Integrated Watershed Management Programme (IWMP)

Detailed Project Report

IWMP-II (E1)

In Parappa & Kanhangad Block Panchayats
Kasaragd District
Kerala State

SLNA: Commissionerate of Rural Development, GoK

PIA: Parappa Block Panchayat

TSO: CRD, Nileshwaram

Content

Chapter -1
Background of IWMP

1.1. Project Background:

The Department of Land Resources Development under the Ministry of Rural Development , Government of India had implemented 3 watershed programmes viz. Integrated Wastelands Development Programme (IWDP), Drought Prone Areas Programme (DPAP), Desert Development Programme (DDP) till 1st April 2008. Since then, these 3 programmes have been brought under a comprehensive programme named Integrated Watershed Management Programme (IWMP) to be implemented under Common Guidelines on Watershed Development, 2008.

1.1.1 What is a watershed?

A Watershed is a geo-hydrologic unit or piece of land that drains in to a common point/outlet. Watersheds are natural units for planning and implementation of developmental activities, ensuring integration and sustainability.

1.1.2 Scope for Watershed Management:

Since soil and water are basic resources that directly influence the development, the concept of soil and water resources development on a watershed basis has gained importance. An important feature of sustainable development is development without any damage to the resource base. This is best possible in watersheds. So, watersheds are the ideal units for sustainable development.

Through Watershed projects, we ultimately aim at influencing human behaviors and generating positive changes in the process of peoples' interaction with the natural resources in the watershed. If desired positive attitude is not developed among the community/people, the objectives of the watershed projects cannot be attained. All watershed projects calls for active and productive involvement of the inhabitant of the watershed.

1.1.3 Objectives of IWMP:

The main objectives of the IWMP are to restore the ecological balance by harnessing, conserving and developing degraded natural resources such as soil, vegetative cover and water. The project visualize a four fold outcomes

a) Prevention of soil run-off
b) Regeneration of natural vegetation
c) Rain water harvesting and
d) Recharging of the ground water table.

This enables multi-cropping and the introduction of diverse agro-based activities, which help to provide sustainable livelihoods to the people residing in the watershed area through a participatory approach.

1.1.4 The salient features of IWMP:

- Setting up of Dedicated Institutions with multi-disciplinary experts at State level - State level Nodal Agency (SLNA), District level - Watershed Cell cum Data Centre (WCDC), Project level - Project Implementing Agency (PIA) and Village level – Watershed Committee (WC)
- Cluster approach in selection and preparation of projects
- Enhanced Cost Norms from Rs. 6000 per ha. to Rs.12,000/ha. in plains; Rs.15,000/ ha in difficulty/hilly areas
- Uniform funding pattern of 90:10 between Centre & State
- Release of central assistance in three instalments viz. 20%, 50% and 30% instead of five instalments
- Project period is 4 to 7 years
- Scientific planning of the projects by using IT, remote sensing techniques, GIS facilities for planning and monitoring & evaluation
- Earmarking of project funds for DPR preparation (1%), Entry point activities (4%), Capacity building (5%), Monitoring (1%) and Evaluation (1%)
- Introduction of new livelihood component with earmarking of 9% of the project fund and production system and micro enterprises with 10% of the fund.
- Delegation of power of sanction of projects to States.

1.1.5. Sector wise allocation of fund:
Since the project area is hilly terrain, per hector cost of the project is Rs.15000.

SL No	Components	%
1	**Administration**	**10**
1.1	*Documentation*	*0.33*
1.2	*Administration*	*9.67*
2	**Monitoring**	**1**
3	**Evaluation**	**1**

4	**Preparatory phase**	**10**
4.1	*Entry point activities*	*4*
4.2	*Institution & Capacity building*	*5*
4.3	*Detailed Project Report*	*1*
8	**Watershed Works phase**	**75**
8.1	*Watershed Development Works*	*56*
8.2	*Livelihood activities*	*9*
8.3	*Production system & Micro Enterprises*	*10*
8.4	**Consolidation phase**	**3**
	Grant total	**100**

1.1.6 Detailed Operational Guidelines:

The Local Self Government Department, Government of Kerala has issued Detailed Operational Guidelines (GO No. 105/2011 L.S.G.D dated 14/06/2011) for the effective implementation of IWMP in the state. Various community structures such as Neighborhood groups, watershed committees, Panchayat level and Block level committees and District Level IWMP Coordination committees for proper implementation and management of the programme are clearly explained in the Operational Guidelines.

1.1.6.1 State Level Nodal Agency (SLNA)

Government of Kerala had created a State Level Nodal Agency (SLNA) for IWMP for the state with Agriculture Production Commissioner as Chairman, Principal Secretary, Local Self Government Department as Co-Chairman and the Rural Development Commissioner as Chief Executive Officer. SLNA will have a Technical Support Unit (TSU) to help the activities at State level.

1.1.6.2 District Level Coordination Committee (DLCC)

The responsibility of planning and implementation of IWMP at District level, DLCC was constituted with District Panchayat President as Chairman, District Collector as Member Secretary and Project Director, Poverty Alleviation Unit (formerly DRDA) as Convener. To accord final approval of the projects within the district, facilitate convergence of schemes and monitoring of the projects are the major responsibilities of DLCC.

1.1.6.3 Project Implementing Agency (PIA)

Concerned Block Panchayat that hold major share of the Project area will act as the PIA. Since Parappa Block Panchayat holds the major share (4285 Ha) of the area of this project, Parappa Block Panchayat is appointed as the PIA for this Project. Details are given below. There is Watershed Cell cum Data Centre (WCDC) to help the DLCC to perform its responsibilities. PIA will constitute a Project Level IWMP Coordination committee for timely implementation and arranging for administrative and technical support services to the project.

Parappa Block Panchayat, the PIA

Parappa Block Panchayat is a new Block Panchayat formed bifurcating Kanhangad and Nileshwaram Block Panchayats vide Government Order (P)No. 139/20IOILSGD dated,02/07/2010. Total there are 7 Grama Panchayats viz. Balal, Kallar, Panathadi, Kodom-Belur, Kinanoor-Karinthalam, West – Eleri and East – Eleri under the jurisdiction of the Block. The Block Panchayats has 14 Block Constituencies (Divisions). They are-

Sl No	Code	Name
1	B14151001	KODOM
2	B14151002	KALLAR
3	B14151003	PANATHADY
4	B14151004	PANATHUR
5	B14151005	MALOM
6	B14151006	KOTTAMALA
7	B14151007	CHITTARIKKAL
8	B14151008	KAMBALLUR
9	B14151009	ELERI
10	B14151010	PARAPPA
11	B14151011	KINANOOR
12	B14151012	BALAL
13	B14151013	KALICHANADUKKAM
14	B14151014	BELUR

For a proper coordination of the IWMP activities, a Block Level Coordination Committee (BLCC) is formed.

1.1.6.4 Watershed Development Team (WDT)

To assist the Block Panchayat in the implementation of the project, the service of WDT is envisaged. This is a multidisciplinary team with Agriculture, Engineering and social mobilization Background.

1.1.6.5 Technical Support Organisation (TSOs)

The Local Self Government (RD) Department, Govt. of Kerala has empanelled competent NGOs who have experience in planning and implementation of Watershed Project as TSOs for IWMP in the state vide Order No. 17237/R&I 5/2010/CRD dated 10/01/2010. If found necessary, the PIAs are empowered to appoint the TSOs for preparing the DPR.

Parappa Block Panchayat vide its resolution No. 8 dated 2nd February 2011 selected and appointed Centre for Research and Development (CRD), Nileshwaram as TSO from the list of empanelled organizations approved by the Government for the IWMP projects.

1.1.6.6 Grama Panchayat level Watershed Committee

The responsibility of direct monitoring of the implementation of watershed project activities belongs to the concerned Grama Panchayats. A Grama Panchayat level Watershed Committee will be formed to ensure timely implementation and monitoring of the project activities. This Committee will have Grama Panchayat President as Chairman/Chairperson, Agricultural Officer as technical Coordinator and the Grama Panchayat Secretary as Member Secretary. Agencies for DPR preparation, Concurrent Monitoring, Evaluation and Documentation and the Conveners of Project Monitoring Committee, Vigilance Committee and Social Audit Committee are the invitees to this committee.

1.1.6.7 Watershed Neighborhood Groups (WS NHG)

WS NHGs are formed in the Micro Watersheds for proper organization of the watershed communities towards ensuring productive participation of the community in the planning, implementation, monitoring and operation & maintenance of the project. These WS NHGs are formed participating the neighboring families (1 adult male and 1 adult female from each family) in a micro watershed. The elected representatives of the Grama Panchayat representing the area and Kudumbasree ADS Chairperson are the Ex-officio members of WS NHG. For effective participation, 40-50 families are the ideal number for 1 WS NHG. The families in a WS NHG will be divided in to 7 sub groups. From each sub groups 1 member will be elected by the families to become a member of the WS NHG. Thus the WS NHG will have a 7 member committee. Of which, at least 3 members should be women. The WS NHG will have President, Vice president, Secretary, Joint secretary and Treasurer. Amongst this, Treasurer and any one of the office bearer should be women. Due representation for SC/ST members has to be given in the committee. It is apart from women representation. The WS NHG should open a bank account in the names of Secretary and Treasurer in a Nationalized Bank.

