution of Geomorphological unit

Geomorphology	**29M20a**	**29M21a**	**29M21b**	**29M21c**	**29M22a**	**29M23a**
Denudational Structural Hills	61.05	56.95	269.02	48.28	96.94	3.33
Piedmont Zone	48.83	117.21	-	76.90	245.13	320.59
Waterbody	0.69	5.93	-	0.36	5.12	0.81
Valley Fill	-	19.00	-	10.51	3.79	43.67
Rock exposure	-	-	8.38	-	-	-
Residual Mount(Pediment)	-	-	-	-	-	9.23
Lower Plateau (Lateritic) -	-	-	-	-	-	1.36

Dissected						
Residual Hill	-	-	-	-	-	27.68
Linear ridge(Piedmont Zone)	-	-	-	-	-	-
Linear ridge(Lower Plateau)	-	-	-	-	-	-
Total	**110.57**	**199.09**	**277.4**	**136.05**	**350.98**	**406.67**

Geomorphology	**29M23b**	**29M23c**	**29M24a**	**29M28c**
Denudational Structural Hills	-	-	-	-
Piedmont Zone	123.61	0.01	-	30.43
Waterbody	-	3.97	7.96	0.92
Valley Fill	27.48	5.68	80.23	276.33
Rock exposure	-	-	-	-
Residual Mount(Pediment)	-	15.87	28.49	25.66
Lower Plateau (Lateritic) - Dissected	47.92	108.29	504.32	1298.69
Residual Hill	0.16	-	-	-
Linear ridge(Piedmont Zone)	19.39	-	-	2.09
Linear ridge(Lower Plateau)	-	-	-	55.61
Total	**218.56**	**133.82**	**621**	**1689.73**

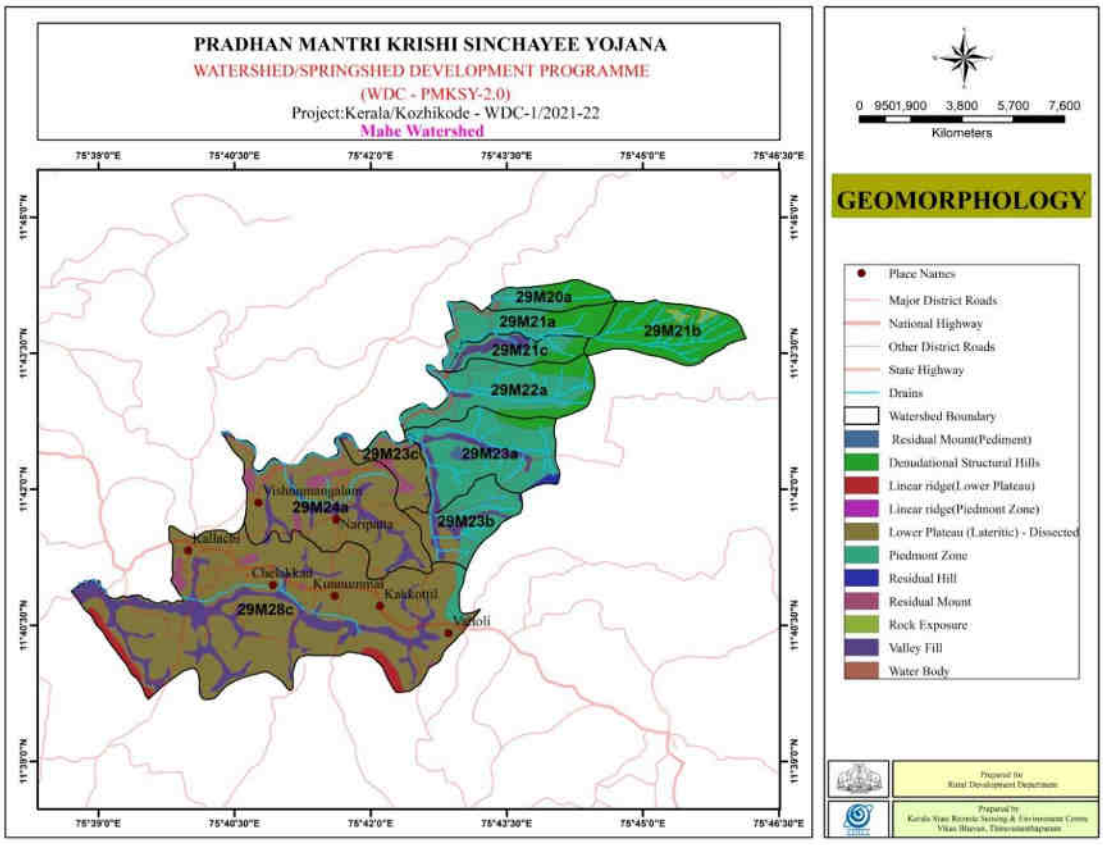


Fig.6: Geomorphology

9.8 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 essential a 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.

9.9 Major Soils

Soils of the watershed vary in their depth, texture, internal drainage and degree of erosion. The upper region of the watershed soil has a texture of clayey to gravelly clay with moderate surface gravelliness and with coherent material at 75 to 100cm. Soils in the lower region has texture of clayey to gravelly clay. Middle and upper region has very deep soil with moderately well drained to excessively drained Soil(Fig.7).

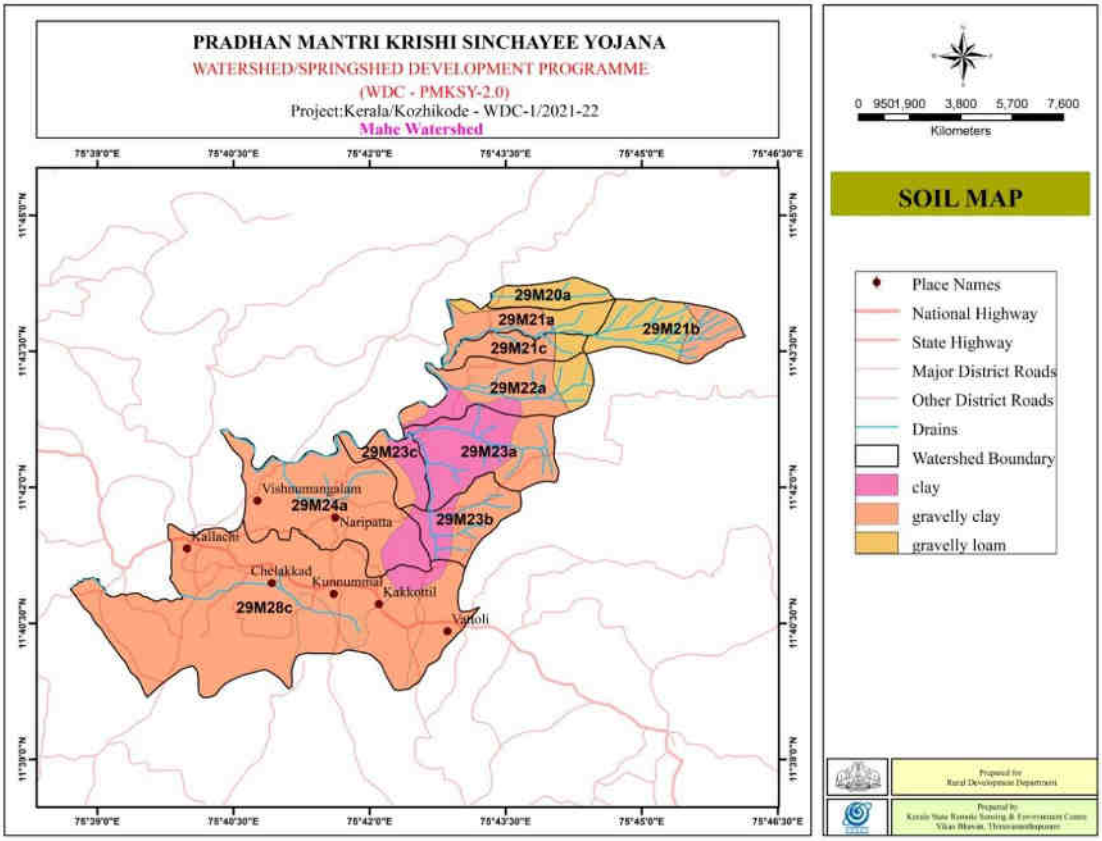


Fig.7: Soil

9.10 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 -morethan150cm

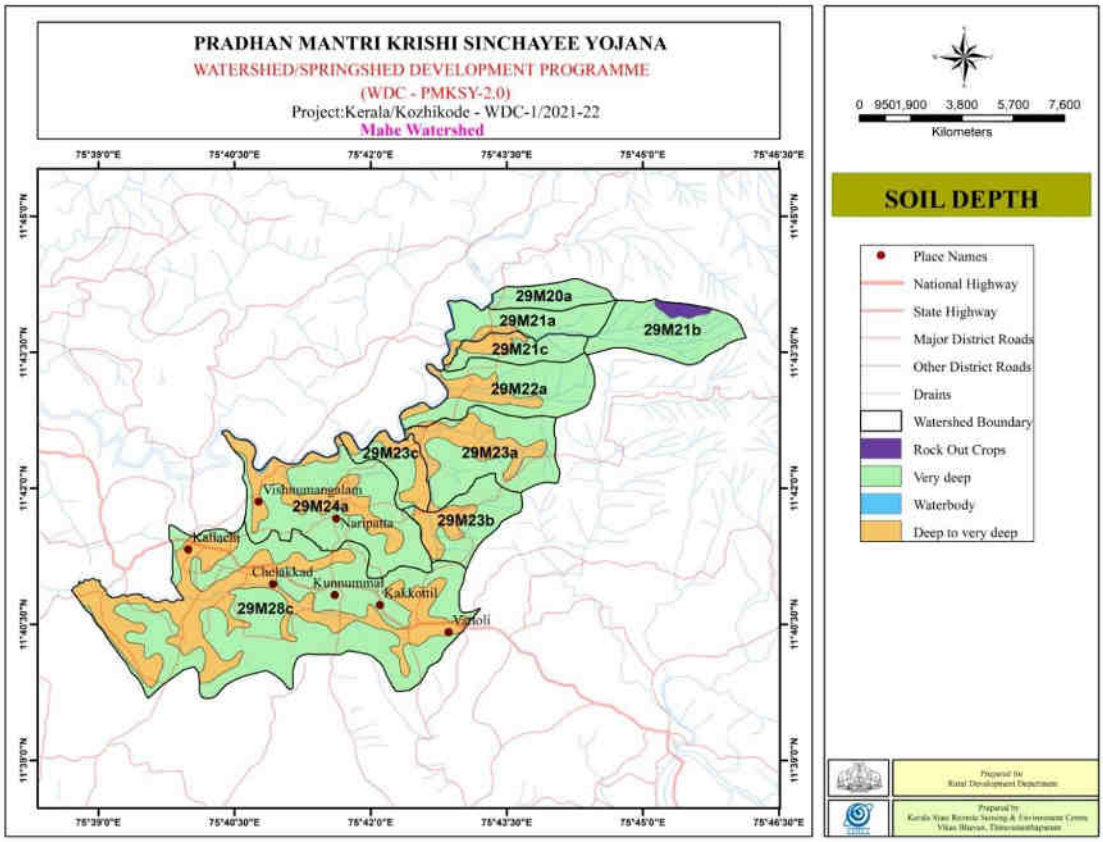


Fig.8: Soil depth

The distribution of soil depth in the ten micro watersheds are given in Table 23

Table: 23Distribution of soil depth in watersheds

Depth	29M20a	29M21a	29M21b	29M21c	29M22a	29M23a
5	-	24.49	-	39.48	84.17	138.64
6	109.89	168.67	251.76	96.20	261.69	267.23
M	-	-	25.64	-	-	-
River	0.69	5.93	-	0.36	5.12	0.81
	110.58	**199.09**	**277.4**	**136.04**	**350.98**	**406.68**

Source: Kerala State Land Use Board

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

Out of the total area, 2840.66 ha (68.55 %) are covered by very deep soils .Deep soil cover 30.21% (1251.81 ha) of the total project area. Rock Outcrop is found in 0.62 % of TGA (25.64 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 texture classification of soil are (1) sandy, (2) loamy, (3) clayey(Fig.9&Table 24). Sandy soils are very permeable and well drained; butt 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.

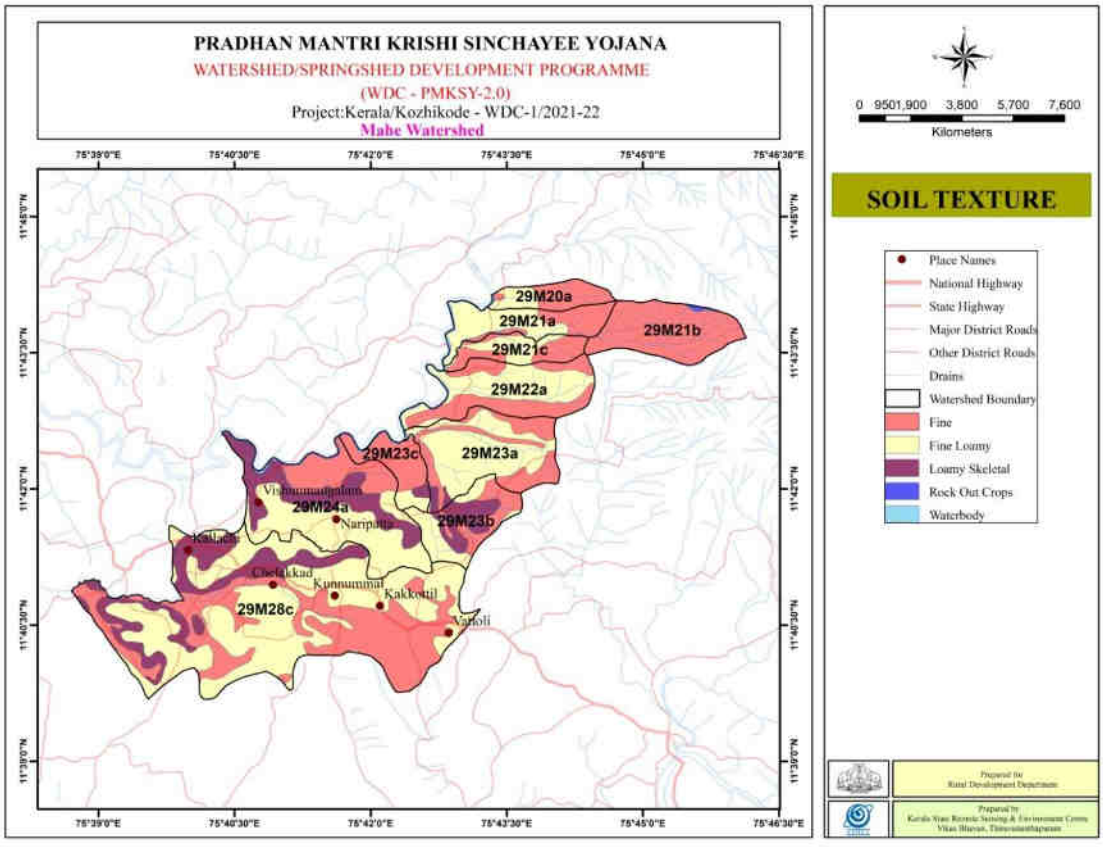


Fig.9: Soil texture

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

Table 24: Distribution of surface soil texture

No.	Texture	Area in Ha	Percentage
1	Fine	1632.16	39.39
2	Fine Loamy	1919.11	46.31
3	Loamy Skeletal	562.57	13.57
4	Waterbody	25.76	0.63
5	Rock Out Crops	4.27	0.10
	Total	**4143.87**	**100.00**

Source: Kerala State Land Use Board

The major soil texture of the project area constitutes that of fine loamy texture which covers an area of 1919.11 ha (46.31%). Generallyfine soilsoccur in 1632.16 ha (39.39%). This surface soil texture covers the major area in all the ten watersheds. Three different soil textures are identified and mapped. The table showing the distribution of surface soil texture in the ten watersheds is given below:

Table 25 Distribution of surface soil texture in watersheds

Texture	**29M20a**	**29M21a**	**29M21b**	**29M21c**	**29M22a**
Fine	75.05	73.67	273.12	77.44	163.44
Fine Loamy	34.84	119.5	-	58.25	182.41
Loamy Skeletal	-	-	-	-	-
Waterbody	0.69	5.93	-	0.36	5.12
Rock Out Crops	-	-	4.27	-	-
	110.58	**199.1**	**277.39**	**136.05**	**350.97**

Texture	**29M23a**	**29M23b**	**29M23c**	**29M24a**	**29M28c**
Fine	140.82	65.76	100.54	125.5	536.82
Fine Loamy	252.31	79.41	21.01	295.96	875.42
Loamy Skeletal	12.74	73.39	8.3	191.57	276.57
Waterbody	0.81	-	3.97	7.96	0.92
Rock Out Crops	-	-	-	-	-
	406.68	**218.56**	**133.82**	**620.99**	**1689.73**

Source: Kerala State Land Use Board

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 through 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.

Three major erosion classes are mapped in the project area

1 – Slight

2 –moderate

3 – Severe

The majority of the area is under moderate erosion class. An area of 1607.58 ha (38.8 % of TGA) is under this class and an area of 1233.1 ha is under severe erosion class. Nearly 1250 ha area is having slight erosion, which use the low lying fields in the project area.

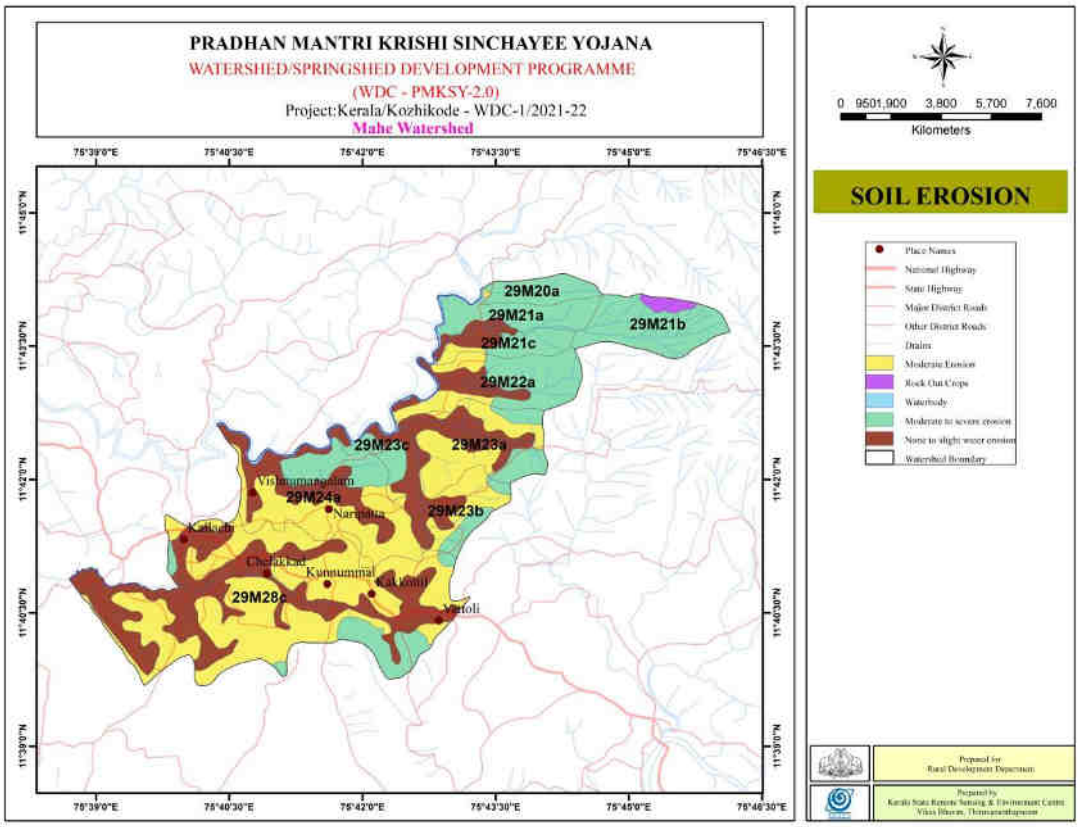


Fig10: Soil texture

The table showing the distribution of soil erosion in the ten watersheds are given in Table 26

Table 26: Distribution of soil erosion in watersheds

Erosion	29M20a	29M21a	29M21b	29M21c	29M22a	29M23a
1	-	24.49	-	39.48	84.17	138.64
2	2.21	0.39	-	17	77.81	187.99
3	107.68	168.28	251.76	79.2	183.88	79.24
Rock outcrop	-	-	25.64	-	-	-
River	0.69	5.93	-	0.36	5.12	0.81
	110.58	**199.09**	**277.4**	**136.04**	**350.98**	**406.68**

Erosion	29M23b	29M23c	29M24a	29M28c	Area (in Ha)	%
1	71.4	66.37	193.6	633.65	1251.8	30.21
2	97.5	6.33	294.1	924.25	1607.58	38.8
3	49.65	57.16	125.34	130.91	1233.1	29.76
Rock outcrop	-	-	-	-	25.64	0.61
River	-	3.97	7.95	0.92	25.75	0.62
	218.55	**133.83**	**620.99**	**1689.73**	**4143.87**	**100**

Source: Kerala State Land Use Board

9.11LAND 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 4 classes and its associations falls in the project area (Fig11). The land irrigability map is shown in Fig.12.

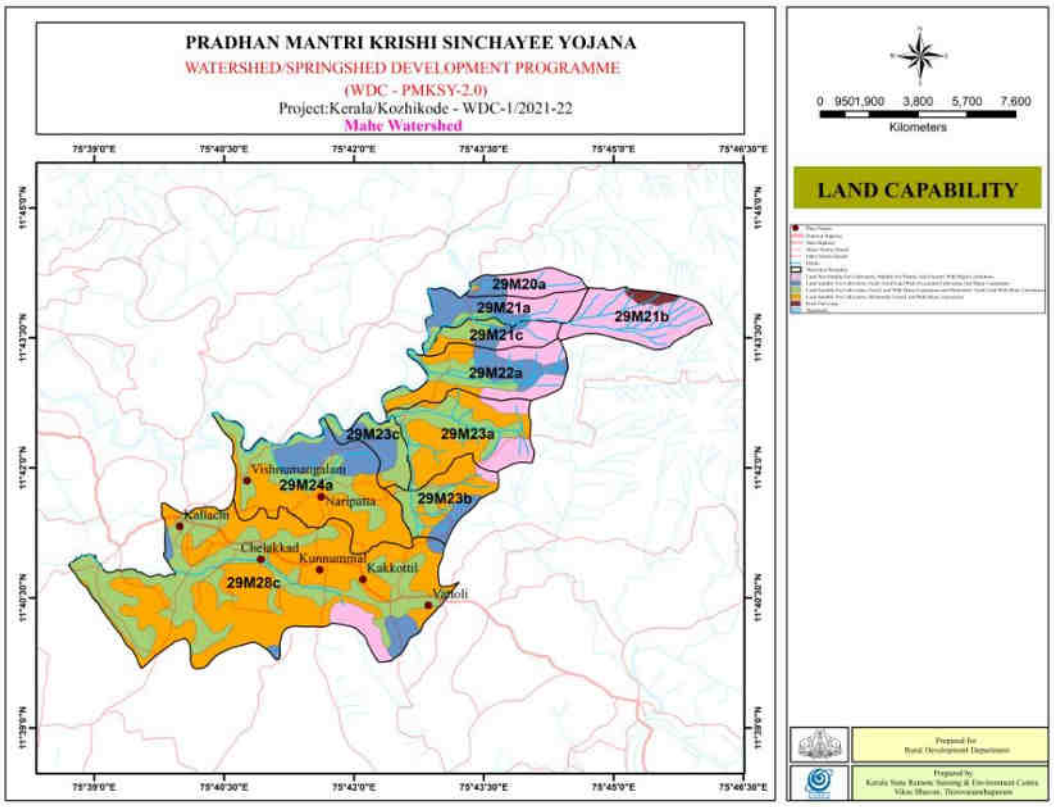


Fig.11. Land capability

Class	Description
II	Good cultivable land
III	Moderately good cultivable land
IV	Fairly good cultivable land suites for occasional or limited cultivation
VII	Fairly well suited for grazing or forestry

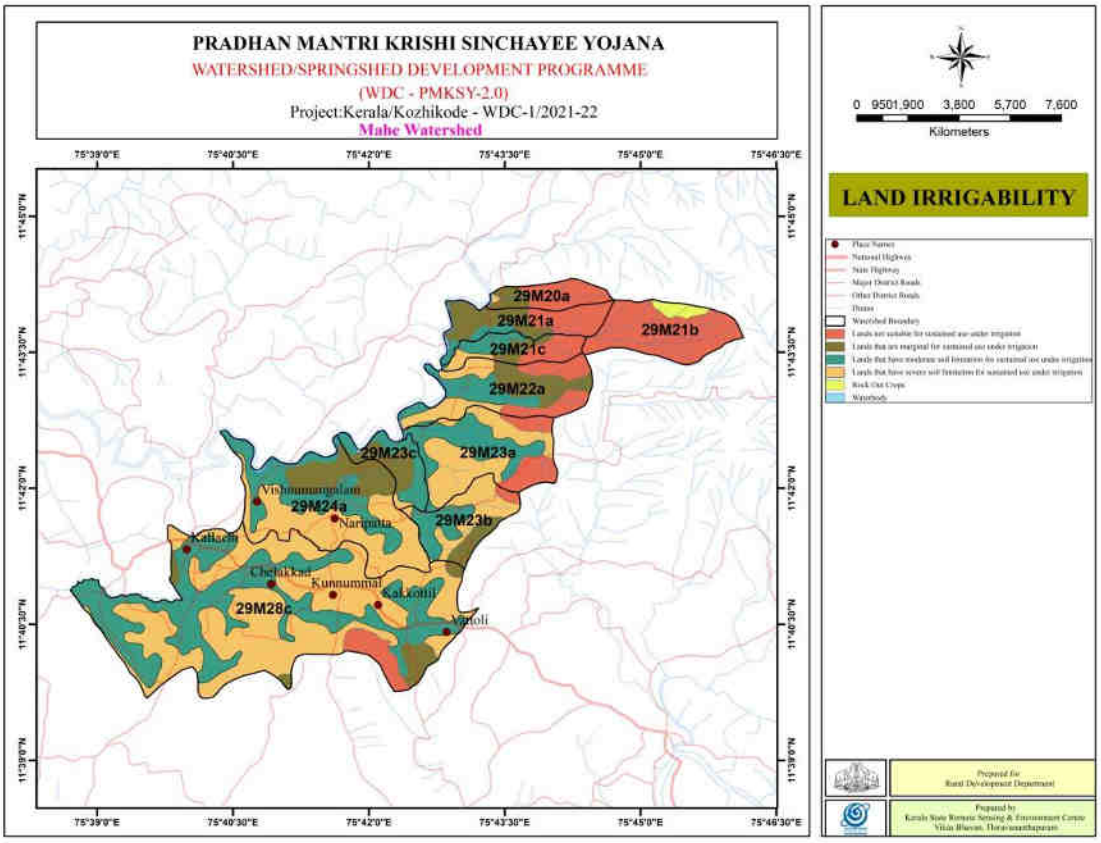


Fig.12. Land Irrigability

The table showing the distribution of land capability in the ten watersheds is given below: **Table:27 Distribution of land capability classes in watersheds**

Capability	**29M20a**	**29M21a**	**29M21b**	**29M21c**	**29M22a**
II-III	-	24.49	-	39.48	84.17
III	2.21	0.39	-	17.00	77.81
IV	28.71	88.81	-	26.10	90.43
VII	78.97	79.47	251.76	53.10	93.45
Waterbody	0.69	5.93	-	0.36	5.12
Rock Outcrops	-	-	25.64	-	-
Total					

Capability	**29M23a**	**29M23b**	**29M23c**	**29M24a**	**29M28c**	**Area(in Ha)**
II-III	138.64	71.40	66.37	193.60	633.66	1251.82
III	187.99	97.50	6.33	294.10	924.25	1607.57
IV	-	38.93	57.16	125.34	65.19	520.65
VII	79.24	10.73	-	-	65.72	712.43

Waterbody	0.81	-	3.97	7.96	0.92	25.76
Rock Outcrops	-	-	-	-	-	25.64
Total						**4143.87**

Source: Kerala State Land Use Board

9.12 LAND USE

Theland use map prepared for the study area is given in Fig. 13 &table.

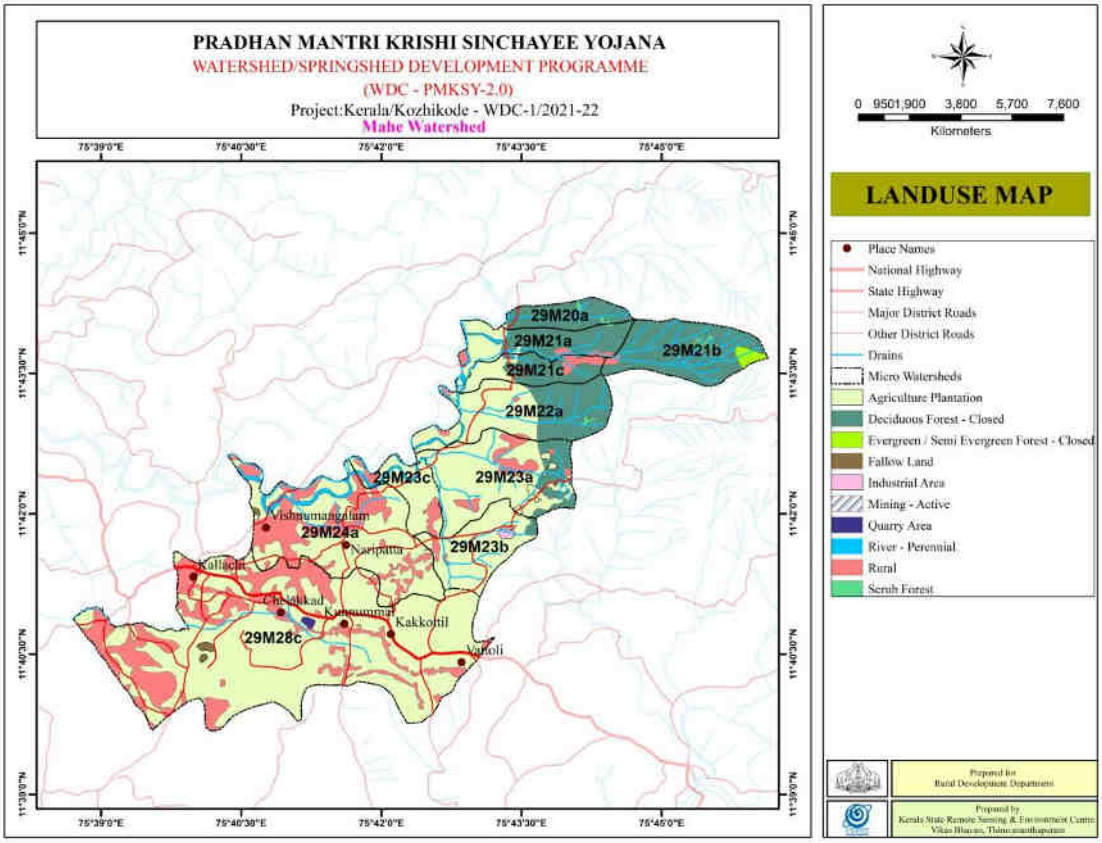


Fig.13. Land use

Table 28: Landuse area classes and area statistics

Code	Landuse Category	Area(ha)
29M20a	Agricultural Crop - Coconut	2.97
	Agricultural Crop - Coconut Dominant Mixed Crops	43.57
	Agricultural Mixed Crops - Mixed Crops	47.19
	Agricultural Plantation Crop - Rubber	13.47
	Built-Up Land - Residential	0.14
	Waste Land - Barren Rocky Land	2.04
	Waste Land - Land Without Scrub	0.59

	Waste Land - Sands/Riverine/Coastal	0.12
	Waterbody - River/Stream	0.49
29M21a	Agricultural Crop - Coconut	12.97
	Agricultural Crop - Coconut Dominant Mixed Crops	82.51
	Agricultural Mixed Crops - Mixed Crops	82.53
	Agricultural Plantation Crop - Rubber	11.77
	Built-Up Land - Residential	1.70
	Paddy Converted - Coconut+Arecanut	0.84
	Waste Land - Land Without Scrub	2.01
	Waste Land - Sands/Riverine/Coastal	0.49
	Waterbody - River/Stream	4.27
29M21b	Agricultural Crop - Coconut	65.09
	Agricultural Crop - Coconut Dominant Mixed Crops	2.37
	Agricultural Mixed Crops - Mixed Crops	107.26
	Agricultural Plantation Crop - Rubber	2.79
	Forest - Barren Rocky/Stony Waste/Sheet Rock	8.97
	Forest - Coconut	0.79
	Forest - Dense	22.06
	Forest - Land Without Scrub	0.63
	Forest - Open	61.77
	Forest - Plantation	3.19
	Waste Land - Barren Rocky Land	0.03
	Waste Land - Land Without Scrub	2.45
29M21c	Agricultural Crop - Coconut	13.09
	Agricultural Crop - Coconut Dominant Mixed Crops	50.54
	Agricultural Mixed Crops - Mixed Crops	54.85
	Agricultural Perennial Crop - Arecanut	0.57
	Built-Up Land - Built-Up Land With Mixed Crops	0.35
	Built-Up Land - Residential	1.11
	Paddy Converted - Coconut+Arecanut	15.25
	Waste Land - Sands/Riverine/Coastal	0.05
	Waterbody - River/Stream	0.24

29M22a	Agricultural Crop - Coconut	96.66
	Agricultural Crop - Coconut Dominant Mixed Crops	145.22
	Agricultural Mixed Crops - Mixed Crops	71.20
	Agricultural Perennial Crop - Arecanut	21.80
	Agricultural Plantation Crop - Rubber	3.87
	Built-Up Land - Educational Institution	0.27
	Built-Up Land - Religious Institution	0.31
	Built-Up Land - Residential	3.48
	Built-Up Land - Road	0.04
	Paddy Converted - Built-Up Land	0.02
	Paddy Converted - Coconut	3.40
	Waste Land - Land Without Scrub	0.51
	Waste Land - Sands/Riverine/Coastal	0.95
	Waterbody - River/Stream	3.25
29M23a	Agricultural Crop - Coconut	46.85
	Agricultural Crop - Coconut Dominant Mixed Crops	119.02
	Agricultural Mixed Crops - Mixed Crops	191.66
	Agricultural Perennial Crop - Arecanut	7.90
	Agricultural Plantation Crop - Rubber	3.99
	Built-Up Land - Built-Up Land With Mixed Crops	0.36
	Built-Up Land - Bus Stand	0.10
	Built-Up Land - Educational Institution	0.19
	Built-Up Land - Health Institution	0.14
	Built-Up Land - Public/Semi Public Institutions	0.14
	Built-Up Land - Religious Institution	0.08
	Built-Up Land - Residential	7.25
	Built-Up Land - Road	4.28
	Built-Up Land _ Commercial	0.62
	Paddy Converted - Built-Up Land	0.10
	Paddy Converted - Coconut	16.57
	Paddy Converted - Seasonal Crop	0.22
	Paddy Converted to Mixed Crops	5.47

	Waste Land - Land Without Scrub	1.11
	Water Body - Lake/Pond	0.08
	Waterbody - River/Stream	0.54
29M23b	Agricultural Crop - Coconut	60.17
	Agricultural Crop - Coconut Dominant Mixed Crops	50.13
	Agricultural Mixed Crops - Mixed Crops	74.40
	Agricultural Plantation Crop - Rubber	0.76
	Built-Up Land - Built-Up Land With Mixed Crops	0.36
	Built-Up Land - Educational Institution	0.05
	Built-Up Land - Health Institution	0.09
	Built-Up Land - Open Spaces/Vacant Land	0.00
	Built-Up Land - Religious Institution	0.01
	Built-Up Land - Residential	5.80
	Built-Up Land - Road	0.39
	Built-Up Land _ Commercial	0.33
	Paddy Converted - Coconut	7.76
	Paddy Converted - Coconut Dominant Mixed Crops	1.91
	Paddy Converted - Mixed Built-Up	0.29
	Paddy Converted - Residential	0.33
	Paddy Converted - Seasonal Crop	0.59
	Paddy Converted to Mixed Crops	9.48
	Waste Land - Land Without Scrub	0.55
	Waste Land - Quarry	5.15
29M23c	Agricultural Crop - Coconut	18.27
	Agricultural Crop - Coconut Dominant Mixed Crops	19.83
	Agricultural Mixed Crops - Mixed Crops	77.44
	Built-Up Land - Educational Institution	1.29
	Built-Up Land - Play Ground	0.37
	Built-Up Land - Public/Semi Public Institutions	0.11
	Built-Up Land - Residential	4.28
	Built-Up Land - Road	2.46
	Built-Up Land _ Commercial	1.09

	Paddy Converted - Built-Up Land	0.03
	Paddy Converted - Coconut	2.51
	Paddy Converted - Seasonal Crop	0.17
	Paddy Converted to Mixed Crops	2.29
	Waste Land - Sands/Riverine/Coastal	0.37
	Waterbody - River/Stream	3.32
29M24a	Agricultural Crop - Coconut	107.93
	Agricultural Crop - Coconut Dominant Mixed Crops	141.50
	Agricultural Mixed Crops - Mixed Crops	254.34
	Agricultural Plantation Crop - Rubber	0.32
	Built-Up Land - Built-Up Land With Mixed Crops	4.10
	Built-Up Land - Educational Institution	0.66
	Built-Up Land - Open Spaces/Vacant Land	0.59
	Built-Up Land - Play Ground	0.11
	Built-Up Land - Public/Semi Public Institutions	0.04
	Built-Up Land - Religious Institution	0.27
	Built-Up Land - Residential	20.65
	Built-Up Land - Road	8.18
	Built-Up Land _ Commercial	0.55
	Paddy Converted - Built-Up Land	2.87
	Paddy Converted - Coconut	38.55
	Paddy Converted - Coconut Dominant Mixed Crops	11.24
	Paddy Converted - Residential	0.51
	Paddy Converted - Seasonal Crop	0.70
	Paddy Converted to Mixed Crops	12.31
	Paddy Cultivating Land - Current Fallow	2.34
	Waste Land - Land With Scrub	0.42
	Waste Land - Land Without Scrub	4.48
	Waste Land - Sands/Riverine/Coastal	2.20
	Water Body - Lake/Pond	0.12
	Waterbody - River/Stream	6.01
29M28c	Agricultural Crop - Coconut	354.83

	Agricultural Crop - Coconut Dominant Mixed Crops	467.53
	Agricultural Mixed Crops - Mixed Crops	460.58
	Agricultural Perennial Crop - Arecanut	0.85
	Agricultural Plantation Crop - Rubber	0.79
	Built-Up Land - Built-Up Land With Mixed Crops	17.90
	Built-Up Land - Educational Institution	6.49
	Built-Up Land - Health Institution	0.40
	Built-Up Land - Open Spaces/Vacant Land	1.56
	Built-Up Land - Play Ground	1.21
	Built-Up Land - Public/Semi Public Institutions	2.00
	Built-Up Land - Religious Institution	0.64
	Built-Up Land - Residential	56.26
	Built-Up Land - Road	16.43
	Built-Up Land _ Commercial	5.52
	Built-Up Land _ Residential	0.61
	Paddy Converted - Built-Up Land	6.93
	Paddy Converted - Coconut	140.08
	Paddy Converted - Coconut Dominant Mixed Crops	37.44
	Paddy Converted - Commercial Building	0.09
	Paddy Converted - Educational Institution	0.05
	Paddy Converted - Mixed Built-Up	1.63
	Paddy Converted - Religious Institution	0.10
	Paddy Converted - Residential	2.84
	Paddy Converted - Seasonal Crop	4.11
	Paddy Converted to Mixed Crops	49.05
	Paddy Converted To Seasonal Crop - Banana	0.23
	Paddy Cultivating Land - Current Fallow	27.10
	Paddy Fallow Land - Long Fallow	1.28
	Waste Land - Land Without Scrub	15.06
	Waste Land - Quarry	2.18
	Waste Land - Sands/Riverine/Coastal	0.55
	Water Body - Canal	6.18

	Water Body - Lake/Pond	0.76
	Waterbody - River/Stream	0.49
	Total	**4143.87**

9.13 GROUND WATER

Groundwater occurs under phreatic conditions in the weathered and fractured crystalline rocks, laterite and shallow coastal aquifers. It occurs under semi confined to confined conditions in the deep-seated fractured aquifers of the crystalline rocks. The depth of dug wells tapping the shallow zones in the weathered/fractured crystalline area varies from 3 to 11 mbgl. The Annual Extractable Ground Water Recharge of the district is 306.12 MCM and existing Gross Ground Water Extractionis of the order of 177.62 MCM. The Stage of Ground Water Extraction is 58%. Out of 12 blocks in the district, 2 are'Semi-critical' (Balussery and Kunnamangalam) and others are 'Safe'. The ins torage ground water resources of phreatic zone (unconfined aquifer) is236.33 MCM, the semi- confined zone is 430.50 MCM. The total ground water resources of the district are972.94MCM

GROUND WATER STATISTICS- KUNNUMMAL BLOCK

Table 29: Ground water resource of Kunnummal Block

SlNo	Category	
1	Assessment Unit	Kunnummal
2	Command/Non-Command	Non-command
3	Recharge from rainfall during monsoon season	2814.74
4	Recharge from other sources during monsoon season	15.63
5	Recharge from rainfall during non-monsoonseason	0.00
6	Recharge from other sources during non-monsoon season	99.68
7	Total Annual Ground Water Recharge (3+4+5+6)	2930.06
8	Provision for Natural Discharges	293.01
9	Net Annual Ground Water Availability (7-8)	2637.05
10	Existing Gross Ground Water Draft for irrigation	367.23
11	Existing Gross Ground Water Draft for domestic andindustrial water supply	1027.53
12	Existing Gross Ground Water Draft for all uses (10+11)	1394.76

13	Provision for domestic and industrial requirement supply in2025	1157.11
14	Net Ground Water Availability for future irrigationdevelopment (9-10-13)	1112.70
15	Stage of Ground water Development {(12/9)*100} (%)	52.89

Source: Central Ground Water Department

Table 30: Ground water prospects in watersheds

Ground water prospects	**29M20a**	**29M21a**	**29M21b**	**29M21c**	**29M22a**
Poor	62.21	53.99	277.40	42.53	30.11
Moderate	37.84	112.39	-	70.55	265.35
Very good to good	9.83	26.78	-	22.61	50.40
Waterbody	0.69	5.93	-	0.36	5.12
Total	110.57	199.09	277.40	136.04	350.97

Ground water prospects	**29M23a**	**29M23b**	**29M23c**	**29M24a**	**29M28c**	**Area (in Ha)**
Poor	-	-	-	-	-	2681.41
Moderate	307.26	186.05	100.61	492.52	1108.85	466.23
Very good to good	98.60	32.50	29.24	120.52	579.97	970.47
Waterbody	0.81	-	3.97	7.96	0.92	25.76
Total	406.68	218.56	133.83	620.99	1689.74	**4143.87**

9.14 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 2 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 PMKSY, 2percent of the total project cost is earmarked for Entry Point Activities. A total amount of Rs. 22.14 lakhs is available for EPA and the details showing the watershed code, name of watershed, area and amount is given below:

Table: 31 Entry Point Activities

No	Code of watershed	Name of watershed	Treatable Area in ha	Amount in Rs.
1	29M20a	Mudikkal	108.00	604080
2	29M21a	Mandokandy	193.00	108080
3	29M21b	Irumbathadam	274.00	153440
4	29M21c	Peruvankuni	135.00	75600
5	29M22a	Mullambath	343.00	192080
6	29M23a	Cheekkonnu west	393.00	220080
7	29M23b	Pathiripatta	211.00	118160
8	29M23c	Kizhakkedathvayal	122.00	68320
9	29M24a	Chiyyoor	579.00	324240
10	29M28c	Kummamkode	1596.00	893760
Total			**3954.00**	**2214240**

A series of user group discussions were carried out in the project area to finalise 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.