1.1.6.8 Watershed Committee (WC)

WCs have pivotal role in the implementation process of the IWMP. It will be formed as the federation of the Watershed Neighborhood Groups (NHGs). The President and Secretary from each Watershed NHG will form the general body of the Watershed NHGs. The watershed will be divided in to nine zones of Watershed NHGs. 1 person from among the office bearers of Watershed NHGs of each zone will be elected to the WC. This committee will be reconstituted every year to give representation to all the Watershed NHGs over a period of time.

Chapter -2
Detailed Project Report Preparation Process

2.1 Methodology adopted in Detailed Project Report Preparation:
The DPR was prepared following scientific method

2.1.1 Watershed area delineation in accordance with PPR
To delineate the watershed boundary, a multidisciplinary team along with the elected representatives and farmers has visited the watershed area. The team learned the watershed boundary and its basic characteristic features. Watershed atlas was used to identify the micro watersheds.

2.1.2 Community organization/formation of community structures and awareness classes-

The IWMP project calls for high level of community participation at all stages of the project cycle. To equip the community to participate productively in IWMP activities, the community organization process was undertaken as a preliminary process of the project. As part of it community structures were formed as viisualised in the Operational Guidelines and awareness class were conducted.

Community structures formed

- Sub groups
- Neighborhood groups
- Neighborhood zones
- Micro Watershed Committee
- Grama Panchayath level committee
- Block Level Co- ordination committee

2.1.3 Training to the Elected Representatives, Watershed Committee Leaders, NHG representatives and Officials at Block (PIA) level
2 Training programmes were conducted at PIA level. There were sessions on salient features of IWMP, Characteristic features of the project area and the watershed concepts. Faculty from SIRD, PAU Kasaragod and TSO representatives facilitated the sessions.

2.1.4 Secondary Data Collection

Secondary data in the areas of basic infrastructure, agricultural crops, weather data, etc were collected and analysed for project purpose.

2.1.5 Participatory Plot wise Net Plan survey, Soil survey studies and Soci-Economic Survey

Plot wise net plan exercise was conducted to collect data related to the characteristic features of the soil (soil type, series, depth, texture class, etc), land use pattern, existing treatment measures and proposed treatment plan. We have constituted a team of 27 persons to conduct this exercise in the filed. Details of socio-economic status of each family also were collected using the format.

2.1.6 Participatory Rural Appraisal (PRA) and Livelihood Planning

PRA was conducted in each micro watershed to know the qualitative information, which is very essential to know the community perception on the problems, potentials/resources and proposing solutions. Area Mapping to have a spatial understanding, seasonality diagrams to know the length of water availability from water bodies and related problems, Historical time lines to learn the changes brought about in development scenario, Pair wise & matrix ranking and scoring which is also a PRA tool to plan the livelihoods, etc were conducted. Watershed committee leaders, Community members and Elected Representatives took part in PRA and livelihood planning.

2.1.7 Identification of Entry Point Activities

Entry point activities for each micro watershed were identified through community participation.

2.1.8 Drainage line survey

To know the drainage character towards proposing drainage line treatment measures, we have conducted drainage line survey. A multi disciplinary team along with the community members has surveyed the drainages.

2.1.9 Preparation of Capacity Building Training Plan

The need of the capacity building training was assessed during the community organization meetings and PRA. The Research and Development institutes in the district such as Central Plantation Crops research Institute (CPCRI), KVK, etc and the District heads of the line departments concerned are consulted with to know their observations and suggestion for capacity building training plan. The plan was finalized based on the discussions and consultations.

2.1.10 Computerization of net plan, socio- economic survey details, and preparation of thematic maps in GIS.

The net plan for the treatment of the watershed, socio-economic survey details of the family, etc as per field survey were computerized and maps such as soil depth, type, slope, land capability classification, contour, drainage, etc are prepared.

2.1.11 District level expert consultation meeting

We had district level expert consultation meeting to vet the treatment plan. Scientist from CPCRI, Consultant Soil Scientist, Consultant Earth Scientist, District Soil Conservation Officer and Assistant Director Soil Survey Organisation are the experts attended the meeting. The suggestions and observations were well taken and have been incorporated to the proposal.

2.1.12 Micro watershed level and Grama Panchayat level presentation of DPR

The draft of the DPR was presented before the community and Grama Panchayat to have their final commends.

2.1.13 Final preparation of the DPR and submission

Final copy with net plan was submitted to DPC for approval

Chapter- 3
Basic details of the watershed area as per the field study for DPR preparation

Table 1. Administrative details

Villages covered	
Grama Panchayaths	Kodom-Belur,Madikai,Balal &Kinanur-Karinthalam
Block	Parappa and Kanhangad
Taluk	Hosdurg
District	Kasaragod

Table 2. Weightage of the project as per PPR

* Weightage under the criteria developed by DoLR													
i	Ii	Iii	iv	v	vi	vii	viii	ix	x	xi	xii	xiii	Total
59	59	0	170	44	0	0	255	22	110	0	100	255	1218

* { i- Poverty index (% of poor to population), ii- % of SC/ ST population, iii- Actual wages, iv- % of small and marginal farmers, v- Ground water status, vi- Moisture index/ DPAP/ DDP Block, vii- Area under rain-fed agriculture, viii- Drinking water, ix- Degraded land, x- Productivity potential of the land, xi- Contiguity to another watershed that has already been developed/ treated, xii- Cluster approach in the plains (more than one contiguous micro-watersheds in the project) and xiii- Cluster approach in the hills (more than one contiguous micro-watersheds in the project) }

Table 3. Block wise distribution of project area

Total treatable area in	**Total Micro watersheds**	**Sharing of the area by Blocks**			
		Parappa Block	**% to the Project total**	**Kanhangad**	**% to the Project total**

Ha					
4972	13	4381	88.11	591	11.89

The project has a total area of 4972 Ha. Of which Parapa has a major share of 4381 Ha. The total area spread over in Kodom-Belur, Madikkai, Balal and Kinanoor-Karinthalam Grama panchayats. The watershed is IVth order watershed. Per hector cost for watershed treatment is Rs.15000/-. Total project cost comes to Rs. 7, 45, 80,000/-

Table 4 Financial outlay of the project

SL No	Components	%	Cost
1	**Administration**	**10**	**7458000**
1.1	*Documentation*	*0.33*	*246114*
1.2	*Administration*	*9.67*	*7211886*
2	**Monitoring**	**1**	**745800**
3	**Evaluation**	**1**	**745800**
4	**Preparatory phase**	**10**	**7458000**
4.1	*Entry point activities*	*4*	*2983200*
4.2	*Institution & Capacity building*	*5*	*3729000*
4.3	*Detailed Project Report*	*1*	*745800*
8	**Watershed Works phase**	**75**	**55935000**
8.1	*Watershed Development Works*	*56*	*41765065*
8.2	*Livelihood activities*	*9*	*6712020*
8.3	*Production system & Micro Enterprises*	*10*	*7457915*
8.4	**Consolidation phase**	**3**	**2237400**
	Grant total	**100**	**74580000**

Table 5. Micro Watershed details and Grama Panchayats

Sl no	Name of Micro Watershed	Code no.	River basin	Effective Area	Gramapanchayat
1	Chullikkara	40C 33b	Chandragiri	568	Kallar-Kodom-Belur
2	Parakkallu	40C 36d	Chandragiri	598	Kodom-Belur,Balal
3	Kunnumvayal	40C 36c	Chandragiri	219	Kodom-Belur,Balal
4	Eladi	40C 36e	Chandragiri	278	Kodom-Belur
5	Attakandam	38N 9e& f	Nileswaram	565	Kodom-Belur,Balal
6	Edathodu	38N 10c	Nileswaram	159	Kodom-Belur,Balal
7	Mundyanam	38N 10e	Nileswaram	373	Kodom-Belur,Balal
8	Anapetty	38N 10b& f	Nileswaram	315	Kodom –Belur
9	Koovatti	38N 10a&g	Nileswaram	342	Kinanur-Karinthalam

10	Malappacheri-Manimunda	38N 8a &9a	Nileswaram	499	Madikai
11	Uthirchankavu	38N 9b	Nileswaram	233	Kodom-Belur&Madikai
12	Mayyanganam	38N 9g	Nileswaram	322	Kodom-Belur
13	Cheralam	38N 9c	Nileswaram	501	Kodom-Belur&Madikai
		Total		**4972**	

Table 6 River basin, Elevation, etc

1	River basin	Nileswaram& Chandragiri
2	Latitude	12° 17′ 32″ & 12° 24′ 50″
3	Longitude	75° 10′ 55″ & 75° 15′ 5″
4	Highest elevation	610mtr
5	Lowest elevation	55mtr
6	Height difference	555mtr
7	Watershed order	IV

3.1 Geomorphology:

Physiographically the watershed area can be divided into the midlands and the highland regions. The midland region with altitude ranging from 10 to 100 msl. The midland area is characterized by rugged topography formed by small hillocks separated by deep cut valleys. The midland and hill ranges of the watershed present a rugged and rolling topography with hills and valleys. The hills are mostly laterite and the valley is covered by valley fill deposits. The valley fill deposits are composed of colluvium and alluvium.

3.1.1 Soil series:

Based on different morphological characteristics, soils of the watershed area have been classified into six soil series.

Table 7 Major soil series identified in the watershed are

Sl No	**Soil series**	**Area in Ha**
1	Kolathoor	402.1978
2	Arathil	1916.017
3	Meeyanganam	926.4097
4	Payalam	752.7447
5	Maloth	598.3081
6	Edanad	36.9686
7	Kalakkara	252.9739

8	Thekkila	86.3802
Total		**4972**

Table 8 Occurrence of the soil series:

Sl.No.	Soil series	Occurrence
1.	Meyanganam	Moderately sloping to very steeply sloping side slopes of low hills
2	Payalam	Moderately steep to very steep side slopes of hills in upland
3	Kalakkara	Along stream banks
4	Maloth	Soils developed over granite gneiss occur on very steep slopes.
5	Thekkila	Very gently to gently sloping lands along stream banks
6	Arathil	Strongly sloping to very steeply sloping side slopes of low hills
7	Kolathur	Gently to moderately sloping flat low hill tops
8	Edanad	Gently sloping foot hills of low hills and mounts

3.1.1.2 General Description of major soil series:

3.1.1.2.1. Meeyanganum series

These are deep to very deep excessively drained soils found in moderately sloping to very steep side slopes in mid uplands and uplands. Solum thickness exceeds 100cm. Surface layer is reddish brown to dark reddish brown, gravelly clay loam to gravelly clay and medium acidic. Subsoil is yellowish red to dark red. Subsoil texture is sandy clay with or without gravels. C horizon is laterite mixed with weathering fragments of gneiss. These are excessively drained soils with moderate permeability. Water holding capacity of the soil is moderately good and nutrient holding capacity is medium. Mainly cashew, rubber coconut, and pepper are cultivated.

3.1.1.2.2 Payalam series:

These are deep to very deep moderately fine-to-fine texturised acid soils generally occurring on steep side slopes of hills in uplands. Solum depth is more than 100cm. Surface soil colour is brown to dark reddish brown and texture is clay to clay loam. Subsurface colour is red to yellowish red and texture is clay to gravelly clay. These are well-drained soils with moderate permeability. Water holding capacity and nutrient holding capacity is good.

3.1.1.2.3 Kalakkara soils

These have brown to dark yellowish brown, gravelly clay subsurface soils. These soils have developed from transported sediments. Imperfect drainage is the major limitation of these soils. These soils are generally less than 120 cm deep and acidic in reaction. Kalakkara soils are cultivated with arecanut and coconut.

3.1.1.2.4 Maloth Series

These soils developed over granite gneiss occur on very steep slopes. They are generally more than 150 cm deep, strongly to medium acid and well drained. Soil erosion and steep slopes are the major limitations. These soils have dark reddish brown, gravelly

clay loam surface soils and red, gravelly clay subsoils. Mostly, they are under forest or cultivated with rubber and cashew.

3.1.1.2.5 Thekila Series

These are very deep; fine textured imperfectly drained soils developed from reverine alluvium occurring on very gently to gently sloping lands along stream banks. Solum thickness is more than 150 cm. Surface soil is yellowish brown and clay loam to clay. Sub soil is brown to strong brown to clay.

These soils are imperfectly to moderately well drain with moderate to moderately slow permeability. These soils have strong water holding and nutrient holding capacity.

3.1.1.2.6 Arathil series

These are deep to very deep soils occurring on the ridges and slopes of low laterite hills. This series, generally noticed on strongly sloping to very steep side slopes. Solum thickness more than 150cm. Surface soil is yellowish red to dark reddish brown and gravelly clay loam to gravelly clay in texture. Fine gravel content is more than 33%. Subsoil is dark reddish brown to red and gravelly clay with plenty of fine gravels. C horizon is laterite. These are well drained soils with moderate permeability. Water holding capacity and nutrient holding capacity are low. Cashew, coconut, pepper, rubber etc, are the major crops grown.

3.1.1.2.7 Edanad series

These are moderately deep to deep soils occurring on gently to moderately slopping foot slopes of low hills and mounds. Surface soil is dark brown to dark reddish brown and gravelly clay loam to gravelly sandy clay loam to gravely sandy clay. Solum thickness is 90 to 140 cm. C horizon is laterite.

These are well drained soils with moderate permeability due to high gravel content. Water holding capacity is low. Cashew, coconut and banana are the crops commonly grown in this soil.

3.1.1.2.8. Kolathur series

Shallow to moderately shallow soils occurring on flat low hill tops with slope gradients of 3 to 10% are included in this series. Solum depth is 25 to 65 cm. Surface layer is dark brown to dark reddish brown, gravelly clay loam to gravelly clay and strongly acidic. Subsoil is yellowish red to reddish brown and gravelly sandy clay to gravelly clay. Solum is underlain by hard laterite. These are well drained soils with moderate permeability. Water holding capacity and nutrient holding capacity is low.

Cashew and coconut are being cultivated in this soil.

Table 9 Soil texture

Sl No	Soil texture	Area in Ha
1	Clay loam	424.5720
2	Gravelly clay loam	4547.428
Total		**4972.00**

Table 10 Soil depth

Sl No	Soil depth in CM	Area in Ha
1	Shallow (25-50)	402.1978
2	Moderately shallow (50-75)	0.00
3	Moderately deep (75-100)	12.8202
4	Deep (100-150)	2464.04
5	Very deep (>150)	2092.942
Total		**4972.00**

Table 11 Slope grade

Sl No	Slope grade	Area in Ha
1	B- Very gently sloppy (1-3 %)	86.3802
2	C- Gently sloppy (3-5%)	672.0025
3	D- Moderately sloppy (5-10%)	20.1157
4	E -Strongly sloppy (10-15 %)	281.0600
5	F Moderately steep (15-25%)	1392.9768
6	G- Steep Slope – (25-33%)	1390.0168
7	H- Very steep – (33-50%)	1129.4480
Total		**4972.00**

(Source : Net Plan Survey)

Table 12 Erosion class

Sl No	Erosion class	Area in Ha
1	Slight erosion	376.3223
2	Moderate erosion	3573.6193
3	Severe erosion	1022.0584
Total		**4972.00**

3.2 Land Capability Classification (LCC):

Land capability classification is an interpretative grouping of soil, based on the inherent soil characteristics, external land features and environmental factors that limit the use of land. Classification of soil units into land capability units enables us to understand the potentials and hazards of soil to various land use for sustained productivity. The soils in the project area is grouped under the following LCC

Table 13 LCC

Sl No	LCC	Area in Ha
1	II	86.3802

2	III	692.1181
3	IV	1674.0368
4	V	2519.4649
Total		**4972.00**

There are eight land capability classes. Class I land is the ideal land free of any limitation, suitable for intensive cultivation of all climatically adapted crops. Lands grouped under class II to VII have progressively increasing hazards and limitations and require more intensive treatments for sustained use. Class VIII lands have severe limitations and are suited only for wild life or recreation.

3.3 Ground water scenario:

Groundwater occur under water table conditions in alluvium, laterites and weathered mantle of the crystallines, where as in the deeper fractured crystallines the groundwater occurs under semi confined to confined conditions. Since the physiographic set up and geological formations are same for entire area of Kasaragod DT, the hydrogeological conditions are same.

3.3.1 Hydrogeology

Laterite is the most wide spread and extensively developed aquifer in the project area It widely vary in its physio-chemical characteristics. The laterite is generally underlain by thick lithomargic clay which is the preliminary lateritisation front. The thickness of lithomargic clay varies from about 0.5 m to 5.0 m at places. Laterite is more ferrogenous and porous in some parts. Due to its porous nature the dug wells tapping laterite get recharged fast and also the water escapes as sub-surface flow and water level falls quite fast especially in wells located on topographic highs and hill slopes.

The depth to water level in pre-monsoon period ranges from 3.62 m to 23.90 m bgl and in post-monsoon period 1.60 m to 22.60 m bgl. Maximum fluctuation is seen in well located in topographic highs and slopes. In midland areas a very common ground water abstraction structure is Tunnel wells (locally called as 'SURANGAMS'), which is a horizontal well (Adit) with a width of 50 cm to 75 cm and height of around 2 m. The length of Tunnel well varies from few metres to 100 metres. Generally, the tunnel well starts at the foot hills and cut across the slope horizontally to have the maximum yield.

The yield of tunnel wells varies from 1 m^3/day to up to 50 m^3/day in summer. In peak summer, the yield of tunnel wells is generally less.