CHAPTER10

MICRO WATERSHED BASED ACTION PLAN

MUDIKKAL - 29M20a

Mudikkal micro watershed is a watershed in the PMSKY Kozhikode cluster with an area of 110.57 ha (2.66 % of total area). This micro watershed is spread over Naripetta Panchayath. The Mahe River flows to the western side of this watershed.

10.1 General Description

Table: 32General Description of Mudikkal (29M20a) micro watershed

Name of micro watershed	:	Mudikkal
Micro watershed code	:	29M20a
River basin	:	Mahe
District	:	Kozhikode
Block Panchayath	:	Thuneri
GramaPanchayath	:	Naripetta
Villages	:	Naripetta
Latitude	:	11.735306 N
Longitude	:	75.733158 E
Wards	:	Naripetta Panchayath, Ward – 1
Total Area	:	110.57 Ha
% Of area in the PMKSY cluster	:	2.66 %

10.2 Socio Economic Profile

As per the information provided in the baseline survey conducted, Mudikkal micro watershed has a total number of 137 households with a total population of 584. 86 BPL families reside in the micro watershed area. Out of the total population 5 belongs to scheduled tribe and 9 belongs to Scheduled cast. 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 Mudikkal micro watershed are given in the Table 33

Table: 33Socio Economic details of Mudikkal micro watershed

1.	Total number of households		137
2.	Total Population		584
3.	No. of BPL families		86
4.	Population	Scheduled Caste	9
		Scheduled Tribe	5
5.	Land holdings/Family (in Ha)		0.81

10.3 Biophysical Resources

10.3.1 Physiography

The relief of the watershed ranges from 25 m above MSL to 415m 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 50 ha (45.20 %). An area of about 55 ha is located above 150m above MSL.

10.3.2 Slope

The watershed area is divided into six categories of slope classes. The majority of area is under the steep sloping area having greater than 35% slope. The category spreads over an area of 54.43 ha (49.22 %), 35.94 % of the watershed area is having moderately steep sloping lands which requires urgent soil and water conservation measures(Fig.14).

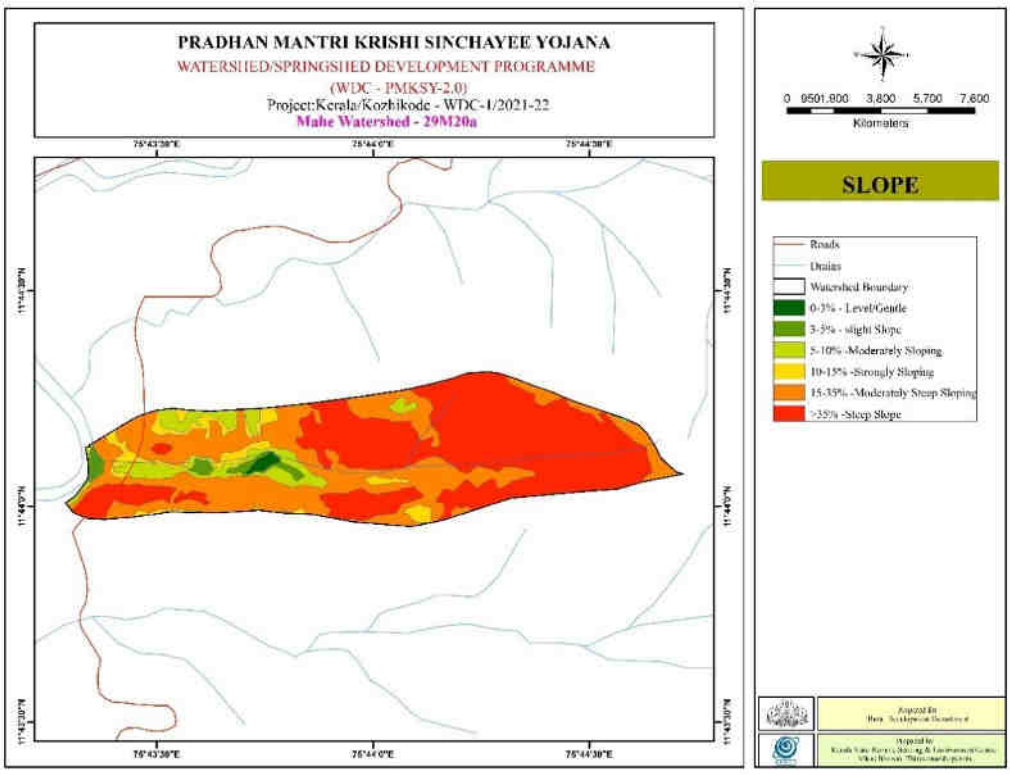


Fig .14: Slope (29M20a)

10.3.3 Drains

The Mahe River flowing through the western portion of the watershed is the major drain of this watershed. Few small drains are originating from different parts of this watershed which drains to the Mahe River at the western boundary of the watershed. The details of the drains and ponds in the watershed area are given in table.

Table:34 Details of Drains in Mudikkalmicro watershed

Grama Panchayat	Drains/River/Streams	Length(m)
Naripetta	Jathikkundu Erattemchalthodu	1988.62
	VanimelPuzha	0.87
	First Order Streams	1098.85

10.3.4 Land use

Agriculture is the prime activity in the watershed area. The major land use category mapped in the watershed area is agricultural mixed crops-coconut. It occurs an area of 47.19 ha (42.68%). The second major category is the agricultural crop - coconut dominant mixed cropswhich are the typical homestead cultivation of Kerala wherein the different crop species are grown together that cannot be spatially mapped separately.

Table: 35 land use categories in Mudikkal micro watershed

Sl. No.	Land use category	Area in (Ha)	Percentage
1	Agricultural Crop - Coconut	2.97	2.69
2	Agricultural Crop - Coconut Dominant Mixed Crops	43.57	39.40
3	Agricultural Mixed Crops - Mixed Crops	47.19	42.68
4	Agricultural Plantation Crop - Rubber	13.47	12.18
5	Built-Up Land - Residential	0.14	0.13
6	Waste Land - Barren Rocky Land	2.04	1.85
7	Waste Land - Land Without Scrub	0.59	0.53
8	Waste Land - Sands/Riverine/Coastal	0.12	0.11
9	Waterbody - River/Stream	0.49	0.44
	Total	110.575	100.00

10.3.5Geology

There are three geomorphological units of which 98.66% (109.09 Ha) of the area falls under the category Charnockite group of rocks. An area of 0.79 ha and 0.69 ha is mapped under the category Migmatite Complex and waterbody respectively.

10.3.6Soils

Geomorphology of this watershed falls majorly under denudation structural hills and Piedmont zone category. Majority of the soil in the watershed area (109.8852 ha) is very deep with a depth of 75-100 cm. Rest of soil belongs to deep to very deep category. Also, most of the watershed area is prone to moderate to severe erosion category.

10.4 Watershed Committee

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

10.5 Neighbourhood 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.

10.6 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.

10.7 Activities proposed

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

Table: 36 Details of Activities proposed

Entry Point Activities	
1	Pineapple Cultivation
2	Tapioca Cultivation
3	Hatchery units
4	Pisciculture
5	Cattle Farming
6	Fruit Processing units
Natural Resource Conservation Activities (NRM)	
1	Cultivation of horticulture crops in wastelands
2	Intercropping in coconut plantation
3	Fruit tree planting
4	Crop demonstration- vegetable garden in schools
5	Medicinal plants in public institution
6	Mudikkal thodu side Protection wall

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

Table:37 Budget

No.	Budget Component	Percentage	Amount (Rs. in Lakh)
1.	Administrative cost	10	3.02
2.	Monitoring	2	0.604
3.	Evaluation	2	0.604
Preparatory phase			
4.	Entry point activities	2	0.604
5.	Institution and capacity building	3	0.907
6.	Detailed Project Report	1	0.302
Watershed works phase			
7.	Natural Resources Conservation works	47	14.21
8.	Livelihood activities for asset less	15	4.54
9.	Production system and micro enterprises	15	4.54
10.	Consolidation phase	3	0.907
		100	**30.24**

MudikkalWatershed (29M20a) - Action Plan

Table: 38 -Sector-I- Natural Resources Conservation and Management - Ist Year Plan

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
1	Cultivation of horticultural crops in wastelands	25 cent	10000	2	20000		2000
2	Intercropping in coconut plantations	25 cent	5500	3	16500		1650
3	Fruit tree planting (Jack fruit, rambutan, mango)	25 cent	10000	6	60000		6000
4	Pachathuruthu	5 cent	50000	1	50000		5000
5	Earthen bunds	rm	62	951		58962	
6	Centripetal terrracing with mulching	no.	179	2094		374826	
7	Stone pitched contour bunds	rm	144	3083		443952	
8	Staggered trenches	no.	122	479		58438	
9	Moisture Conservation pits	no.	122	372		45384	
10	Live fencing	rm	24.5	190		4655	
11	Gully plugs	no.	1500	19		28500	
12	Brushwood checkdams	rm	316	20		6320	
13	Sidewall protection of drains (geotextiles)	m2	191	398		76018	
14	Desiltation of drains	10m3	485.85	25		12146.25	
15	Desiltation of ponds	10m3	649	50		32450	
16	Side varambuearthening of drains	m	234	318		74412	
17	Side protection of drains with bamboo planting	no.	34.65	500		17325	
18	Well recharging	no.	8000	75		600000	

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
19	Construction of new well	no.	50000	1		50000	
	Total				**146500**	**1883388.25**	**14650**

MudikkalWatershed (29M20a) - Action Plan

Table: 39Sector-I- Natural Resources Conservation and Management –2nd Year Plan

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
1	Intercropping in coconut plantations	25 cent	5500	4	22000		2200
2	Fruit tree planting (Jack fruit, rambutan, mango)	25 cent	10000	8	80000		8000
3	Pachathuruthu	5 cent	50000	2	100000		10000
4	Earthen bunds	rm	62	951		58962	
5	Centripetal terrracing with mulching	no.	179	2792		499768	
6	Stone pitched contour bunds	rm	144	3083		443952	
7	Staggered trenches	no.	122	959		116998	
8	Moisture Conservation pits	no.	122	745		90890	
9	Live fencing	rm	24.5	254		6223	
10	Gully plugs	no.	1500	19		28500	
11	Brushwood checkdams	rm	316	20		6320	
12	Sidewall protection of drains (geotextiles)	m2	191	796		152036	
13	Desiltation of drains	10m3	485.85	51		24778.35	
14	Desiltation of ponds	10m3	649	100		64900	

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
15	Side varambuearthening of drains	m	234	478		111852	
16	Side protection of drains with bamboo planting	no.	34.65			0	
17	Well recharging	no.	8000	100		800000	
18	Construction of new well	no.	50000	2		100000	
19	Mudikkalthodu side protection wall	1			1000000		
	Total				**1202000**	**2505179.35**	**20200**

MudikkalWatershed (29M20a) - Action Plan

Table 40: Sector-I- Natural Resources Conservation and Management –3rd Year Plan

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
1	Intercropping in coconut plantations	25 cent	5500	4	22000		2200
2	Fruit tree planting (Jack fruit, rambutan, mango)	25 cent	10000	5	50000		5000
3	Centripetal terrracing with mulching	no.	179	2094		374826	
4	Stone pitched contour bunds	rm	144	1541		221904	
5	Staggered trenches	no.	122	479		58438	
6	Moisture Conservation pits	no.	122	745		90890	
7	Live fencing	rm	24.5	190		4655	
8	Sidewall protection of drains (geotextiles)	m2	191	796		152036	
9	Desiltation of drains	10m3	485.85	51		24778.35	
10	Desiltation of ponds	10m3	649	100		64900	

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
11	Well recharging	no.	8000	75		600000	
12	Construction of new well	no.	50000	2		100000	
	Total				**72000**	**1692427.35**	**7200**

Mudikkal Watershed (29M20a) - Action Plan

Table 41: Livelihood Support system for Landless/ Asset less - 1st Year Plan

No.	Name of Activity	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	WDC PMKSY	Beneficiary contribution
1	Poultry unit (5 bird+ cage)	2600	40	104000	800	32000	72000
2	Mushroom cultivation (80-100 bed)	28125	3	84375	11250	33750	50625
3	Goat rearing (female 2)	30000	4	120000	15000	60000	60000
4	Minimal fruit and vegetable Processing unit	200000	1	200000	100000	100000	100000
5	Trichoderma Enriched cowdung production unit	30000	1	30000	20000	20000	10000
	Total			**538375**		**245750**	292625

Mudikkal Watershed (29M20a) - Action Plan

Table 42 Livelihood Support system for Landless/ Asset less -2nd Year Plan

No.	Name of Activity	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	WDC PMKSY	Beneficiary contribution
1	Poultry unit (5 bird+ cage)	2600	30	78000	800	24000	54000

2	Mushroom cultivation (80-100 bed)	28125	3	84375	11250	33750	50625
3	Goat rearing (female 2)	30000	4	120000	16000	64000	56000
	Total			**282375**		**121750**	**160625**

Mudikkal Watershed (29M20a) - Action Plan

Table 43 Livelihood Support system for Landless/ Asset less -3rd Year Plan

No.	Name of Activity	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	WDC PMKSY	Beneficiary contribution
1	Poultry unit (5 bird+ cage)	2600	24	62400	800	19200	43200
2	Mushroom cultivation (80-100 bed)	28125	2	56250	11250	22500	33750
3	Goat rearing (female 2)	30000	3	90000	15000	45000	45000
	Total			**208650**		**86700**	**121950**

Mudikkal Watershed (29M20a) - Action Plan

Table 44.Production System - 1st Year Plan

Sl. No	Project	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	Cost to be met from project fund	Beneficiary contribution	WDF
1	Vegetable Cultivation in Growbags (unit of 25 bags)	2000	102	204000	1500	153000	51000	30600
	Total					**153000**	**51000**	**30600**

Mudikkal Watershed (29M20a) - Action Plan
Table: 45ProductionSystem -2nd Year Plan

Sl. No	Project	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	Cost to be met from project fund	Beneficiary contribution	WDF
1	Small nursery (0.5 acre)	300000	1	300000	150000	150000	150000	30000
	Total					**150000**	**150000**	**30000**

Mudikkal Watershed (29M20a) - Action Plan
Table: 46ProductionSystem -3rd Year Plan

Sl. No	Project	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	Cost to be met from project fund	Beneficiary contribution	WDF
1	Rambutan/ Mango/Jack fruit/ Mangosteen/Passionfruit Cultivation	60000	5	300000	30000	150000	150000	30000
	Total					**150000**	**150000**	**30000**

CHAPTER11

MICRO WATERSHED BASED ACTION PLAN

MANDOKANDY (29M21a)

Mandokandy micro watershed is one of the micro watersheds in the PMSKY Kozhikode cluster with an area of 199.09 ha (4.80 % of total Mahe watershed area). This micro watershed is spread over Naripatta Panchayath.

11.1 General Description

Table: 47 General Description of Mandokandy (29M21a) micro watershed

Name of micro watershed	:	Mandokandy
Micro watershed code	:	29M21a
River basin	:	Mahe
District	:	Kozhikode
Block Panchayath	:	Kunnummal
GramaPanchayath	:	Naripatta
Villages	:	Naripatta
Latitude	:	11.730451 N
Longitude	:	75.727855 E
Wards	:	Naripatta (1,4,17) Part
Total Area	:	199.09 ha
% of area in the PMSKY cluster	:	4.80 %

11.2 Socio economic profile

As per the information provided in the baseline survey conducted, Mandokandy micro watershed has a total number of 245 households with a total population of 1045. 154 BPL families reside in the micro watershed area. Out of the total population 9 belongs to scheduled tribe and 16 belongs to Scheduled caste. 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 Mandokandy micro watershed are given in the table 48.

Table:48 Socio Economic details of Mandokandy micro watershed

1.	Total number of households		245
2.	Total Population		1045
3.	No. of BPL families		154
4.	Population	Scheduled Caste	16
		Scheduled Tribe	9
5.	Land holdings/Family (in Ha)		0.81

11.3 Biophysical Resources

11.3.1 Physiography

The relief of the watershed ranges from 28m above MSL to 410m above MSL. The majority of the area falls in the relief category of 50m to 200m above MSL which occurs in an area of 100 ha (50.2%).

11.3.2 Slope

The watershed area is divided into six categories of slope classes. The majority of area is under the moderatelysteep sloping area having 15-35 % slope. This category spreads over an area of 72.08 ha (36.20%). 16.72% (33.29 ha) of the watershed area is having steep slope lands which require urgent soil and water conservation measures (Fig.15).

Table: 49 Details of Slope in Mandokandy micro watershed

SL No	Slope Category	Area in Ha	Percentage
1	0-3% - Level/Gentle	10.82	5.44
2	3-5% - slight Slope	12.19	6.12
3	5-10% -Moderately Sloping	37.52	18.84
4	10-15% -Strongly Sloping	33.18	16.67
5	15-35% -Moderately Steep Sloping	72.08	36.20
6	>35% -Steep Slope	33.29	16.72
	Total	**199.09**	**100.00**

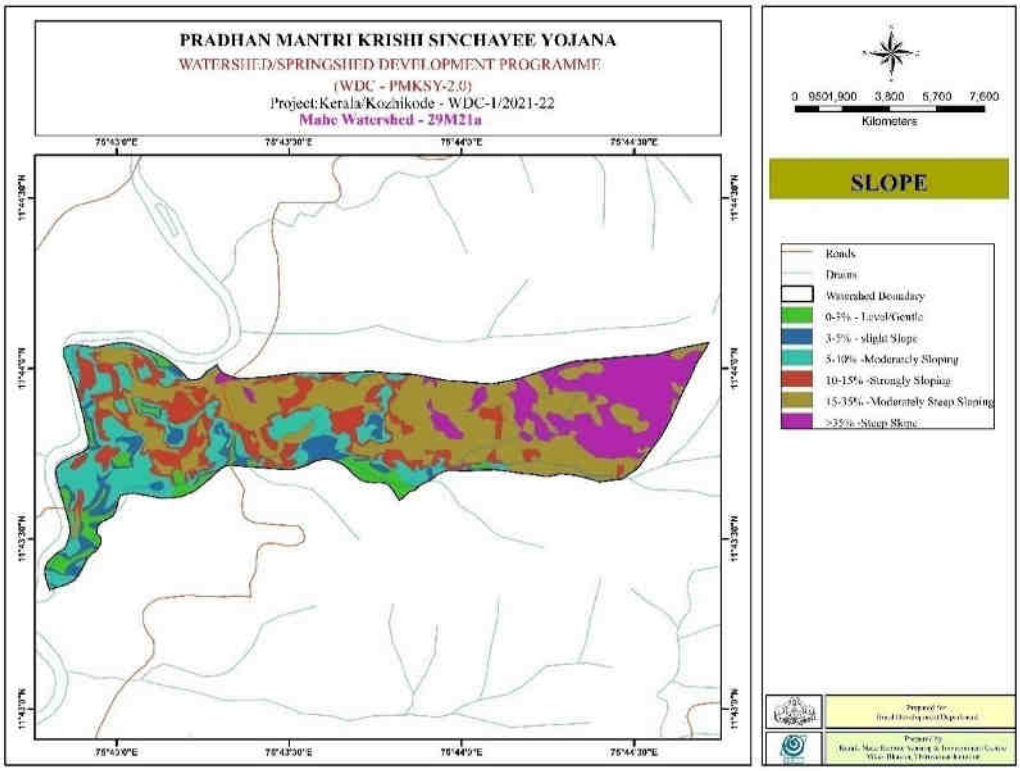


Fig.15. Slope (29M21a)

11.3.3 Drains

The Mahe River flowing through the western portion of the watershed is the major drain of this watershed. Few small drains are originating from different parts of this watershed which drains to the Mahe River at the western boundary of the watershed. The details of the drains and ponds in the watershed area are given in table. The details of the drains and ponds in the watershed area are given in table below.

Table: 50 Details of Drains in Mandokandy micro watershed

GramaPanchayat	Drains	Length (m)	Breadth (m)	Depth (m)
Naripatta	First order Stream	2969.588	-	-

11.3.4 Land use

Agriculture is the prime activity in the watershed area. The major land use category mapped in the watershed area is Mixed Crops, which are the typical homestead cultivation of Kerala wherein the different crop species are grown together that cannot be spatially mapped separately. It occupies an area of 82.53 ha (41.45 %). The second major category is the Coconut Dominant Mixed Crops. This is mapped in an area of 82.51 ha.

Table:51 land use categories in Mandokandymicro watershed

Sl. No.	Land use category	Area in ha	Percentage
1	Agricultural Crop – Coconut	12.97	6.51
2	Agricultural Crop - Coconut Dominant Mixed Crops	82.51	41.44
3	Agricultural Mixed Crops - Mixed Crops	82.53	41.45
4	Agricultural Plantation Crop - Rubber	11.77	5.91
5	Built-Up Land – Residential	1.70	0.85
6	Paddy Converted – Coconut + Arecanut	0.84	0.42
7	Waste Land - Land Without Scrub	2.01	1.01
8	Waste Land - Sands/Riverine/Coastal	0.49	0.25
9	Water body - River/Stream	4.27	2.14
	Total	**199.09**	**100.00**

11.3.5 Geology

The watershed falls in the geological unit of Migmatite Complex, has an area of 154.91 ha (70.88%).

Table: 52 showing rock types in Mandokandy watershed

SL No	Rock Type	Area in Ha	Percentage
1	Charnockite group of rocks	186.65	93.75
2	Migmatite Complex	6.51	3.27
3	Waterbody	5.93	2.98
	Total	**199.09**	**100.00**

11.3.6 Geomorphology

There are five geomorphological units of which more than 50 % (123.61 ha) of the area falls under the Piedmont Zone category. An area of 47.92 ha is mapped under the Lower Plateau (Lateritic) - Dissected category which accounts 21.92 % of the total area of the micro watershed.

Table: 53 Geomorphology in Mandokandy micro watershed

SL No	Geomorphology	Area in Ha	Percentage
1	Denudational Structural Hills	56.95	28.61
2	Piedmont Zone	117.21	58.87
3	Valley Fill	19.00	9.54
4	Waterbody	5.93	2.98
	Total	**199.09**	**100.00**

11.3.7 Soils

The soil in the micro watershed is mostly very deepwith a depth of 75- 100 cm, which accounts around 147.15 ha area (67.33 %). Around 32.67 % of the area is having deep to very deep soil. The major surface soil textures in the watershed area constitutes that of fine loamy (79.41 ha) and Loamy Skeletal (73.39 ha). Nearly 44.61 % of the watershed area is prone to moderate soil erosion which calls for proper soil and water conservation measures in the area.

11.4 Watershed Committee

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

11.5 Neighbour hood Groups

Neighbourhood 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.

11.6 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.

11.7 Activities proposed

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

Table: 54 Details of Activities proposed

Entry Point Activities	
1	Banana cultivation
2	Vegetable cultivation
3	Pineapple cultivation
4	Mushroom cultivation
5	Apiculture
6	Mulberry cultivation
7	Tapioca cultivation
Natural Resoruce Conservation Activities	
1	Cultivation of horticulture crops in wastelands
2	Intercropping in coconut plantation
3	Fruit tree planting
4	Crop demonstration- vegetable garden in schools
5	Medicinal plants in public institution
6	Irumanthadam Kandanchola thodu check dam and side wall renovation
7	Renovation of Uppumal check dam and side wall construction

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

Table:55 Budget for Mandokandy micro watershed

No.	Budget component	%	Amount in Rs. (Lakhs)
1.	Administrative cost	10	5.40
2.	Monitoring	2	1.08
3.	Evaluation	2	1.08
Preparatory phase			
4.	Entry point activities	2	1.08
5.	Institution and capacity building	3	1.62
6.	Detailed Project Report	1	0.54
Watershed works phase			
7.	Natural Resoruces Conservation works	47	25.40
8.	Livelihood activities for asset less	15	8.11
9.	Production system and micro enterprises	15	8.11
10.	Consolidation phase	3	1.62
		100	**54.04**

MandokandyWatershed (29M21a) - Action Plan

Table: 56Sector-I- Natural Resources Conservation and Management - Ist Year Plan

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
1	Cultivation of horticultural crops in wastelands	25 cent	10000	2	20000		2000
2	Intercropping in coconut plantations	25 cent	5500	6	33000		3300
3	Fruit tree planting (Jack fruit, rambutan, mango)	25 cent	10000	2	20000		2000
4	Medicinal plants in public institutions	5 cent	5500	3	16500		1650
5	Earthen bunds	Rm	62	5826		361212	
6	Centripetal terrracing with mulching	no.	179	4296		768984	
7	Stone pitched contour bunds	Rm	144	5009		721296	
8	Strip terracing for rubber/Inward terracing for plantation	no.	191	34		6494	
9	Moisture Conservation pits	no.	122	764		93208	
10	Live fencing	Rm	24.5	1165		28542.5	
11	Gully plugs	no.	1500	50		75000	
12	Brushwood checkdams	Rm	316	4		1264	
13	Loose boulder check dams (2 m length)	no.	3900	13		50700	
14	Sidewall protection of drains (geotextiles)	m2	191	586		111926	
15	Sidewall protection of ponds (geotextiles)	m2	191	150		28650	
16	Desiltation of drains	10m3	485.85	70		34009.5	
17	Desiltation of ponds	10m3	649	25		16225	
18	Side varambuearthening of drains	M	234	469		109746	

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
19	Side protection of drains with bamboo planting	no.	34.65	1000		34650	
20	Construction of farm ponds (10m x 10 m x 3 m) with geotextiles	no.	130000	2		260000	
21	Well recharging	no.	8000	114		912000	
22	Construction of new well	no.	50000	2		100000	
23	Irumnthadam-KandancholathoduCheckdam& sidewall renovation	1			1000000		
25					**1089500**	**3713907**	**8950**

MandokandyWatershed (29M21a) - Action Plan

Table: 57Sector-I- Natural Resources Conservation and Management –2nd Year Plan

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
1	Cultivation of horticultural crops in wastelands	25 cent	10000	2	20000		2000
2	Intercropping in coconut plantations	25 cent	5500	8	44000		4400
3	Fruit tree planting (Jack fruit, rambutan, mango)	25 cent	10000	2	20000		2000
4	Medicinal plants in public institutions	5 cent	5500	3	16500		1650
5	Earthen bunds	Rm	62	5826		361212	0
6	Centripetal terrracing with mulching	no.	179	5728		1025312	
7	Stone pitched contour bunds	Rm	144	5009		721296	
8	Strip terracing for rubber/Inward terracing for plantation	no.	191	69		13179	

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
9	Moisture Conservation pits	no.	122	1528		186416	
10	Live fencing	Rm	24.5	1554		38073	
11	Gully plugs	no.	1500	50		75000	
12	Brushwood checkdams	Rm	316	4		1264	
13	Loose boulder check dams (2 m length)	no.	3900	13		50700	
14	Sidewall protection of drains (geotextiles)	m2	191	1172		223852	
15	Sidewall protection of ponds (geotextiles)	m2	191	300		57300	
16	Desiltation of drains	10m3	485.85	139		67533.15	
17	Desiltation of ponds	10m3	649	50		32450	
18	Side varambuearthening of drains	M	234	703		164502	
19	Side protection of drains with bamboo planting	no.	34.65			0	
20	Construction of farm ponds (10m x 10 m x 3 m) with geotextiles	no.	130000	3		390000	
21	Well recharging	no.	8000	152		1216000	
22	Construction of new well	no.	50000	3		150000	
23	Renovation of uppummalcheckdam and side wall construction	1			1300000		
	Total				**1400500**	**4774089.15**	10050

MandokandyWatershed (29M21a) - Action Plan

Table: 58Sector-I- Natural Resources Conservation and Management –3rd Year Plan

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
1	Intercropping in coconut plantations	25 cent	5500	6	33000		3300
2	Medicinal plants in public institutions	5 cent	5500	3	16500		1650
3	Centripetal terrracing with mulching	no.	179	4296		768984	
4	Stone pitched contour bunds	rm	144	2504		360576	
5	Strip terracing for rubber/Inward terracing for plantation	no.	191	34		6494	
6	Moisture Conservation pits	no.	122	1528		186416	
7	Live fencing	rm	24.5	1165		28542.5	
8	Sidewall protection of drains (geotextiles)	m2	191	1172		223852	
9	Sidewall protection of ponds (geotextiles)	m2	191	300		57300	
10	Desiltation of drains	10m3	485.85	139		67533.15	
11	Desiltation of ponds	10m3	649	50		32450	
12	Well recharging	no.	8000	114		912000	
13	Construction of new well	no.	50000	3		150000	
					49500	**2794147.65**	**4950**

Mandokandy Watershed (29M21a) - Action Plan

Table:59 Livelihood Support system for Landless/ Asset less -1st Year Plan

No.	Name of Activity	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	WDC PMKSY	Beneficiary contribution
1	Poultry unit (5 bird+ cage)	2600	40	104000	800	32000	72000
2	Cow rearing (milching)	60000	5	300000	30000	150000	150000
3	Goat rearing (female 2)	30000	4	120000	15000	60000	60000
4	Minimal fruit and vegetable Processing unit	200000	1	200000	100000	100000	100000
5	Trichoderma Enriched cowdung production unit	30000	1	30000	20000	20000	10000
	Total			**754000**		**362000**	**392000**

Mandokandy Watershed (29M21a) - Action Plan

Table: 60Livelihood Support system for Landless/ Asset less -2nd Year Plan

No.	Name of Activity	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	WDC PMKSY	Beneficiary contribution
1	Poultry unit (5 bird+ cage)	2600	40	104000	800	32000	72000
2	Cow rearing (milching)	60000	3	180000	30000	90000	90000
3	Goat rearing (female 2)	30000	4	120000	15000	60000	60000
4	Minimal fruit and vegetable Processing unit	200000	1	200000	100000	100000	100000
5	Trichoderma Enriched cowdung production unit	30000	1	30000	20000	20000	10000
	Total			**634000**		**302000**	**332000**

Mandokandy Watershed (29M21a) - Action Plan

Table: 61 Livelihood Support system for Landless/ Asset less -3rd Year Plan

No.	Name of Activity	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	WDC PMKSY	Beneficiary contribution
1	Poultry unit (5 bird+ cage)	2600	34	88400	800	27200	61200
2	Cow rearing (milching)	60000	2	120000	30000	60000	60000
3	Goat rearing (female 2)	30000	4	120000	15000	60000	60000
	Total			**328400**		**147200**	**181200**

Mandokandy Watershed (29M21a) - Action Plan

Table: 62 Production System -1st Year Plan

Sl. No	Project	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	Cost to be met from project fund	Beneficiary contribution	WDF
1	IFS (5-30 cents)	80000	2	160000	30000	60000	100000	12000
2	Banana cultivation	216000	5	1080000	26250	131250	948750	26250
3	Vegetable Cultivation in Growbags	2000	60	120000	1500	90000	30000	18000
4	Distribution of Coconut seedlings (DxT)/Hybrid	250	100	25000	125	12500	12500	2500
5				**1385000**		**293750**	**1091250**	**58750**

Mandokandy Watershed (29M21a) - Action Plan
Table: 63.Production System -2nd Year Plan

Sl. No	Project	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	Cost to be met from project fund	Beneficiary contribution	WDF
1	IFS (5-30 cents)	80000	2	160000	30000	60000	100000	12000
2	Banana cultivation	216000	5	1080000	26250	131250	948750	26250
3	Vegetable Cultivation in Growbags	2000	60	120000	1500	90000	30000	18000
4	Distribution of Coconut seedlings (DxT)/Hybrid	250	98	24500	125	12250	12250	2450
5	**Total**			**1384500**		**293500**	**1091000**	**58700**

Mandokandy Watershed (29M21a) - Action Plan
Table: 64 Production System -3rd Year Plan

Sl. No	Project	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	Cost to be met from project fund	Beneficiary contribution	WDF
1	Banana cultivation	216000	5	1080000	26250	131250	948750	26250
2	Vegetable Cultivation in Growbags	2000	53	106000	1500	79500	26500	15900
3	Distribution of Coconut seedlings (DxT)/Hybrid	250	99	24750	125	12375	12375	2475
	Total			**1210750**		**223125**	**987625**	**44625**

CHAPTER 12

MICRO WATERSHED BASED ACTION PLAN

IRUMATHADAM (29M21b)

Irumathadam micro watershed is one of the micro watersheds in the PMSKY Kozhikode cluster with an area of 277.40ha (6.69% of total Mahe watershed area). This micro watershed is spread over Naripatta Panchayath.

12.1 General Description

Table: 65 General Description of Irumathadam (29M21b) micro watershed

Name of micro watershed	:	Irumathadam
Micro watershed code	:	29M21b
River basin	:	Mahe
District	:	Kozhikode
Block Panchayath	:	Kunnummal
GramaPanchayath	:	Naripatta
Villages	:	Thinoor
Latitude	:	11.729 N
Longitude	:	75.7543 E
Wards		Naripetta (1,2,4) Part
Total Area	:	277.40 ha
% of area in the PMSKY cluster	:	6.69%

12.2 Socio economic profile

As per the information provided in the baseline survey conducted, Irumathadam micro watershed has a total number of 327 households with a total population of 1395. 206 BPL families reside in the micro watershed area. Out of the total population 12 belongs to scheduled tribe and 22 belongs to Scheduled caste. 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 Irumathadam micro watershed are given in the Table 66.

Table:66Socio Economic details of Irumathadam micro watershed

1.	Total number of households		327
2.	Total Population		1395
3.	No. of BPL families		206
4.	Population	Scheduled Caste	22
		Scheduled Tribe	12
5.	Land holdings/Family (in Ha)		0.84

12.3 Biophysical Resources

12.3.1 Physiography

The relief of the watershed ranges from 132m above MSL to 905m above MSL.

12.3.2 Slope

The watershed area is divided into four categories of slope classes. The majority of area is under the steep sloping area having >35 % slope. This category spreads over an area of 190.70 ha (68.75 %). 28.62 % (79.39 ha) of the watershed area is having moderately steep slope lands which require urgent soil and water conservation measures(Fig.16).

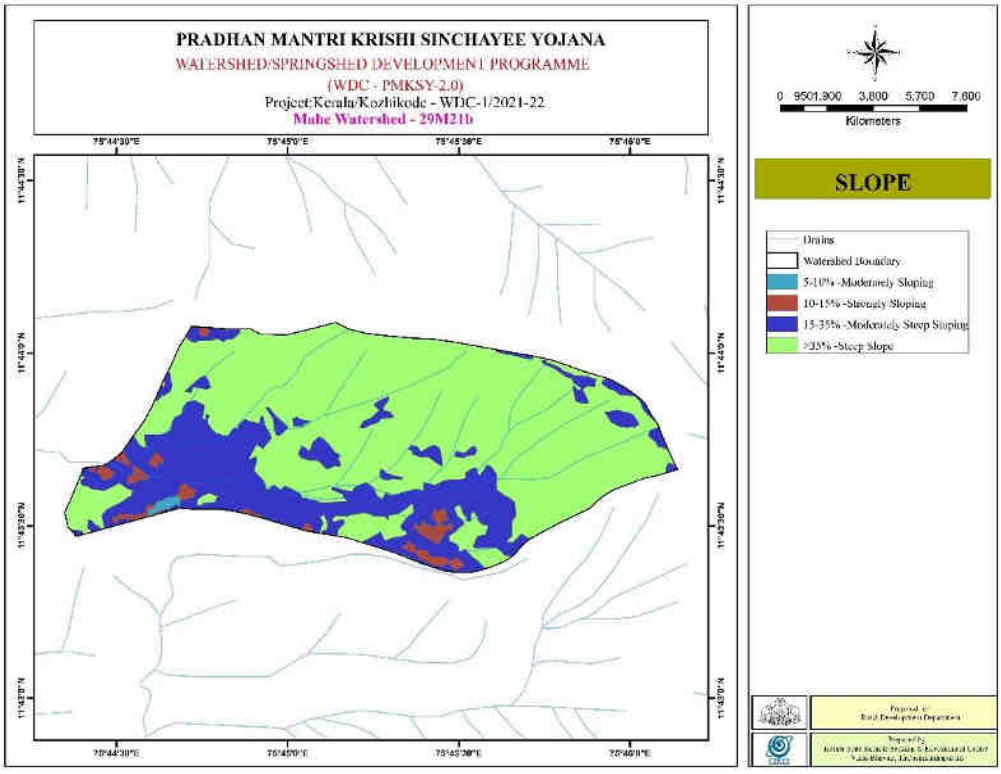


Fig.16. Slope (29M21b)

Table: 67Details of Slope of Irumathadammicro watershed

SL No	Slope Category	Area in Ha	Percentage
1	5-10% -Moderately Sloping	0.85	0.31
2	10-15% -Strongly Sloping	6.45	2.32
3	15-35% -Moderately Steep Sloping	79.39	28.62
4	>35% -Steep Slope	190.70	68.75
	Total	**277.40**	**100.00**

12.3.3 Drains

The Mahe River flowing through the western portion of the watershed is the major drain of this watershed. Few small drains are originating from different parts of this watershed which drains to the Mahe River at the western boundary of the watershed. The details of the drains and ponds in the watershed area are given in table. The details of the drains and ponds in the watershed area are given in table 68

Table:68 Details of Drains in Irumathadam micro watershed

Drains	Length (m)
MullambathMandokandythodu	1513.34
Urithookkiedonithodu	1871.80
Other First order Streams	5911.76
Total	**9296.90**

12.3.4 Land use

Agriculture is the prime activity in the watershed area. The major land use category mapped in the watershed area is Mixed Crops, which are the typical homestead cultivation of Kerala wherein the different crop species are grown together that cannot be spatially mapped separately. It occupies an area of 107.26 ha (38.67 %). The second major category is the Coconut Crop. This is mapped in an area of 65.09 ha.

Table.69 land use categories in Irumathadammicro watershed

Sl. No.	Land use category	Area in ha	Percentage
1	Agricultural Crop – Coconut	65.09	23.46
2	Agricultural Crop - Coconut Dominant Mixed Crops	2.37	0.86
3	Agricultural Mixed Crops - Mixed Crops	107.26	38.67

4	Agricultural Plantation Crop - Rubber	2.79	1.01
5	Forest - Barren Rocky/Stony Waste/Sheet Rock	8.97	3.23
6	Forest – Coconut	0.79	0.28
7	Forest – Dense	22.06	7.95
8	Forest - Land Without Scrub	0.63	0.23
9	Forest – Open	61.77	22.27
10	Forest - Plantation	3.19	1.15
11	Waste Land - Barren Rocky Land	0.03	0.01
12	Waste Land - Land Without Scrub	2.45	0.88
	Total	**277.40**	**100.00**

12.3.5 Geology

The watershed falls in the geological unit of Charnockite group of rocks and it covers the entire micro watershed.

12.3.6 Geomorphology

There are two geomorphological units of which 96.98 % (269.02 ha) of the area falls under the Denudational Structural Hillscategory and 3.02% falls under Rock exposure category.

12.3.7 Soils

The soil in the micro watershed is mostly very deepwith a depth of 75- 100 cm, which accounts around 251.76 ha area (90.75 %). The major surface soil textures in the watershed area constitutes that of fine texture (273.12 ha).90.75 % of the watershed area is prone to moderate to severe soil erosion which calls for proper soil and water conservation measures in the area.

12.4 Watershed Committee

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

12.5 Neighbour hood Groups

Neighbourhood 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.

12.6 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 70: Details of Activities proposed

Entry Point Activities	
1	Banana cultivation
2	Vegetable cultivation
3	Pineapple cultivation
4	Mushroom cultivation
5	Apiculture
6	Mulberry cultivation
7	Tapioca cultivation
Natural Resoruce Conservation Activities	
1	Cultivation of horticulture crops in wastelands
2	Intercropping in coconut plantation
3	Fruit tree planting
4	Crop demonstration- vegetable garden in schools

5	Medicinal plants in public institution
6	Edoni-Urithukki mala –thonikundu water storage tank with smart channel construction

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

Table:71 Budget for Irumathadam micro watershed

No.	Budget component	%	Amount in Rs. (Lakhs)
1.	Administrative cost	10	7.67
2.	Monitoring	2	1.53
3.	Evaluation	2	1.53
Preparatory phase			
4.	Entry point activities	2	1.53
5.	Institution and capacity building	3	2.30
6.	Detailed Project Report	1	0.77
Watershed works phase			
7.	Natural Resoruces Conservation works	47	36.06
8.	Livelihood activities for asset less	15	11.51
9.	Production system and micro enterprises	15	11.51
10.	Consolidation phase	3	2.30
		100	**76.71**

IrumathadamWatershed (29M21b) - Action Plan

Table 72: Sector-I- Natural Resources Conservation and Management - Ist Year Plan

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
1	Cultivation of horticultural crops in wastelands	25 cent	10000	20	200000		20000
2	Intercropping in coconut plantations	25 cent	5500	30	165000		16500
3	Fruit tree planting (Jack fruit, rambutan, mango)	25 cent	10000	4	40000		4000
4	Crop demonstration - vegetable garden in schools	25 cent	15000	1	15000		1500
5	Pachathuruthu	5 cent	50000	2	100000		10000
6	Medicinal plants in public institutions	5 cent	5500	1	5500		550
7	Earthen bunds	rm	62	1287		79794	
8	Centripetal terrracing with mulching	no.	179	3036		543444	
9	Stone pitched contour bunds	rm	144	6934		998496	
10	Strip terracing for rubber/Inward terracing for plantation	no.	191	8		1528	
11	Moisture Conservation pits	no.	122	540		65880	
12	Live fencing	rm	24.5	257		6296.5	
13	Gully plugs	no.	1500	99		148500	
14	Brushwood checkdams	rm	316	32		10112	
15	Loose boulder check dams (2 m length)	no.	3900	1		3900	
16	Sidewall protection of drains (geotextiles)	m2	191	679		129689	
17	Desiltation of drains	10m3	485.85	66		32066.1	
18	Side varambuearthening of drains	m	234	544		127296	

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
19	Side protection of drains with bamboo planting	no.	34.65	500		17325	
20	Well recharging	no.	8000	135		1080000	
21	Construction of new well	no.	50000	2		100000	
				14176	**525500**	**3344326.6**	**52550**

IrumathadamWatershed (29M21b) - Action Plan

Table 73Sector-I- Natural Resources Conservation and Management –2^{d}Year Plan

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
1	Cultivation of horticultural crops in wastelands	25 cent	10000	32	320000		32000
2	Intercropping in coconut plantations	25 cent	5500	30	165000		16500
3	Fruit tree planting (Jack fruit, rambutan, mango)	25 cent	10000	6	60000		6000
4	Crop demonstration - vegetable garden in schools	25 cent	15000	1	15000		1500
5	Pachathuruthu	5 cent	50000	3	150000		15000
6	Medicinal plants in public institutions	5 cent	5500	1	5500		550
7	Earthen bunds	rm	62	1287		79794	0
8	Centripetal terrracing with mulching	no.	179	4048		724592	
9	Stone pitched contour bunds	rm	144	6934		998496	
10	Strip terracing for rubber/Inward terracing for plantation	no.	191	17		3247	
11	Moisture Conservation pits	no.	122	1079		131638	
12	Live fencing	rm	24.5	343		8403.5	
13	Gully plugs	no.	1500	99		148500	

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
14	Brushwood checkdams	rm	316	32		10112	
15	Loose boulder check dams (2 m length)	no.	3900	1		3900	
16	Sidewall protection of drains (geotextiles)	m2	191	1359		259569	
17	Desiltation of drains	10m3	485.85	132		64132.2	
18	Side varambuearthening of drains	m	234	815		190710	
19	Well recharging	no.	8000	180		1440000	
20	Construction of new well	no.	50000	4		200000	
21	Edoni-Urithookkimala-thonikkund Water storage tank with smart channel construction	1			1800000		
23	**Total**			**16401**	**2515500**	**4263093.7**	**71550**

IrumathadamWatershed (29M21b) - Action Plan

Table 74: Sector-I- Natural Resources Conservation and Management – 3rd Year Plan

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
1	Cultivation of horticultural crops in wastelands	25 cent	10000	20	200000		20000
2	Intercropping in coconut plantations	25 cent	5500	40	220000		22000
3	Fruit tree planting (Jack fruit, rambutan, mango)	25 cent	10000	4	40000		4000
4	Pachathuruthu	5 cent	50000	2	100000		10000
5	Medicinal plants in public institutions	5 cent	5500	1	5500		550
6	Centripetal terrracing with mulching	no.	179	3036		543444	

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
7	Stone pitched contour bunds	rm	144	3467		499248	
8	Strip terracing for rubber/Inward terracing for planatation	no.	191	8		1528	
9	Moisture Conservation pits	no.	122	1079		131638	
10	Live fencing	rm	24.5	257		6296.5	
11	Sidewall protection of drains (geotextiles)	m2	191	1359		259569	
12	Desiltation of drains	10m3	485.85	132		64132.2	
13	Well recharging	no.	8000	135		1080000	
14	Construction of new well	no.	50000	4		200000	
	Total				**565500**	**2785855.7**	**56550**

IrumathadamWatershed (29M21b) - Action Plan

Table 76 Livelihood Support system for Landless/ Asset less -1st Year Plan

No.	Name of Activity	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	WDC PMKSY	Beneficiary contribution
1	Poultry unit (5 bird+ cage)	2600	40	104000	800	32000	72000
2	Cow rearing (milching)	60000	8	480000	30000	240000	240000
3	Goat rearing (female 2)	30000	4	120000	15000	60000	60000
4	Minimal fruit and vegetable Processing unit	200000	1	200000	100000	100000	100000
5	Fish farming	123000	1	123000	49200	49200	73800
6	Trichoderma Enriched cowdung production unit	30000	1	30000	20000	20000	10000

	Total			**1057000**		**501200**	**555800**

IrumathadamWatershed (29M21b)- Action Plan

Table:76 Livelihood Support system for Landless/ Asset less -2nd Year Plan

No.	Name of Activity	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	WDC PMKSY	Beneficiary contribution
1	Poultry unit (5 bird+ cage)	2600	38	98800	800	30400	68400
2	Cow rearing (milching)	60000	5	300000	30000	150000	150000
3	fish farming	123000	1	123000	49200	49200	73800
4	Goat rearing (female 2)	30000	6	180000	15000	90000	90000
5	Minimal fruit and vegetable Processing unit	200000	1	200000	100000	100000	100000
6	Trichoderma Enriched cowdung production unit	30000	1	30000	20000	20000	10000
	Total			**931800**		**439600**	**492200**

IrumathadamWatershed (29M21b)- Action Plan

Table:77 Livelihood Support system for Landless/ Asset less -3rd Year Plan

No.	Name of Activity	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	WDC PMKSY	Beneficiary contribution
1	Poultry unit(5 bird+ cage)	2600	37	96200	800	29600	66600
2	Cow rearing (milching)	60000	4	240000	30000	120000	120000
3	Goat rearing (female 2)	30000	4	120000	15000	60000	60000
	Total			**456200**		**209600**	**246600**

IrumathadamWatershed (29M21b) - Action Plan
Table 78:Production System -1st Year Plan

Sl. No	Project	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	Cost to be met from project fund	Beneficiary contribution	WDF
1	Floriculture	136000	1	136000	16000	16000	120000	3200
2	Small nursery (0.5 acre)	300000	1	300000	150000	150000	150000	30000
3	Rambutan/ Mango/Jack fruit/ Mangosteen/Passionfruit Cultivation	60000	3	180000	30000	90000	90000	18000
4	Medicinal Plants cultivation	250000	1	250000	125000	125000	125000	25000
5	Vegetable Cultivation in Growbags	2000	65	130000	1500	97500	32500	19500
6	Distribution of Coconut seedlings (DxT)/Hybrid	250	255	63750	125	31875	31875	6375
7	Promotion of nutritional garden (distributing kit containing 2 to 3 varieties)	100	120	12000	50	6000	6000	1200
	Total			**1071750**		**516375**	**555375**	**103275**

IrumathadamWatershed (29M21b) - Action Plan
Table 79Production System -2nd Year Plan

Sl. No	Project	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	Cost to be met from project fund	Beneficiary contribution	WDF
1	Rambutan/ Mango/Jack fruit/	60000	8	480000	30000	240000	240000	48000

	Mangosteen/Passionfruit Cultivation							
2	Vegetable Cultivation in Growbags	2000	36	72000	1500	54000	18000	10800
3	Distribution of Coconut seedlings (DxT)/Hybrid	250	255	63750	125	31875	31875	6375
4	Promotion of nutritional garden (distrubuting sampling kit containing 2 to 3 varieties)	100	120	12000	50	6000	6000	1200
5	**Total**			**627750**		**331875**	**295875**	**66375**

IrumathadamWatershed (29M21b)- Action Plan
Table 80Production System -3rd Year Plan

Sl. No	Project	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	Cost to be met from project fund	Beneficiary contribution	WDF
1	Floriculture	136000	1	136000	16000	16000	120000	3200
2	Small nursery (0.5 acre)	300000	1	300000	150000	150000	150000	30000
3	Rambutan/ Mango/Jack fruit/ Mangosteen/Passionfruit Cultivation	60000	1	60000	30000	30000	30000	6000
4	Vegetable Cultivation in Growbags	2000	38	76000	1500	57000	19000	11400
5	Distribution of Coconut seedlings (DxT)/Hybrid	250	255	63750	125	31875	31875	6375
6	Promotion of nutritional garden (distributing kit containing 2 to 3 varieties)	100	350	35000	50	17500	17500	3500
	Total			**670750**		**302375**	**368375**	**60475**

CHAPTER 13

MICRO WATERSHED BASED ACTION PLAN

PERUVANKUNI (29M21c)

Peruvankuni micro watershed in the PMSKY cluster has an area of136.04ha (3.28 % of total area). This micro watershed is spread over NaripattaPanchayath.TheMahe River flows through theNorthernpartof the watershed.

13.1 General Description

Table: 81 General Description of Peruvankuni **(29M21c)** micro watershed

Name of micro watershed	:	Peruvankuni
Micro watershed code	:	29M21c
River basin	:	Mahe
District	:	Kozhikode
Block Panchayath	:	Kunnummal
GramaPanchayath	:	Naripatta
Villages	:	Naripatta
Latitude	:	11^0 45' 30" N
Longitude	:	75^0 43' 30" E
Wards	:	Naripatta (4,17)
Total Area	:	136.04
% of area in the PMKSY-WDC cluster	:	3.28%

13.2 Socio economic profile

As per the information provided in the baseline survey conducted, Peruvankuni micro watershed has a total number of 168 households with a total population of 716. 106 BPL families reside in the micro watershed area. Out of the total population 6 belongs to scheduled tribe and 11 belongs to Scheduled cast. Agriculture is not the major source of livelihood in the micro watershed area. Animal husbandry is a source of livelihood some poor families in the watershed area. The socio economic details of the Peruvankunimicro watershed are given in the table.

Table 82: Socio economic details of Peruvankuni micro watershed

1.	Total number of households		168
2.	Total Population		716
		Scheduled Caste	11
		Scheduled Tribe	6
3	No. of BPL families		106
4	Land holdings/Family (in Ha)		0.81

13.3 Biophysical Resources

13.3.1 Physiography

The majority of the area falls in the relief category of 70 to 100 m above MSL and other area is located above 150m above MSL.

13.3.2 Slope

The watershed area is divided into six categories of slope classes. . The majority of area is under theModerately steep to steep area having 15-35 % slope. The category spreads over an area of 31.26 ha (22.97 %), 23.36% of the watershed area is having very steep sloping lands which requires urgent soil and water conservation measures(Fig.17).

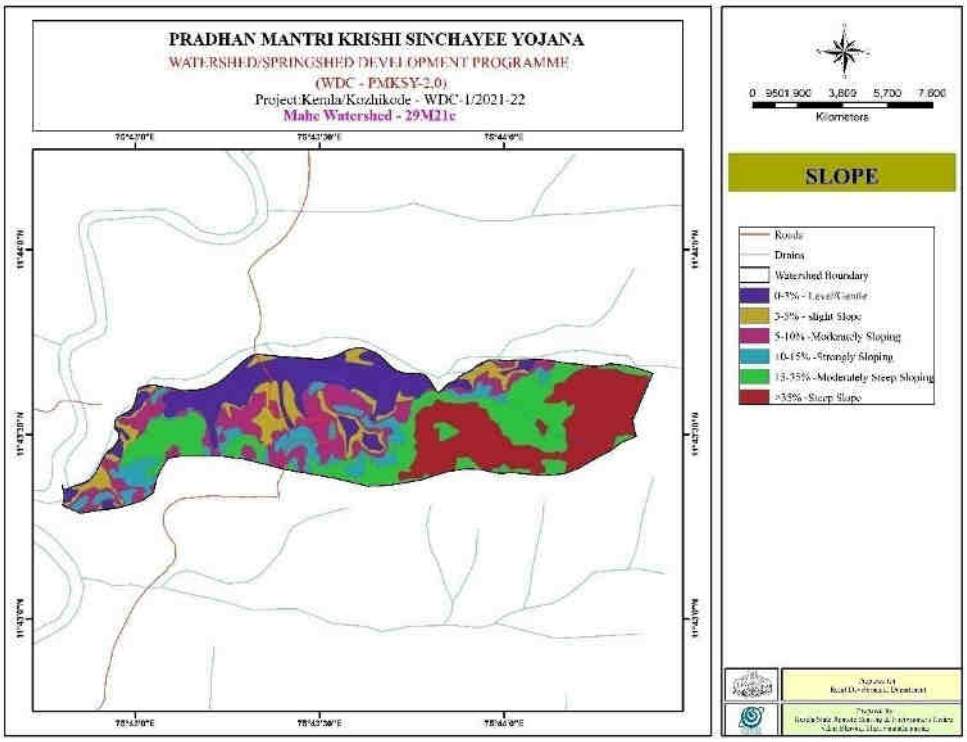


Fig.17. Slope (29M21c)

13.3.3 Drains

The Mahe River is flowing through the northern part of the watershed is the major drain of this watershed. Few small drains are originating from different a part of this watershed which drains to to the MaheRiver. The details of the drains and ponds in the watershed area are given in table No. 83

Table 83: Details of Drains inPeruvankuni micro watershed

Drains	Length (m)
MullambathMandokandyThodu	3512.96
ThaivachaparambMandokandythodu	1316.90
Other second order streams	404.41
Other first order streams	963.10

13.3.4 Land use

Agriculture is the prime activity in the watershed area. The major land use category mapped in the watershed area is Agricultural mixed crop. It occupies an area of 54.85 ha (40.32 %). The second major category is the Coconut Dominant mixed crops (37.15%) which are the typical homestead cultivation of Kerala wherein the different crop species are grown together that cannot be spatially mapped separately.

Table84:Land use categories in Peruvankuni micro watershed

Sl. No.	Land use category	Area in ha	Percentage
1	Agricultural Crop - Coconut	13.09	9.62
2	Agricultural Crop - Coconut Dominant Mixed Crops	50.54	37.15
3	Agricultural Mixed Crops - Mixed Crops	54.85	40.32
4	Agricultural Perennial Crop - Arecanut	0.57	0.41
5	Built-Up Land - Built-Up Land With Mixed Crops	0.35	0.25
6	Built-Up Land - Residential	1.11	0.81
7	Paddy Converted - Coconut+Arecanut	15.25	11.21
8	Waste Land - Sands/Riverine/Coastal	0.05	0.03
9	Waterbody - River/Stream	0.24	0.17
	Total	**136.04**	**100**

13.3.5 Geology

The watershed falls the geological unit of Archean Crystalline rock. There are four geomorphological units of which more than 98.57 % (134.13ha) of the area falls under the category Charnockite Group of rocks .An area of 1.56ha is mapped under the category Migmatite Complex.

13.3.6 Soils

The soil has a surface texture offine. This is distributed in an area of 77.44 ha (56.92 %). More than 70% of the Soils in watershed area is under very deep with a depth of more than 150cm. The major surface soil textures in the watershed area constitutes Fine loamy (58.25ha) and fine soil (77.44 ha) Nearly 58 % of the watershed area is prone to severe soil erosion which calls for proper soil and water conservation measures in the area.

13.4 Watershed Committee

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

13.5 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.

13.6 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.

13.7 Activities proposed

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

Table:85 Details of activities proposed

Entry Point Activities	
1	Tapioca cultivation
2	Pineapple cultivation
3	Mashroom cultivation
4	Banana cultivation
9	Apiculture
Natural Resoruce Conservation Activities	
1	Cultivation of horticulture crops in wastelands
2	Intercropping in coconut plantation
3	Fruit tree planting
4	Crop demonstration- vegetable garden in schools
5	Medicinal plants in public institution
6	Peruvankuzhy thodu weir construction of checkdams and side wall protection

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

Table 86: Budget for Peruvankuni micro watershed

No.	Budget component	% age	Amount in lakhs
1.	Administrative cost	10	3.78
2.	Monitoring &Evaluation	2	0.76
Preparatory Phase			
3.	Entry point activities	2	0.76
4	Detailed Project Report Institution and capacity building	1	0.38
5	Institution and capacity building	3	1.13
Watershed works phase			
6.	Natural Resource Management	47	17.77
7	Production System	15	5.67
8	Natural Resource Management & Governance	2	0.76
9	Livelihood activities for asset less persons micro enterprises& Business development	15	5.67
	Consolidation phase	3	1.13
		100	**37.81**

PeruvankuniWatershed (29M21c) - Action Plan

Table 87: Sector-I- Natural Resources Conservation and Management - Ist Year Plan

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
1	Cultivation of horticultural crops in wastelands	25 cent	10000	3	30000		3000
2	Intercropping in coconut plantations	25 cent	5500	6	33000		3300
3	Fruit tree planting (Jack fruit, rambutan, mango)	25 cent	10000	2	20000		2000
4	Crop demonstration - vegetable garden in schools	25 cent	15000	1	15000		1500
5	Medicinal plants in public institutions	5 cent	5500	1	5500		550
6	Earthen bunds	rm	62	1879		116498	
7	Centripetal terrracing with mulching	no.	179	2864		512656	
8	Stone pitched contour bunds	rm	144	2621		377424	
9	Moisture Conservation pits	no.	122	509		62098	
10	Live fencing	rm	24.5	376		9212	
11	Gully plugs	no.	1500	38		57000	
12	Brushwood checkdams	rm	316	4		1264	
13	Loose boulder check dams (2 m length)	no.	3900	12		46800	
14	Sidewall protection of drains (geotextiles)	m2	191	552		105432	
15	Desiltation of drains	10m3	485.85	63		30608.55	
16	Side varambuearthening of drains	m	234	442		103428	
17	Side protection of drains with bamboo planting	no.	34.65	400		13860	
18	Construction of farm ponds (10m x 10 m x 3 m) with	no.	150000	1		150000	

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
	geotextiles						
19	Well recharging	no.	8000	75		600000	
20	Construction of new well	no.	50000	1		50000	
21	Paruvankuzhithodu weir- construction of checkdam and side wall protection	1			1500000	0	
	Total				**1603500**	**2236280.55**	**10350**

PeruvankuniWatershed (29M21c) - Action Plan

Table 88: Sector-I- Natural Resources Conservation and Management –2nd Year Plan

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
1	Cultivation of horticultural crops in wastelands	25 cent	10000	3	30000		3000
2	Intercropping in coconut plantations	25 cent	5500	8	44000		4400
3	Fruit tree planting (Jack fruit, rambutan, mango)	25 cent	10000	2	20000		2000
4	Crop demonstration - vegetable garden in schools	25 cent	15000	1	15000		1500
5	Medicinal plants in public institutions	5 cent	5500	2	11000		1100
6	Earthen bunds	rm	62	1879		116498	0
7	Centripetal terrracing with mulching	no.	179	3818		683422	
8	Stone pitched contour bunds	rm	144	2621		377424	
9	Moisture Conservation pits	no.	122	1018		124196	
10	Live fencing	rm	24.5	501		12274.5	

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
11	Gully plugs	no.	1500	38		57000	
12	Brushwood checkdams	rm	316	4		1264	
13	Loose boulder check dams (2 m length)	no.	3900	12		46800	
14	Sidewall protection of drains (geotextiles)	m2	191	1104		210864	
15	Desiltation of drains	10m3	485.85	125		60731.25	
16	Side varambuearthening of drains	m	234	662		154908	
17	Construction of farm ponds (10m x 10 m x 3 m) with geotextiles	no.	130000	2		260000	
18	Well recharging	no.	8000	100		800000	
19	Construction of new well	no.	50000	2		100000	
20	**Total**				**120000**	**3005381.75**	**12000**

PeruvankuniWatershed (29M21c) - Action Plan

Table 89: Sector-I- Natural Resources Conservation and Management –3rd Year Plan

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
1	Cultivation of horticultural crops in wastelands	25 cent	10000	2	20000		2000
2	Intercropping in coconut plantations	25 cent	5500	6	33000		3300
3	Centripetal terrracing with mulching	no.	179	2864		512656	
4	Stone pitched contour bunds	rm	144	1310		188640	
5	Moisture Conservation pits	no.	122	1018		124196	

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
6	Live fencing	rm	24.5	376		9212	
7	Sidewall protection of drains (geotextiles)	m2	191	1104		210864	
8	Desiltation of drains	10m3	485.85	125		60731.25	
9	Well recharging	no.	8000	75		600000	
10	Construction of new well	no.	50000	2		100000	
	Total				**53000**	**1806299.25**	**5300**

PeruvankuniWatershed (29M21c) - Action Plan

Table: 90 Livelihood Support system for Landless/ Asset less -1st Year Plan

No.	Name of Activity	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	WDC PMKSY	Beneficiary contribution
1	Poultry unit (5 bird+ cage)	2600	40	104000	800	32000	72000
2	Mushroom cultivation (80-100 bed)	28125	3	84375	11250	33750	50625
3	Goat rearing (female 2)	30000	6	180000	15000	90000	90000
4	Minimal fruit and vegetable Processing unit	200000	1	200000	100000	100000	100000
5	Trichoderma Enriched cowdung production unit	30000	1	30000	20000	20000	10000
	Total			**598375**		**275750**	**322625**

PeruvankuniWatershed (29M21c) - Action Plan

Table:91 Livelihood Support system for Landless/ Asset less -2nd Year Plan

No.	Name of Activity	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	WDC PMKSY	Beneficiary contribution
1	Poultry unit (5 bird+ cage)	2600	40	104000	800	32000	72000
2	Mushroom cultivation (80-100 bed)	28125	3	84375	11250	33750	50625
3	Goat rearing (female 2)	30000	6	180000	15000	90000	90000
4	Trichoderma Enriched cowdung production unit	30000	1	30000	20000	20000	10000
	Total			**398375**		**175750**	**222625**

PeruvankuniWatershed (29M21c) - Action Plan

Table: 92 Livelihood Support system for Landless/ Asset less -3rd Year Plan

No.	**Name of Activity**	**Unit cost/Nos**	**Area/ Nos**	**Total cost**	**Rate of assistance as per existing norms/unit**	**WDC PMKSY**	**Beneficiary contribution**
1	Poultry unit (5 bird+ cage)	2600	23	59800	800	18400	41400
2	Mushroom cultivation (80-100 bed)	28125	2	56250	11250	22500	33750
3	Goat rearing (female 2)	30000	5	150000	15000	75000	75000
	Total			**266050**		**115900**	**150150**

PeruvankuniWatershed (29M21c) - Action Plan
Table: 93Production System -1st Year Plan

Sl. No	Project	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	Cost to be met from project fund	Beneficiary contribution	WDF
1	Vegetable Cultivation in Growbags (unit of 25 bags)	2000	91	182000	1500	136500	45500	27300
	Total					**136500**	**45500**	**27300**

PeruvankuniWatershed (29M21c) - Action Plan
Table: 94Production System -2nd Year Plan

Sl. No	Project	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	Cost to be met from project fund	Beneficiary contribution	WDF
1	Banana cultivation	216000	5	1080000	26250	131250	948750	26250
2	Small nursery (0.5 acre)	300000	1	300000	150000	150000	150000	30000
	Total			**1380000**		**281250**	**1098750**	**56250**

PeruvankuniWatershed (29M21c) - Action Plan
Table: 95Production System -3rd Year Plan

Sl. No	Project	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	Cost to be met from project fund	Beneficiary contribution	WDF
1	Rambutan/ Mango/Jack fruit/ Mangosteen/Passionfruit Cultivation	60000	5	300000	30000	150000	150000	30000
	Total					**150000**	**150000**	**30000**

CHAPTER 14

MICRO WATERSHED BASED ACTION PLAN

MULLAMBATH (29M22a)

Mullambath micro watershed in the PMSKY clusters with an area of 350.97ha (8.47 % of total area). This micro watershed is spread over NaripattaPanchayath.TheMaheRiver flows through the central part of the watershed.

14.1 General Description

Table: 96 General Description of Mullambath (29M22a) micro watershed

Name of micro watershed	:	Mullambath
Micro watershed code	:	29M22a
River basin	:	Mahe
District	:	Kozhikode
Block Panchayath	:	Kunnummal
GramaPanchayath	:	Naripatta
Villages	:	Naripatta
Latitude	:	11.718
Longitude	:	75.7254
Wards	:	Naripatta panchayath –(4,5,6,7,17) Part
Total Area	:	350.97
% of area in the PMKSY-WDC cluster	:	8.47

14.2 Socio economic profile

As per the information provided in the baseline survey conducted, Nambikolli micro watershed has a total number of 432 households with a total population of 1846. 272 BPL families reside in the micro watershed area. Out of the total population 16 belongs to scheduled tribe and 29 belongs to Scheduled cast. Agriculture is not the major source of livelihood in the micro watershed area. Animal husbandry is a source of livelihood some poor families in the watershed area. The socio economic details of the Mullambath micro watershed are given in the table.

Table 97: Socio economic details of Mullambath micro watershed

1.	Total number of households		432
2.	Total Population		1846
	Population	Scheduled Caste	29
		Scheduled Tribe	16
6.	Land holdings/Family (in Ha)		0.81

14.3 Biophysical Resources

14.3.1 Physiography

The relief of the watershed ranges from above MSL to above MSL. The majority of the area falls in the relief category of 60m to100 m above MSL. Remaiing area falls in <20m.

14.3.2 Slope

The watershed area is divided into six categories of slope classes. The majority of area is under theModerately steep to steep area having 15-35 % slope. The category spreads over an area of 119.17 ha (33.95 %), 8.76 % of the watershed area is having very steep sloping lands which requires urgent soil and water conservation measures (Fig.18).

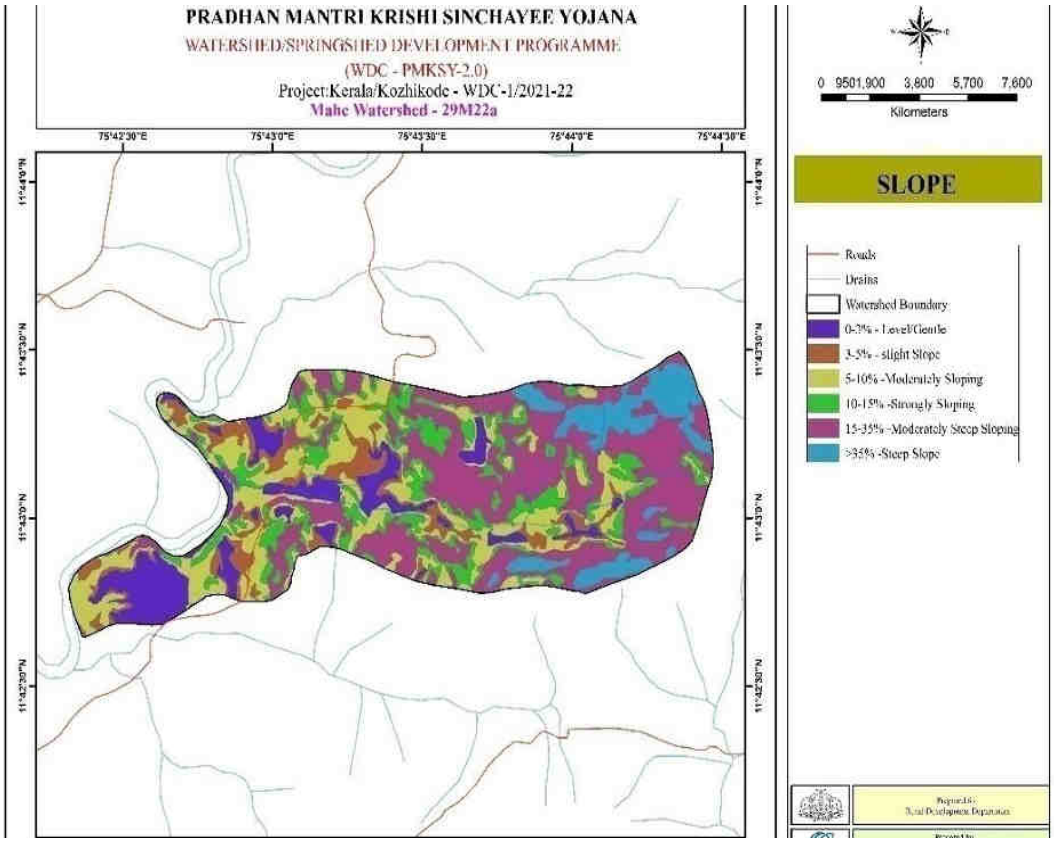


Fig.18. Slope (29M22a)

14.3.3 Drains

The Mahe River flowing through the central portion of the watershed is the major drain of this watershed. Few small drains are originating from different parts of this watershed which drains to the Mahe River. The details of the drains and ponds in the watershed area are given in table 98.

Table 98. Details of Drains in Mullambathmicro watershed

Drains	Length (m)
MonthommalThodu	2925.15
Vanimelpuzha	2714.29
Other first order streams	5618.59

14.3.4 Land use

Agriculture is the prime activity in the watershed area. The major land use category mapped in the watershed area is Coconut dominant mixed crops. It occurs an area of 145.22 ha (41.38 %). The second major category is the Coconut which an area of 96.66 ha.

Table: 99land use categories in Mullambath micro watershed

Sl. No.	Land use category	Area in ha	Percentage
1	Agricultural Crop - Coconut	96.66	27.54
2	Agricultural Crop - Coconut Dominant Mixed Crops	145.22	41.38
3	Agricultural Mixed Crops - Mixed Crops	71.20	20.29
4	Agricultural Perennial Crop - Arecanut	21.80	6.21
5	Agricultural Plantation Crop - Rubber	3.86	1.1
6	Built-Up Land - Educational Institution	0.27	0.08
7	Built-Up Land - Religious Institution	0.31	0.09
8	Built-Up Land - Residential	3.48	1
9	Built-Up Land - Road	0.04	0.01
10	Paddy Converted - Built-Up Land	0.02	0
11	Paddy Converted - Coconut	3.40	0.97
12	Waste Land - Land Without Scrub	0.51	0.14
13	Waste Land - Sands/Riverine/Coastal	0.95	0.27

14	Waterbody - River/Stream	3.25	0.92
	Total	350.97	100

14.3.5 Geology

The watershed falls the geological unit of Archean Crystalline rock. There are four geomorphological units of which more than 73 % (258.04ha) of the area falls under the category Migmatite Complex.An area of 87.81 ha is mapped under the category Charnockite Group of rocks.

14.3.6 Soils

The soil has a surface texture of fine loamy. This is distributed in an areaof182.41 ha (51.97 %). Soils in more than 74% of the watershed area (261.69 ha) is very deep with a depth of more than 150 cm. The major surface soil textures in the watershed area constitutes that of Fine loamy (182.41 ha) and Fine (163.44 ha). Nearly 50 % of the watershed area is prone to severe soil erosion.

14.4 Watershed Committee

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

14.5 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.

14.6 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.