3.3.2 Status of Ground Water Development

The hydrogeological conditions in various locations of the the watershed are same. The aquifers are Alluvium, Laterites, weathered crystallines and deep fractured crystallines.

The yield of wells including filter point wells in alluvium ranges from 10 to 50m^3/day. The dug wells have the depth ranges from 3.59 m to 6.74 mbgl. The diameters of wells

are 1.5 m to 2.5 m. The yield of wells in laterite ranges from 5 to 60m^3/day in winter period and it reduces to 2 to 20m^3/day in summer.
Generally large diameter wells are constructed in laterite terrain. In the weathered crystallines, the yield of wells ranges from 1 to 10m^3/day in summer period. The depth ranges of wells are 4.35 to 16.46 m bgl and the diameter of wells are 1.5 to 3.0m. In the fractured crystallines rocks, the bore wells constructed to the depth ranges from 40 m to around 120 metres. The general potential zones are between 40 to 75 metres. Below 100m depth only in limited areas high yielding zones encountered.

3.4 Stream order:
The watershed has a total drainage length of 175.25 KM. This is IVth order watershed.
Table 14 Order wise number of streams

Sl No	Order	Total No
1	I	102
2	II	19
3	III	3
4	IV	1
Total		**125**

3.5 Climatic data:
Table 15 Average of last 10 years - source: RARS, Pilicode

Average Annual rainfall in MM	Average temperature	
	Maximum	Minimum
3344.23	32.23 °C	30.26 °C

The watershed receives an average annual rainfall of 3344.23 mm. The major source of rainfall is southwest monsoon from June to September which contributes nearly 85.3% of the total rainfall of the year. The northeast monsoon contributes nearly 8.9% and balance of 5.8% is received during the month of January to May as pre-monsoon showers.

Table 16 Weather data 2011(source CPCRI: Kasaragod)

Month	Rainfall in CM	Temperature in ^oC		Humidity in %	
		Max	Min	FN	AN
Jan	000.0	31.8	19.7	89	54
Feb	000.0	32.3	20.1	86	54
Mar	000.0	32.5	22.8	92	66
Apr	147.0	32.8	23.9	90	67
May	088.2	32.9	24.1	90	67

Jun	957.2	29.6	23.1	94	88
Jul	1100.8	27.8	22.0	98	93
Aug	829.8	28.1	21.9	97	89
Sept	617.2	29.1	21.9	93	85
Oct	192.4	31.0	22.1	94	74
Nov	166.2	32.2	22.0	87	61
Dec	000.6	32.6	20.8	81	54
Average	341.617	31.05	22.03	90.91	71

Temperature

The temperature is more during the months of March to May and is less during December and January. The average mean monthly maximum temperature ranges from 29.1 to 32.9 ^{0}C and minimum temperature ranges from 19.7 to 24.1 ^{0}C.

Relative Humidity

Relative humidity is more during morning hours and is less during evening hours. During the morning hours it ranges from 81 to 98% and during evening hours it ranges from 54 to 89%.

Table 17 Lad use

Public Land	
Forest Land	93.50
Govt/ Revenue /Panchayath land	21.50
Roads & Buildings	43.00
Sub Total	**158.00**
Privately owned land	
Cropped area	4740.25
Irrigated Area	685.95
Rain fed Area	4054.30
Fallow Land(Cultivable waste)	56.75
Waste Land (Uncultivable waste)	17.00
Sub Total	**4814**
Total	**4972**

Table 18 Land holding pattern

Sl No	Land holding class	Households		Land held	
		Number	% of Total	Ha	% of Total
1	Landless	0	0	0	0
2	Marginal farmers	1940	50.77	580.2932	12.05
3	Small farmers	1749	45.77	3177.9246	66.01
4	Large farmers	132	3.46	1056	21.94
	TOTAL	**3821**	**100.00**	**4814.2178**	**100.00**
Average gross land holding per Household = 1.25					

Table 19 Major Agricultural Crops

Sl No	Major crops	Area in Ha	Average production in MT	Productivity(Kg/Ha)
1	Coconut	945.80	426	7334
2	Areca nut	587.20	32701	1856
3	Rubber	1991.60	31357	1236
4	Cashew	218.88	17925	992
5	Pepper	37.50	1950	292
6	Paddy- First crop	33.25	8234	2544
7	Vegetables	112.00	-	-
8	Banana	3926.23	7130	9037

Table 20 Details of Irrigation devise/method

Sl No	Type of irrigation	Area in Ha	No. of Families
1	Manual	800	662
2	Motorised	6800	866
3	Drip	110	1
4	Sprinkler	142.46	47
	Total	**7852.46**	**1576**

Table 21 Live stock resources

Sr No	Category of Livestock	Existing No
A	Existing Livestock under present land use	
1	Indigenous Cows	39

2	Cross bred Cows	899
3	Buffalo	2
4	Duck	13
5	Pig	15
6	Goat	703
7	Rabbit	14
8	Chicks	1397

3.6 Demographic and socio economic status of the families
(Source: PRA and Socio-Economic Survey)

1. Total No. of households/ families : 3821
2. Total Population : 13836
3. Average family size : 3.6

Table 22 Category of the families:

	SC	ST	OBC	General	Total	APL	BPL
Total No. of Families	79	582	1563	1597	3821	2666	1155
% of Total Families	2.07	15.23	40.91	41.79	100	69.77	30.23

3.7 Profile of the families:
Table 23 Age wise grouping

Sl No	Age group	Male	Female	Total
1	0 - 05	323	323	**646**
2	06 - 12	596	612	**1208**
3	13 - 18	787	788	**1575**
4	19 - 40	2667	2530	**5197**
5	41 - 60	1954	1955	**3909**
6	Above 60	624	677	**1301**
	TOTAL	**6951**	**6885**	**13836**

Table 24 Education

Sl No	Level of Education	Male	Female	Total
1	Literate/Read & Write only	901	995	**1896**
2	Primary	1166	1235	**2401**
3	Upper Primary	1528	1314	**2842**
4	Secondary School	1713	1450	**3163**

5	Senior Secondary	892	962	**1854**
6	Graduate & Above	517	563	**1080**
7	Diploma	178	131	**309**
8	B. Tech	17	12	**29**
9	Nursing	37	217	**254**
10	Doctors	2	6	**8**
	Total	**6951**	**6885**	**13836**

(Source: PRA & Socio-Economic survey)

Tab le 25 Status of Housing

Total families	**Having a house**	**Not having a house**
3821	3287	534
	86.02	13.98

(Source: PRA & Socio-Economic survey)

Table 26 Condition of Houses

Story		**Roof**			**Floor**			**Latrine**	
Ground floor	**First floor**	**RCC**	**Tiled**	**Thatched**	**Mud/ ordinary**	**Cement**	**Tiled/ Marble**	**Yes**	**No**
2365	243	1347	1473	311	386	2098	300	2767	285

(Source: PRA & Socio-Economic survey)

Table 27 Income Source of the Families

Sl No	**Source of Income**	**Male**	**Female**	**Total**
1	Agriculture wage labour	2112	1427	3539
2	Non Agriculture wage labour	1384	899	2283
3	Agriculture	1702	1122	2824
4	Govt. Services	271	129	400
5	Other Sources	852	647	1499
6	Studying	932	814	1746
7	Unemployed	799	746	1545
	Total	**8052**	**5784**	**13836**

(Source: PRA & Socio-Economic survey)

Table 28 Annual Incomes of the Families

Sl No	Annual Income	Total
1	Below – 24000	2438
2	24000 - 40000	339
3	40000 - 60000	226
4	60000 - 80000	70
5	80000 - 100000	92
6	100000 - 120000	56
7	Above 120000	62
	Total	**3283**

(Source: PRA & Socio-Economic survey)

Table 29 Savings

Sl No	Institutions	No. of families
1	Bank/Cooperative societies	1362
2	Post Office	215
3	Kudumbasree	2373
4	Self Help Groups	421
5	Kury(Local Chit)	821
6	Chit funds(Registered Chit funds)	68
7	LIC	903

(Source: PRA & Socio-Economic survey)

Table 30 Credit availed

Sl No	Purpose	Total Families	Total loan amount	Repayment status	
				Regular	Default
1	Agriculture	1109	62778800	1012	97
2	Marriage	25	86681000	21	4
3	Housing	501	16995000	498	3
4	Educational	93	4350000	67	26
5	Personal	352	52681000	264	88
	Total	**2080**	**223485800**	**1862**	**218**

(Source: PRA & Socio-Economic survey)

Table 31 Status of Registration & Job days of Families under MGNREGS

No. of families Registered	No. of job days in 2010-2011 for the families					
	Below 20	21 - 40	41 - 60	61 - 80	81-99	100
499	264	127	111	81	60	77

(Source: PRA & Socio-Economic survey)