14.7 Activities proposed

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

Table:100 Details of Activities proposed

Entry Point Activities	
1	Tapioca cultivation
2	Pineapple cultivation
3	Mashroom cultivation
4	Banana cultivation
9	Apiculture
Natural Resoruce Conservation Activities	
1	Cultivation of horticulture crops in wastelands
2	Intercropping in coconut plantation
3	Fruit tree planting
4	Crop demonstration- vegetable garden in schools
5	Medicinal plants in public institution
6	Construction of checkdam and side wall at Atthavullakolli Kunji thodu
7	Checkdam renovation near Charmel lift Irrigation
8	Thavullakolli- Pond renovation
9	Thavullakolli- Ponnambalam Laksham veedu Colony Public Well renovation
10	Podikulam –Public well Irrigation

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

Table 101: Budget for Mullambathmicro watershed

No.	Budget component	% age	Amount in lakhs
1.	Administrative cost	10	9.60
2.	Monitoring &Evaluation	2	1.92
Preparatory Phase			
3.	Entry point activities	2	1.92
4	Detailed Project Report Institution and capacity building	1	0.96
5	Institution and capacity building	3	2.88
Watershed works phase			
6.	Natural Resource Management	47	45.14
7	Production System	15	14.41
8	Natural Resource Management & Governance	2	1.92
9	Livelihood activities for asset less persons micro enterprises& Business development	15	14.41
10	Consolidation phase	3	2.88
		100	**96.04**

MullambathWatershed (22M22a) - Action Plan

Table 102: Sector-I- Natural Resources Conservation and Management - Ist Year Plan

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
1	Cultivation of horticultural crops in wastelands	25 cent	10000	1	10000		1000
2	Intercropping in coconut plantations	25 cent	5500	15	82500		8250
3	Fruit tree planting (Jack fruit, rambutan, mango)	25 cent	10000	5	50000		5000
4	Crop demonstration - vegetable garden in schools	25 cent	15000	1	15000		1500
5	Earthen bunds	rm	62	8096		501952	
6	Centripetal terrracing with mulching	no.	179	10885		1948415	
7	Stone pitched contour bunds	rm	144	9630		1386720	
8	Moisture Conservation pits	no.	122	1935		236070	
9	Live fencing	rm	24.5	1619		39665.5	
10	Gully plugs	no.	1500	94		141000	
11	Brushwood checkdams	rm	316	29		9164	
12	Sidewall protection of drains (geotextiles)	m2	191	586		111926	
13	Desiltation of drains	10m3	485.85	77		37410.45	
14	Side varambuearthening of drains	m	234	468		109512	
15	Side protection of drains with bamboo planting	no.	34.65	1200		41580	
16	Construction of farm ponds (10m x 10 m x 3 m) with geotextiles	no.	130000	4		520000	

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
17	Well recharging	no.	8000	150		1200000	
18	Construction of new well	no.	50000	4		200000	
19	construction of checkdam and side wall atthavullakolli-kunjithode	1			1300000	0	
	Total				**1457500**	**6483414.95**	**15750**

MullambathWatershed (22M22a) - Action Plan

Table: 103 Sector-I- Natural Resources Conservation and Management –2nd Year Plan

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
1	Cultivation of horticultural crops in wastelands	25 cent	10000	1	10000		1000
2	Intercropping in coconut plantations	25 cent	5500	20	110000		11000
3	Fruit tree planting (Jack fruit, rambutan, mango)	25 cent	10000	5	50000		5000
4	Crop demonstration - vegetable garden in schools	25 cent	15000	1	15000		1500
5	Pachathuruthu	5 cent	50000	1	50000		5000
6	Earthen bunds	rm	62	8096		501952	0
7	Centripetal terrracing with mulching	no.	179	14513		2597827	
8	Stone pitched contour bunds	rm	144	9630		1386720	
9	Moisture Conservation pits	no.	122	3870		472140	
10	Live fencing	rm	24.5	2159		52895.5	

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
11	Gully plugs	no.	1500	94		141000	
12	Brushwood checkdams	rm	316	29		9164	
13	Sidewall protection of drains (geotextiles)	m2	191	1171		223661	
14	Desiltation of drains	10m3	485.85	155		75306.75	
15	Side varambuearthening of drains	m	234	703		164502	
16	Construction of farm ponds (10m x 10 m x 3 m) with geotextiles	no.	130000	7		910000	
17	Well recharging	no.	8000	200		1600000	
18	Construction of new well	no.	50000	6		300000	
21	Checkdam renovation near charmel lift irrigation	1			1000000	0	
22	Thavullakoli - pond Renovation	1			1100000	0	
	Total				**2335000**	**8435168.25**	**23500**

MullambathWatershed (22M22a)- Action Plan

Table :104 Sector-I- Natural Resources Conservation and Management –3rd Year Plan

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
1	Intercropping in coconut plantations	25 cent	5500	10	55000		5500
2	Fruit tree planting (Jack fruit, rambutan, mango)	25 cent	10000	5	50000		5000
3	Crop demonstration - vegetable garden in schools	25 cent	15000	1	15000		1500

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
4	Centripetal terrracing with mulching	no.	179	10885		1948415	
5	Stone pitched contour bunds	rm	144	4815		693360	
6	Moisture Conservation pits	no.	122	3870		472140	
7	Live fencing	rm	24.5	1619		39665.5	
8	Sidewall protection of drains (geotextiles)	m2	191	1171		223661	
9	Desiltation of drains	10m3	485.85	155		75306.75	
10	Well recharging	no.	8000	150		1200000	
11	Construction of new well	no.	50000	4		200000	
12	Thavullakolli-Ponnambalam-Lakshamveed colony Public well Reonovation	1			300000	0	
13	Podikkulam - public well renovation	1			300000	0	
	Total				**720000**	**4852548.25**	**12000**

MullambathWatershed (29M22a) - Action Plan

Table: 105 Livelihood Support system for Landless/ Asset less -1st Year Plan

No.	Name of Activity	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	WDC PMKSY	Beneficiary contribution
1	Poultry unit (5 bird+ cage)	2600	40	104000	800	32000	72000
2	Cow rearing (milching)	60000	8	480000	30000	240000	240000
3	Goat rearing (female 2)	30000	5	150000	15000	75000	75000
4	Minimal fruit and vegetable Processing unit	200000	1	200000	100000	100000	100000
5	Fish farming	123000	1	123000	49200	49200	73800
6	Trichoderma Enriched cowdung production unit	30000	1	30000	20000	20000	10000
	Total			**1087000**		**516200**	**570800**

MullambathWatershed (29M22a) - Action Plan

Table: 106 Livelihood Support system for Landless/ Asset less -2nd Year Plan

No.	Name of Activity	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	WDC PMKSY	Beneficiary contribution
1	Poultry unit (5 bird+ cage)	2600	40	104000	800	32000	72000
2	Cow rearing (milching)	60000	9	540000	30000	270000	270000
3	Fish farming	123000	1	123000	49200	49200	73800
4	Goat rearing (female 2)	30000	7	210000	15000	105000	105000

5	Minimal fruit and vegetable Processing unit	200000	1	200000	100000	100000	100000
6	Trichoderma Enriched cowdung production unit	30000	1	30000	20000	20000	10000
	Total			**1207000**		**576200**	**630800**

MullambathWatershed (29M22a) - Action Plan

Table: 107Livelihood Support system for Landless/ Asset less – 3rd Year Plan

No.	Name of Activity	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	WDC PMKSY	Beneficiary contribution
1	Poultry unit (5 bird+ cage)	2600	49	127400	800	39200	88200
2	Fish farming	123000	2	246000	49200	98400	147600
3	Cow rearing (milching)	60000	5	300000	30000	150000	150000
4	Goat rearing (female 2)	30000	4	120000	15000	60000	60000
				793400		**347600**	445800

MullambathWatershed (29M22a) - Action Plan

Table: 108 Production System -1st Year Plan

Sl. No	Project	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	Cost to be met from project fund	Beneficiary contribution	WDF
1	Integrated Farming System (5-30 cents)	80000	7	560000	30000	210000	350000	42000
2	Rambutan/ Mango/Jack fruit/	60000	3	180000	30000	90000	90000	18000

	Mangosteen/Passionfruit Cultivation							
3	Medicinal Plants cultivation	250000	1	250000	125000	125000	125000	25000
4	Vegetable Cultivation in Growbags	2000	100	200000	1500	150000	50000	30000
5	Distribution of Coconut seedlings (DxT)/Hybrid	250	300	75000	125	37500	37500	7500
6	Promotion of nutritional garden (distrubuting kit containing 2 to 3 varieties)	100	300	30000	50	15000	15000	3000
	Total			**1295000**		**627500**	**667500**	**125500**

MullambathWatershed (29M22a) - Action Plan
Table: 109 Production System -2nd Year Plan

Sl. No	Project	Unit cost/ Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	Cost to be met from project fund	Beneficiary contribution	WDF
1	Floriculture	136000	1	136000	16000	16000	120000	3200
2	Small nursery (0.5 acre)	300000	1	300000	150000	150000	150000	30000
3	Rambutan/ Mango/Jack fruit/ Mangosteen/Passionfruit Cultivation	60000	3	180000	30000	90000	90000	18000
4	Vegetable Cultivation in Growbags	2000	100	200000	1500	150000	50000	30000
5	Distribution of Coconut seedlings (DxT)/Hybrid	250	250	62500	125	31250	31250	6250

6	Promotion of nutritional garden (distributing sampling kit containing 2 to 3 varieties)	100	100	10000	50	5000	5000	1000
	Total			**888500**		**442250**	**446250**	**88450**

MullambathWatershed (29M22a) - Action Plan
Table: 110 Production System -3rd Year Plan

Sl. No	Project	Unit cost/ Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	Cost to be met from project fund	Beneficiary contribution	WDF
1	Integrated Farming System (31-40 cents)	100000	4	400000	40000	160000	240000	32000
2	Rambutan/ Mango/Jack fruit/ Mangosteen/ Passionfruit Cultivation	60000	3	180000	30000	90000	90000	18000
3	Vegetable Cultivation in Growbags	2000	60	120000	1500	90000	30000	18000
4	Distribution of Coconut seedlings (DxT)/Hybrid	350	150	52500	125	18750	33750	3750
5	Promotion of nutritional garden (distributing sampling kit containing 2 to 3 varieties)	100	250	25000	50	12500	12500	2500
	Total			**777500**		**371250**	**406250**	**74250**

CHAPTER 15

MICRO WATERSHED BASED ACTION PLAN

CHEEKKONNU WEST (29M23a)

Cheekkonnu west micro watershed in the PMSKY cluster has an area of 406.68 ha (9.81 % of total area). This micro watershed is spread over NaripattaPanchayath.TheMahe River flows through the central part of the watershed.

15.1 General Description

Table: 111General Description of Cheekkonnu West (29M23a) micro watershed

Name of micro watershed	:	Cheekkonnu West
Micro watershed code	:	29M23a
River basin	:	Mahe
District	:	Kozhikode
Block Panchayath	:	Kunnummal
GramaPanchayath	:	Naripatta
Villages	:	Naripatta
Latitude	:	11.7065
Longitude	:	75.7212
Wards	:	Naripatta(6,7,8,9,10,11,17) Part
Total Area	:	406.68
% of area in the PMKSY-WDC cluster	:	9.81%

15.2 Socio economic profile

As per the information provided in the baseline survey conducted, Cheekkonnuwest micro watershed has a total number of 544 households with a total population of 2333. 343 BPL families reside in the micro watershed area. Out of the total population 17 belongs to scheduled tribe and 41 belongs to Scheduled cast. Agriculture is not the major source of livelihood in the micro watershed area. Animal husbandry is a source of livelihood some poor families in the watershed area. The socio economic details of the Cheekkonnu west micro watershed are given in the table.

Table 112: Socio economic details of Cheekkonnu West micro watershed

1.	Total number of households		544
2.	Total Population		2333
		Scheduled Caste	41
		Scheduled Tribe	17
3	No. of BPL families		343
4	Land holdings/Family (in Ha)		0.75

15.3 Biophysical Resources

15.3.1 Physiography

The majority of the area falls in the relief category of 70 to 100 m above MSL which occurs in an area of 48.94 %.Other area is located above 150m above MSL.

15.3.2 Slope

The watershed area is divided into six categories of slope classes. . The majority of area is under theModerately steep to steep area having 15-35 % slope. The category spreads over an area of 102.07ha (25.09 %), 11.39 % of the watershed area is having very steep sloping lands which requires urgent soil and water conservation measures (Fig.19).

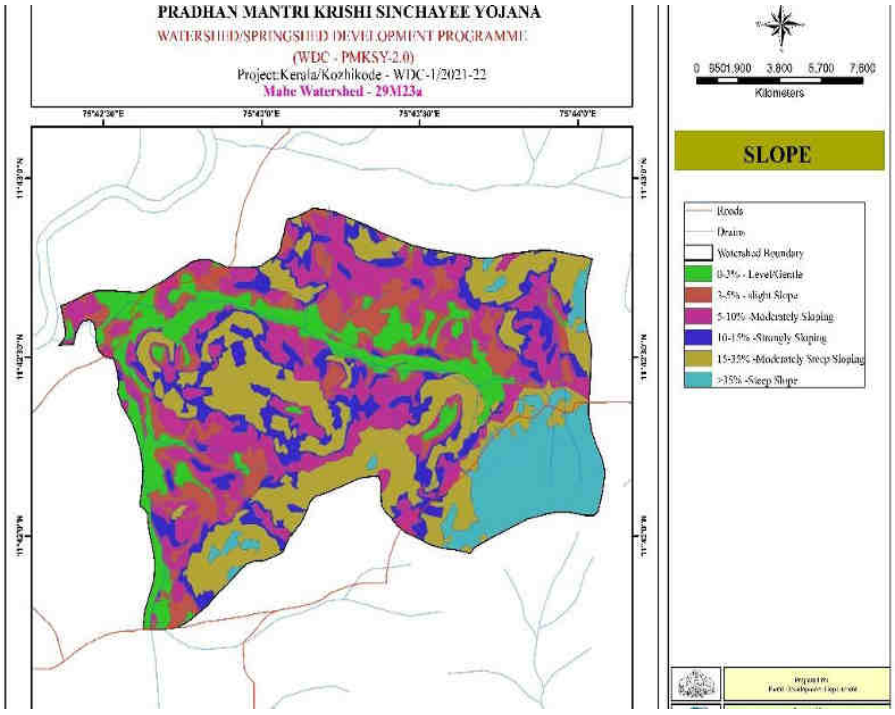


Fig. 19Slope (29M23a)

15.3.3 Drains

The Mahe River flowing through the central part of the watershed is the major drain of this watershed. Few small drains are originating from different parts of this watershed which drain to to the maheRiver. The details of the drains and ponds in the watershed area are given in table 113

Table 113: Details of Drains inCheekkonnuWest micro watershed

Drains	Length(m)
Aanikottvayalnambyathamkundneerchal	2036.81
Asharikandithazhanambyathamkundthodu	2732.99
Other first order streams	2304.58
Total	**7074.38**

15.3.4 Land use

Agriculture is the prime activity in the watershed area. The major land use category mapped in the watershed area is Agricultural mixed crop. It occurs an area of 191.66 ha (47.33 %). The second major category is the Coconut Dominant mixed crops (29.27%) which are the typical homestead cultivation of Kerala wherein the different crop species are grown together that cannot be spatially mapped separately.

Table. 114 land use categories in Cheekkonnu West micro watershed

Sl. No.	Land use category	Area in ha	Percentage
1	Agricultural Crop - Coconut	46.85	11.52
2	Agricultural Crop - Coconut Dominant Mixed Crops	119.02	29.27
3	Agricultural Mixed Crops - Mixed Crops	191.66	47.13
4	Agricultural Perennial Crop - Arecanut	7.90	1.94
5	Agricultural Plantation Crop - Rubber	3.99	0.98
6	Built-Up Land - Built-Up Land With Mixed Crops	0.36	0.09
7	Built-Up Land - Bus Stand	0.10	0.02
8	Built-Up Land - Educational Institution	0.19	0.05
9	Built-Up Land - Health Institution	0.14	0.03
10	Built-Up Land - Public/Semi Public	0.14	0.03

	Institutions		
11	Built-Up Land - Religious Institution	0.08	0.02
12	Built-Up Land - Residential	7.25	1.8
13	Built-Up Land - Road	4.28	1.05
14	Built-Up Land _ Commercial	0.62	0.15
15	Paddy Converted - Built-Up Land	0.10	0.02
16	Paddy Converted - Coconut	16.58	4.08
17	Paddy Converted - Seasonal Crop	0.22	0.05
18	Paddy Converted to Mixed Crops	5.47	1.34
19	Waste Land - Land Without Scrub	1.11	0.27
20	Water Body - Lake/Pond	0.08	0.02
21	Waterbody - River/Stream	0.54	0.13
	Total	**406.68**	**100**

15.3.5 Geology

The watershed falls the geological unit of Archean Crystalline rock. There are four geomorphological units of which more than 59.47 % (241.88ha) of the area falls under the category Charnockite Group of rocks .An area of 163.98ha is mapped under the category Migmatite Complex.

15.3.6 Soils

The soil has a surface texture of fine loamy. This is distributed in an area of 252.31 ha (62.04 %). More than 65% of the Soils in watershed area is under very deep with a depth of more than 150cm. The major surface soil textures in the watershed area constitutes Fine loamy (252.31ha) and fine soil (140.82 ha) Nearly 46 % of the watershed area is prone to moderate soil erosion which calls for proper soil and water conservation measures in the area.

15.4 Watershed Committee

Watershed Committee is constituted by Gram Sabha to implement the watershed project with technical support of WDT in the village. Watershed committees are formed at village keeping all parameter of watershed committee keeping the gender sensitive issues intact. Watershed committee member are briefed about the project objectives and a

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

15.5 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.

15.6 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.

15.7 Activities proposed

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

Table 115 Details of activities proposed

Entry Point Activities	
1	Banana cultivation
2	Pineapple cultivation
3	Mashroom cultivation
4	Tapioca cultivation
Natural Resoruce Conservation Activities	
1	Cultivation of horticulture crops in wastelands
2	Intercropping in coconut plantation
3	Fruit tree planting
4	Crop demonstration- vegetable garden in schools
5	Medicinal plants in public institution

6	Pond renovation at Challiyil Thodu
7	Side Protection wall Poyilthazhe Thodu
8	Kaiveli thodu- Cheruvarathu Moyileth side wall and Check dam renovation
9	Kattalithazhathu- Construction of Check dam and side wall
10	Well renovation vengoraKumli drinking water Project
11	Areekara methal well renovation
12	Check dam and side wall construction –Mundammal thodu

The distribution of budget for Cheekkonnu West micro watershed for the various components as per PMKSY guidelines is given below:

Table 116: Budget for Cheekkonnu West micro watershed

No.	Budget component	% age	Amount in lakhs
1.	Administrative cost	10	11.00
2.	Monitoring &Evaluation	2	2.20
Preparatory Phase			
3.	Entry point activities	2	2.20
4	Detailed Project Report Institution and capacity building	1	1.10
5	Institution and capacity building	3	3.30
Watershed works phase			
6.	Natural Resource Management	47	51.72
7	Production System	15	16.51
8	Natural Resource Management & Governance	2	2.20
9	Livelihood activities for asset less persons micro enterprises& Business development	15	16.51
10	Consolidation phase	3	3.30
		100	**110.04**

Cheekkonnu West Watershed (29M23a) - Action Plan

Table 117: Sector-I- Natural Resources Conservation and Management - Ist Year Plan

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
1	Avenue planting	no.	160	200		32000	
2	Cultivation of horticultural crops in wastelands	25 cent	10000	3	30000		3000
3	Intercropping in coconut plantations	25 cent	5500	5	27500		2750
4	Fruit tree planting (Jack fruit, rambutan, mango)	25 cent	10000	4	40000		4000
5	Pachathuruthu	5 cent	50000	2	100000		10000
6	Earthen bunds	rm	62	8556		530472	
7	Centripetal terrracing with mulching	no.	179	7464		1336056	
8	Stone pitched contour bunds	rm	144	7032		1012608	
9	Moisture Conservation pits	no.	122	1327		161894	
10	Live fencing	rm	24.5	1711		41919.5	
11	Gully plugs	no.	1500	39		58500	
12	Brushwood checkdams	rm	316	39		12324	
13	Loose boulder check dams (3 m length)	no.	5800	3		17400	
14	Sidewall protection of drains (geotextiles)	m2	191	889		169799	
15	Desiltation of drains	10m3	485.85	61		29636.85	
16	Side varambuearthening of drains	m	234	711		166374	
17	Side protection of drains with bamboo planting	no.	34.65	800		27720	

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
18	Construction of farm ponds (10m x 10 m x 3 m) with geotextiles	no.	130000	5		650000	
19	Well recharging	no.	8000	180		1440000	
20	Construction of new well	no.	50000	4		200000	
21	Pond Renovation – Challiyilthodu	1			700000		
22	Side protection wall – Poyilthazhethodud	1			900000		
23	KaiveliThodu - cheruvarathuMoyiloth side wall and check dam Renovation	1			600000		
	Total				**2397500**	**5886703.35**	**19750**

Cheekkonnu West Watershed (29M23a) - Action Plan

Table 118: -Sector-I- Natural Resources Conservation and Management –2nd Year Plan

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
1	Avenue planting	no.	160	200		32000	
2	Cultivation of horticultural crops in wastelands	25 cent	10000	4	40000		4000
3	Intercropping in coconut plantations	25 cent	5500	5	27500		2750
4	Fruit tree planting (Jack fruit, rambutan, mango)	25 cent	10000	4	40000		4000
5	Pachathuruthu	5 cent	50000	2	100000		10000
6	Earthen bunds	rm	62	8556		530472	

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
7	Centripetal terrracing with mulching	no.	179	9952		1781408	
8	Stone pitched contour bunds	rm	144	7032		1012608	
9	Moisture Conservation pits	no.	122	2654		323788	
10	Live fencing	rm	24.5	2282		55909	
11	Gully plugs	no.	1500	39		58500	
12	Brushwood checkdams	rm	316	39		12324	
13	Loose boulder check dams (3 m length)	no.	5800	2		11600	
14	Sidewall protection of drains (geotextiles)	m2	191	1778		339598	
15	Desiltation of drains	10m3	485.85	122		59273.7	
16	Side varambuearthening of drains	m	234	1067		249678	
17	Construction of farm ponds with geotextiles	no.	130000	8		1040000	
18	Well recharging	no.	8000	240		1920000	
19	Construction of new well	no.	50000	6		300000	
20	Kattalithazhath - Construction of checkdam and side wall	1			1300000		
21	WellRenovatioVengorakumulli drinking water project	1			300000		
23	AreekaraMeethal well renovation	1			200000		
24	Check dam and Side wall Construction Monthammalthodu	1			700000		
	Total				**2707500**	**7727158.7**	**20750**

Cheekkonnu West Watershed (29M23a) - Action Plan

Table 119Sector-I- Natural Resources Conservation and Management –3rd Year Plan

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
1	Avenue planting	no.	160	100		16000	
2	Intercropping in coconut plantations	25 cent	5500	5	27500		2750
3	Fruit tree planting (Jack fruit, rambutan, mango)	25 cent	10000	4	40000		4000
4	Centripetal terrracing with mulching	no.	179	7464		1336056	
5	Stone pitched contour bunds	rm	144	3516		506304	
6	Moisture Conservation pits	no.	122	2654		323788	
7	Live fencing	rm	24.5	1711		41919.5	
8	Sidewall protection of drains (geotextiles)	m2	191	1778		339598	
9	Desiltation of drains	10m3	485.85	122		59273.7	
10	Well recharging	no.	8000	180		1440000	
11	Construction of new well	no.	50000	6		300000	
12	**Total**				**67500**	**4362939.2**	**6750**

Cheekkonnu West Watershed (29M23a) - Action Plan

Table 121:Livelihood Support system for Landless/ Asset less -1st Year Plan

No.	Name of Activity	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	WDC PMKSY	Beneficiary contribution
1	Poultry unit ((5 bird+ cage)	2600	34	88400	800	27200	61200
2	Cow rearing (milching)	60000	4	240000	30000	120000	120000
3	Goat rearing (female 2)	30000	5	150000	15000	75000	75000
4	Minimal fruit and vegetable Processing unit	200000	1	200000	100000	100000	100000
5	Trichoderma Enriched cowdung production unit	30000	1	30000	20000	20000	10000
				708400		**342200**	366200

Cheekkonnu West Watershed (29M23a) - Action Plan

Table 121 Livelihood Support system for Landless/ Asset less -2nd Year Plan

No.	Name of Activity	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	WDC PMKSY	Beneficiary contribution
1	Poultry unit (5 bird+ cage)	2600	22	57200	800	17600	39600
2	Cow rearing (milching)	60000	4	240000	30000	120000	120000
3	fish farming	123000	1	123000	49200	49200	73800
4	Goat rearing (female 2)	30000	5	150000	15000	75000	75000
5	Hatchery (Poultry)	300000	1	300000	75000	75000	225000
6	Agromachinery service centre	1000000	1	1000000	900000	900000	100000
	Total			**1870200**		**1236800**	**633400**

Cheekkonnu West Watershed(29M23a) - Action Plan

Table 122 Livelihood Support system for Landless/ Asset less -3rd Year Plan

No.	Name of Activity	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	WDC PMKSY	Beneficiary contribution
1	Poultry unit (5 bird+ cage)	2600	28	72800	800	22400	50400
2	Fish farming	123000	1	123000	49200	49200	73800
	Total			**195800**		**71600**	**124200**

Cheekkonnu West Watershed (29M23a) - Action Plan

Table 123. Production System -1st Year Plan

Sl. No	Project	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	Cost to be met from project fund	Beneficiary contribution	WDF
1	Floriculture	136000	1	136000	16000	16000	120000	3200
2	Banana cultivation	216000	5	1080000	26250	131250	948750	26250
3	Rambutan/ Mango/Jack fruit/ Mangosteen/Passionfruit Cultivation	60000	3	180000	30000	90000	90000	18000
4	Medicinal Plants cultivation	250000	1	250000	125000	125000	125000	25000
5	Vegetable Cultivation in Growbags	2000	50	100000	1500	75000	25000	15000
6	Distribution of Coconut seedlings	250	320	80000	125	40000	40000	8000

	(DxT)/Hybrid							
7	Promotion of nutritional garden (kit containing 2 to 3 varieties)	100	250	25000	50	12500	12500	2500
	Total			**1851000**		**489750**	**1361250**	**97950**

Cheekkonnu West Watershed (29M23a) - Action Plan
Table 124 Production System -2nd Year Plan

Sl. No	Project	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	Cost to be met from project fund	Beneficiary contribution	WDF
1	Floriculture	136000	1	136000	16000	16000	120000	3200
2	Small nursery (0.5 acre)	300000	1	300000	150000	150000	150000	30000
3	Rambutan/ Mango/Jack fruit/ Mangosteen/Passionfruit Cultivation	60000	3	180000	30000	90000	90000	18000
4	Vegetable cultivation	70000	5	350000	25000	125000	225000	25000
5	Vegetable Cultivation in Growbags	2000	25	50000	1500	37500	12500	7500
6	Distribution of Coconut seedlings (DxT)/Hybrid	250	320	80000	125	40000	40000	8000
7	Promotion of nutritional garden (distrubuting kit containing 2 to 3 varieties)	100	250	25000	50	12500	12500	2500
	Total			**1121000**		**471000**	**650000**	**94200**

Cheekkonnu West Watershed (29M23a) - Action Plan

Table 125 Production System -3rd Year Plan

Sl. No	Project	Unit cost/ Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	Cost to be met from project fund	Beneficiary contribution	WDF
1	Integrated Farming System (5-30 cents)	80000	7	560000	30000	210000	350000	42000
2	Integrated Farming System (31-40 cents)	100000	4	400000	40000	160000	240000	32000
3	Integrated Farming System (41 cents-2 ha)	120000	4	480000	50000	200000	280000	40000
4	Rambutan/ Mango/Jack fruit/ Mangosteen/ Passionfruit Cultivation	60000	1	60000	30000	30000	30000	6000
5	Vegetable Cultivation in Growbags	2000	25	50000	1500	37500	12500	7500
6	Distribution of Coconut seedlings (DxT)/Hybrid	250	318	79500	125	39750	39750	7950
7	Promotion of nutritional garden (distrubuting sampling kit containing 2 to 3 varieties)	100	250	25000	50	12500	12500	2500
	Total			**1654500**		**689750**	**964750**	**137950**

CHAPTER 16

MICRO WATERSHED BASED ACTION PLAN

PATHIRIPATTA (29M23b)

Pathiripatta micro watershed is one of the micro watershed in the PMSKY Kozhikode cluster with an area of 218.56 ha (5.27 % of total Mahe watershed area). Major portion of this micro watershed is spread over Kunnummal panchayath.

16.1 General Description

Table 126 General Description of Pathiripatta (29M23b) micro watershed

Name of micro watershed	:	Pathiripatta
Micro watershed code	:	29M23b
River basin	:	Mahe
District	:	Kozhikode
Block Panchayath	:	Kunnummal
GramaPanchayath	:	Kunnummal
Villages	:	Narippatta, Kunnummal
Latitude	:	11.6941 N
Longitude	:	75.7175 E
Wards	:	Kunnummal (1,3,2) Part Naripatta (9,10,11) Part
Total Area	:	218.56 ha
% of area in the PMSKY cluster	:	5.27 %

16.2 Socio economic profile

As per the information provided in the baseline survey conducted, Pathiripatta micro watershed has a total number of 674 households with a total population of 2832. 425 BPL families reside in the micro watershed area. Out of the total population 7 belongs to scheduled tribe and 59 belongs to Scheduled cast. 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 Pathiripatta micro watershed are given in the table.

Table 127 Socio economic details of Pathiripatta micro watershed

1.	Total number of households		674
2.	Total Population		2832
3.	No. of BPL families		425
4.	Population	Scheduled Caste	59
		Scheduled Tribe	7
5.	Land holdings/Family (in Ha)		0.32

16.3 Biophysical Resources

16.3.1 Physiography

The relief of the watershed ranges from 31 m above MSL to 153 m above MSL. The majority of the area falls in the relief category of 25 to 50 m above MSL which occurs in an area of 106.92 ha (49.04 %).

16.3.2 Slope

The watershed area is divided into six categories of slope classes. The majority of area is under the moderatelysteepsloping area having 15-35 % slope. The category spreads over an area of 60.59 ha (27.72 %), 4.07 % of the watershed area is having steep slope lands which requires urgent soil and water conservation measures(Fig.20).

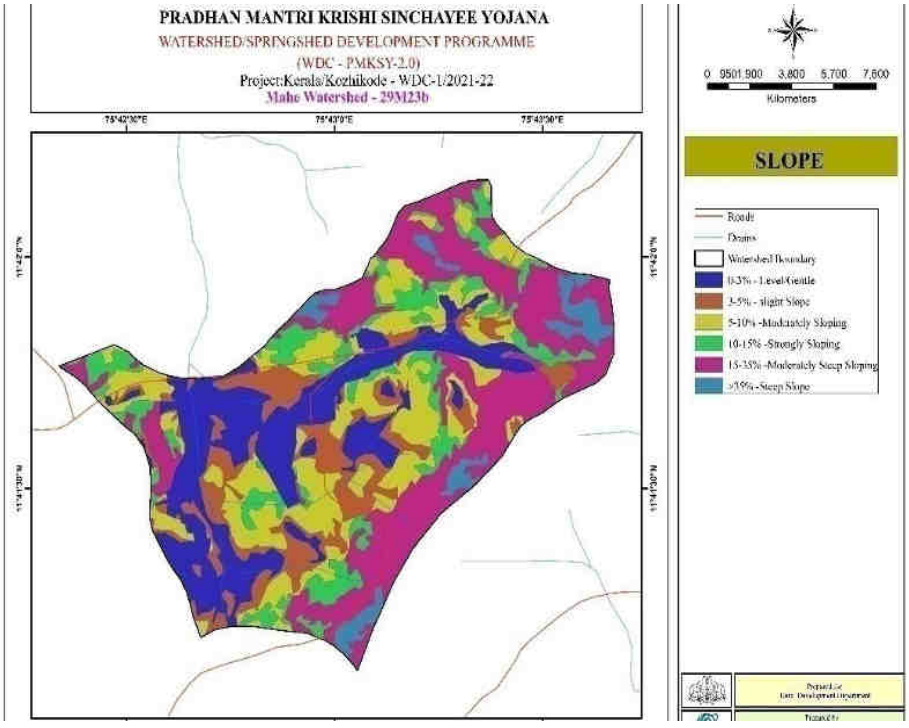


Fig. 20 Slope (29M23b)

Table 128: Details of Slope in Pathiripattamicro watershed

SL No	Slope Category	Area in Ha	Percentage
1	0-3% - Level/Gentle	47.44	21.71
2	3-5% - slight Slope	28.61	13.09
3	5-10% -Moderately Sloping	46.53	21.29
4	10-15% -Strongly Sloping	26.51	12.13
5	15-35% -Moderately Steep Sloping	60.59	27.72
6	>35% -Steep Slope	8.89	4.07
	Total	**218.56**	**100.00**

16.3.3 Drains

The Mahe River flowing through the western portion of the watershed is the major drain of this watershed. Few small drains are originating from different parts of this watershed which drains to the Mahe River at the western boundary of the watershed. The details of the drains and ponds in the watershed area are given in table. The details of the drains and ponds in the watershed area are given in table 129.

Table 129: Details of Drains in Pathiripatta micro watershed

Grama Panchayat	Drains	Length(m)
Kunnummal	First order Streams	2151.71

16.3.4 Land use

Agriculture is the prime activity in the watershed area. The major land use category mapped in the watershed area is Mixed Crops, which are the typical homestead cultivation of Kerala wherein the different crop species are grown together that cannot be spatially mapped separately. It occurs an area of 74.40 ha (34.04 %). The second major category is the Coconut Dominant Mixed Crops. This is mapped in an area of 50.13 ha.

Table:130 Land Use categories in Pathiripattamicro watershed

Sl. No.	Land use category	Area in ha	Percentage
1	Agricultural Crop - Coconut	60.17	27.53
2	Agricultural Crop - Coconut Dominant Mixed Crops	50.13	22.94

3	Agricultural Mixed Crops - Mixed Crops	74.40	34.04
4	Agricultural Plantation Crop - Rubber	0.76	0.35
5	Built-Up Land - Built-Up Land With Mixed Crops	0.36	0.17
6	Built-Up Land - Educational Institution	0.05	0.03
7	Built-Up Land - Health Institution	0.09	0.04
8	Built-Up Land - Open Spaces/Vacant Land	0.00	0.00
9	Built-Up Land - Religious Institution	0.01	0.00
10	Built-Up Land - Residential	5.80	2.65
11	Built-Up Land - Road	0.39	0.18
12	Built-Up Land _ Commercial	0.33	0.15
13	Paddy Converted - Coconut	7.76	3.55
14	Paddy Converted - Coconut Dominant Mixed Crops	1.91	0.87
15	Paddy Converted - Mixed Built-Up	0.29	0.13
16	Paddy Converted - Residential	0.33	0.15
17	Paddy Converted - Seasonal Crop	0.59	0.27
18	Paddy Converted to Mixed Crops	9.48	4.34
19	Waste Land - Land Without Scrub	0.55	0.25
20	Waste Land - Quarry	5.15	2.35
	Total	**218.56**	**100.00**

16.3.5 Geology

The watershed falls in the geological unit of Migmatite Complex, has an area of 154.91 ha (70.88 %).

Table: 131Rock types in Pathiripattamicro watershed

SL No	Rock Type	Area in Ha	Percentage
1	Charnockite group of rocks	63.65	29.12
2	Migmatite Complex	154.91	70.88
	Total	**218.56**	**100.00**

16.3.6 Geomorphology

There are five geomorphological units of which more than 50 % (123.61 ha) of the area falls under the Piedmont Zone category. An area of 47.92 ha is mapped under the

Lower Plateau (Lateritic) - Dissected category which accounts 21.92 % of the total area of the micro watershed.

Table:132Geomorphology in Pathiripattamicro watershed.

SL No	Geomorphology	Area in Ha	Percentage
1	Linear ridge(Piedmont Zone)	19.39	8.87
2	Lower Plateau (Lateritic) - Dissected	47.92	21.92
3	Piedmont Zone	123.61	56.56
4	Residual Hill	0.16	0.07
5	Valley Fill	27.48	12.58
	Total	**218.56**	**100.00**

16.3.7 Soils

The soil in the micro watershed is mostly very deepwith a depth of 75- 100 cm, which accounts around 147.15 ha area (67.33 %). Around 32.67 % of the area is having deep to very deep soil. The major surface soil textures in the watershed area constitutes that of fine loamy (79.41 ha) and Loamy Skeletal (73.39 ha). Nearly 44.61 % of the watershed area is prone to moderate soil erosion which calls for proper soil and water conservation measures in the area.

16.4 Watershed Committee

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

16.5 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.

16.6 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.

16.7 Activities proposed

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

Table:133Details of activities proposed

Entry Point Activities	
1	Banana cultivation
2	Vegetable cultivation
3	Pepper cultivation
4	Mushroom cultivation
5	Apiculture
6	Fish farming
Natural Resoruce Conservation Activities	
1	Cultivation of horticulture crops in wastelands
2	Intercropping in coconut plantation
3	Fruit tree planting
4	Crop demonstration- vegetable garden in schools
5	Medicinal plants in public institution
6	Rejuvenation of Meen muttikkal Kaithapoyil Pathiripatta UPS thodu- side wall protection,-downstream
7	Rejuvenation of Meen muttikkal Kaithapoyil Pathiripatta UPS thodu- side wall protection, - upstream

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

Table 134: Budget for Pathiripatta micro watershed

No.	Budget component	%	Amount in Rs. (Lakhs)
1.	Administrative cost	10	5.91
2.	Monitoring	2	1.18
3.	Evaluation	2	1.18
Preparatory phase			
4.	Entry point activities	2	1.18
5.	Institution and capacity building	3	1.77
6.	Detailed Project Report	1	0.59
Watershed works phase			
7.	Natural Resoruces Conservation works	47	27.77
8.	Livelihood activities for asset less	15	8.86
9.	Production system and micro enterprises	15	8.86
10.	Consolidation phase	3	1.77
		100	**59.08**

PathiripattaWatershed (29M23b) - Action Plan

Table 135: -Sector-I- Natural Resources Conservation and Management - Ist Year Plan

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
1	Cultivation of horticultural crops in wastelands	25 cent	10000	4	40000		4000
2	Intercropping in coconut plantations	25 cent	5500	16	88000		8800
3	Fruit tree planting (Jack fruit, rambutan, mango)	25 cent	10000	4	40000		4000
4	Crop demonstration - vegetable garden in schools	25 cent	15000	2	30000		3000
5	Medicinal plants in public institutions	5 cent	5500	3	16500		1650
6	Earthen bunds	rm	62	3805		235910	
7	Centripetal terrracing with mulching	no.	179	4964		888556	
8	Stone pitched contour bunds	rm	144	4673		672912	
9	Moisture Conservation pits	no.	122	882		107604	
10	Live fencing	rm	24.5	761		18644.5	
11	Gully plugs	no.	1500	36		54000	
12	Brushwood checkdams	rm	316	3		948	
13	Sidewall protection of drains (geotextiles)	m2	191	7		1337	
14	Desiltation of drains	10m3	485.85	11		5344.35	
15	Side varambuearthening of drains	m	234	5		1170	
16	Side protection of drains with bamboo planting	no.	34.65	300		10395	
17	Construction of farm ponds (10m x 10 m x 3 m) with	no.	130000	2		260000	

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
	geotextiles						
18	Well recharging	no.	8000	120		960000	
19	Construction of new well	no.	50000	2		100000	
20	Rejuvenation of MeenmuttikkalKaithapoyilpathirapatta UP school thodu -Side wall protection, Dredging towards downstream	1			1000000		
	Total			**15600**	**1214500**	**3316820.85**	**21450**

PathiripattaWatershed (29M23b) - Action Plan

Table 136: -Sector-I- Natural Resources Conservation and Management –2nd Year Plan

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
1	Cultivation of horticultural crops in wastelands	25 cent	10000	4	40000		4000
2	Intercropping in coconut plantations	25 cent	5500	20	110000		11000
3	Fruit tree planting (Jack fruit, rambutan, mango)	25 cent	10000	8	80000		8000
4	Crop demonstration - vegetable garden in schools	25 cent	15000	2	30000		3000
5	Pachathuruthu	5 cent	50000	1	50000		5000
6	Medicinal plants in public institutions	5 cent	5500	4	22000		2200
7	Earthen bunds	rm	62	3805		235910	0

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
8	Centripetal terrracing with mulching	no.	179	6618		1184622	
9	Stone pitched contour bunds	rm	144	4673		672912	
10	Moisture Conservation pits	no.	122	1765		215330	
11	Live fencing	rm	24.5	1014		24843	
12	Gully plugs	no.	1500	36		54000	
13	Brushwood checkdams	rm	316	3		948	
14	Sidewall protection of drains (geotextiles)	m2	191	13		2483	
15	Desiltation of drains	10m3	485.85	22		10688.7	
16	Side varambuearthening of drains	m	234	8		1872	
17	Construction of farm ponds (10m x 10 m x 3 m) with geotextiles	no.	130000	4		520000	
18	Well recharging	no.	8000	160		1280000	
19	Construction of new well	no.	50000	3		150000	
20	Rejuvenation of MeenmuttikkalKaithapoyilpathirapatta UP school thodu-Side protection and Dredging	1			1000000	0	
	Total			**18162**	**1332000**	**4353608.7**	**33200**

PathiripattaWatershed (29M23b) - Action Plan

Table 137: -Sector-I- Natural Resources Conservation and Management –3rd Year Plan

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
1	Cultivation of horticultural crops in wastelands	25 cent	10000	4	40000		4000
2	Intercropping in coconut plantations	25 cent	5500	15	82500		8250
3	Fruit tree planting (Jack fruit, rambutan, mango)	25 cent	10000	4	40000		4000
4	Pachathuruthu	5 cent	50000	1	50000		5000
5	Medicinal plants in public institutions	5 cent	5500	3	16500		1650
6	Centripetal terrracing with mulching	no.	179	4964		888556	
7	Stone pitched contour bunds	rm	144	2336		336384	
8	Moisture Conservation pits	no.	122	1765		215330	
9	Live fencing	rm	24.5	761		18644.5	
10	Sidewall protection of drains (geotextiles)	m2	191	13		2483	
11	Desiltation of drains	10m3	485.85	22		10688.7	
12	Well recharging	no.	8000	120		960000	
13	Construction of new well	no.	50000	3		150000	
	Total				**229000**	**2582086.2**	**22900**

PathiripattaWatershed (29M23b) - Action Plan

Table 138:Livelihood Support system for Landless/ Asset less -1st Year Plan

No.	Name of Activity	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	WDC PMKSY	Beneficiary contribution
1	Poultry unit (5 bird+ cage)	2600	40	104000	800	32000	72000
2	Cow rearing (milching)	60000	5	300000	30000	150000	150000
3	Goat rearing (female 2)	30000	6	180000	15000	90000	90000
4	Minimal fruit and vegetable Processing unit	200000	1	200000	100000	100000	100000
5	Trichoderma Enriched cowdung production unit	30000	1	30000	20000	20000	10000
	Total			**814000**		**392000**	**422000**

PathiripattaWatershed (29M23b) - Action Plan

Table 139:Livelihood Support system for Landless/ Asset less -2nd Year Plan

No.	Name of Activity	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	WDC PMKSY	Beneficiary contribution
1	Poultry unit (5 bird+ cage)	2600	40	104000	800	32000	72000
2	Cow rearing (milching)	60000	3	180000	30000	90000	90000
3	Goat rearing (female 2)	30000	6	180000	15000	90000	90000
4	Minimal fruit and vegetable Processing unit	200000	1	200000	100000	100000	100000
5	Trichoderma Enriched cowdung production unit	30000	1	30000	20000	20000	10000
	Total			**694000**		**332000**	**362000**

PathiripattaWatershed (29M23b) - Action Plan

Table :140Livelihood Support system for Landless/ Asset less -3rd Year Plan

No.	Name of Activity	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	WDC PMKSY	Beneficiary contribution
1	Poultry unit (5 bird+ cage)	2600	34	88400	800	27200	61200
2	Cow rearing (milching)	60000	2	120000	30000	60000	60000
3	Goat rearing (female 2)	30000	5	150000	15000	75000	75000
	Total			**358400**		**162200**	**196200**

PathiripattaWatershed (29M23b) - Action Plan

Table: 141 Production System – 1st Year Plan

Sl. No	Project	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	Cost to be met from project fund	Beneficiary contribution	WDF
1	Integrated Farming System (5-30 cents)	80000	3	240000	30000	90000	150000	18000
2	Banana cultivation	216000	5	1080000	26250	131250	948750	26250
3	Vegetable Cultivation in Growbags	2000	20	40000	1500	30000	10000	6000
4	Distribution of Coconut seedlings (DxT)/Hybrid	250	265	66250	125	33125	33125	6625
	Total			**1426250**		**284375**	**1141875**	**56875**

PathiripattaWatershed (29M23b) - Action Plan

Table: 142 Production System – 2nd Year Plan

Sl. No	Project	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	Cost to be met from project fund	Beneficiary contribution	WDF
1	Integrated Farming System (5-30 cents)	80000	1	80000	30000	30000	50000	6000
2	Banana cultivation	216000	6	1296000	26250	157500	1138500	31500
3	Vegetable Cultivation in Growbags	2000	20	40000	1500	30000	10000	6000
4	Distribution of Coconut seedlings (DxT)/Hybrid	250	265	66250	125	33125	33125	6625
	Total			**1482250**		**250625**	**1231625**	**50125**

PathiripattaWatershed (29M23b) - Action Plan

Table: 143 Production System – 3rd Year Plan

Sl. No	Project	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	Cost to be met from project fund	Beneficiary contribution	WDF
1	Banana cultivation	216000	6	1296000	26250	157500	1138500	31500
2	Integrated Farming System (31-40 cents)	100000	3	300000	40000	120000	180000	24000
3	Vegetable Cultivation in Growbags	2000	27	54000	1500	40500	13500	8100
4	Distribution of Coconut seedlings (DxT)/Hybrid	250	270	67500	125	33750	33750	6750
	Total			**1717500**		**351750**	**1365750**	**70350**

CHAPTER 17
MICRO WATERSHED BASED ACTION PLAN
KIZHAKKEDATH VAYAL (29M23c)

Kizhakkedathvayal micro watershed is one of the micro watershed in the PMSKY Kozhikode cluster with an area of 133.83 ha (3.2 % of total proejct area). The micro watershed is spread over Narippatta panchayath.