Infrastructural facilities: Following infrastructural facilities are available

a) Medical/health institutions: Each Grama Panchayat coming under the project area has its own Public Health Centre and the Community Health Centre is at Panathady. People also depend to the District Hospital at Kanhangad for medical purpose
b) Credit facilities: The area has access to the branches of nationalized banks as well as Cooperative banks
c) Marketing facilities: There are local markets in the watershed area whre the farmers market their agricultural produces
d) Communication facilities: The area has good telephone connectivity (land line as well as wireless/cell phone)
e) Transportation: The watershed area is blessed with good road connectivity and the people mainly depend to public transport system
f) Electricity: The watershed area has electricity connectivity
g) Education: There are Lower primary schools, Upper primary schools, High school and Higher secondary school. For higher education, the students depend to the St. Pious xth college, Rajapuram, E.K.Nayanar Memorial Government College, Elerithattu, SN College, Kalichamaram, NAS College, Padanakkad and Government College, Kasaragod

3.8 Major Problems in the watershed:

3.8.1 Water sector

- Ground water depletion
  The water availability from most of the ground water sources shows a diminishing tendency since February month onwards. The water table becomes very low; even to meet the drinking water purpose in the month of May. Most of the water bodies are non perennial.
- Contamination of water bodies
  Water contamination is a serious problem in this watershed. Water is contaminated due to unscientific application of chemical pesticides to the crops, dumping of wastes (from meat market, plastic carry bags and bottles) and over flow water during rainy season.
- Water over use
  Community use water without any control for domestic purpose, cleaning of vehicles, family level functions and for irrigation during the water available period. This uncontrolled use lead to over extraction of water from water bodies ultimately resulting in to unfavorable water level depletion. This shows that the community is water illiterate.

3.8.2 Soil related

- Top soil erosion due to high speed of run off water

Since the area is not scientifically treated for soil and water conservation and the topography is undulating, during rainy period the area experiences excessive soil erosion, especially top soil erosion. The erosion will carry the fertile soil.

- Loss of soil nutrients

The excessive soil erosion carries the fertile soil causing loss of soil nutrients.

3.8.3 Drainage systems

- Sliding of drainage line due to high speed of runoff water and over flow water.
- Non perennial streams / rivulets- Due to absence of scientific soil and water conservation measures in the area and the unprotected drainages, the length of water availability in streams and rivulets are only up to Mid April.
- Siltation of drainages- The eroded soil is deposited in the streams causing reduced size of the drainage to contain water.
- Water over flow from drainages during monsoon- This is mainly due to excess runoff water coming from sloppy areas and the reduced size of the drainage to contain water due to silt diposit
- Defunct VCBs- VCBs are constructed under various schemes in the watershed area. But due to attitudinal problems, unscientific selection of the site for construction, the VCBs are defunct and not serving the purpose.

3.8.4 Agriculture

- Unscientific land use and cultivation practices

  Land is used for various purposes such as cultivation, road construction, waste disposal and building construction. But there is no scientific land use plan developed so far. The cultivation practice is not as per the land capability class. The mono cropping practice is on the high. The crop cultivation is shifted to cash crops. Soil nutrient management is not being practiced scientifically by most of the farmers. The application of fertilizers to manage the soil nutrients is not systematic as soil testing is not performed regularly. The practice of producing bio-fertilizer on farm using farm waste/on farm recycling is also on the diminishing end. Due to this, farmers had to purchase fertilizers from private vendors paying high price. This has increased the cost of cultivation.

- Paddy land filling.

  Paddy fields are storing large amount of water during rain. Due to rapid shift from short term crops to cash crops and for construction of buildings, the paddy land is being filled up rapidly.

- Acute shortage of agricultural wage labour

  Due to the attitude of the people to get in to white collar jobs, the persons opting for the wage labour as an income source is on the wane. Only aged men and women are continuing to be agricultural wage laboures. They also are not exclusively for agricultural wage labour. They will go for construction jobs also as it provides good wage. All this has created a situation of near non availability of sufficient number of agricultural wage labours to undertake farm activities timely. Farmers are struggling to find out labours during agriculture season. Dearth of labours has compelled the farmers either to reduce the area under cultivation or to skip some crucial agricultural practices such as tilling and fertilization.

- Insufficiency of quality seed /dependency

  The system of seed production is not being practiced by many of the farmers. They mainly depend to the Governmental agencies and Grama Panchayat for seeds. These agencies often fail to meet the huge demand for the seed, especially vegetable seed. In such cases, the farmers collect seeds from way side vendors remitting higher price for which no quality is guaranteed. Insufficiency of quality seed is a serious problem faced by the farmers.
- Unscientific irrigation practices

  Irrigation of crop is a major use of water. For reduced/regulated water use, technologies like drip and sprinkler are available. But due to some stigma, farmers prefer conventional methods of irrigation ie. using hose, causing excess use of water. Farmers generally use water over and above the actual need of the crop in times of water availability and will stop irrigation during water scarcity. Both this practice is not good for the health and production capacity of the crops.
- Indigenous Technical Know how (ITK) is not documented/used for crop improvement

  A number of Indigenous Technical Know how (ITK) for farming improvement (In the areas of Nutrient management, Pest & Disease management, etc) is available with farmers at grassroots. But this ITK are not documented systematically and thus are not known to larger farming community

3.8.5 Environmental

- Degradation to bio-diversity

  The watershed area had rich biodiversity. But over the years due to shift in livelihood practices, agricultural practices, value system change, etc the rich bio-diversity started degrading. This is reflected in near extinction of local variety seeds, herbal medicinal plants, degradation of sacred groves which has a crucial role in conserving the eco system. No conscious effort was taken to document the bio diversity and to conserve it.
- Demolition of hillocks

  Hillocks are the unique feature of this watershed area, which conserve the water resource and are place for rare species of plants and birds. For land filling purpose in construction sites, the hillocks are demolished without any control. This has resulted in loss of bio diversity and depletion of ground water.
- Wastage dumping in public places

  Huge amount of waste material is a by-product of modern development process. In public places, residential buildings, offices and other buildings, the waste management practice is very poor. Household wastes, wastes from commercial/shopping centres & offices are simply thrown away on roads and public places without segregating in to degradable and non degradable. These wastes when put in to fire produce harmful gases causing health hazards and increase atmospheric temperature.

- Lack of public toilet system in markets and towns
  This is a crucial environmental as well as social problem. Due to the absence of public toilet system in markets and other public places, open defecation takes place.

3.8.6 Socio-economic and health

- Shortage of sanitary latrine in SC/ST colonies
  Even after implementing a number of schemes, the need for sanitary latrine is not yet addressed fully. There are colonies where sanitary latrines proportionate to the population are not constructed.
- Financial indiscipline in families
  The consumerist behaviour of the community has bagged a major share of the family income for luxuries and extravaganza expenses. For majority cases, the crop loan taken is not used exclusively for crop improvement. Diversion of the use has resulted in to non repayment of loans.
- Water born diseases , especially in SC/ST colonies
  Data available with the heath centres shows that occurrence of contagious disease in monsoon period and water scarce period is on the increase over the years. One of the main reasons for this is contamination of drinking water source.

All the above problems are to be addressed by developmental agencies with convergence of schemes. Watershed projects as it is a development intervention in natural boundaries are the vehicle for sustainable development.

3.9 Goals, objectives and activities

3.9.1 Project Goal

The ultimate goal of the project is to generate sustainable development through management of natural resource base, agricultural production and livelihoods with increased people participation and application of appropriate technology.

3.9.10 Project objectives

- To conserve the natural resource base of the Watershed
- To Promote in-situ soil and water conservation measures
- To augment the ground water table on a sustained manner
- To Improve the soil health
- To improve production and productivity of agriculture crops and income
- To improve the living standard of the people
- To bring about effective people participation at all stages of implementation of IWMP, viz. planning, implementation, monitoring , evaluation, and post project maintenance

- To improve the possibilities for convergence of various schemes so as to enhance the effectiveness of the schemes
- To strengthen the community based organizations like watershed committees, user groups, neighborhood groups, watershed grama sabha etc, through appropriate capacity building processes and skill improvement
- To document the Indigenous Technical Knowledge (ITK) and to make use of the traditional wisdom of the community in solving local problems under training component
- To evolve location specific natural resource management linked livelihood support systems
- To take up effective IEC activities through folklores, songs, films, leaflets, pamphlets, booklets, and publications under training component
- To develop user friendly computer software for agri service and support systems which will provide scientific practical information and solutions for matters related to soils, water, crops, livestock and livelihood under training component

Chapter -4

Proposed Activities-Watershed Development Works (NRM Activities)

4.1 Proposed treatment measures

4.1.1 Watershed Development Works

4.1.1.1 Area treatment measures

- Water Percolation Pit - (Slope grade - A – E)
- Husk Pit (Slope grade A-C)
- Stone Pitched Bund (Slope grade Above E)
- Stone Bund Heightening (Slope grade Above E)
- Source /Well Recharge Pit (Slope grade A-B)
- Ground Water Recharge Pit (Slope grade A-B)
- Roof Top Rain Water Harvesting Tank -
- Agrostological Measures (AM)
- Pallam Conservation
- Farm Pond/Percolation Pond
- Pond Construction
- Construction of "Madakkam"
- Water Collection Pit
- Land Reclamation /Development for Agriculture
- Agro Horticulture