17.1 General Description

Table 144 General Description of Kizhakkedathvayal (29M23c)micro watershed

Name of micro watershed	:	Kizhakkedathvayal
Micro watershed code	:	29M23c
River basin	:	Mahe
District	:	Kozhikode
Block Panchayath	:	Kunnummal
GramaPanchayath	:	Narippatta
Villages	:	Narippatta
Latitude	:	11.704 N
Longitude	:	75.7048 E
Wards	:	Narippatta (10,11,15,16) Part
Total Area	:	133.83 ha
% of area in the PMSKY cluster	:	3.22 %

17.2 Socio economic profile

As per the information provided in the baseline survey conducted, Kizhakkedathvayal micro watershed has a total number of 164 households with a total population of 703. 104 BPL families reside in the micro watershed area. Out of the total population 6 belongs to scheduled tribe and 11 belongs to Scheduled cast. 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 Kizhakkedathvayal micro watershed are given in the table.

Table 145: Socio economic details of Kizhakkedathvayal micro watershed

1.	Total number of households		164
2.	Total Population		703
3.	No. of BPL families		104
4.	Population	Scheduled Caste	11
		Scheduled Tribe	6
5.	Land holdings/Family (in Ha)		0.81

17.3 Biophysical Resources

17.3.1 Physiography

The relief of the watershed ranges from 21 m above MSL to 92 m above MSL. The majority of the area falls in the relief category of 25 to 50 m above MSL which occurs in an area of 97.2 ha (73.68 %).

17.3.2 Slope

The watershed area is divided into six categories of slope classes. The majority of area is under the moderately sloping area having 5-10 % slope. The category spreads over an area of 43.13 ha (32.23 %).23.14 % of the micro watershed area is having strongly sloping and 22.33 % of the micro watershedis having moderately steep slope which requires urgent soil and water conservation measures(fig.23).

Table: 146Details of Slope in Kizhakkedathvayal Micro Watershed

SL No	Slope Category	Area in Ha	Percentage
1	0-3% - Level/Gentle	16.54	12.36
2	3-5% - slight Slope	12.45	9.30
3	5-10% -Moderately Sloping	43.13	32.23
4	10-15% -Strongly Sloping	30.97	23.14
5	15-35% -Moderately Steep Sloping	29.88	22.33
6	>35% -Steep Slope	0.86	0.64
	Total	**133.83**	**100.00**

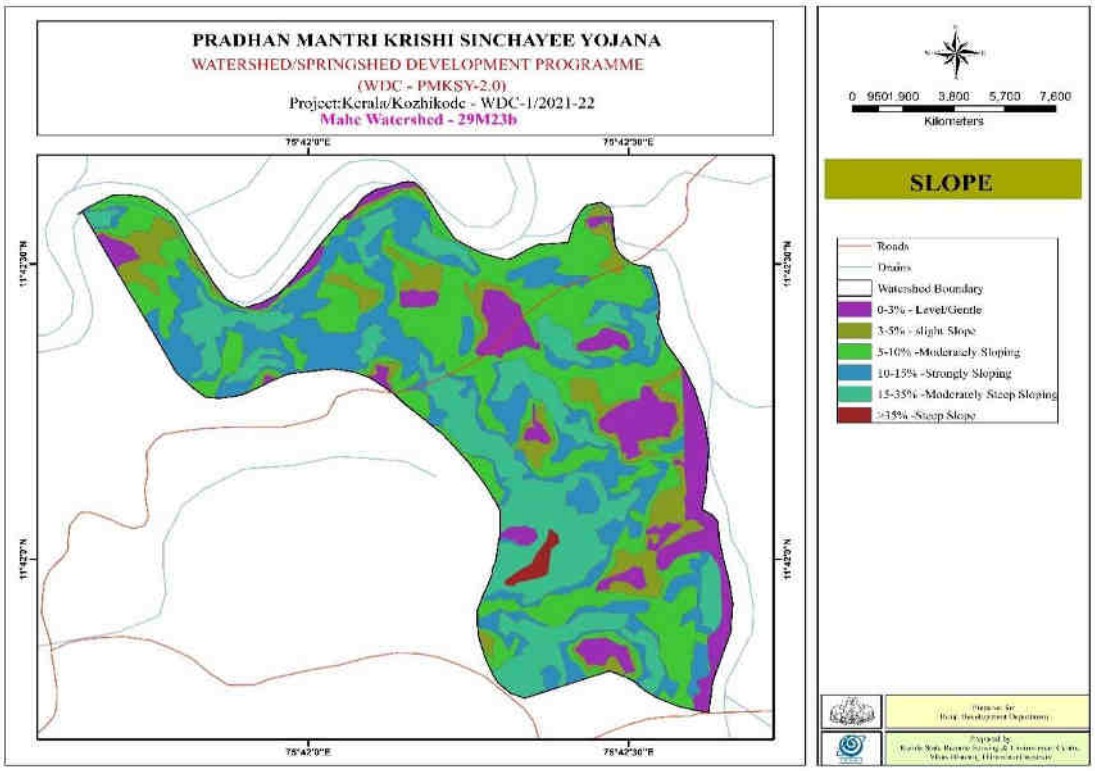


Fig. 21 Slope (29M23c)

17.3.3Drains

The Mahe River flowing through the western portion of the watershed is the major drain of this watershed. Few small drains are originating from different parts of this watershed which drains to the Mahe River at the western boundary of the watershed. The details of the drains and ponds in the watershed area are given in table. The details of the drains and ponds in the watershed area are given in table 147.

Table: 147 Details of Drains in Kizhakkedathvayal micro watershed

Grama Panchayat	Drains	Length(m)
Narippatta	Aanikottvayalnambyathamkundneerchal	2036.81
	VanimelPuzha	1814.11
Narippatta	Other First order Streams	623.38
	Total	**4474.30**

17.3.4 Land use

Agriculture is the prime activity in the watershed area. The major land use category mapped in the watershed area is Mixed Crops, which are the typical homestead cultivation

of Kerala wherein the different crop species are grown together that cannot be spatially mapped separately. It occurs an area of 77.44 ha (57.86 %). The second major category is the Coconut Dominant Mixed Crops. This is mapped in an area of 19.83 ha.

Table. : 148 Land use categories in Kizhakkedathvayalmicro watershed

Sl. No.	Land use category	Area in ha	Percentage
1	Agricultural Crop – Coconut	18.27	13.65
2	Agricultural Crop - Coconut Dominant Mixed Crops	19.83	14.82
3	Agricultural Mixed Crops - Mixed Crops	77.44	57.86
4	Built-Up Land - Educational Institution	1.29	0.96
5	Built-Up Land - Play Ground	0.37	0.27
6	Built-Up Land - Public/Semi Public Institutions	0.11	0.09
7	Built-Up Land – Residential	4.28	3.19
8	Built-Up Land – Road	2.46	1.84
9	Built-Up Land _ Commercial	1.09	0.81
10	Paddy Converted - Built-Up Land	0.03	0.03
11	Paddy Converted - Coconut	2.51	1.87
12	Paddy Converted - Seasonal Crop	0.17	0.13
13	Paddy Converted to Mixed Crops	2.29	1.71
14	Waste Land - Sands/Riverine/Coastal	0.37	0.27
15	Waterbody - River/Stream	3.32	2.48
	Total	**133.83**	**100.00**

17.3.5 Geology

Majority of area of the watershed falls in the geological unit of Migmatite Complex, and has an area of 85.81 ha (64.12 %). Around 32.91 % of the area has Charnockite group of rocks.

Table: 149 Table showing rock types in Kizhakkedathvayal micro watershed

SL No	Rock Type	Area in Ha	Percentage
1	Charnockite group of rocks	44.04	32.91
2	Migmatite Complex	85.81	64.12
3	Waterbody	3.97	2.97
	Total	**133.83**	**100.00**

17.3.6 Geomorphology

There are five geomorphological units of which more than 80 % (108.29 ha) of the area falls under the Lower Plateau (Lateritic) - Dissected category. An area of 15.87 ha is mapped under the Residual Mount category which accounts 11.86 % of the total area of the micro watershed.

Table: 150 Geomorphology in Kizhakkedathvayalmicro watershed

SL No	Geomorphology	Area in Ha	Percentage
1	Lower Plateau (Lateritic) - Dissected	108.29	80.91
2	Piedmont Zone	0.01	0.01
3	Residual Mount	15.87	11.86
4	Valley Fill	5.68	4.25
5	Waterbody	3.97	2.97
	Total	**133.83**	**100.00**

17.3.7 Soils

The soil in the micro watershed is mostly deep to very deep, which accounts around 66.37 ha area (49.60 %). Around 47.4 % of the area is having very deep soil. The major surface soil textures in the watershed area constitutes that of fine texture (100.54 ha) and Fine loamy (21.01 ha). Nearly 42.7 % of the watershed area is prone to moderate to severe soil erosion which calls for proper soil and water conservation measures in the area.

17.4 Watershed Committee

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

17.5 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.

17.6 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.

17.7 Activities proposed

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

Table: 151 Details of activities proposed

Entry Point Activities	
1	Banana cultivation
2	Vegetable cultivation
3	Pineapple cultivation
4	Mushroom cultivation
5	Apiculture
6	Fish farming
7	Mulberry cultivation
8	Tapioca cultivation
Natural Resoruce Conservation Activities	
1	Cultivation of horticulture crops in wastelands
2	Intercropping in coconut plantation
3	Fruit tree planting
4	Crop demonstration- vegetable garden in schools
5	Medicinal plants in public institution
6	Puttangi village office thodu-side wall Protection
7	Puttnagi karimban kandi thodu side wal protection

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

Table: 152 – Budget for Kizhakkedathvayal micro watershed

No.	Budget component	%	Amount in Rs. (Lakhs)
1.	Administrative cost	10	3.41
2.	Monitoring	2	0.68
3.	Evaluation	2	0.68
Preparatory phase			
4.	Entry point activities	2	0.68
5.	Institution and capacity building	3	1.02
6.	Detailed Project Report	1	0.34
Watershed works phase			
7.	Natural Resoruces Conservation works	47	16.05
8.	Livelihood activities for asset less	15	5.12
9.	Production system and micro enterprises	15	5.12
10.	Consolidation phase	3	1.02
		100	**34.16**

KizhakkedathVayalWatershed (29M23c) - Action Plan

Table: 153 -Sector-I- Natural Resources Conservation and Management - Ist Year Plan

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
1	Avenue planting	no.	35	160		5600	
2	Cultivation of horticultural crops in wastelands	25 cent	10000	2	20000		2000
3	Intercropping in coconut plantations	25 cent	5500	6	33000		3300
4	Fruit tree planting (Jack fruit, rambutan, mango)	25 cent	10000	3	30000		3000
5	Crop demonstration - vegetable garden in schools	25 cent	15000	1	15000		1500
6	Medicinal plants in public institutions	5 cent	5500	2	11000		1100
7	Earthen bunds	Rm	62	4613		286006	
8	Centripetal terrracing with mulching	no.	179	1715		306985	
9	Stone pitched contour bunds	Rm	144	1903		274032	
10	Strip terracing for rubber/Inward terracing for plantation	no.	191	3		573	
11	Moisture Conservation pits	no.	122	305		37210	
12	Live fencing	Rm	24.5	761		18644.5	
13	Gully plugs	no.	1500	11		16500	
14	Brushwood checkdams	Rm	316	12		3792	
15	Loose boulder check dams (2 m length)	no.	3900	2		7800	
16	Sidewall protection of drains (geotextiles)	m2	191	350		66850	
17	Desiltation of drains	10m3	485.85	26		12632.1	

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
18	Side varambuearthening of drains	M	234	280		65520	
19	Side protection of drains with bamboo planting	no.	34.65	400		13860	
20	Construction of farm ponds (10m x 10 m x 3 m) with geotextiles	no.	130000	2		260000	
21	Well recharging	no.	8000	75		600000	
22	Construction of new well	no.	50000	1		50000	
					109000	**2026004.6**	**10900**

KizhakkedathVayalWatershed (29M23c) - Action Plan

Table: 154 -Sector-I- Natural Resources Conservation and Management –2nd Year Plan

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
1	Avenue planting	no.	35	160		5600	
2	Cultivation of horticultural crops in wastelands	25 cent	10000	2	20000		2000
3	Intercropping in coconut plantations	25 cent	5500	7	38500		3850
4	Fruit tree planting (Jack fruit, rambutan, mango)	25 cent	10000	4	40000		4000
5	Crop demonstration - vegetable garden in schools	25 cent	15000	2	30000		3000
6	Medicinal plants in public institutions	5 cent	5500	1	5500		550
7	Earthen bunds	Rm	62	4613		286006	
8	Centripetal terrracing with mulching	no.	179	2286		409194	

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
9	Stone pitched contour bunds	Rm	144	1903		274032	
10	Strip terracing for rubber/Inward terracing for planatation	no.	191	5		955	
11	Moisture Conservation pits	no.	122	610		74420	
12	Live fencing	Rm	24.5	1014		24843	
13	Gully plugs	no.	1500	11		16500	
14	Brushwood checkdams	Rm	316	12		3792	
15	Loose boulder check dams (2 m length)	no.	3900	3		11700	
16	Sidewall protection of drains (geotextiles)	m2	191	700		133700	
17	Desiltation of drains	10m3	485.85	52		25264.2	
18	Side varambuearthening of drains	M	234	420		98280	
19	Construction of farm ponds (10m x 10 m x 3 m) with geotextiles	no.	130000	4		520000	
20	Well recharging	no.	8000	100		800000	
21	Construction of new well	no.	50000	2		100000	
22	Puttanki Village office thodu side wall	1			700000		
				11911	834000	2784286.2	13400

KizhakkedathVayalWatershed (29M23c) - Action Plan

Table 155: -Sector-I- Natural Resources Conservation and Management –3rd Year Plan

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
1	Avenue planting	no.	35	80		2800	
2	Intercropping in coconut plantations	25 cent	5500	6	33000		3300
3	Fruit tree planting (Jack fruit, rambutan, mango)	25 cent	10000	3	30000		3000
4	Centripetal terrracing with mulching	no.	179	1715		306985	
5	Stone pitched contour bunds	Rm	144	952		137088	
6	Strip terracing for rubber/Inward terracing for plantation	no.	191	3		573	
7	Moisture Conservation pits	no.	122	610		74420	
8	Live fencing	Rm	24.5	761		18644.5	
9	Sidewall protection of drains (geotextiles)	m2	191	700		133700	
10	Desiltation of drains	10m3	485.85	52		25264.2	
11	Well recharging	no.	8000	75		600000	
12	Construction of new well	no.	50000	2		100000	
13	Puttanki-karimbankandi	1			600000		
	Total			**4957**	**663000**	**1399474.7**	**6300**

Kizhakkedath VayalWatershed((29M23c) - Action Plan

Table: 156 Livelihood Support system for Landless/ Asset less -1st Year Plan

No.	Name of Activity	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	WDC PMKSY	Beneficiary contribution
1	Poultry unit (5 bird+ cage)	2600	48	124800	800	38400	86400
2	Mushroom cultivation (80-100 bed)	28125	3	84375	11250	33750	50625
3	Goat rearing (female 2)	30000	4	120000	15000	60000	60000
4	Minimal fruit and vegetable Processing unit	200000	1	200000	100000	100000	100000
5	Trichoderma Enriched cowdung production unit	30000	1	30000	20000	20000	10000
	Total			**559175**		**252150**	**307025**

Kizhakkedath VayalWatershed((29M23c) - Action Plan

Table: 157 Livelihood Support system for Landless/ Asset less -2nd Year Plan

No.	Name of Activity	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	WDC PMKSY	Beneficiary contribution
1	Poultry unit (5 bird+ cage)	2600	39	101400	800	31200	70200
2	Mushroom cultivation (80-100 bed)	28125	3	84375	11250	33750	50625
3	Goat rearing (female 2)	30000	4	120000	15000	60000	60000
4	Trichoderma Enriched cowdung production unit	30000	1	30000	20000	20000	10000
	Total			**335775**		**144950**	**190825**

Kizhakkedath VayalWatershed((29M23c) - Action Plan

Table: 158 Livelihood Support system for Landless/ Asset less -3rd Year Plan

No.	Name of Activity	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	WDC PMKSY	Beneficiary contribution
1	Poultry unit (5 bird+ cage)	2600	22	57200	800	17600	39600
2	Mushroom cultivation (80-100 bed)	28125	2	56250	11250	22500	33750
3	Goat rearing (female 2)	30000	5	150000	15000	75000	75000
	Total			**263450**		**115100**	**148350**

Kizhakkedath VayalWatershed((29M23c) - Action Plan

Table: 159 Production System -1st Year Plan

Sl. No	Project	Unit cost/ Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	Cost to be met from project fund	Beneficiary contribution	WDF
1	Integrated Farming System (5-30 cents)	80000	3	240000	30000	90000	150000	18000
2	Banana cultivation	216000	4	864000	26250	105000	759000	21000
3	Vegetable Cultivation in Growbags	2000	20	40000	1500	30000	10000	6000
4	Distribution of Coconut seedlings (DxT)/Hybrid	250	175	43750	125	21875	21875	4375
	Total			**1187750**		**246875**	**940875**	**49375**

Kizhakkedath VayalWatershed((29M23c) - Action Plan
Table: 160. Production System -2nd Year Plan

Sl. No	Project	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	Cost to be met from project fund	Beneficiary contribution	WDF
1	Integrated Farming System (5-30 cents)	80000	1	80000	30000	30000	50000	6000
2	Banana cultivation	216000	2	432000	26250	52500	379500	10500
3	Vegetable Cultivation in Growbags	2000	20	40000	1500	30000	10000	6000
4	Distribution of Coconut seedlings (DxT)/Hybrid	250	175	43750	125	21875	21875	4375
	Total			**595750**		**134375**	**461375**	**26875**

Kizhakkedath VayalWatershed((29M23c) - Action Plan
Table: 161 Production System -3rd Year Plan

Sl. No	Project	Unit cost/ Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	Cost to be met from project fund	Beneficiary contribution	WDF
1	Banana cultivation	216000	3	648000	26250	78750	569250	15750
2	Vegetable Cultivation in Growbags	2000	20	40000	1500	30000	10000	6000
3	Distribution of Coconut seedlings (DxT)/Hybrid	250	180	45000	125	22500	22500	4500
	Total			**733000**		**131250**	**601750**	**26250**

CHAPTER 18

MICRO WATERSHED BASED ACTION PLAN

CHIYYOOR (29M24a)

Chiyyoor micro watershed is one of the micro watershed in the PMSKY Kozhikode cluster with an area of 620.99 ha (14.98 % of total Mahe watershed area). Major portion of this micro watershed is spread over Narippatta panchayath and a small portion spread over Nadapuram panchayath.

18.1 General Description

Table: 162 General Description of Chiyyoor(29M24a)micro watershed

Name of micro watershed	:	Chiyyoor
Micro watershed code	:	29M24a
River basin	:	Mahe
District	:	Kozhikode
Block Panchayath	:	Kunnummal, Thuneri
GramaPanchayath	:	Narippatta, Nadapuram
Villages	:	Narippatta, Kunnummal, Nadapuram
Latitude	:	11.6967 N
Longitude	:	75.6929 E
Wards	:	Kunnummal (1,11,13) Part Nadapuram (5,6,7,8) Part, Narippatta (11,12,13,14,15) Part
Total Area	:	620.99 ha
% of area in the PMSKY cluster	:	14.98 %

18.2 Socio economic profile

As per the information provided in the baseline survey conducted, Chiyyoor micro watershed has a total number of 1404 households with a total population of 6305. 884 BPL families reside in the micro watershed area. Out of the total population 25 belongs to scheduled tribe and 101 belongs to Scheduled cast. 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 Chiyyoor micro watershed are given in the table.

Table:163 Socio economic details of Chiyyoor micro watershed

1.	Total number of households		1404
2.	Total Population		6305
3.	No. of BPL families		884
4.	Population	Scheduled Caste	101
		Scheduled Tribe	25
5.	Land holdings/Family (in Ha)		0.44

18.3 Biophysical Resources

18.3.1 Physiography

The relief of the watershed ranges from 14 m above MSL to 101 m above MSL. The majority of the area falls in the relief category of 25 to 50 m above MSL which occurs in an area of 449.55 ha (72.50 %).

18.3.2 Slope

The watershed area is divided into six categories of slope classes. The majority of area is under the moderately sloping area having 5-10 % slope. The category spreads over an area of 181.78 ha (29.27 %), 21.77 % of the watershed area is having moderately steep slope lands which requires urgent soil and water conservation measures(fig.22).

Table: 164 Details of Slope in Chiyyoor Micro watershed

SL No	Slope Category	Area in Ha	Percentage
1	0-3% - Level/Gentle	114.12	18.38
2	3-5% - slight Slope	64.63	10.41
3	5-10% -Moderately Sloping	181.78	29.27
4	10-15% -Strongly Sloping	119.73	19.28
5	15-35% -Moderately Steep Sloping	135.17	21.77
6	>35% -Steep Slope	5.55	0.89
	Total	**620.99**	**100.00**

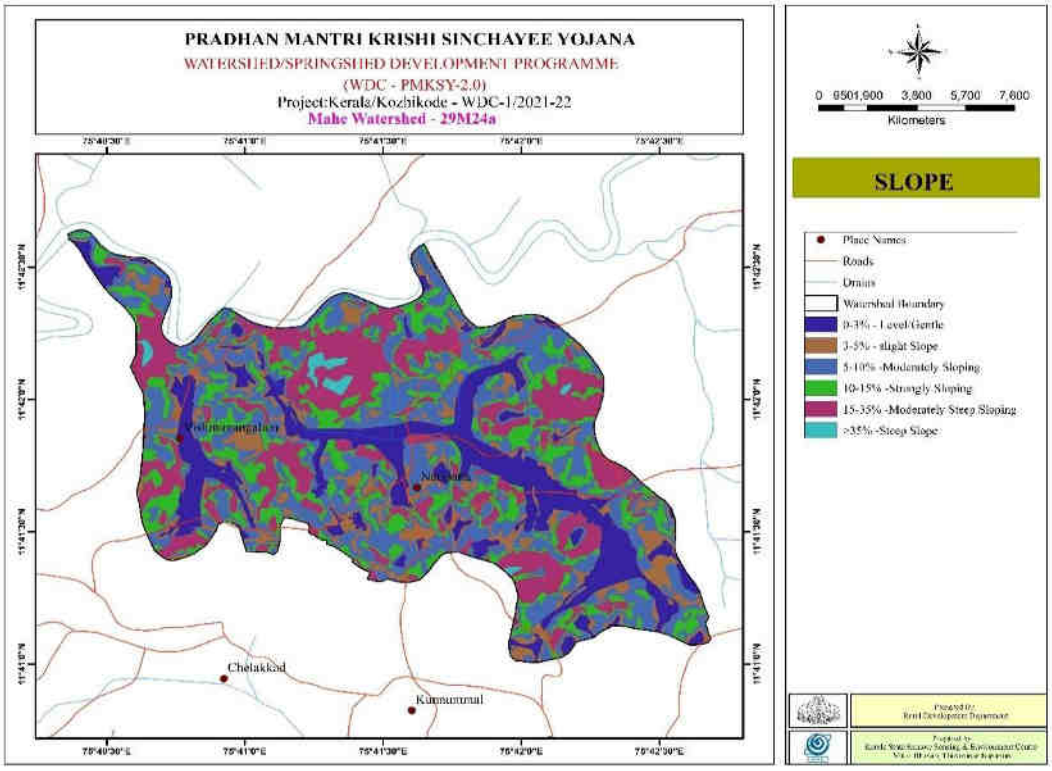


Fig. 22 Slope (29M24a).

18.3.3 Drains

The Mahe River flowing through the western portion of the watershed is the major drain of this watershed. Few small drains are originating from different parts of this watershed which drains to the Mahe River at the western boundary of the watershed. The details of the drains and ponds in the watershed area are given in table.

Table: 165 Details of Drains in Chiyyoor micro watershed

Drains	Length (m)
Changaroththazhacherukavilthazhathodu	1102.60
Devarkunnaththazhavanimelpuzha	1846.74
VanimelPuzha	3664.93
Other First order Streams	3006.69
Total	**9620.96**

18.3.4 Land use

Agriculture is the prime activity in the watershed area. The major land use category mapped in the watershed area is Mixed Crops, which are the typical homestead cultivation of Kerala wherein the different crop species are grown together that cannot be spatially

mapped separately. It occurs an area of 254.34 ha (40.96 %). The second major category is the Coconut Dominant Mixed Crops. This is mapped in an area of 141.50 ha.

Table. 166:Land use categories in Chiyyoormicro watershed

Sl. No.	Land use category	Area in ha	Percentage
1	Agricultural Crop - Coconut	107.93	17.38
2	Agricultural Crop - Coconut Dominant Mixed Crops	141.50	22.79
3	Agricultural Mixed Crops - Mixed Crops	254.34	40.96
4	Agricultural Plantation Crop - Rubber	0.32	0.05
5	Built-Up Land - Built-Up Land With Mixed Crops	4.10	0.66
6	Built-Up Land - Educational Institution	0.66	0.11
7	Built-Up Land - Open Spaces/Vacant Land	0.59	0.10
8	Built-Up Land - Play Ground	0.11	0.02
9	Built-Up Land - Public/Semi Public Institutions	0.04	0.01
10	Built-Up Land - Religious Institution	0.27	0.04
11	Built-Up Land – Residential	20.65	3.33
12	Built-Up Land – Road	8.18	1.32
13	Built-Up Land _ Commercial	0.55	0.09
14	Paddy Converted - Built-Up Land	2.87	0.46
15	Paddy Converted – Coconut	38.55	6.21
16	Paddy Converted - Coconut Dominant Mixed Crops	11.24	1.81
17	Paddy Converted - Residential	0.51	0.08
18	Paddy Converted - Seasonal Crop	0.70	0.11
19	Paddy Converted to Mixed Crops	12.31	1.98
20	Paddy Cultivating Land - Current Fallow	2.34	0.38
21	Waste Land - Land With Scrub	0.42	0.07
22	Waste Land - Land Without Scrub	4.48	0.72
23	Waste Land - Sands/Riverine/Coastal	2.20	0.35
24	Water Body - Lake/Pond	0.12	0.02
25	Waterbody - River/Stream	6.01	0.97
	Total	**620.99**	**100.00**

18.3.5 Geology

Majority of area of the watershed falls in the geological unit of Charnockite group of rocks, and has an area of 313.78 ha (50.53 %). Around 38.66 % of the area has Migmatite Complex.

Table: 167 Rock types in Chiyyoor micro watershed

SL No	Rock Type	Area in Ha	Percentage
1	Basic Rocks	59.16	9.53
2	Charnockite group of rocks	313.78	50.53
3	Migmatite Complex	240.09	38.66
4	Waterbody	7.96	1.28
	Total	**620.99**	**100.00**

18.3.6 Geomorphology

There are four geomorphological units of which more than 80 % (504.32 ha) of the area falls under the Lower Plateau (Lateritic) - Dissected category. An area of 80.23 ha is mapped under the Valley Fillcategorywhich accounts 12.92 % of the total area of the micro watershed.

Table: 168Geomorphology in Chiyyoormicro watershed

SL No	Geomorphology	Area in Ha	Percentage
1	Lower Plateau (Lateritic) - Dissected	504.32	81.21
2	Residual Mount	28.49	4.59
3	Valley Fill	80.23	12.92
4	Waterbody	7.96	1.28
	Total	**620.99**	**100.00**

18.3.7 Soils

The soil in the micro watershed is mostly very deepwith a depth of 75- 100 cm, which accounts around 419.44 ha area (67.54 %). Around 31.17 % of the area is having deep to very deep soil. The major surface soil textures in the watershed area constitutes that of fine loamy (295.96 ha) and Loamy Skeletal (191.57 ha). Nearly 47.35 % of the watershed area is prone to moderate soil erosion which calls for proper soil and water conservation measures in the area.

18.4 Watershed Committee

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

18.5 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.

18.6 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.

18.7 Activities proposed

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

Table:169- Details of activities proposed

Entry Point Activities	
1	Banana cultivation
2	Vegetable cultivation
3	Pineapple cultivation
4	Mushroom cultivation

5	Apiculture
6	Fish farming
7	Mulberry cultivation
8	Tapioca cultivation
Natural Resoruce Conservation Activities	
1	Cultivation of horticulture crops in wastelands
2	Intercropping in coconut plantation
3	Fruit tree planting
4	Crop demonstration- vegetable garden in schools
5	Medicinal plants in public institution
6	Polandi thodu side rotection- smart chanel construction
7	Channel side protection wall fro chathothe Poyil to Anappara puzha
8	Well renovation Chavuttipara
9	Naripetta Up School Pond Renovation
10	Rejuvenation of Nochi kandi thodu
11	Check dam construction at Cholangattumukku Polandi thodu- side wall protection
12	Construction of check dam and side protection wall kavil thazhe near health Centre
13	Rejuvenation of Illathu thazhe thodu or olippil thodu

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

Table: 170 Budget for Chiyyoor micro watershed

No.	Budget component	%	Amount in Rs. (Lakhs)
1.	Administrative cost	10	16.21
2.	Monitoring	2	3.24
3.	Evaluation	2	3.24
Preparatory phase			
4.	Entry point activities	2	3.24
5.	Institution and capacity building	3	4.86
6.	Detailed Project Report	1	1.62

Watershed works phase			
7.	Natural Resoruces Conservation works	47	76.20
8.	Livelihood activities for asset less	15	24.32
9.	Production system and micro enterprises	15	24.32
10.	Consolidation phase	3	4.86
		100	**162.12**

ChiyyoorMicroWatershed (29M24a) - Action Plan

Table: 171 -Sector-I- Natural Resources Conservation and Management - Ist Year Plan

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
1	Cultivation of horticultural crops in wastelands	25 cent	10000	3	30000		3000
2	Intercropping in coconut plantations	25 cent	5500	20	110000		11000
3	Fruit tree planting (Jack fruit, rambutan, mango)	25 cent	10000	20	200000		20000
4	Crop demonstration - vegetable garden in schools	25 cent	15000	2	30000		3000
5	Pachathuruthu	5 cent	50000	2	100000		10000
6	Earthen bunds	Rm	62	17390		1078180	
7	Centripetal terrracing with mulching	no.	179	11225		2009275	
8	Stone pitched contour bunds	Rm	144	8982		1293408	
9	Moisture Conservation pits	no.	122	1995		243390	
10	Live fencing	Rm	24.5	923		22613.5	
11	Gully plugs	no.	1500	65		97500	
12	Brushwood checkdams	Rm	316	21		6636	
13	Sidewall protection of drains (geotextiles)	m2	191	410		78310	
14	Desiltation of drains	10m3	485.85	40		19434	
15	Side varambuearthening of drains	M	234	328		76752	
16	Side protection of drains with bamboo planting	no.	34.65	1000		34650	
17	Construction of farm ponds (10m x 10 m x 3 m) with	no.	130000	10		1300000	

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
	geotextiles						
18	Well recharging	no.	8000	240		1920000	
19	Construction of new well	no.	50000	5		250000	
20	Polandithodu Side protection wall -Smart Channel construction	1			600000		
21	Channel side protection wall construction from Chathothpoyil to Anapparapuzha	1			600000		
22	Well renovation Chavittupara	1			300000		
23	Narippatta UP school Pond Renovation	1			700000		
23	Rejuvanationof Nochikandi thodu	1			1250000		
	Total			**42680**	**3920000**	**8430148.5**	**47000**

ChiyyoorMicroWatershed (29M24a) - Action Plan

Table: 172 -Sector-I- Natural Resources Conservation and Management –2nd Year Plan

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
1	Cultivation of horticultural crops in wastelands	25 cent	10000	3	30000		3000
2	Intercropping in coconut plantations	25 cent	5500	20	110000		11000
3	Fruit tree planting (Jack fruit, rambutan, mango)	25 cent	10000	30	300000		30000
4	Pachathuruthu	5 cent	50000	3	150000		15000

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
5	Earthen bunds	Rm	62	17390		1078180	0
6	Centripetal terrracing with mulching	no.	179	14966		2678914	
7	Stone pitched contour bunds	Rm	144	8982		1293408	
8	Moisture Conservation pits	no.	122	3991		486902	
9	Live fencing	Rm	24.5	1230		30135	
10	Gully plugs	no.	1500	65		97500	
11	Brushwood checkdams	Rm	316	21		6636	
12	Sidewall protection of drains (geotextiles)	m2	191	819		156429	
13	Desiltation of drains	10m3	485.85	80		38868	
14	Side varambuearthening of drains	M	234	491		114894	
15	Construction of farm ponds (10m x 10 m x 3 m) with geotextiles	no.	130000	14		1820000	
16	Well recharging	no.	8000	320		2560000	
17	Construction of new well	no.	50000	10		500000	
18	Construct Check dam CholangattuMukkuPolandithodu Side protection wall	1			1000000		
19	Construct Checkdam and side protection wall Kavilthaze near healthcenter	1			700000		
20	Rejuvenation of EllathuThazhethode or Olippilthodu-	1			970000		

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
	Widening, Dredging and Side protection on LHS downstream (50m) and Widening, Dredging and Side protection on RHS downstream (70 m						
	Total				**3260000**	**10861866**	**59000**

ChiyyoorMicroWatershed (29M24a) - Action Plan

Table: 173 -Sector-I- Natural Resources Conservation and Management –3rd Year Plan

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
1	Cultivation of horticultural crops in wastelands	25 cent	10000	3	30000		3000
2	Intercropping in coconut plantations	25 cent	5500	20	110000		11000
3	Fruit tree planting (Jack fruit, rambutan, mango)	25 cent	10000	20	200000		20000
4	Pachathuruthu	5 cent	50000	2	100000		10000
5	Centripetal terrracing with mulching	no.	179	11225		2009275	
6	Stone pitched contour bunds	Rm	144	4491		646704	
7	Moisture Conservation pits	no.	122	3991		486902	
8	Live fencing	Rm	24.5	923		22613.5	
9	Sidewall protection of drains (geotextiles)	m2	191	819		156429	
10	Desiltation of drains	10m3	485.85	80		38868	
11	Well recharging	no.	8000	240		1920000	
12	Construction of new well	no.	50000	10		500000	
	Total			**21823**	**440000**	**5780791.5**	**44000**

Chiyyoor Watershed((29M24a)- Action Plan

Table: 174Livelihood Support system for Landless/ Asset less -1st Year Plan

No.	Name of Activity	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	WDC PMKSY	Beneficiary contribution
1	Poultry unit (5 bird+ cage)	2600	47	122200	800	37600	84600
2	Cow rearing (milching)	60000	10	600000	30000	300000	300000
3	Goat rearing (female 2)	30000	10	300000	15000	150000	150000
4	Trichoderma Enriched cowdung production unit	30000	1	30000	20000	20000	10000
	Total			**1052200**		**507600**	**544600**

Chiyyoor Watershed((29M24a) - Action Plan

Table: 175 Livelihood Support system for Landless/ Asset less -2nd Year Plan

No.	Name of Activity	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	WDC PMKSY	Beneficiary contribution
1	Poultry unit (5 bird+ cage)	2600	40	104000	800	32000	72000
2	Retail Market/ Outlet(Environmentally Controlled) for Horticultural produce/Agroproducts	1500000	1	1500000	750000	750000	750000
3	Agromachinery service centre	1000000	1	1000000	900000	900000	100000
4	Minimal fruit and vegetable Processing unit	200000	1	200000	100000	100000	100000
	Total			**2804000**		**1782000**	**1022000**

Chiyyoor Watershed((29M24a) - Action Plan

Table: 176 Livelihood Support system for Landless/ Asset less -3rd Year Plan

No.	Name of Activity	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	WDC PMKSY	Beneficiary contribution
1	Poultry unit (5 bird+ cage)	2600	28	72800	800	22400	50400
2	Goat rearing (female 2)	30000	3	90000	15000	45000	45000
3	Hatchery (Poultry)	300000	1	300000	75000	75000	225000
	Total			**462800**		**142400**	**320400**

Chiyyoor Watershed(29M24a) - Action Plan

Table: 177 Production System -1st Year Plan

Sl. No	Project	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	Cost to be met from project fund	Beneficiary contribution	WDF
1	Floriculture	136000	2	272000	16000	32000	240000	6400
2	Integrated Farming System (5-30 cents)	80000	5	400000	30000	150000	250000	30000
3	Integrated Farming System (31-40 cents)	100000	5	500000	40000	200000	300000	40000
4	Integrated Farming System (41 cents-2 ha)	120000	3	360000	50000	150000	210000	30000
5	Small nursery (0.5 acre)	300000	1	300000	150000	150000	150000	30000
6	Rambutan/ Mango/Jack fruit/ Mangosteen/Passionfruit Cultivation	60000	2	120000	30000	60000	60000	12000
7	Medicinal Plants cultivation	250000	2	500000	125000	250000	250000	50000

8	Vegetable Cultivation in Growbags	2000	50	100000	1500	75000	25000	15000
9	Distribution of Coconut seedlings (DxT)/Hybrid	250	200	50000	125	25000	25000	5000
10	Vegetable Area expansion	75000	3	225000	25000	75000	150000	15000
11	Banana cultivation	216000	4	864000	26250	105000	759000	21000
12	Promotion of nutritional garden (kit containing 2 to 3 varieties)	100	200	20000	50	10000	10000	2000
	Total			**3711000**		**1282000**	**2429000**	**256400**

Chiyyoor Watershed(29M24a) - Action Plan
Table: 178 Production System -2nd Year Plan

Sl. No	Project	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	Cost to be met from project fund	Beneficiary contribution	WDF
1	Integrated Farming System (5-30 cents)	80000	5	400000	30000	150000	250000	30000
2	Integrated Farming System (31-40 cents)	100000	5	500000	40000	200000	300000	40000
3	Integrated Farming System (41 cents-2 ha)	120000	3	360000	50000	150000	210000	30000
4	Rambutan/ Mango/Jack fruit/ Mangosteen/Passionfruit Cultivation	60000	4	240000	30000	120000	120000	24000
5	Intercropping in coconut	20000	10	200000	6000	60000	140000	12000
6	Vegetable Cultivation in Growbags	2000	50	100000	1500	75000	25000	15000
7	Distribution of Coconut seedlings (DxT)/Hybrid	250	150	37500	125	18750	18750	3750

8	Banana cultivation	216000	4	864000	26250	105000	759000	21000
9	Vegetable Area Expansion	75000	2	150000	25000	50000	100000	10000
	Promotion of nutritional garden (2 to 3 varieties)	100	200	20000	50	10000	10000	2000
	Total			**2871500**		**938750**	**1932750**	**157750**

Chiyyoor Watershed(29M24a) - Action Plan
Table: 179 Production System -3rd Year Plan

Sl. No	Project	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	Cost to be met from project fund	Beneficiary contribution	WDF
1	Rambutan/ Mango/Jack fruit/ Mangosteen/Passionfruit Cultivation	60000	2	120000	30000	60000	60000	12000
2	Vegetable Cultivation in Growbags	2000	50	100000	1500	75000	25000	15000
3	Distribution of Coconut seedlings (DxT)/Hybrid	250	200	50000	125	25000	25000	5000
4	Intercropping in coconut	20000	7	140000	6000	42000	98000	8400
5	Promotion of nutritional garden (2 to 3 varieties)	100	100	10000	50	5000	5000	1000
	Total			**420000**		**207000**	**213000**	**41400**

CHAPTER 19

MICRO WATERSHED BASED ACTION PLAN

KUMMAMKODE (29M28c)

Kummamkode micro watershed is the largest watershed in the PMSKY Kozhikode cluster with an area of 1689.74ha (40.78 % of total Mahe watershed area). Major portion of this micro watershed is spread over Kunnummal and Nadapuram panchayath and a small portion over Kutyadi and Purameri panchayath.