4.1.1.2Drainage line treatment measures

- Gully Plugs
- Loose Boulder Check Dam
- Loose Boulder Check Dam with wing wall
- Retaining Wall using Stone

4.2. Details of Proposed treatment Measures

Sl No	Treatment Measures	Unit of Measures	Target	IWMP Grant	WDF contribution
A	**Area Treatment**				
1	Horticulture	Ha	2.917	875100	70008
2	Contour Bunding	Ha	219.5	15435502	1234840
3	Staggered Trenching	Ha	37.14	1673995	140821
4	Farm Ponds	No	31	2008007	169941
5	Percolation Tank	No	201	854219	70734
6	Ground Water Recharge system	No	39	505500	42008
7	Others	No	4	250000	21250
	Sub Total			**21602323**	**1749602**
Drainage line treatment					
8	Gully Plugging	CuM	285.64	312012	31201
9	Loose boulder check dams	CuM	3156.32	3447243	344724
10	Retaining wall	CuM	10184.3	16403488	1640349
	Sub Total			**20162743**	**2016274**
	Total (A+B)			**41765066**	**3765876**

Details of Sub activities

Sl No	Treatment Measures	Unit of Measures	Unit cost	Target	IWMP Grant	WDF contribution
A	**Area Treatment**					
1	**Horticulture**	**Ha**		**2.917**	875100	70008
a	*Agro Horti/Agro Forestry*	*No*	*60*	*14585*	*875100*	*70008*
2	**Contour Bunding**	**Ha**		**219.5**	**15435502**	**1234840**
a	*Stone Pitched Bund*	*M2*	*100.46*	*149303.14*	*14998993*	*1199919*
b	*Stone Bund Heightening*	*M2*	*100.46*	*4345.1*	*436509*	*34921*
3	**Staggered Trenching**	**Ha**		**37.14**	**1673995**	**140821**
a	*Water Percolation Pit*	*No*	*108.79*	*2700*	*293733*	*23499*
b	*Husk Trench*	*No*	*163.48*	*8443*	*1380262*	*117322*
4	**Farm Ponds**	**No**		**31**	**2008007**	**169941**
a	*Farm Pond*	*No*	*62000*	*30*	*1860000*	*158100*
	Pond Construction	*No*	*148007*	*1*	*148007*	*11841*
5	**Percolation Tank**	**No**		**201**	**854219**	**70734**
a	*Water Collection Pit*	*No*	*1955.79*	*176*	*344219*	*29259*
b	*Water Collection Tank*	*No*	*25000*	*5*	*125000*	*10000*
c	*Madakkam*	*No*	*7500*	*18*	*135000*	*11475*
d	*Pallam Conservation*	*No*	*125000*	*2*	*250000*	*20000*
6	**Ground Water Recharge system**	**No**		**39**	**505500**	**42008**
a	*Ground Water Recharge system*	*No*	*9600*	*20*	*192000*	*15360*
b	*Well Recharge System*	*No*	*16500*	*19*	*313500*	*26648*

Sl No	Treatment Measures	Unit of Measures	Unit cost	Target	IWMP Grant	WDF Contribution
7	**Others**	**No**		**4**	**250000**	**21250**
a	*Land reclamation/Improvement for Agriculture*	*No*	*85000*	*2*	*170000*	*14450*
b	*RWH Tank*	*No*	*40000*	*2*	*80000*	*6800*
	Sub Total				**21602323**	**1749602**
Drainage line treatment						
8	**Gully Plugging**	**CuM**		**285.64**	**312012**	**31201**
a	*Gully Plugging*	*No*	*808.32*	*386*	*312012*	*31201*
9	**Loose boulder check dams**	**CuM**		**3156.32**	**3447243**	**344724**
a	*Loose Boulder Check Dams*	*No*	*4771.48*	*279*	*1331243*	*133124*
b	*Loose Boulder Check Dams with wing wall*	*No*	*9200*	*230*	*2116000*	*211600*
10	**Retaining wall**	**CuM**		**10184.3**	**16403488**	**1640349**
a	*Retaining wall*	*RM*	*2254.93*	*7274.5*	*16403488*	*1640349*
	Sub Total				**20162743**	**2016274**
	Total (A+B)				**41765066**	**3765876**

4.3. YEAR WISE TREATMENT PLAN

Sl No	Treatment Measures	Unit of Measures	Unit cost	Target	1st Year		2nd Year		3rd Year		4th Year	
					Target	Amount	Target	Amount	Target	Amount	Target	Amount
A	**Area Treatment**											
1	Horticulture	Ha		2.917	0	0	1.9	593400	1.017	281700		
2	Contour Bunding	Ha		219.5	46	3264950	77	5409279	53	3707408	43.5	3053865
3	Staggered Trenching	Ha		37.14			20	895339	10	457581	7.14	321075
4	Farm Ponds	No		31	23	1512007	8	496000	0	0	0	0
5	Percolation Tank	No		201	113	265358	88	588861	0	0	0	0
6	Ground Water Recharge system	No		39	20	192000	19	313500	0	0	0	0
7	Others	No		4	2	170000	2	80000	0	0	0	0
B	**Drainageline Treatment**											
8	Gully Plugging	CuM		285.64	205	224713	80.64	87299	0	0	0	0
9	Loose boulder check dams	CuM		3156.32	2203	2406181	872	952804	81.32	88257	0	0
10	Retaining wall	CuM		10184.3	5343	8607068	4021	6477286	602	969620	218.3	349514
	Total					**16642277**		**15893768**		**5504566**		**3724454**

Sub actitivity wise year plan

Sl No	Treatment Measures	Unit of Measures	Unit cost	Target	1st Year		2nd Year		3rd Year		4th Year	
					Target	Amount	Target	Amount	Target	Amount	Target	Amount
A	**Area Treatment**											
1	**Horticulture**	**Ha**		**2.917**	0	0	**1.9**	**593400**	**1.017**	**281700**		
a	*Agro Horti/Agro Forestry*	*No*	*60*	*14585*	*0*	*0*	*9890*	*593400*	*4695*	*281700*	*0*	*0*
2	**Contour Bunding**	**Ha**		**219.5**	**46**	**3264950**	**77**	**5409279**	**53**	**3707408**	**43.5**	**3053865**
a	*Stone Pitched Bund*	*M2*	*100.46*	*149303*	*31500*	*3164490*	*50500*	*5073230*	*36904.3*	*3707408*	*30399*	*3053865*
b	*Stone Bund Heightening*	*M2*	*100.46*	*4345.1*	*1000*	*100460*	*3345.1*	*336049*	*0*		*0*	
3	**Staggered Trenching**	**Ha**		**37.14**			**20**	**895339**	**10**	**457581**	**7.14**	**321075**
a	*Water Percolation Pit*	*No*	*108.79*	*2700*	*0*	*0*	*2700*	*293733*	*0*	*0*	*0*	*0*
b	*Husk Trench*	*No*	*163.48*	*8443*	*0*	*0*	*3680*	*601606*	*2799*	*457581*	*1964*	*321075*
4	**Farm Ponds**	**No**		**31**	**23**	**1512007**	**8**	**496000**	0	0	0	0
a	*Farm Pond*	*No*	*62000*	*30*	*22*	*1364000*	*8*	*496000*	*0*	*0*	*0*	*0*
b	*Pond Construction*	*No*	*148007*	*1*	*1*	*148007*	*0*	*0*	*0*	*0*	*0*	*0*
5	**Percolation Tank**	**No**		**201**	**113**	**265358**	**88**	**588861**	**0**	**0**	**0**	**0**
a	*Water Collection Pit*	*No*	*1955.79*	*176*	*105*	*205358*	*71*	*138861*	*0*	*0*	*0*	*0*
b	*Water Collection Tank*	*No*	*25000*	*5*	*0*	*0*	*5*	*125000*	*0*	*0*	*0*	*0*
c	*Madakkam*	*No*	*7500*	*18*	*8*	*60000*	*10*	*75000*	*0*	*0*	*0*	*0*
d	*Pallam Conservation*	*No*	*125000*	*2*	*0*	*0*	*2*	*250000*	*0*	*0*	*0*	*0*
6	**Ground Water Recharge system**	**No**		**39**	**20**	**192000**	**19**	**313500**	**0**	**0**	**0**	**0**
a	*Ground Water Recharge system*	*No*	*9600*	*20*	*20*	*192000*	*0*	*0*	*0*	*0*	*0*	*0*
b	*Well Recharge System*	*No*	*16500*	*19*	*0*	*0*	*19*	*313500*	*0*	*0*	*0*	*0*