19.1 General Description

Table: 180 General Description of Kummamkode (29M28c) micro watershed

Name of micro watershed	:	Kummamkode
Micro watershed code	:	29M28c
River basin	:	Mahe
District	:	Kozhikode
Block Panchayath	:	Kunnummal
GramaPanchayath	:	Kunnummal, Nadapuram
Villages	:	Kunnummal, Nadapuram
Latitude	:	11.6773 N
Longitude	:	75.6832 E
Wards	:	Kunnummal (3,6,7,8,9,10,11,12,13) Part Nadapuram (3,5,8,9,10, 11,12,13,14,15,16,17,18,19,20,21)Part Kutiyadi 1 Part
Total Area	:	1689.74ha
% of area in the PMSKY cluster	:	40.78 %

19.2 Socio economic profile

As per the information provided in the baseline survey conducted, Kummamkode micro watershed has a total number of 6884 households with a total population of 31407. 4337 BPL families reside in the micro watershed area. Out of the total population 53 belongs to scheduled tribe and 522 belongs to Scheduled cast. 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 Kummamkode micro watershed are given in the table.

Table: 181- Socio economic details of Kummamkode micro watershed

1.	Total number of households		6884
2.	Total Population		31407
3.	No. of BPL families		4337
4.	Population	Scheduled Caste	522
		Scheduled Tribe	53
5.	Land holdings/Family (in Ha)		0.25

19.3 Biophysical Resources

19.3.1 Physiography

The relief of the watershed ranges from 11 m above MSL to 183 m above MSL. The majority of the area falls in the relief category of 25 to 50 m above MSL which occurs in an area of 1037.61 ha (63.63 %). An area of 11.34 ha is located above 125m above MSL.

19.3.2 Slope

The watershed area is divided into six categories of slope classes. The majority of area is under the moderately sloping area having 5-10 % slope. The category spreads over an area of 476.24 ha (28.18 %), 15.27 % of the watershed area is having strongly sloping lands which requires urgent soil and water conservation measures.

Table: 182 Details of Slope of Kummamcodemicro watershed

SL No	Slope Category	Area in Ha	Percentage
1	0-3% - Level/Gentle	417.76	24.72
2	3-5% - Slight Slope	192.19	11.37
3	5-10% -Moderately Sloping	476.24	28.18
4	10-15% -Strongly Sloping	258.10	15.27
5	15-35% -Moderately Steep Sloping	314.86	18.63
6	>35% -Steep Slope	30.58	1.81
	Total	**1689.74**	**100.00**

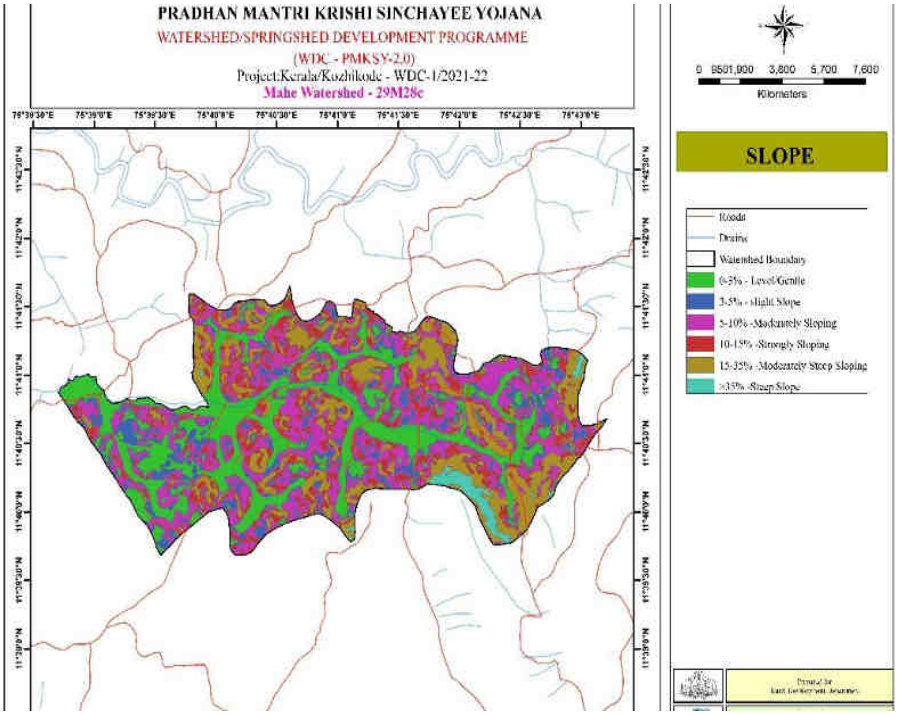


Fig.23.Slope (29M28c)

19.3.3 Drains

The Mahe River flowing through the western portion of the watershed is the major drain of this watershed. Few small drains are originating from different parts of this watershed which drains to the Mahe River at the western boundary of the watershed. The details of the drains and ponds in the watershed area are given in table. The details of the drains and ponds in the watershed area are given in table 183

Table: 183 Details of Drains in Kummamcode micro watershed

Drains	Length(m)
Kumamkode	1930.76
PulikoolThodu	8268.38
Other First Order Streams	5120.35
Total	**1319.49**

19.3.4 Land use

Agriculture is the prime activity in the watershed area. The major land use category mapped in the watershed area is Coconut Dominant Mixed Crops. It occurs an area of 467.53 ha (27.67 %). 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 460.58 ha.

Table. : 184 Land use categories in Kummamcodemicro watershed

Sl. No.	Land use category	Area in ha	Percentage
1	Agricultural Crop - Coconut	354.83	21.00
2	Agricultural Crop - Coconut Dominant Mixed Crops	467.53	27.67
3	Agricultural Mixed Crops - Mixed Crops	460.58	27.26
4	Agricultural Perennial Crop - Arecanut	0.85	0.05
5	Agricultural Plantation Crop - Rubber	0.79	0.05
6	Built-Up Land - Built-Up Land With Mixed Crops	17.90	1.06
7	Built-Up Land - Educational Institution	6.49	0.38
8	Built-Up Land - Health Institution	0.40	0.02
9	Built-Up Land - Open Spaces/Vacant Land	1.56	0.09
10	Built-Up Land - Play Ground	1.21	0.07
11	Built-Up Land - Public/Semi Public Institutions	2.00	0.12
12	Built-Up Land - Religious Institution	0.64	0.04
13	Built-Up Land - Residential	56.26	3.33
14	Built-Up Land - Road	16.43	0.97
15	Built-Up Land _ Commercial	5.52	0.33
16	Built-Up Land _ Residential	0.61	0.04
17	Paddy Converted - Built-Up Land	6.93	0.41
18	Paddy Converted - Coconut	140.08	8.29
19	Paddy Converted - Coconut Dominant Mixed Crops	37.44	2.22
20	Paddy Converted - Commercial Building	0.09	0.01
21	Paddy Converted - Educational Institution	0.05	0.00
22	Paddy Converted - Mixed Built-Up	1.63	0.10
23	Paddy Converted - Religious Institution	0.10	0.01
24	Paddy Converted - Residential	2.84	0.17
25	Paddy Converted - Seasonal Crop	4.11	0.24
26	Paddy Converted to Mixed Crops	49.05	2.90
27	Paddy Converted To Seasonal Crop - Banana	0.23	0.01
28	Paddy Cultivating Land - Current Fallow	27.10	1.60
29	Paddy Fallow Land - Long Fallow	1.28	0.08
30	Waste Land - Land Without Scrub	15.06	0.89

31	Waste Land - Quarry	2.18	0.13
32	Waste Land - Sands/Riverine/Coastal	0.55	0.03
33	Water Body - Canal	6.18	0.37
34	Water Body - Lake/Pond	0.76	0.04
35	Waterbody - River/Stream	0.49	0.03
	Total	**1689.74**	**100.00**

19.3.5 Geology

The watershed falls in the geological unit of Migmatite Complex, has an area of 1544.99 ha (91.43 %).

Table. : 185Rock types in Kummamcodemicro watershed

SL No	Rock Type	Area in Ha	Percentage
1	Basic Rocks	67.34	3.99
2	Charnockite group of rocks	76.49	4.53
3	Migmatite Complex	1544.99	91.43
4	Waterbody	0.92	0.05
	Total	**1689.74**	**100.00**

19.3.6 Geomorphology

There are seven geomorphological units of which more than 75 % (1298.69 ha) of the area falls under the Lower Plateau (Lateritic) - Dissected category. An area of 276.33 ha is mapped under the category valley fill which accounts 16.35 % of the total area of the micro watershed.

Table: 186 geomorphology in Kummamcodemicro watershed

SL No	Geomorphology	Area in Ha	Percentage
1	Linear ridge(Lower Plateau)	55.61	3.29
2	Linear ridge(Piedmont Zone)	2.09	0.12
3	Lower Plateau (Lateritic) - Dissected	1298.69	76.86
4	Piedmont Zone	30.43	1.80
5	Residual Mount	25.66	1.52
6	Valley Fill	276.33	16.35
7	Waterbody	0.92	0.05
	Total	**1689.74**	**100.00**

19.3.7 Soils

The soil in the micro watershed is mostly very deepwith a depth of 75- 100 cm, which accounts around 1055.16 ha area (62.44 %). Around 31.77 % of the area is having deep to very deep soil. The major surface soil textures in the watershed area constitutes that of fine loamy (875.42 ha) and Fine (536.82 ha). Nearly 54.70 % of the watershed area is prone to moderate soil erosion which calls for proper soil and water conservation measures in the area.

19.4 Watershed Committee

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

19.5 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.

19.6 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.

19.7 Activities proposed

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

Table: 187- Details of Activities proposed

Entry Point Activities	
1	Banana cultivation
2	Vegetable cultivation
3	Pepper cultivation
4	Mushroom cultivation
5	Apiculture
6	Fish farming
7	Coconut cultivation
Natural Resoruce Conservation Activities	
1	Cultivation of horticulture crops in wastelands
2	Intercropping in coconut plantation
3	Fruit tree planting
4	Crop demonstration- vegetable garden in schools
5	Rejuvenation of Nellom kuzhi Spring with side wall protection
6	Side protection of veterinary hospital near Unniyarkandi Chathothu kunnil thodu
7	Rejuvenation of Kunnummal thodu with side Protection at both side downstream at Ambalakulangara and Podiyanar
8	Rejuvenation of Kunnummal thode at Madathil thaze down stram
9	Rejuvenation of Pulikkal at paloli thazhde with side wall
10	Rjuvenation of Easwaran porath valiyakovilakathu thodu – side wall Protection and dredging
11	Rejuvenation of well –kuttiyadi
`12	Renovation of Poykayil thodu dredging side protection
13	Rejuvenation of Kunnummel thodu with VCB side wall seed channel-Naduthodu
14	Rjuvenation of Kannayithodu in Kottayil Thazham upstream
15	Rejuvenation of Malakulangara Public Pond with dredging and side wall
16	Rejuvenation of Kunnamangalam Illamkulam
17	Rejuvenation of Kummankode thodu at Panayullathil thazhe Bhagam
18	Rejuvenation of Pulikkal kakkampalli thodu dredging with side

	protection up stream and downstream
19	Rejuvenation of Pulikkal thodu at Narikkathari Kodiyamkoth thazhe

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

Table:188 Budget for Kummamcode micro watershed

No.	Budget component	%	Amount in Rs.
1.	Administrative cost	10	4468800
2.	Monitoring	2	893760
3.	Evaluation	2	893760
Preparatory phase			
4.	Entry point activities	2	893760
5.	Institution and capacity building	3	1340640
6.	Detailed Project Report	1	446880
Watershed works phase			
7.	Natural Resoruces Conservation works	47	21003360
8.	Livelihood activities for asset less	15	6703200
9.	Production system and micro enterprises	15	6703200
10.	Consolidation phase	3	1340640
		100	**44688000**

KummakoduMicroWatershed (29M28c) - Action Plan

Table: 189 -Sector-I- Natural Resources Conservation and Management - Ist Year Plan

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
1	Avenue planting	no.	35	800		28000	
2	Cultivation of horticultural crops in wastelands	25 cent	10000	10	100000		10000
3	Intercropping in coconut plantations	25 cent	5500	23	126500		12650
4	Fruit tree planting (Jack fruit, rambutan, mango)	25 cent	10000	25	250000		25000
5	Crop demonstration - vegetable garden in schools	25 cent	15000	1	15000		1500
6	Pachathuruthu	5 cent	50000	1	50000		5000
7	Medicinal plants in public institutions	5 cent	5500	5	27500		2750
8	Earthen bunds	rm	62	36184		2243408	
9	Centripetal terrracing with mulching	no.	179	37006		6624074	
10	Stone pitched contour bunds	rm	144	21172		3048768	
11	Moisture Conservation pits	no.	122	4579		558638	
12	Live fencing	rm	24.5	3478		85211	
13	Gully plugs	no.	1500	89		133500	
14	Brushwood checkdams	rm	316	18		5688	
15	Loose boulder check dams (3 m length)	no.	5800	30		174000	
16	Sidewall protection of drains (geotextiles)	m2	191	1531		292421	

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
17	Desiltation of drains	10m3	485.85	162		78707.7	
18	Side varambuearthening of drains	m	234	1225		286650	
19	Side protection of drains with bamboo planting	no.	34.65	800		27720	
20	Construction of farm ponds (10m x 10 m x 3 m) with geotextiles	no.	130000	25		3250000	
21	Well recharging	no.	8000	300		2400000	
22	Construction of new well	no.	50000	8		400000	
23	Rejuvenation of Nellomkuzhy spring with side wall protection	1			800000		
24	side protection of veterinary hospital uniyarkandichathottukunnilthodu	1			420000		
25	Rejuvenation of kunnumalthodu with side protection at both side in downstream at Ambalakulangara and podiyanal	1			875000		
26	rejuvanation of kunnummelthodu at madathilthazhe-downstream	1			800000		
27	rejuvanation of pulikkal at palolithazhe with side wall	1			950000		
28	Rejuvanation of easwaranpurathu valiyakovilakathu thodu -side wall protection and dredging	1			1200000		

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
	Total				**5614000**	**19636785.7**	**56900**

KummakoduMicroWatershed (29M28c) - Action Plan

Table: 190-Sector-I- Natural Resources Conservation and Management – 2nd Year Plan

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
1	Avenue planting	no.	35	800		28000	
2	Cultivation of horticultural crops in wastelands	25 cent	10000	10	100000		10000
3	Intercropping in coconut plantations	25 cent	5500	30	165000		16500
4	Fruit tree planting (Jack fruit, rambutan, mango)	25 cent	10000	30	300000		30000
5	Crop demonstration - vegetable garden in schools	25 cent	15000	2	30000		3000
6	Pachathuruthu	5 cent	50000	2	100000		10000
7	Medicinal plants in public institutions	5 cent	5500	5	27500		2750
8	Earthen bunds	rm	62	36184		2243408	
9	Centripetal terrracing with mulching	no.	179	49341		8832039	
10	Stone pitched contour bunds	rm	144	21172		3048768	
11	Moisture Conservation pits	no.	122	9158		1117276	
12	Live fencing	rm	24.5	4637		113606.5	
13	Gully plugs	no.	1500	89		133500	
14	Brushwood checkdams	rm	316	18		5688	
15	Loose boulder check dams (3 m length)	no.	5800	29		168200	

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
16	Sidewall protection of drains (geotextiles)	m2	191	3063		585033	
17	Desiltation of drains	10m3	485.85	324		157415.4	
18	Side varambuearthening of drains	m	234	1838		430092	
19	Construction of farm ponds (10m x 10 m x 3 m) with geotextiles	no.	130000	38		4940000	
20	Well recharging	no.	8000	400		3200000	
21	Construction of new well	no.	50000	16		800000	
22	renovation of poitayalthodu dredging side protection	1			1120000		
23	Rejuvenation of kunnumalthodu with vcb side wall field channel- naduthodu	1			1335000		
24	Rejuvanation of well (kuttiyadi part)	1			300000		
25	rejuvanation of kannayithodu in kottayithazham up stream	1			1400000		
26	Rejuvenation of malakulangara public pond with dredging and side wall	1			1500000		
27	Rejuvanation of kunnamangalamillamkulam	1			1200000		
28	Rejuvanation of kummankoduthodu at panayullathilthazhebhagam	1			540000		
	Total				**8117500**	**25803025.9**	**72250**

KummakoduMicroWatershed (29M28c) - Action Plan

Table:192 -Sector-I- Natural Resources Conservation and Management –3rd Year Plan

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
1	Intercropping in coconut plantations	25 cent	5500	20	110000		11000
2	Fruit tree planting (Jack fruit, rambutan, mango)	25 cent	10000	25	250000		25000
3	Crop demonstration - vegetable garden in schools	25 cent	15000	1	15000		1500
4	Pachathuruthu	5 cent	50000	1	50000		5000
5	Centripetal terrracing with mulching	no.	179	37006		6624074	
6	Stone pitched contour bunds	rm	144	10586		1524384	
7	Moisture Conservation pits	no.	122	9158		1117276	
8	Live fencing	rm	24.5	3478		85211	
9	Sidewall protection of drains (geotextiles)	m2	191	3063		585033	
10	Desiltation of drains	10m3	485.85	324		157415.4	
11	Well recharging	no.	8000	300		2400000	
12	Construction of new well	no.	50000	16		800000	
13	Rejuvanation of pulikkalkakkampallythodu-dredging with side wall protection upstream and downstream	1			2793000		
14	Rejuvanation of pulikkalthoduatNarikkathari-kodiyamkoththazhe	1			4090000		

No.	Activity	Unit	Rate	Volume	PMKSY	Convergence	WDF
	Total				**7308000**	**13293393.4**	**42500**

Kummakodu Watershed((29M28c) - Action Plan

Table: 193 Livelihood Support system for Landless/ Asset less -1st Year Plan

No.	Name of Activity	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	WDC PMKSY	Beneficiary contribution
1	Poultry unit (5 bird+ cage)	2600	303	787800	800	242400	545400
2	Cow rearing (milching)	60000	36	2160000	30000	1080000	1080000
3	Goat rearing (female 2)	30000	21	630000	15000	315000	315000
4	Fish farming	123000	6	738000	49200	295200	442800
5	Distribution Milking Machines (5 cow unit)	75000	10	750000	25000	250000	500000
6	Mushroom cultivation (80-100 bed)	28125	4	112500	11250	45000	67500
				5178300		**2227600**	**2950700**

Kummakodu Watershed ((29M28c) - Action Plan

Table: 194Livelihood Support system for Landless/ Asset less -2nd Year Plan

o.	Name of Activity	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	WDC PMKSY	Beneficiary contribution
1	Poultry unit (5 bird+ cage)	2600	250	650000	800	200000	450000
2	Cow rearing (milching)	60000	30	1800000	30000	900000	900000

3	Fish farming	123000	6	738000	49200	295200	442800
4	Mushroom cultivation (80-100 bed)	28125	4	112500	11250	45000	67500
5	Evaporative Low energy cooling Chamber (8 MT)	500000	1	500000	250000	250000	250000
6	Goat rearing (female 2)	30000	30	900000	15000	450000	450000
7	Minimal fruit and vegetable Processing unit	200000	1	200000	100000	100000	100000
8	Distribution Milking Machines (5 cow unit)	75000	10	750000	25000	250000	500000
9	Trichoderma Enriched cowdung production unit	30000	1	30000	20000	20000	10000
	Total			**5680500**		**2510200**	**3170300**

Kummakodu Watershed((29M28c) - Action Plan

Table: 195Livelihood Support system for Landless/ Asset less -3rd Year Plan

No.	Name of Activity	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	WDC PMKSY	Beneficiary contribution
1	Poultry unit (5 bird+ cage)	2600	325	845000	800	260000	585000
2	Fish farming	123000	6	738000	49200	295200	442800
3	Cow rearing (milching)	60000	20	1200000	30000	600000	600000
4	Distribution Milking Machines (5 cow unit)	75000	7	525000	25000	175000	350000
5	Mushroom cultivation (80-100 bed)	28125	4	112500	11250	45000	67500
6	Copra Processing Unit	500000	1	500000	125000	125000	375000
7	Goat rearing (female 2)	30000	31	930000	15000	465000	465000
				4850500		**1965200**	**2885300**

Kummakodu Watershed(29M28c) - Action Plan
Table: 196 Production System -1st Year Plan

Sl. No	Project	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	Cost to be met from project fund	Beneficiary contribution	WDF
1	Floriculture	136000	1	136000	16000	16000	120000	3200
2	Integrated Farming System (5-30 cents)	80000	10	800000	30000	300000	500000	60000
3	Integrated Farming System (31-40 cents)	100000	5	500000	40000	200000	300000	40000
4	Integrated Farming System (41 cents-2 ha)	120000	5	600000	50000	250000	350000	50000
5	Rambutan/ Mango/Jack fruit/ Mangosteen/Passionfruit Cultivation	60000	10	600000	30000	300000	300000	60000
6	Vegetable Area Expansion	75000	5	375000	25000	125000	250000	25000
7	Medicinal Plants cultivation	250000	1	250000	125000	125000	125000	25000
8	Vegetable Cultivation in Growbags	2000	150	300000	1500	225000	75000	45000
9	Banana cultivation	216000	15	3240000	26250	393750	2846250	78750
10	Distribution of Coconut seedlings (DxT)/Hybrid	250	1000	250000	125	125000	125000	25000
11	Intercropping in coconut	20000	15	300000	6000	90000	210000	18000
12	Rainshelter Cultivation(100m2)	100000	3	300000	50000	150000	150000	30000

13	Drip Irrigation In Growbags in terracces	20000	4	80000	7500	30000	50000	6000
14	Promotion of nutritional garden (kit containing 2 to 3 varieties)	100	200	20000	50	10000	10000	2000
	Total			**7751000**		**2339750**	**5411250**	**467950**

Kummakodu Watershed(29M28c) - Action Plan
Table: 197 Production System -2nd Year Plan

Sl. No	Project	Unit cost/Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	Cost to be met from project fund	Beneficiary contribution	WDF
1	Floriculture	136000	1	136000	16000	16000	120000	3200
2	Integrated Farming System (5-30 cents)	80000	10	800000	30000	300000	500000	60000
3	Integrated Farming System (31-40 cents)	100000	5	500000	40000	200000	300000	40000
4	Integrated Farming System (41 cents-2 ha)	120000	5	600000	50000	250000	350000	50000
5	Small nursery (0.5 acre)	300000	1	300000	150000	150000	150000	30000
6	Rambutan/ Mango/Jack fruit/ Mangosteen/Passionfruit Cultivation	60000	10	600000	30000	300000	300000	60000
7	Vegetable Area Expansion	75000	5	375000	25000	125000	250000	25000
8	Medicinal Plants cultivation	250000	1	250000	125000	125000	125000	25000
9	Vegetable Cultivation in Growbags	2000	150	300000	1500	225000	75000	45000
10	Banana cultivation	216000	15	3240000	26250	393750	2846250	78750

11	Distribution of Coconut seedlings (DxT)/Hybrid	250	1000	250000	125	125000	125000	25000
12	Intercropping in coconut	20000	15	300000	6000	90000	210000	18000
13	Rainshelter Cultivation(100m2)	100000	3	300000	50000	150000	150000	30000
	Drip Irrigation In Growbags in terracces	20000	4	80000	7500	30000	50000	6000
14	Promotion of nutritional garden (kit containing 2 to 3 varieties)	100	200	20000	50	10000	10000	2000
	Total			**8051000**		**2489750**	**5561250**	**497950**

Kummakodu Watershed(29M28c) - Action Plan

Table: 198 Production System -3rd Year Plan

Sl. No	Project	Unit cost/ Nos	Area/ Nos	Total cost	Rate of assistance as per existing norms/unit	Cost to be met from project fund	Beneficiary contribution	WDF
1	Integrated Farming System (5-30 cents)	80000	12	960000	30000	360000	600000	72000
2	Integrated Farming System (41 cents-2 ha)	120000	5	600000	50000	250000	350000	50000
3	Rambutan/ Mango/Jack fruit/ Mangosteen/Passionfruit Cultivation	60000	10	600000	30000	300000	300000	60000
4	Vegetable Area Expansion	75000	5	375000	25000	125000	250000	25000
5	Vegetable Cultivation in Growbags	2000	150	300000	1500	225000	75000	45000
6	Banana cultivation	216000	15	3240000	26250	393750	2846250	78750

7	Distribution of Coconut seedlings (DxT)/Hybrid	250	1000	250000	125	125000	125000	25000
8	Intercropping in coconut	20000	15	300000	6000	90000	210000	18000
9	Promotion of nutritional garden (kit containing 2 to 3 varieties)	100	100	10000	50	5000	5000	1000
	Total			**6635000**		**1873750**	**4761250**	**374750**

CHAPTER 20
WATERSHED DEVELOPMENT WORKS

Watershed work phase is the core component of the project. Creating permanent structures as required the slope, geology and topography starting from ridge to valley to conserve rain water at point of its incidence with ground. 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 approached towards implementation of watershed development projects. A net budget of 56 percent is allotted for this work.

20.1 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 form 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.

This 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, under 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 rising 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, and bio fuel plantation etc.

20.2 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 to see the geographical 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 in PMKSY-WDC-1 watershed. For the ridge area treatment of PMKSY-WDC-1 watersheds, following structure 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 Bund

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 high rainfall areas and regions where the [clay] soil is relatively impervious. 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 with arranging loose boulder perpendicular to the flow of water is called gully plug.

Benefits:

1. Prevents soil erosion of land and reduces the flow of water and further prevents the formation of new streams.
2. Very useful in moisture conservation and reduces the scroucing and desiltation of the streams.

c. Contour trenching:

It is a simple, and a low-cost method of checking the velocity ofrunoff in the ridge area of any watershed. A contour trench is a trench dug along acontour line. A contour line is a line, which joins together points of the sameelevation. Digging a trench along such a line increases the chances of containingrunoff for a longer period of time within the trench. It is also true that if trencheswere not to follow a contour, such digging could actually increase the possibility

ofsoil erosion because there would be a rise in the velocity of runoff following anincrease in the slope of the land.

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 flatterportion of the watershed referred to as the "valley". This eroded soil gets depositedas silt in the reservoirs and ponds, thereby reducing their life. Thus, any waterharvesting work undertaken in the valley will become meaningless unlessappropriate measures such as contour trenching are undertaken to control runoffand soil erosion on the ridge. Contour trenches serve to collect the rainwater thatfalls in the ridge area. This way the soil moisture profile in the area adjacent to thetrench gets improved. Along with the water the eroded fertile topsoil also gets deposited in the trench. It is, therefore, necessary to combine trench constructionwith plantation.

d. Staggered trenches

In medium rainfall areas with highly dissected topography, Staggered ContourTrenches are adopted. The length of the trenches is kept short around 2-3 m and the spacingbetween the rows may vary from 3-5 m. The chances of breaches of SCT are less as comparedto Continuous Contour Trenches. Over time, experience of watershed programs has shown that it is better to staggerthe digging of contour trenches. This is because it has been found that invariably errors havebeen made in contouring over long distances. If the contour trench is not level and by mistakesloped, 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 bemade 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 containing 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, blinds also collect the rainwater that falls in the ridge area. This way the soil moisture profile in the area adjacent to the blind is improved. Along with the water, eroded fertile topsoil also gets deposited in the blind. It is, therefore, important to combine contour blinding 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

Following structures are been proposed in these areas

a. Land Leveling
b. Plantation
c. Earthen Bund

Land leveling: Bench terracing means construction of nearly level steps like fields along contoursusually by half cutting and half filling procedure. It is an earthen embankment or a

ridge andchannel, 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 soilmoisture conservation for enhanced crop production. Bench terracing is recommended forslopes from 10 to 30%.

Plantation: Several agronomical measures are adopted, supplementing the mechanical measures in the treated lands. The processes of soil erosion (detachability and transportability) will continue resulting fluctuating crop fields. 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, and paddy. These will reduce splash erosion.
d. Mixed cropping. increasing the capacity to retain water
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.

Farm Bunds: Bunding, also called a bund wall, is the area within a structure designed to prevent inundation or breaches of various types. 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:

These are at field level of farmers where farmers are operating at a very high labour intensive way. These generally field bunding, crop pattern alteration. 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 two 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. Rainwater harvesting usually involves collecting water from cleaner surfaces, such as roofs. 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 contaminates 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. Biogas is a renewable fuel, so it qualifies for renewable energy subsidies in some parts of the world. 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.

20.3 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 thisscheme.

20.4 Major interventions suggested

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

Table: 199 Major Intervention Suggested under water shed development works

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	Renovationof drains
22	Renovation of ponds
23	Mini drinking water scheme
24	Renovationof 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

CHAPTER 21

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. 15% 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.

21.1 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.

21.2 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, VFPCK, NHM, etc.

21.3 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.

21.4 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 budget component of the project cost earmarked for institution and capacity building.

21.5 Budget

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

Table: 200 Budget for livelihood activities

No	Name of watershed	Amount (in Lakhs)
1	29M20a (Mudikkal)	4.536
2	29M21a (Mandokandy)	8.106
3	29M21b (Irumbathadam)	11.508
4	29M21c(Peruvankuni)	5.67
5	29M22a(Mullambath)	14.406
6	29M23a(Cheekkonnu west)	16.506
7	29M23b(Pathiripatta)	8.862
8	29M23c(Kizhakkedathvayal)	5.124
9	29M24a(Chiyyoor)	24.318
10	29M28c(Kummamkode)	67.032
	Total	**166.0**

21.6 Major interventions suggested

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

Table: 201 Budget for Livelihood Activities

No	**Name of watershed**
1	Poultry unit (5 bird+ cage)
2	Mushroom cultivation (80-100 bed)
3	Goat rearing (female 2)
4	Minimal fruit and vegetable Processing unit

5	Trichoderma Enriched cowdung production unit
6	Poultry unit (5 bird+ cage)
7	Fish farming
8	Retail Market/ Outlet(Environmentally Controlled) for Horticultural produce/Agroproducts
9	Agromachinery service centre
10	Minimal fruit and vegetable Processing unit
11	Cow rearing (milching)
12	Distribution Milking Machines (5 cow unit)
13	Copra Processing Unit

CHAPTER 22
PRODUCTION SYSTEM

One of the important components in the watershed development activities under WDC-PMKSY 2.0 includes support to production/farming system based livelihood activities and enterprises. 15% 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.

22.1 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,VFPCK, 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.

22.2 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...

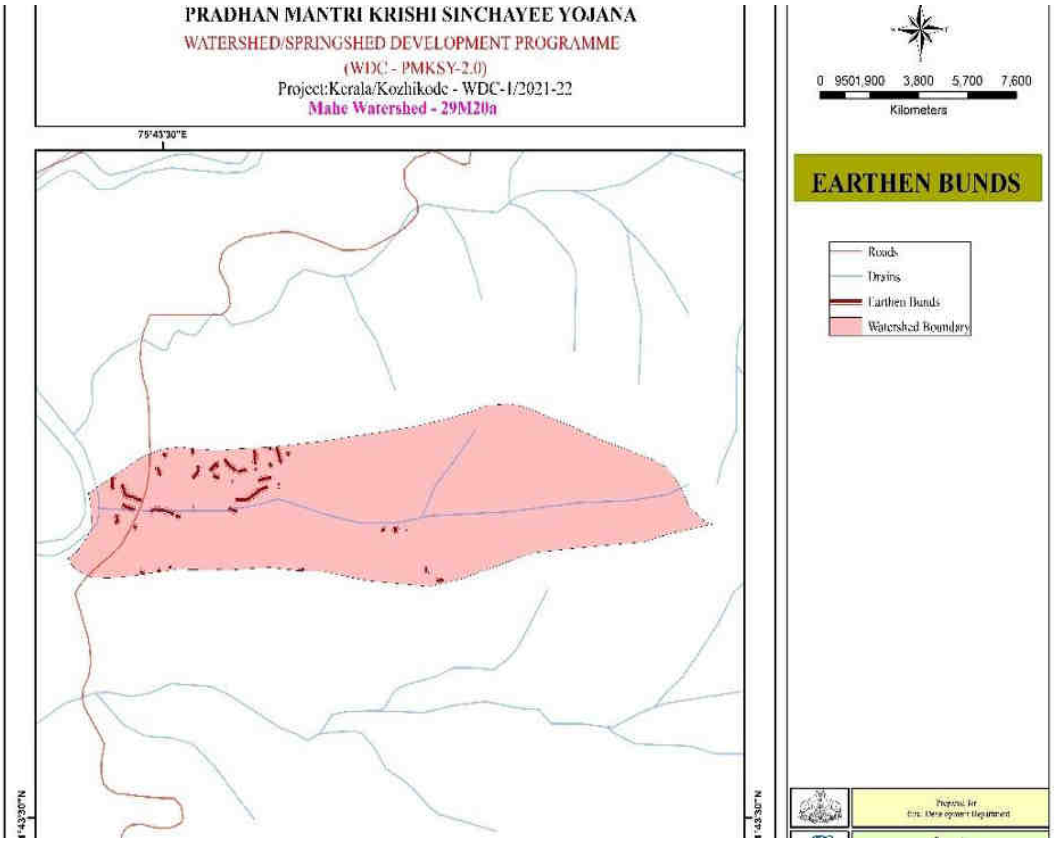
22.3 CapacityBuilding for Beneficiaries

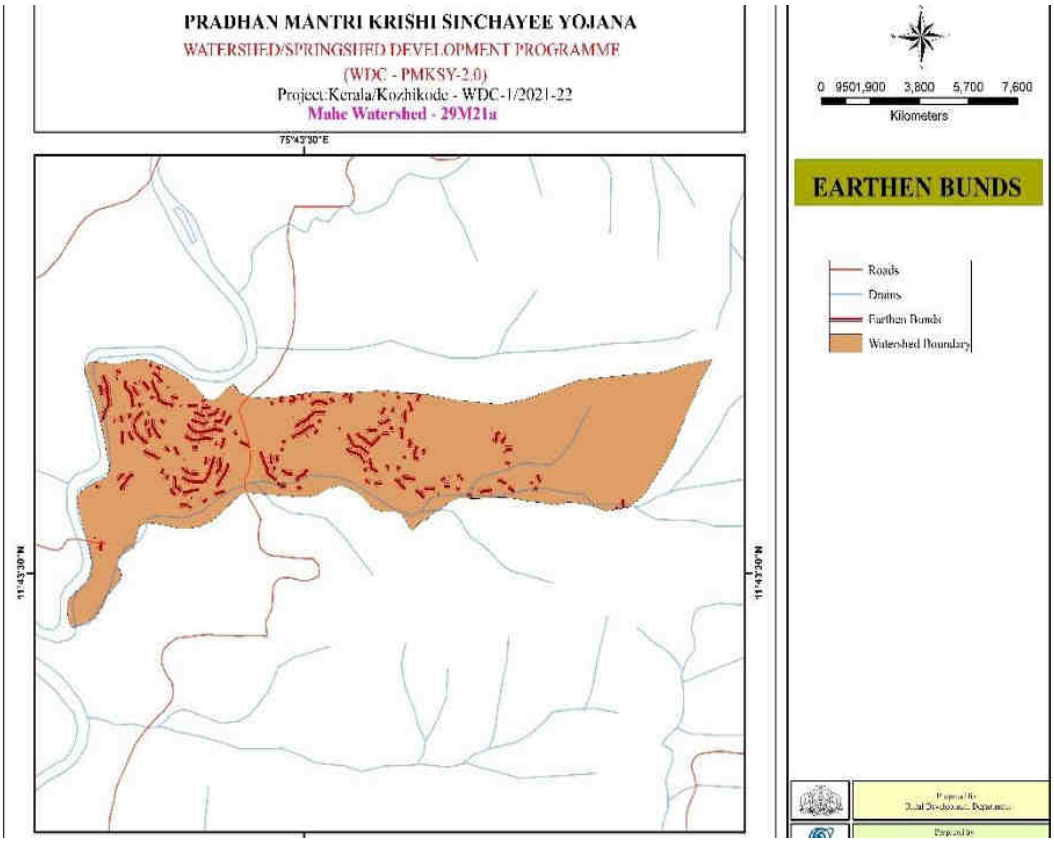
The capacity building needs of the marginalized communities, including SC/ST, landless/asset less people, women, etc is also be included in the action plan prepared for production systems and micro enterprises.The capacity building aims at skill enhancement and not just knowledge and information.The 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.

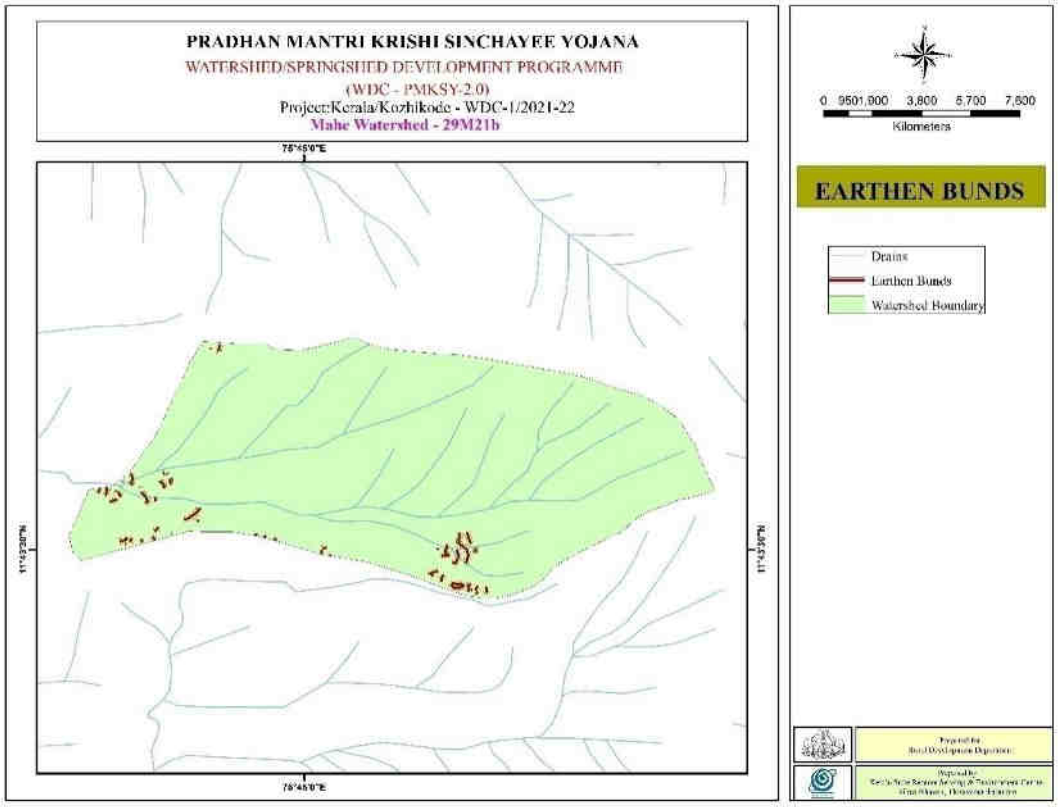
22.4 Major interventions suggested

The major interventions suggested under the Production System are the following:

Fig 24 Major intervention Suggested



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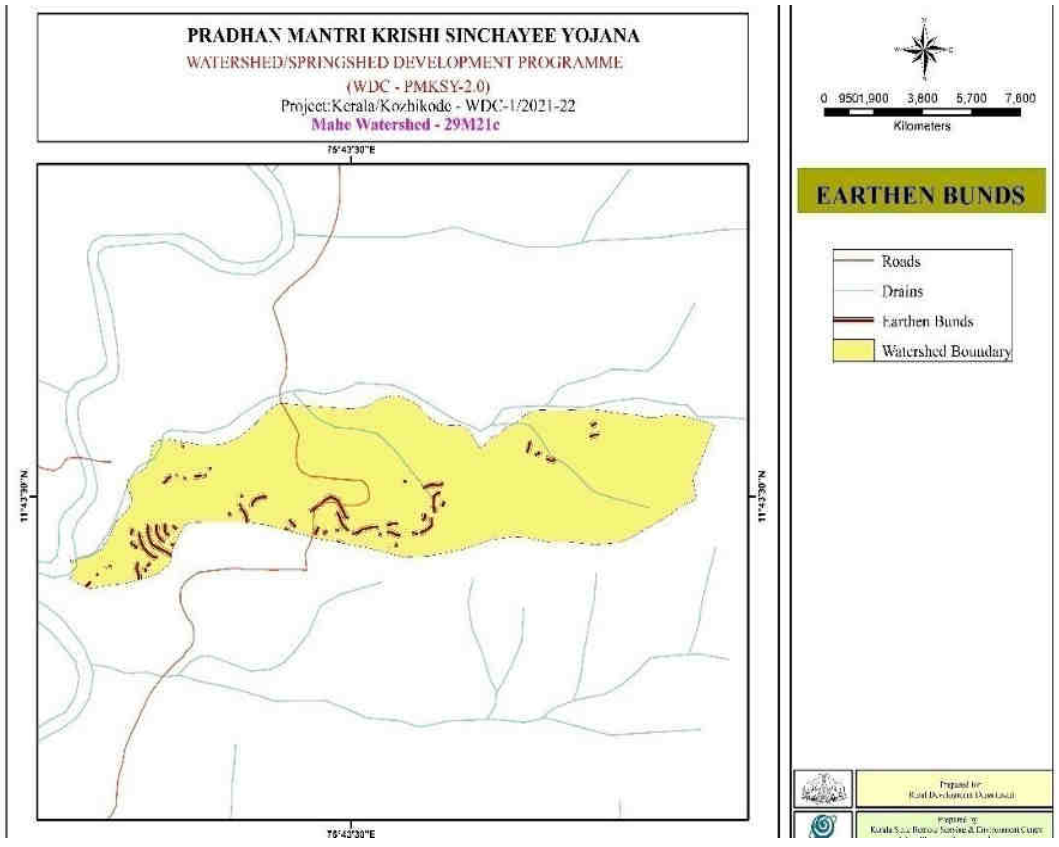
Kilometers
EARTHEN BUNDS
Drains
Earthen Bunds
Watershed Boundary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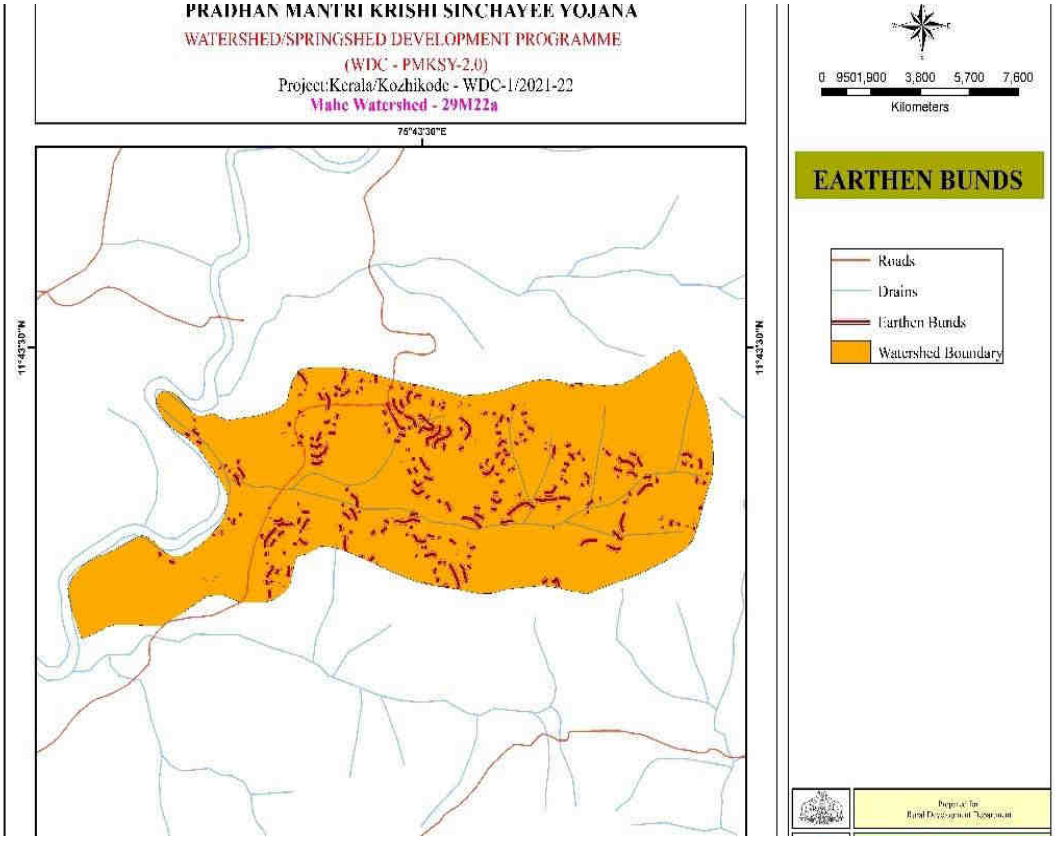
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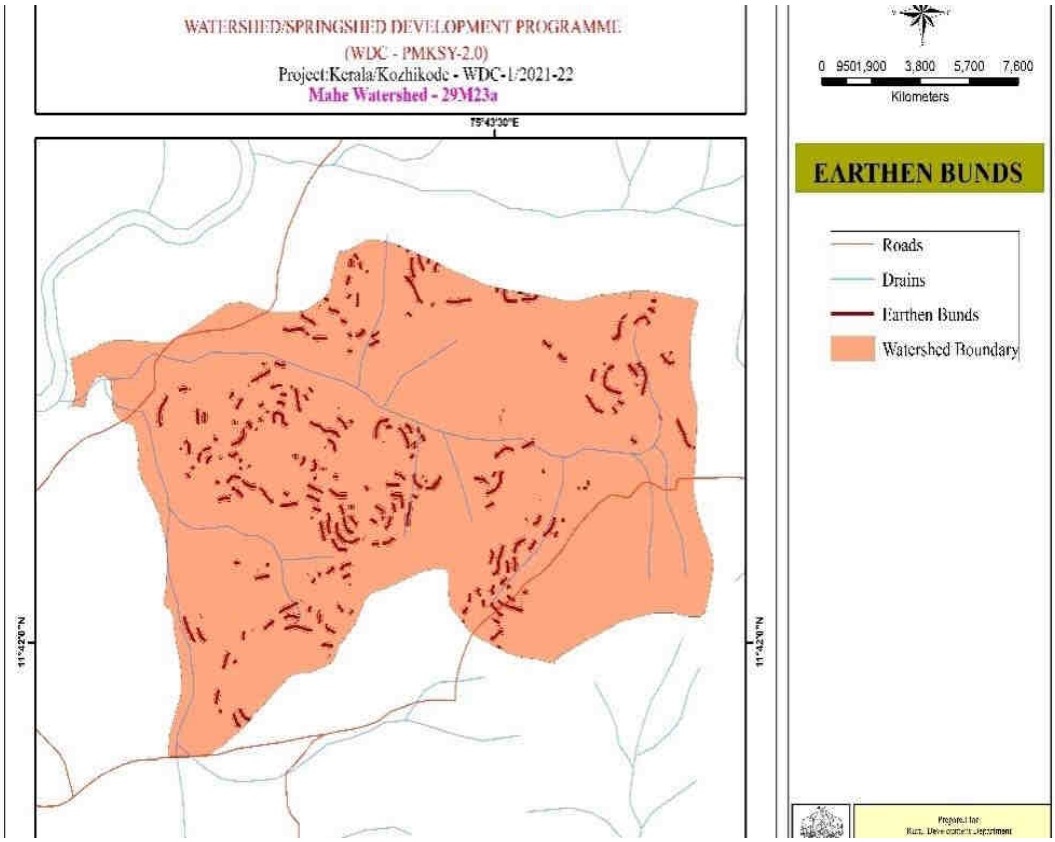
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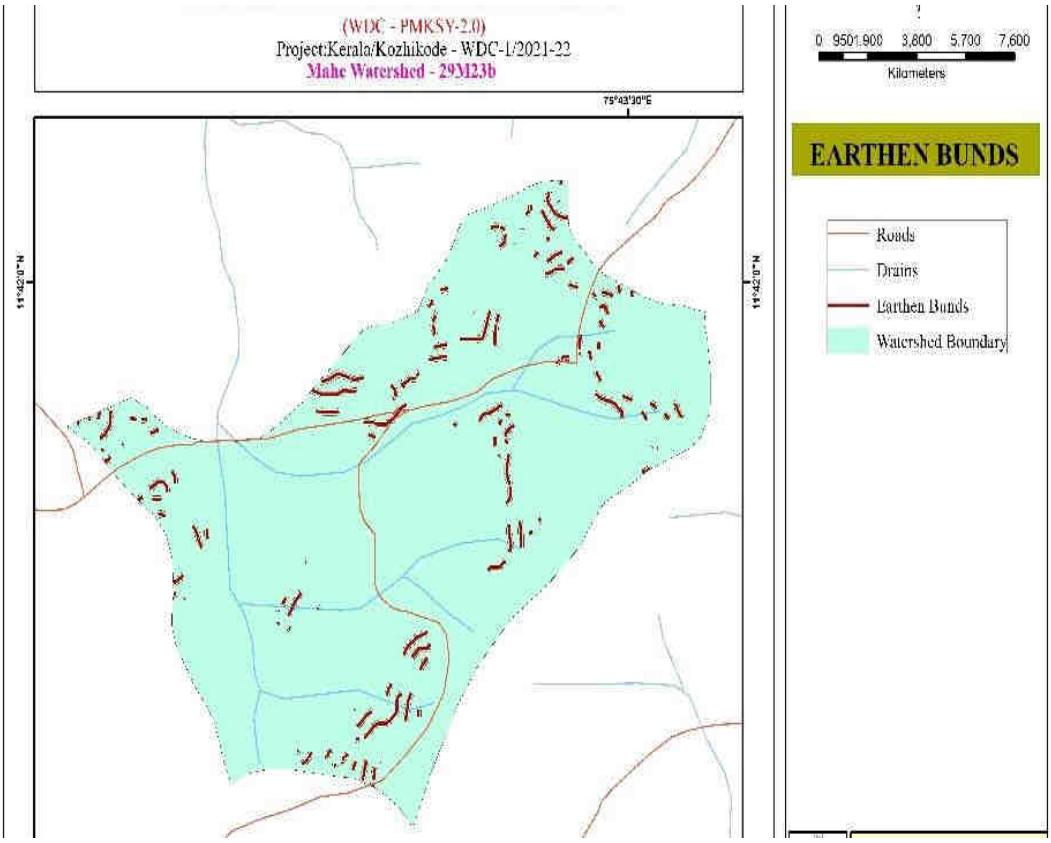
Earthen Bunds
Watershed Boundary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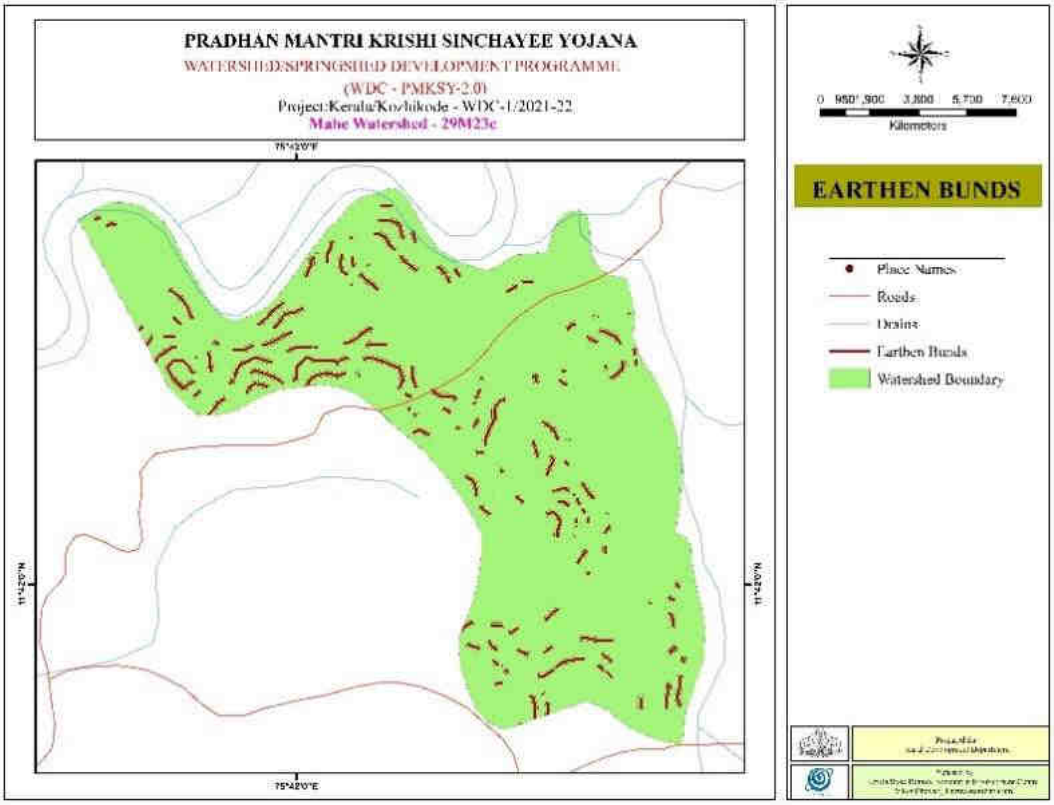
Drains
Earthen Bunds
Watershed Boundary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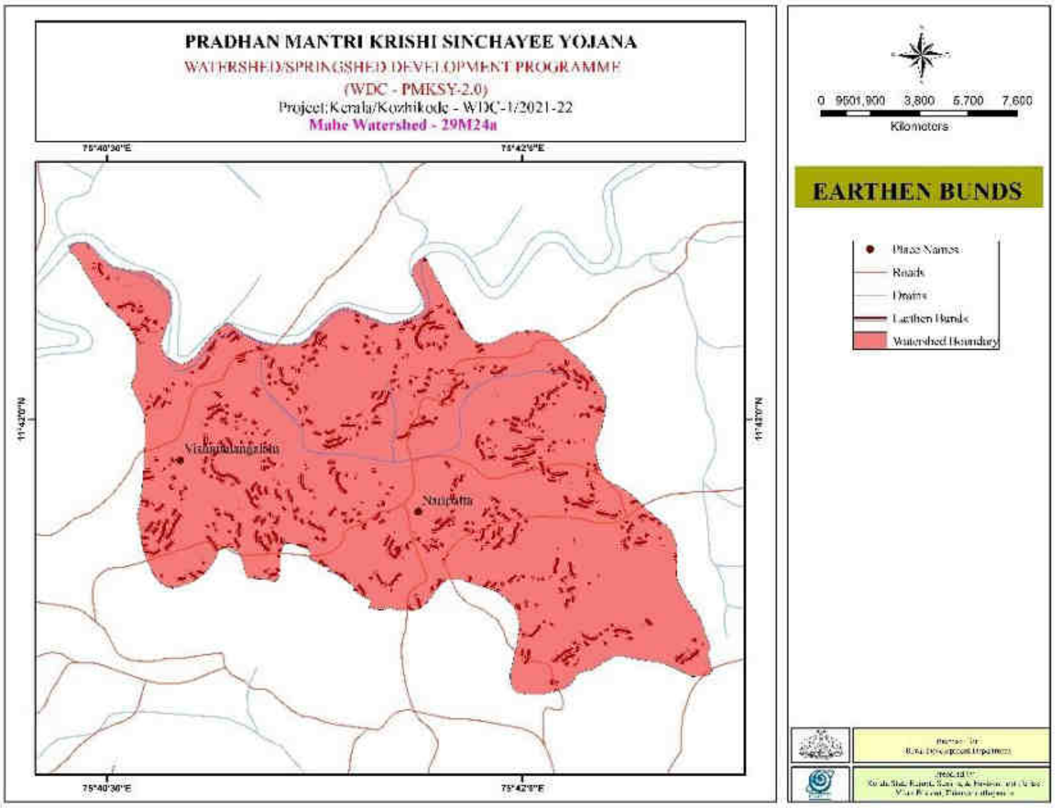
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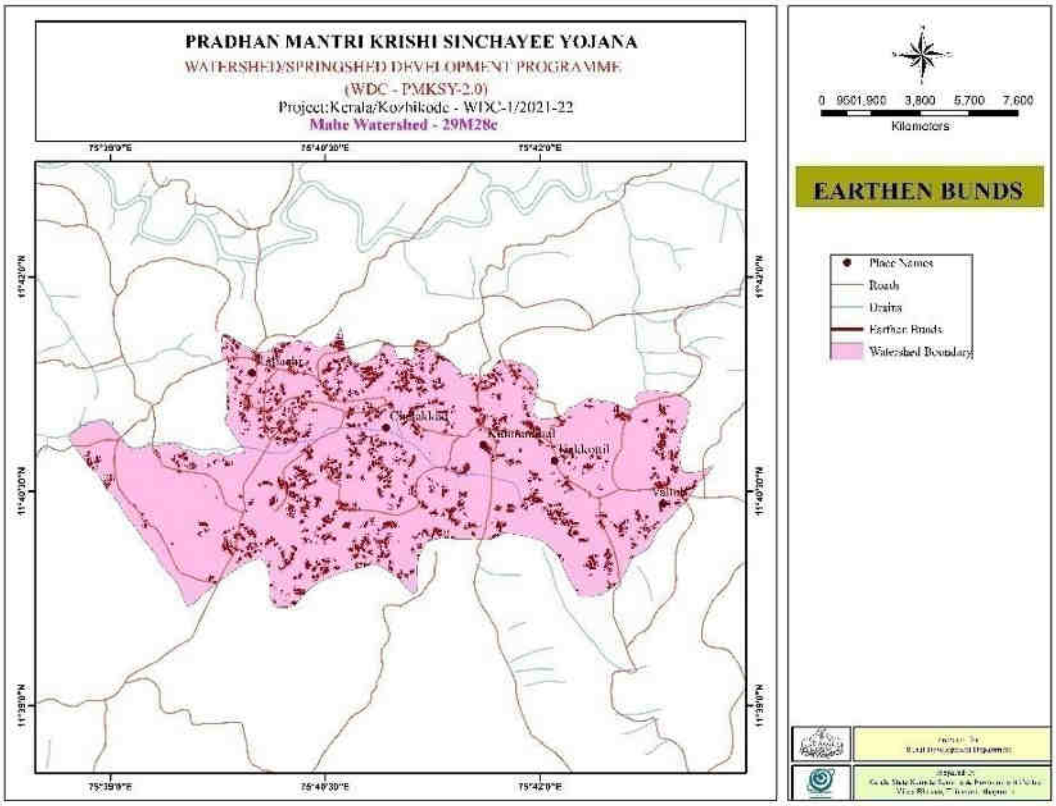
Place Names
Roads
Drains
Earthen Bunds
Watershed Boundary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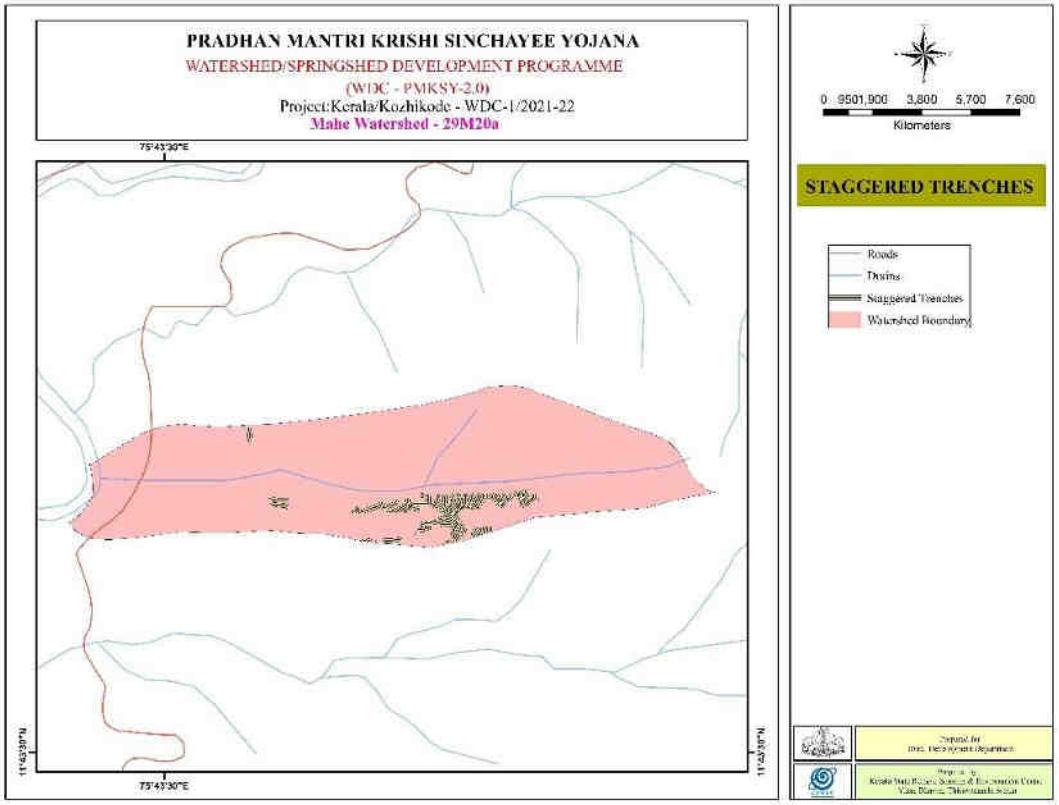
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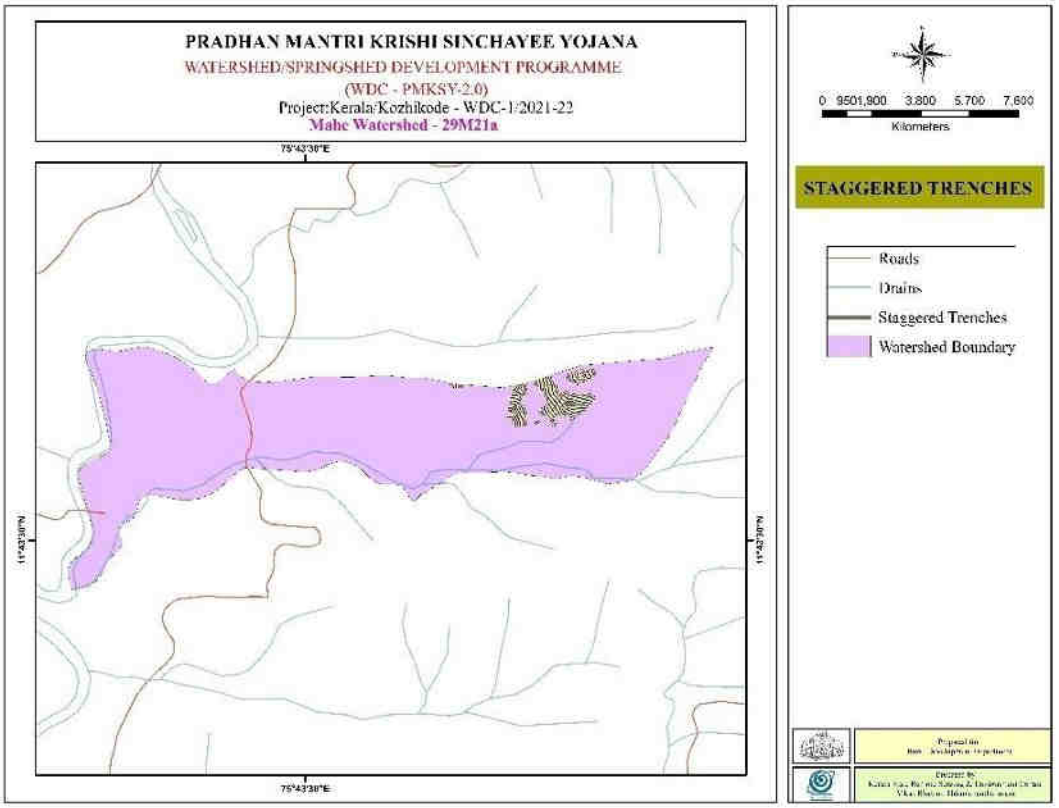
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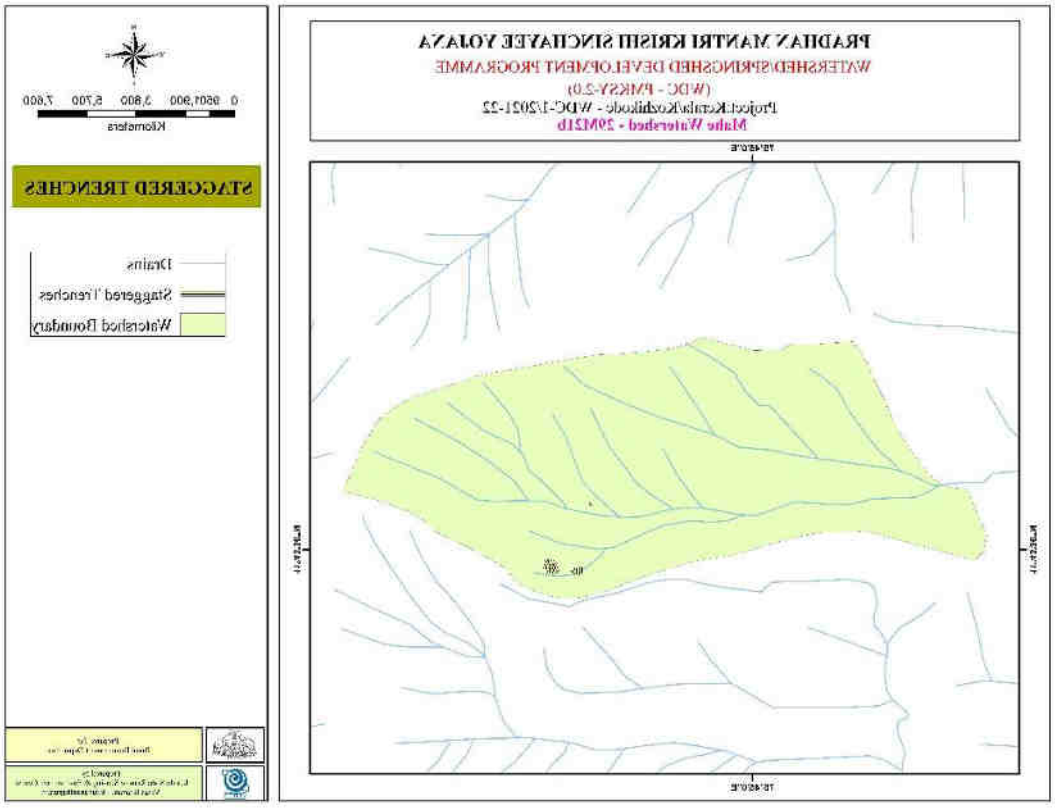
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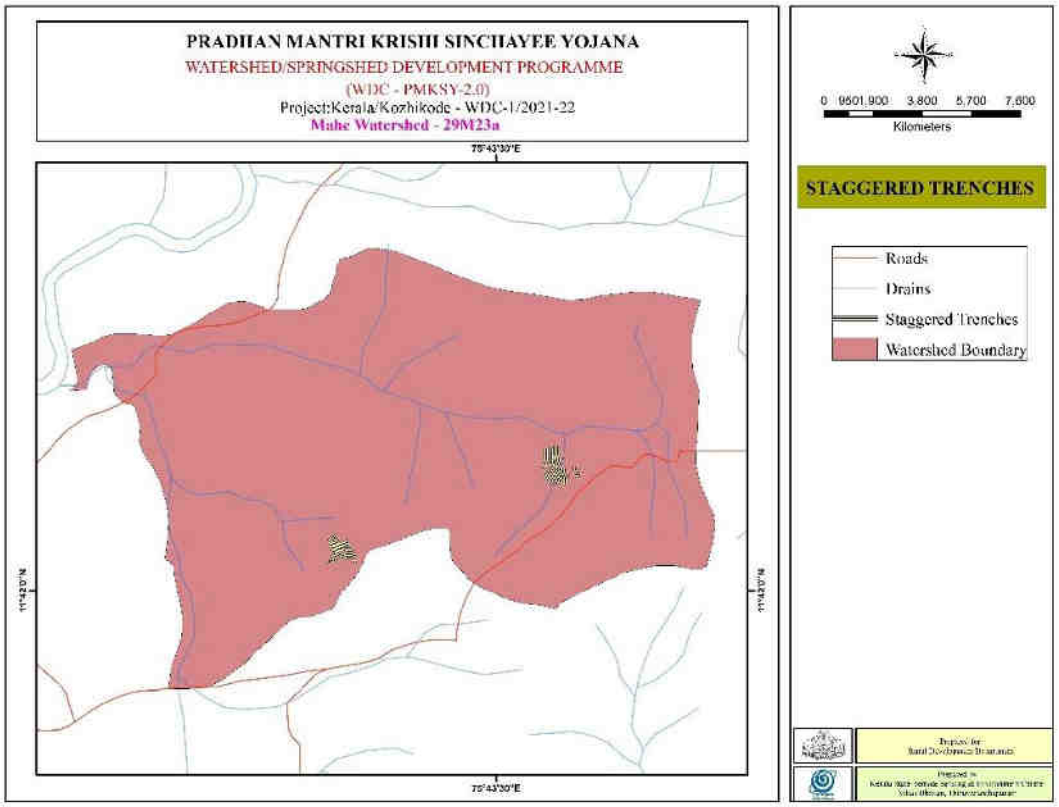
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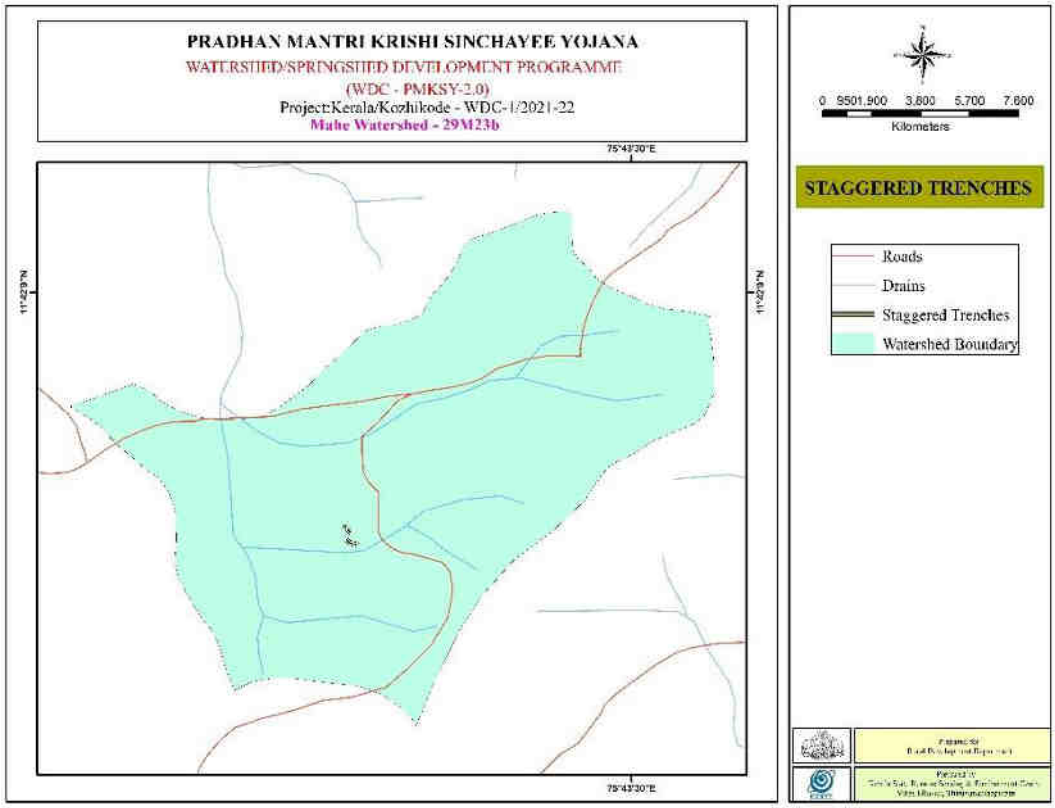
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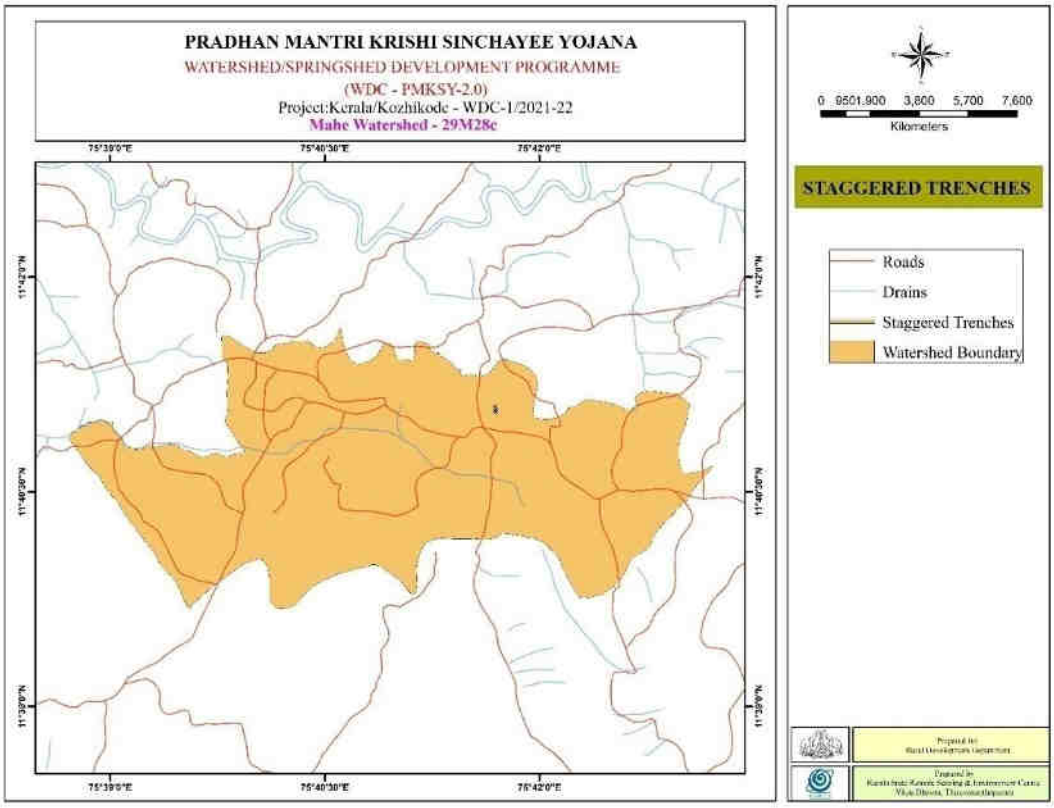
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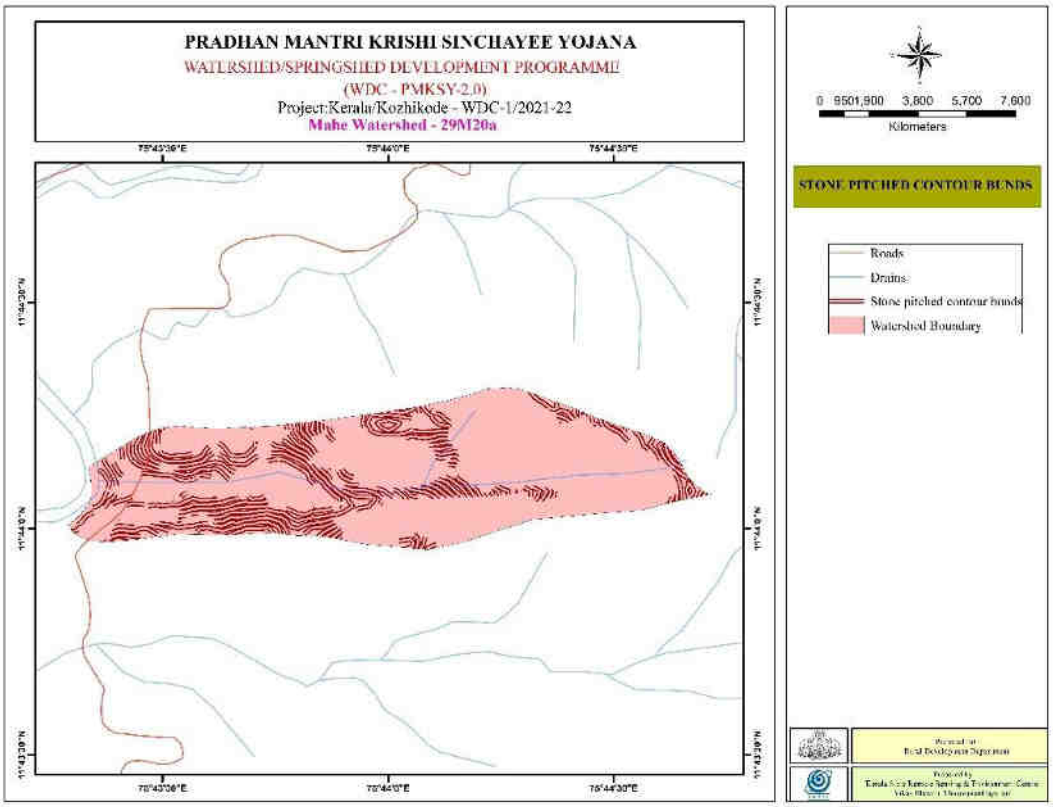
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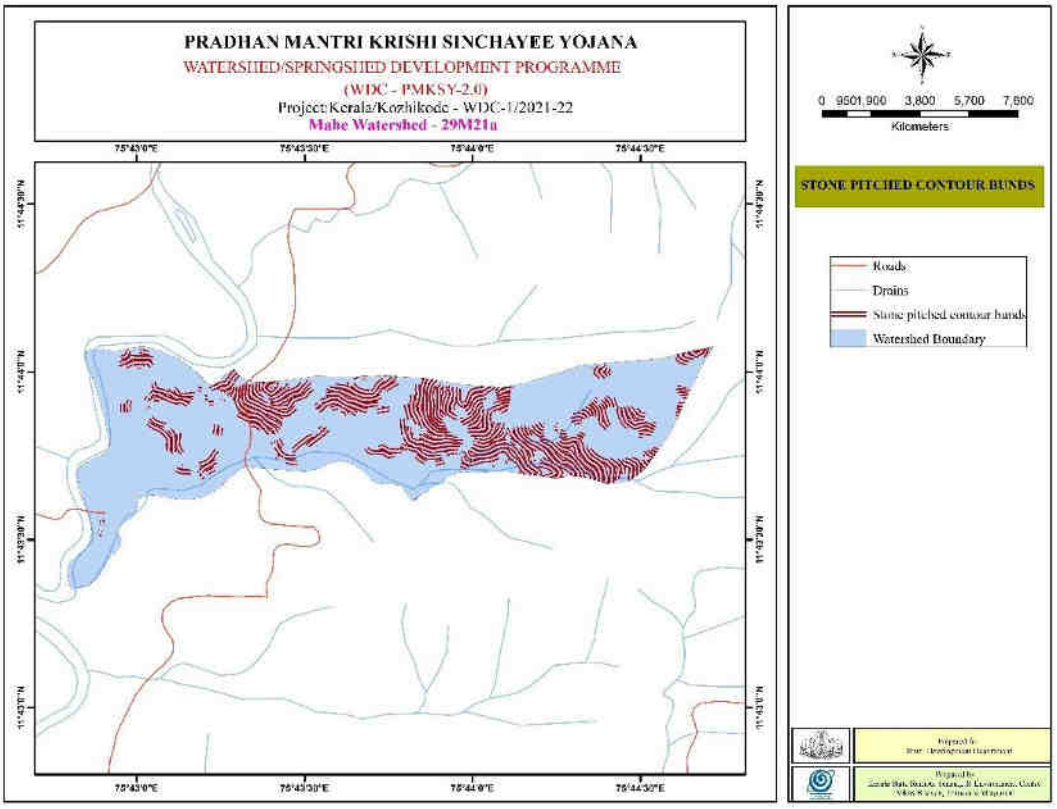
Roads
Drains
Stone pitched contour bunds
Watershed Boundary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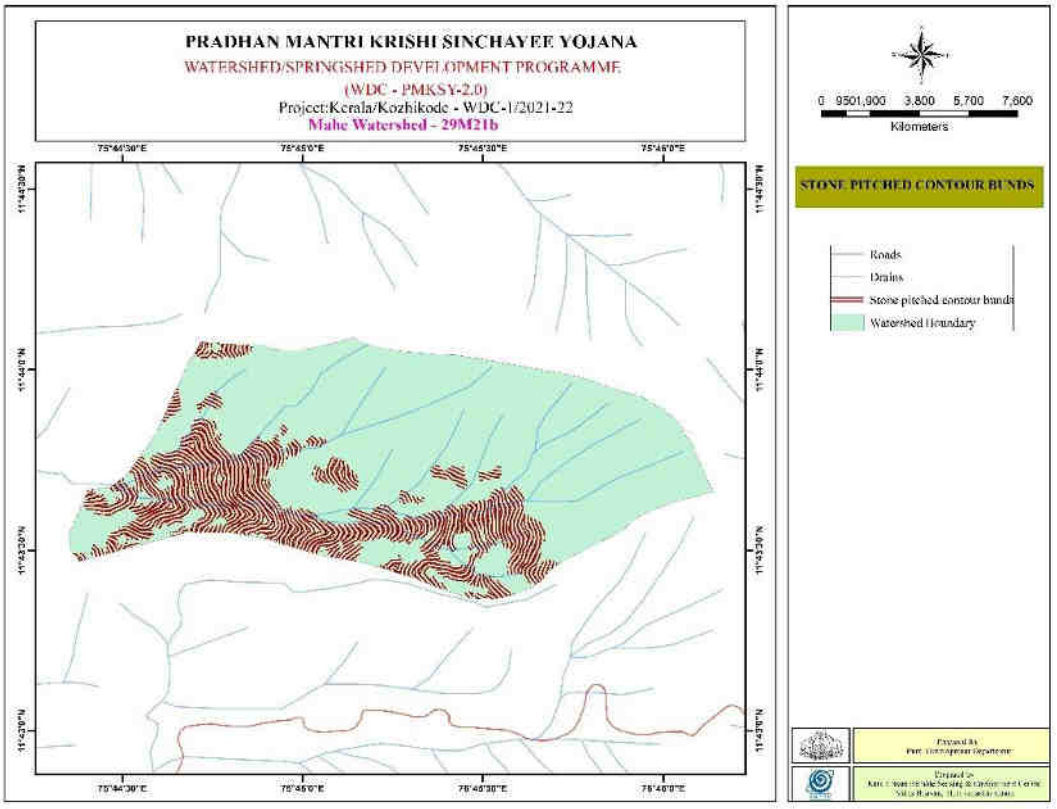
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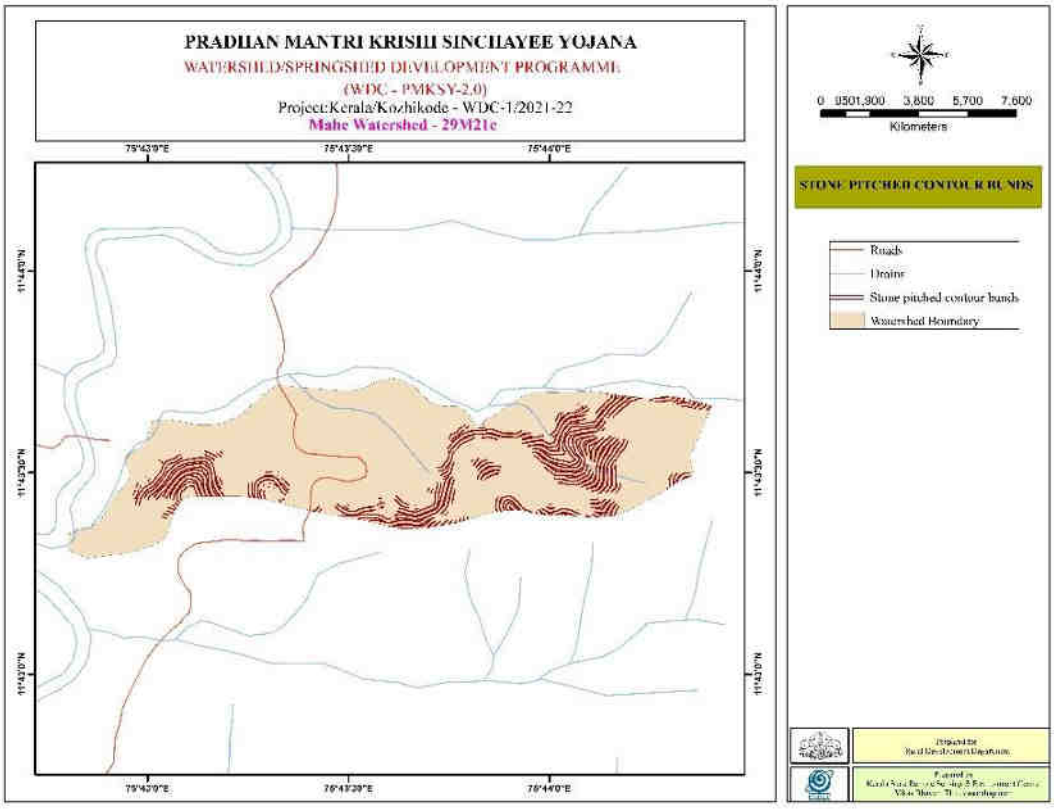
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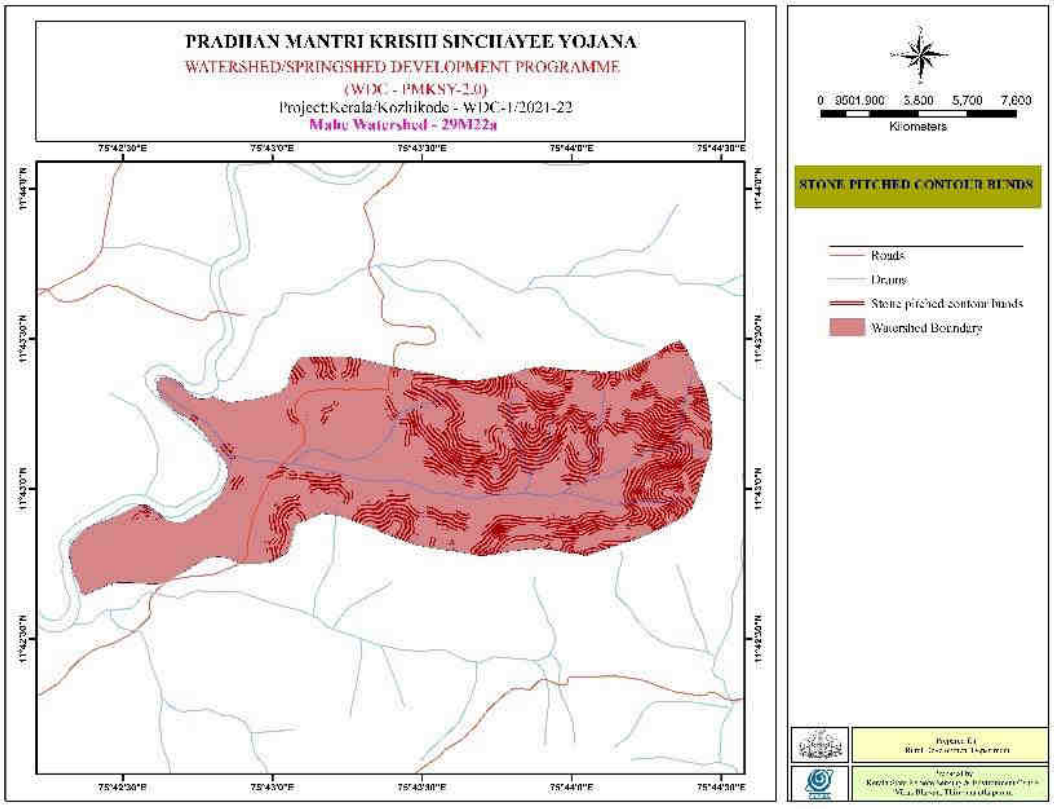
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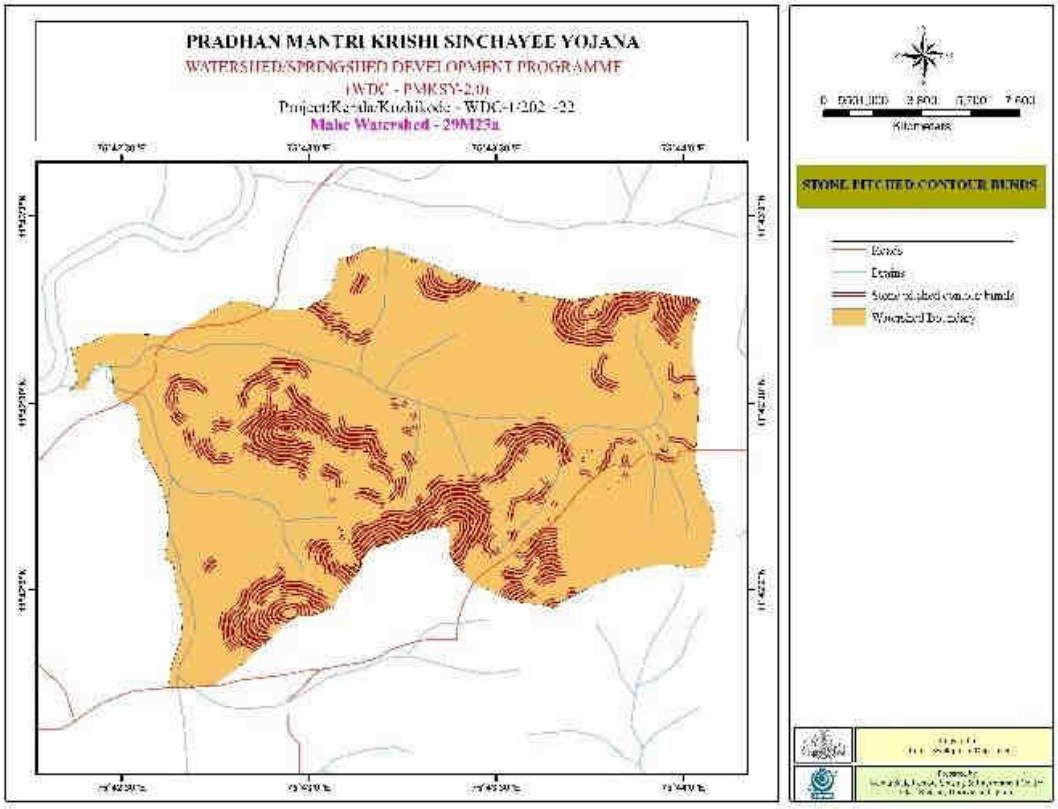
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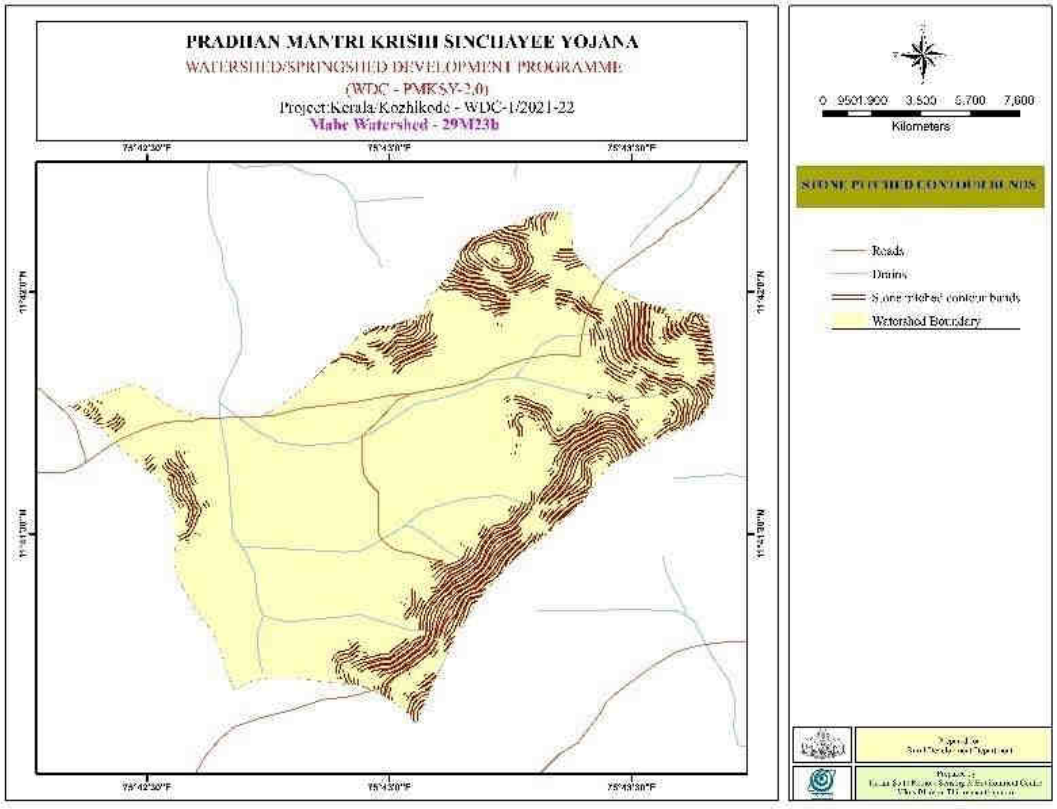
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Roads
Drains
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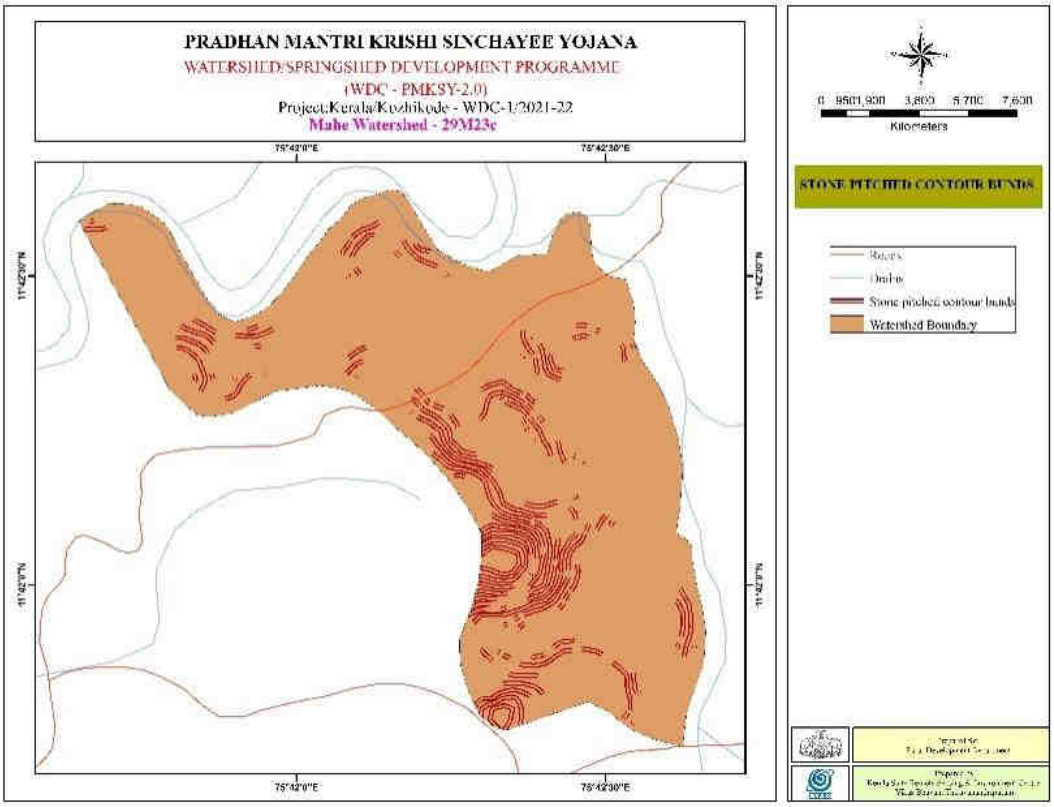
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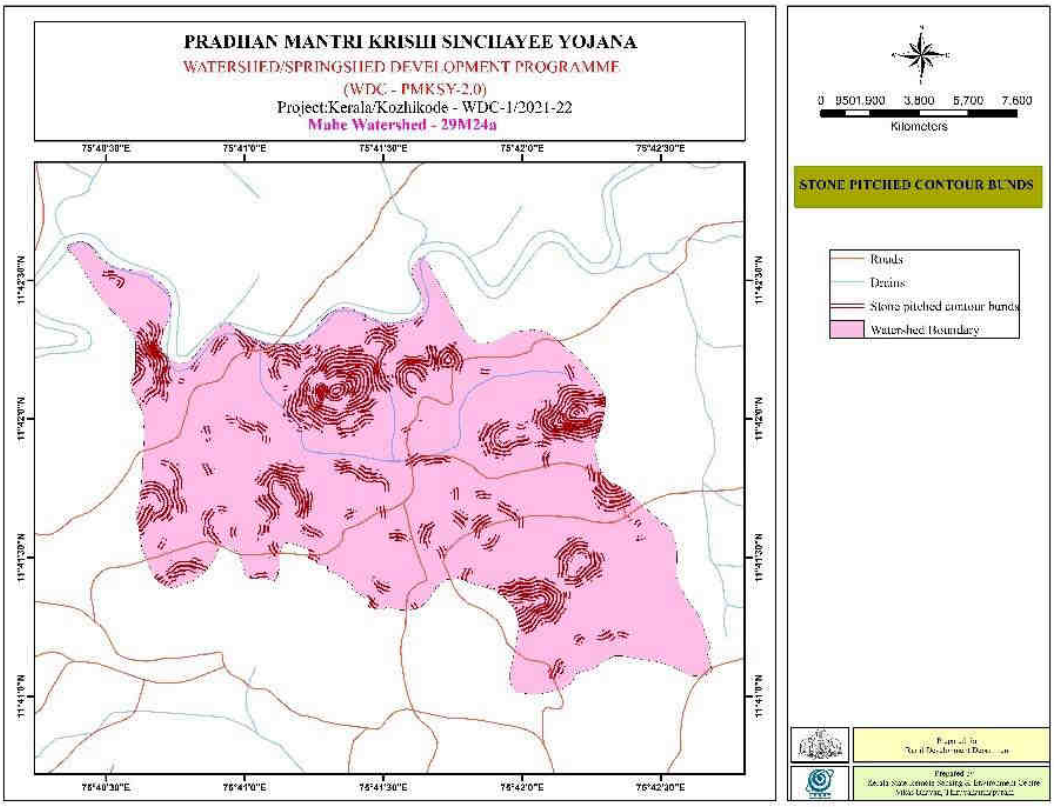
Roads
Drains
Stone pitched contour bunds
Watershed Boundary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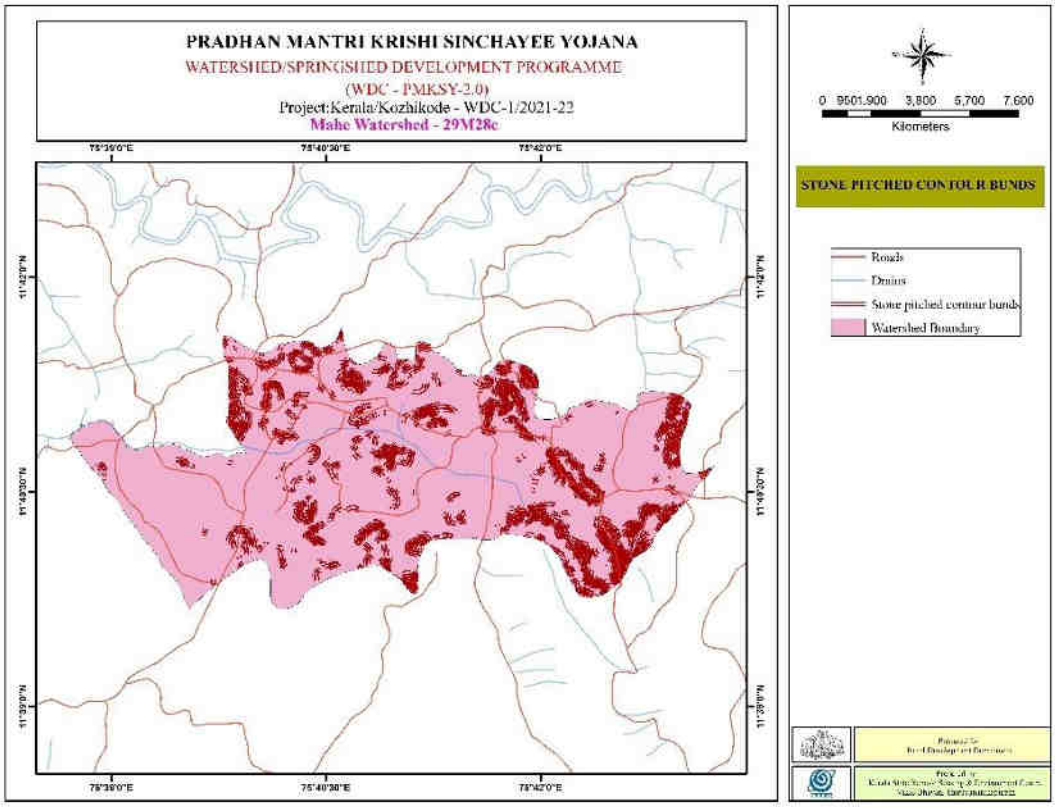
Roads
Drains
Stone pitched contour bunds
Watershed Boundary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Kilometers
STONE PITCHED CONTOUR BUNDS
Roads
Drains
Stone pitched contour bunds
Watershed Boundary