Sl No	Treatment Measures	Unit of Measures	Unit cost	Target	1st Year		2nd Year		3rd Year		4th Year	
					Target	Amount	Target	Amount	Target	Amount	Target	Amount
7	**Others**	**No**		**4**	**2**	**170000**	**2**	**80000**	**0**	**0**	**0**	**0**
a	*Land reclamation/Improvement for Agriculture*	*No*	*85000*	*2*	*2*	*170000*	*0*	*0*	*0*	*0*	*0*	*0*
b	*RWH Tank*	*No*	*40000*	*2*	*0*	*0*	*2*	*80000*	*0*	*0*	*0*	*0*
B	**Drainageline Treatment**											
8	**Gully Plugging**	**CuM**		**285.64**	**205**	**224713**	**80.64**	**87299**	**0**	**0**	**0**	**0**
a	*Gully Plugging*	*No*	*808.32*	*386*	*278*	*224713*	*108*	*87299*	*0*	*0*	*0*	*0*
9	**Loose boulder check dams**	**CuM**		**3156.32**	**2203**	**2406181**	**872**	**952804**	**81.32**	**88257**	**0**	**0**
a	*Loose Boulder Check Dams*	*No*	*4771.48*	*279*	*190*	*906581*	*84*	*400804*	*5*	*23857*	*0*	*0*
b	*Loose Boulder Check Dams with wing wall*	*No*	*9200*	*230*	*163*	*1499600*	*60*	*552000*	*7*	*64400*	*0*	*0*
10	**Retaining wall**	**CuM**		**10184.3**	**5343**	**8607068**	**4021**	**6477286**	**602**	**969620**	**218.3**	**349514**
a	*Retaining wall*	*RM*	*2254.93*	*7274.5*	*3817*	*8607068*	*2872.5*	*6477286*	*430*	*969620*	*155*	*349514*
	Total					**16642277**		**15893768**		**5504566**		**3724454**

4.4. Details of Activities proposed:

4.4.1 Area treatment measures for soil and water management:

Based on soil survey and land capability classification, management practices for soil and water conservation for the area will be taken up. The interventions will include engineering as well as agronomic measures. Details of common activities are given below

4.4.1.1 Stone pitched contour bunds and Stone Bund Heightening

These are the structural barriers constructed along the contours at specified vertical intervals. Scientifically inclined construction of stone pitched contour bunds would either prevent or slow down the surface run off of rain water that in turn would create condition for enhancing the recharge of ground water and retention of soil moisture by preventing soil erosion. The construction of Contour bunds would ensure moisture regime conservation and fertile top soil protection that would eventually lead to increased plant growth and re-vegetarian. These are necessary requirement for increasing water infiltration capacity of the soil.

4.4.1.2. Water collection pits, Water Percolation Pit and Husk Pit

These are earthen dug up structures with different cross sections constructed in suitable areas to collect more quantity of runoff water and to protect soil. The overflow from the structure will be taken to other structures through outlet. To protect the earthen bunds which will be formed out of the excavated soil, vegetative reinforcement measures will be made.

4.4.1.3. Ground water recharging system and Well/Source recharge system

There structures are proposed to collect water flowing to ground from roof tops. Water will be collected through a small trench, in a pit constructed near to the house/building and the water source.

4.4.1.4. 'Pallam' Conservation

'Pallams' are natural water collection structures seen on laterite rocky areas. The runoff water stored in the Pallams will act as a natural recharge system which

regulate the runoff water by collecting it. The Pallams in the Project areas will be rejuvenated by removing silt and protecting its lines.

4.4.1.5 Farm Pond, Waters collection tank and Percolation Pond

A percolation pond is an earthen structure with varied size constructed to harvest and impounds the runoff from the catchments for a longer time, to facilitate vertical and lateral percolation of impounded water into the soil substrata, thereby recharging groundwater storage in the zone of influence of the pond.

4.4.1.6. Roof Top Rain Water Harvesting Tanks

These are systems to collect rain water directly from the roof top during rainy season through channels and a filtering unit in to a Fero-cement tank constructed near to the house/building. The water collected in the tank will be used during dry period.

4.4.1.7. Construction of "Madakkam"

'Madakkams' are the traditional water conservation structure. These are earthen dug up pits constructed in slopes and plains to collect rain water. The sides of the Madakkams will be stabilized through ramming and plastering with cow dung. The water stored in the Madakkams during rainy period will be used for crop cultivation, especially vegetable cultivation.

4.4.1.8 Agro Horticulture:-

These are agronomic interventions in watershed to protect soil through its root system and ensure food security. Need based and site specific agro horti saplings will be planted.

4.4.2 Drainage Line Treatments

To protect the drainage systems in the watershed various site specific measures such as Gully Plugs, Loose Boulder Check Dam, Loose Boulder Check Dam with Wing Wall and Retaining Wall are proposed.

Plugging the gullies of the micro watersheds by constructing various types of loose boulder checks have been proved as the most effective artificial method for recharging ground water and prevention of soil erosion. Different types of series of check dams are suggested for the upper, middle and lower reaches of the watershed.

Chapter -5

Proposed Activities- Production System & Micro Enterprises

5.1. Production System and Micro Enterprises

- Vegetable Cultivation
- Betel vine cultivation
- Tuber Crops Cultivation
- Banana Cultivation
- Fodder grass cultivation
- Floriculture
- Azolla Cultivation
- System of Rice Intensification (SRI)
- Fruit Processing Unit

5.2. Details of Proposed Activities

Sl No	Treatment Measures	Unit of Measures	Unit cost	Target	IWMP Grant	WDF contribution
1	Vegetable Cultivation	Ha	75000	14.10	1057485	89886
2	Betel vine Cultivation	Ha	555000	0.6053	335942	28555
3	Tuber crop Cultivation	Ha	500500	8.31842	4163369	353886
4	Banana Cultivation	Ha	150000	4.3205	648075	55086
5	Fodder Grass Cultivation	Ha	30000	2.6326	78978	6713
6	Flori Culture	Ha	497500	0.22184	110365	9381
7	Azolla Cultivation	No	5000	12	60000	5100
8	Fruit Processing Unit	No	125000	6	750000	63750
9	Readymade Garment Unit	No	125000	2	250000	21250
10	SRI	Ha	37500	0.1011	3791	322
	Total				**7458005**	**633930**

5.3. Year wise Treatment Plan

Sl No	Treatment Measures	Unit cost	Target	1st Year		2nd Year		3rd Year		4th Year	
				Target	Amount	Target	Amount	Target	Amount	Target	Amount
1	Vegetable Cultivation	75000	14.10	0	0	9.42	706500	4.1295	309713	0.5503	41272.5
2	Betel vine Cultivation	555000	0.6053	0	0	0.3035	168443	0.3018	167499	0	0
3	Tuber crop Cultivation	500500	8.31842	0	0	4.5686	2286584	3.32632	1664823	0.4235	211962
4	Banana Cultivation	150000	4.3205	0	0	4.1501	622515	0.1704	25560	0	0
5	Fodder Grass Cultivation	30000	2.6326	0	0	2.4306	72918	0	0	0.202	6060
6	Flori Culture	497500	0.22184	0	0	0.06	29850	0.16184	80515	0	0
7	Azolla Cultivation	5000	12	0	0	12	60000	0	0	0	0
8	Fruit Processing Unit	125000	6	0	0	1	125000	5	625000	0	0
9	Readymade Garment Unit	125000	2	0	0	0	0	2	250000	0	0
10	SRI	37500	0.1011	0	0	0	0	0.1011	3791	0	0
	Total				**0**		**4071810**		**3126902**		**259294**

5.4. Acvtivities Proposed

5.4.1 Vegetable cultivation

The state is dependent to other states for meeting the home demand for vegetables. Those who cultivate vegetables have received encouraging production. The common items cultivated are Okra, amaranth, bitter gourd, brinjal, chilly, pumpkin, cucumber and snake gourd. Normally people in these areas cultivate a mix of vegetables.

5.4.2. Betelvine Cultivation

Betel vine which requires a tropical climate with high atmospheric humidity can be cultivated in the uplands as well as in wetlands. In Kerala, it is mainly cultivated in arecanut and coconut gardens as an intercrop. Betel vine comes up very well in lateritic soils. Proper shade and irrigation are essential for successful cultivation. The crop tolerates a minimum temperature of 10^{o}C and a maximum of 40^{o}C. The important verieties cultivated are Thulasi, Venmani, Arikodi, Kalkodi, Karilanchi, Karpuram, Chelanthikarpuram, Koottakkodinandan and Perumkodi. Betel has got good market demenad locally.

5.4.3. Tuber crop cultivation

Tuber crops are mportant staple food crops. These crops produce high level of calories and carbohydrates from a unit area and unit time and they can withstand adverse biotic and abiotic conditions. The major tropical root crops are cassava, sweet potato, yams and aroids.

5.4.4. Banana cultivation

Banana cultivation is being practiced in the watersheds area as there is high market demand. The crop prefers tropical humid lowlands. April-May is the season for rain fed crops and August-September is the season for irrigated crop. The planting season can be adjusted depending to the local condiction. Common varieties cultivated are Nendran (clones), Robusta, Poovan, Palayankodan and Njalipoovan. Under the project we propose Banana cultivation.