CHAPTER 23
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

Table:202 Training Plan

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	• 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	• 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	• Fundamentals of watershed • Participatory approach in watershed management • Roles and responsibilities • Institutional and financial arrangements • Coordination and linkages Convergence of programmes • GIS, MIS training
Training Methodology	• 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 PMKSY**
Training Objectives	To orient the participants on different dimensions of participatory watershed management
Coverage/ topic	• Fundamentals of watershed • Participatory approach in watershed management • Roles and responsibilities • Institutional and financial arrangements • Coordination, linkages Convergence of programmes
Training Methodology	• 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	• Fundamentals of watershed • Participatory approach in watershed management • Roles and responsibilities • Institutional and financial arrangements • Coordination, linkages Convergence of programmes • Documentation • Community organization
Training Methodology	• 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 PMKSY
Training Objectives	The need for watershed based development programs, concepts involved in watershed development, PMKSY its objectives, steps involved in the implementation of the program, financial management etc.
Coverage/topic	• To create awareness among the peoples representatives regarding the need for watershed based development programs. • Concepts of PMKSY • Projects involved in the programs • Scope of the project. • Role and responsibilities. • Financial management.
Training Methodology	• 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	• Measurement and valuation • Fundamentals of watershed • Roles and responsibilities • GIS & MIS • Documentation • Community organization
Training Methodology	• 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	• Participatory approach in watershed management • Fundamentals of watershed • Roles and responsibilities • Institutional and financial arrangements • Coordination and linkages Convergence of programmes
Training Methodology	• 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 PMKSY**
Training Objectives	To orient the participants on different dimensions of participatory watershed management
Coverage/ topic	• 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	• 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	• 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 PMKSY**
Training Objectives	To orient the participants on operational strategies and financial management in participatory watershed management
Coverage/ topic	• 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	• 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 PMKSY**
Training Objectives	To orient the participants on operational guidelines for Watershed Committees in PMKSY
Coverage/ topic	• Leadership

	• Institutional and financial arrangements • Conducting meetings • Recording the proceedings • Office management • Accounting procedures • Book keeping
Training Methodology	• 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 PMKSYfor effective implementation of the project and proper maintenance of records.

Programme No. 12

Title of the Programme	**Awareness programme on production system (PS)a, Micro Enterprises (ME) 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	• Various PS & M. • Generating additional income from such activities. • Self sustainability. • Women empowerment.
Training Methodology	• Lecture - cum - discussion • Group exercises • Case Analysis • Group discussions
Target Groups	SHGs : rearing cattle, fodder cultivation, Pisiculture, 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, ME and LSS
Training Objectives	More than 50% of the communities are often land less agrilabourers. For attain self sustainability LSS is the main option.
Coverage/topic	• Various LSS activities envisaged in the project. • Operational guidelines • Action plan for each watershed depending upon their suitability.
Training Methodology	• 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	• Responsibility of UGs • Establishing common assets. • Mode of operation in establishing common assets. • Financial procedures involved.
Training Methodology	• 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 PMKSY
Training Objectives	To build a team of faculties for imparting training, monitoring and evaluation
Coverage/topic	• Fundamentals of watershed • Leadership • Managerial skills • Effective communication • Implementation • Management • Roles and responsibilities • Monitoring and evaluation.
Training Methodology	• Lecture – cum - discussions • Interactive sessions • Group exercises • 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	• Methodology • Techniques • People participation • Implementation • Documentation
Training Methodology	• 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	1. Agriculture 2. Horticulture 3. Animal Husbandry 4. Pisci Culture 5. Rain water harvesting 6. Well recharging 7. Soil and Water conservation methods 8. Food processing 9. Storage &Marketting 10. Value addition 11. Livelihood 12. Entrepreneurship development
Training Objectives	To provide skills and techniques of various activities
Coverage/ topic	• Organic Vegetable cultivation • Organic Banana cultivation • Post-harvest technologies • 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	• 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.

Table: 203LIST 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- KILA (SIRD-KILA)	Director SIRD-KILA, 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	National Centre for Earth Science Studies (N-CESS)	Director NCESS, 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	Kerala State Remote Sensing & Environment Centre (KSREC)	Diretor KSREC Vikas Bhavan, Tvpm – 33	Government	Remote Sening&GIS, Spatial mapping, Information System
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	Government	Various soil and water conservation techniques, watershed management etc.
10	KrihiVijnanKendras (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

CHAPTER 24
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 Grama Panchayaths of SulthanBatheryblock under the WDC-PMKSY 2.0. 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.

1. 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.

2. Expected migration

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.

3. Ground water table

In the presence scenario the ground water level of open wells varies from 3 meter to 5 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 1 to 2 meter.

4. 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 Jal Jeevan Mission will increase the ground water table so that the expected status of drinking water will increase.

5. Expected Crops 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.

6. 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 the entire household engaged in the horticulture activities. There will be significant increase in the area covered under horticulture.

7. Livestock

Milch-animals include cow and buffalo in the project area. Productivity of the cow is 3 liters per day where as 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.

8. 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 intheor 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

Table: 204 Expected out come 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
	Storage centres	Post harvest handling of fruits and vegtables
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

Table: 205Pre-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, especially fruit crops, 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 centre to store and gradation of the products.	The marketing system will be strengthened, and linkage will be established with corporate houses and as a result of the collection 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 Rising	Activity being practiced not in a systematic manner.	Nursery Rising 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 PMKSY 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.

CHAPTER 25

Natural Resources Management and Governance Plans

Maintenanceofnaturalresources related assets

Natural resources related physical works need maintenance, and the bio-workssuch as plantation require strong protection measures and care.The watershedcommitteeresponsibleforundertakingtreatmentworksandassetcreationshould maintain a Watershed Assets Register,and the list of completed worksrecordedandupdatedcontinuously.Thecompleted assetsshouldbetransferred to the GramPanchayat for their continued maintenanceat the endofeachyear of implementation.A system of annual audit of natural resource assets should be taken up by theGP to assess their status and maintenance needs. These can be integrated intothe MGNREGS by a resolution of the Gram Panchayats. The WDT shouldensure that these processes are institutionalized into the functioning of GramPanchayatandfollowedregularlyfrom2nd yearonwards.Theactivitiesplanned to achieve this should be submitted as a part of the overall Projectdevelopment plan.Various types of engineering structures & biologicalinterventionslike waterharvesting structuressuchascheckdams,*nala*bunds,diversiondrains,percolationtanks,venteddams,farmsponds,artificialrechargestructures,equipmentfornaturalresourcegovernance,specificinterventionsforspring rejuvenation etc., created in the watershed are prone to damages by stray cattle,rain, sunshine, wind and unexpected natural calamities. Over the period there can alsobenatural damageor theremaybeneed forits renovationfor betterresults.There may be need strengthen or rejuvenate biological activities like block plantationspasturesetc.In such cases, if the assets exist on common properties, resourcesfrom WDF May beaccessed. Expenditure can beincurredalsoonassetsbuiltonprivatelandbutservethecommunity, andanagreement to this effecthas beencreated between the WC and the landowner, andthishas been shared with theGP.

WaterBudgeting,Management/RegulatoryNormsandGovernance

It is crucial for the community to establish reference sites of wells/ bore wells,andregularlymonitorgroundwateralongwithlocalrainfall,soastoarriveat regulatory norms on water extraction, type of crops to be grown and areacoverage.The groundwater monitoring exercise may be taken up twice a year (April-May & September-October /before thecrop season), andresultsbeplacedafteranalysis, beforetheGramSabha.Thepurposeshouldbetobuild acommon

understandingandconsensusintheprojectcommunityforsustainable use of groundwater. The community should be brought to agree onpotential restrictions on new extraction structures, reducing area under waterintensive crops and other such norms that economise on water use. Theseexercises are to be taken up twice a year and activities proposed should be parofthe watershed development plan. A suitable arrangementfor carrying outthis exercise should be made by PIAin consultation with Watershed Committee and also provide requisite trainingforthe same.

ProtectionandRegulation/RegenerationofCommon Lands

Common lands that are typically in the upper reaches of the watershed slopes, including forests, pasturesetc.shouldreceive focused attention, along withidentification of users, their needs and organizing them into user groups. Theplan for regeneration and development should also enlist various products, usufructs arising out of the planned regeneration process, and their benefitsharing norms. Protection measures, norms and their enforcement mechanismsneedto bearrivedat and must havesanctionoftheGramPanchayat.

Appropriate Technology Centres (ATCs)

It is proposed to set up **Appropriate Technology Centres (ATCs)**that could function more like dedicated cells (or more like special purpose vehicles – SPVs) within the project area. ATCs would function as the technology arm of the WC and PIA and work under their They could also be a registered institution, thereby functioning as legal entities. This will open up opportunities to integrate appropriate technology with gender sensitivity, convergence, environment friendliness, transparency etc.The functions of ATCs could include (i) awareness building and sensitisation about appropriate technologies: their need, scope, benefits, etc., (ii) piloting and demonstration of various appropriate technology options in different areas, (iii) provision of various technology services and implementation of projects on a turnkey basis, (iii) taking up repairs and maintenance and (iv) trainings and handholding of technology applications. In order to improve the efficiency, Each ATC can have about 5-6 members. It is important that the members together should have the capabilities in terms of skill base to perform the above-mentioned functions covering all the areas mentioned above. In short, they should be multi-skilled groups. Capacity building of the members would be very crucial most of the appropriate technology options would be new to them. Since the selected members would already have a bit of technology bent it would be easy for them to absorb the technologies easily. The ATCs need to function in a professional manner and cannot be based on voluntarism. This would require a work station

in the form of a space with adequate infrastructural facilities and instrumentation. The space required to create this facility can be made available by the PIA. If so, then as per very rough estimation, the capital cost required would be about Rs. 15 lakh per centre. This would include the cost of the establishing the workshop facility, and basic instrumentation and allied facilities. Each ATC would require about Rs. 2 lakh as working capital. An appropriate cost estimate will have to be worked out considering the deployment requirement of ATCs over the years to reach all the GPs and ULBs. The working capital could be raised by the ATCs through different ways including bank especially cooperative bank loans, CSR funds, inviting the public (the members of ATCs who can invest, SHGs and Kudumbashree units from the concerned LSG, and also the wider public), to invest with an assured interest or return on investment that can match and/or 1 or 2% higher than the interest fetched by term deposits. User fees appropriately charged can be another source of revenue for the ATCs. Also, the funds earmarked for technology support for various development programmes and schemes like watershed development, renewable energy programmes, etc., can be also made available to the ATCs.With ATCs in place, it has a potential of creating green jobs or self-employment. The number can increase with more and more activities taken up by the ATCs. The members of the ATCs can be drawn from a large catchment including the Kudumbashree units, landless and agricultural labourers, workers from other informal sectors like construction and also from the Gulf returnees. It is estimated that nearly 8 lakh people have come back from the Gulf after the outbreak of the pandemic. Of this, at least 1 to 2 lakh would stay back in Kerala and would require some employment. These are people with different skill sets and the ATCs should be able to tap into this huge skilled human resource. Probably they can also make investments into the ATCs (as part of the running costs as discussed above) as most of them would have some savings.The experience of Integrated Rural Technology Centre (IRTC) at Mundur, Palakkad and such other institutions at present can provide valuable lessons in the functioning of ATCs. If the ATCs need to succeed then they would require handholding support throughout. For this we propose setting up Support Centres (SCs) at block level which will seek expert inputs from nearest engineering/agricultural colleges and such other technical institutions. The functions of the SCs could be (i) dissemination of Information, Education and Communication (IEC) material related to appropriate technologies that could be used for awareness building (ii) assessment of the feasibility and relevance of suggested alternative technologies (iii) capacity building of the ATC members in various appropriate technologies and this would also include identification of other resource persons/institutions

who can provide specialised training in a particular field and lining up the same, (iv) monitoring and periodic evaluations to see that the ATCs function within the agreed upon criteria of alternative technologies, examine quality of work, etc., (v) suggest ways to strengthen the functioning of ATCs including its financial matters (for example suggest sources from where the ATCs can source financial resources for the running cost) and (vi) facilitate bulk purchase of materials, tools and equipment for the ATCs.The SCs can be housed in the block level office of one of the related line departments (agriculture, PWD, Water Resources, etc). The SC team could include persons from related departments, educational institutions (Industrial Training Institutes, polytechnics, engineering colleges, regular colleges, science teachers), NGOs including Parishad units, etc. The costs would be mainly in the form of running costs – compensation for the time spent, travel, etc. There would not be capital costs as the SCs would be housed in the premises of one of the line departments. There could be various ways to meet the running costs like: small grant by the state government, CSR money, and a portion of the funds earmarked for the technology component of various development programmes and schemes, user fees form the ATCs, etc. The SC and ATC can merge with a conventional institutional arrangement as the PIA or WDT, thereby reducing the institutional complexities to a large extent.

Table 206:- Budget

No	Activity	No	Unitcost	Amount
1	Geospatial Resource Information System	1	500000	500000
2	Automatic weather stations for local predictions	5	100000	500000
3	Establishment of observation wells and data collection using mobile app	1	200000	200000
4	Appropriate Technology centres	1	300000	300000
5	Water Budgeting	4	100000	400000
7	Installation of scales in selected ponds and establishment of observation	1	200000	200000
8	Regeneration of common land	1	100000	100000
	Total			**2200000**

CHAPTER 26

CONSOLIDATION AND WITHDRAWAL

The last one year is 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 utilising 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 programe 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 wtll 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.

Table: 207 Details of Monitoring System

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	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 conduct 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 utilising WDF as security deposit and the profit earned should go to the WDF.
13. The remuneration for the Watershed secretary will be finalised 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 meering 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.

CHAPTER 27

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 PMKSY-WDC project of Nemom. 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 non political 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.

KERALA STATE REMOTE SENSING & ENVIRONMENT CENTRE

Under the aegis of National Natural Resources Management System (NNRMS), Kerala State Remote Sensing & Environment Centre (KSREC) was established in 1995 by Government of Kerala as an autonomous body under Planning and Economic Affairs Department for carrying out research, training and other related activities in the field of Remote Sensing and GIS applications. KSREC is a

- Facility provider in Space Application and GIS
- Technology Developer
- Facilitator for transferring of Technology to Grass root level.
- Support provider to various developmental sectors in developing comprehensive multipurpose geospatial database.

1. KSREC provides services in the field of

- **Remote Sensing Applications**: For inventory mapping, developmental planning and monitoring of natural resources, environmental issues of resources.
- **GIS:** conceptualizing, creating and organizing multipurpose common digital database and for preparing sectoral/need based decision support system.
- **Software Development:** For wider usage of geospatial applications and to provide decision support systems to the administrators and users at low cost.

2. Functions of the Centre

- Build up a firm database on natural resources and other related information for local and regional level utilizing the Remote Sensing Technology as well as the existing data from conventional method.
- Temporal monitoring of Land use/ land cover and waste land mapping – Change detection, damage detection, assessment etc.
- Preparation of optimum Land use plan for the State, District, Region and Urban areas.
- Analysis of landforms, their effect on ground water availability, landform changes and causes, landslips/slides, littoral changes, tectonics and neo-tectonism.
- To carryout environmental impact assessment studies.
- Flood mapping, damage assessment and disaster management studies.

- Conduct studies in industrial development, impact on land use and landscape quality. Location optimization studies in relation to raw material, power and potential land use.
- Conduct training courses to the officers and staff of Government Departments and other agencies in the application of the Remote Sensing in the fields of land, water and environment management
- Development of a Marine Resource Information System.
- Take up analytical and research studies in collaboration with other departments and agencies.
- Establish and maintain a library of books, periodicals and other documents relating to the subjects of interest to the functioning of the centre
- Establish a digital spatial data base on natural resources of the State and develop information systems to help planning and decision making
- To conduct awareness campaign on environmental issues

KSREC

KERALA STATE REMOTE SENSING AND ENVIRONMENT CENTRE

PLANNING AND ECONOMIC AFFAIRS DEPARTMENT

VIKAS BHAVAN , THIRUVANANTHAPURAM

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