5.4.5. Fodder grass cultivation

Cultivation of suitable varieties of fodder grass on contour bunds, open areas, non arable areas, etc is proposed to increase the fodder availability in the watershed.

5.4.6. Flori culture

Flori culture is a growing sector and is a good venture for earning income. Under the project we propose to cultivate Jasmin bush cultivation. Jasmine (*Jasminum polyanthum*) is a woody shrub. This plant is native to tropical and warm temperate regions. The plant prefers full sun to partial shade and a warm site. It grows well in moist, well drained, sandy loam to clayey garden soil.

5.4.7. Azolla cultivation

Azolla is a floating fern which resembles algae. Normally azolla is grown in paddy fields or shallow water bodies. Azolla Multiplies very rapidly. It can be used as fodder for animals to enhance yield.

Azolla as fodder

- Rich in proteins, essential amino acids, vitamins (vitamin A, vitamin B12 and Beta- Carotene), growth promoter intermediaries and minerals like calcium, phosphorus, potassium, iron, copper, magnesium
- Dry weight basis, it contains 25 - 35 percent protein, 10 - 15 percent minerals and 7 - 10 percent of amino acids, bio-active substances and bio-polymers
- Livestock easily digest it, owing to its high protein and low lignin content
- Azolla can be mixed with concentrates or can be given directly to livestock
- Can also be fed to poultry, sheep, goats, pigs and rabbits.

5.4.8. Fruit processing

Fruits are part of our diet but they are perishable items. To over come this problem, since many years various products are made from juice of fruits so that they can be consumed during off season as well.

Products like jam, jelly, squash etc. are made from fruits. With the help of new technology and preservatives, shelf life of such products has gone up and they can be preserved for many months with proper packing. So, under the project we propose fruit processing unit. The main fruits are jack fruit, mango fruit and pineapple.

5.4.9. Readymade Garment

The textile industry including readymade garments holds important position in the economy. The textiles shops at the towns mainly source the garments from

rural as well as urban areas. This is a viable venture for the groups of women in the watersheds as it yields good income.

5.4.10. System of Rice Intensification (SRI)

Under SRI, paddy fields are not flooded but kept moist during vegetative phase. Later only one inch water is maintained. SRI requires only about half as much water as normally applied in irrigated rice. SRI Paddy Cultivation requires less water, involves less expenditure and gives more yields. Thus it is beneficial for small and marginal farmers.

SRI uses less external inputs

In Paddy Cultivation under SRI technology, Less quantity of seeds - 2 kg / acre - is required. Hence, fewer plants per unit area (25 x 25 cm) whereas in conventional paddy cultivation requires 20 kg seed per acre. (1 acre= apprx 0.4 ha).

Chapter -6
Livelihood Activities

1. **Context:**

One of the important aims of the watershed management programme is livelihood security of the watershed community. One of the unique features of IWMP is the planning and implementation of livelihood activities. 9% of the total project cost is earmarked to assist the livelihood activities. Livelihood programme is visualized to maximize the utilization of potential generated by watershed activities and creation of sustainable livelihoods and enhanced incomes for households within the watershed area.

'Livelihood' generally deals with people, their resources and what they do with the resources. Livelihoods essentially revolve around resources such as soil/land, crops/plants, seed/seedlings, labour, energy, knowledge, cattle, money, social relationships, and so on. Livelihood can be viewed in the light of changing environmental, political, economic and socio-cultural circumstances.

2. **Guiding Principles of Livelihood programme in IWMP**

   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.

3. **Methodology followed to Plan the livelihood programme**

   i. Presentation of the concept of livelihood: The concept of livelihood security of families in watershed area was presented and discussed in the watershed community meetings. It provided the community awareness on the details of the livelihood programme under IWMP.
   ii. Participatory Livelihood Planning (PLP): Participatory Livelihood Planning was conducted in each Micro Watershed with the participation of the families. Social and Resource Map were prepared to know the present livelihood activities, resource base, livelihood capitals of the watershed and the scope for new livelihood activities. To know the present flow pattern of the resource of the village, Resource Inflow and Outflow tool was used. It has helped the community to internalise the present gap in income to meet the day to day need of the families and an

understanding on mobilising the required contribution of the family to implement the livelihood activities. Pair wise and Matrix Ranking and Scoring tool was used to prioritise the livelihood activities. It has helped the community to know the scope and risks of the activities and to select the viable livelihood activities for IWMP. Livelihood experts were also consulted at various stages of planning. The result frame work of the livelihood programme was also planned in the community meeting.

4. **Mode of implementation**

i. The livelihood action plan will be implemented either through the existing or new Self Help Groups (SHGs)/the Joint Liability Groups (JLGs) in the watershed area. The Federation of these groups also will be considered for implementation. However financial support to enterprising individuals could also be considered subject to a maximum of 10% of the funds under the livelihood component.
ii. SHGs/JLGs selected for implementing livelihood action plan will be homogeneous in-terms of their existing livelihood capitals, common interest and need.
iii. 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.
iv. The financial support to enterprising individuals who prepare and submit a viable livelihood proposal, may 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.

5. Eligibility for availing the funds under the Livelihood Component

i. The beneficiaries should be poor/marginalized communities, including SC/ST, landless/asset less people, women, etc.
ii. It will be ensured that the selected SHG/JLG does not have more than one member from a household.
iii. Priority may be given to women SHGs.

6. Procedure of release and administration:

i. This earmarked amount shall be taken out of the total project fund as a grant to WC in its bank account, which in turn will be used to provide financial assistance, (seed money for revolving fund to SHGs/JLGs and a grant -in -aid for enterprising SHGs/ JLGs or its federations to undertake major livelihood activities).
ii. At least 70% of this livelihood fund will be used to support revolving fund for SHGs, including support to enterprising individuals, and a maximum of 30% for supporting grant–in–aid to enterprising SHGs/ SHG federations.

6.1 Seed Money for Revolving Fund:

a. Seed money for SHGs/JLGs

i. Each SHG/JLG shall make an application for financial assistance to the WC. WC in its regular meeting, will consider these applications and pass resolution regarding its approval of financial assistance to SHGs/JLGs based on merit of the case. The representatives of applicant SHGs/JLGs may also be present in such meetings of the WC. The resolution will clearly rank the approved cases, based on the priorities and preferences, so that the support may be extended to all the eligible SHGs/JLGs in order of ranking.
ii. The initial amount up to Rs. 25,000 may be given as seed money to a SHG/JLGs as the revolving fund after their proposed activity(s) has been approved by the WC in its meeting and included in the resolution.
iii. The SHGs/JLGs will return the seed money on monthly basis and that could be reinvested in the same or other SHGs/JLGs as per the resolution passed in the meeting of WC. The amount and number of monthly instalments may be decided by WC based on the type of activity, capacity of the group and their savings. The amount may be returned in a maximum of 18 months.
iv. The payment will be made by cheque after the respective SHG/JLG has opened a joint bank account with two signatories from the SHG/JLG members.
v. The SHGs/JLGs may use the amount for a combined activity and/ or shall provide the above amount to the concerned members as individual loan against a specific activity for improving income. In case of individual support under the SHGs/JLGs, the individual will be accountable to the main SHGs/JLGs for finances and performance.

b. Seed money for Enterprising Individuals

i. The enterprising individual shall apply for financial assistance to the WC, along with a viable livelihood proposal. WC in its regular meeting, will consider such applications and recommend to WCDC, through PIA, the amount to be provided as seed money to such individual(s) as the revolving fund after their proposed activity(s) has been approved by the WC in its meeting and included in the resolution based on the merits of the case.
ii. The applicants may also be present in such meetings of the WC. The resolution will clearly rank the approved cases, based on the priorities and preferences, so that the support may be extended to all the eligible enterprising individuals in order of ranking.
iii. The WC may release financial assistance to these enterprising individuals after approval by WCDC. Such individuals will return the seed money on monthly basis and that could be reinvested further as per the resolution passed in meeting of WC. The amount and number of monthly instalments may be decided by WC based on the type of activity and capacity of the individual. The amount may be returned in a maximum of 18 months.
iv. The payment will be made by account payee cheque in such individual cases.

6.2 Funding for Major Livelihood activities:

i. The funding for major livelihood activities will enable the enterprising SHGs/ JLG/SHG federations (with atleast 5 enterprising SHGs) to avail a composite loan for undertaking major livelihood activities or to expand/upscale activities as recommended by the WC and approved by WCDC in consultation with line departments and bank.
ii. For such activities, a composite loan (grant in aid and bank loan) can be availed depending upon the type of activity. The grant -in-aid will be 50 % of the cost of the activity or Rs. 2.00 lakh whichever is less. However, grant in aid shall not exceed 30 % of the livelihood component (i.e. 9% of the total project cost) of the project.
iii. SLNA may issue detailed modalities for payment of grant-in-aid for funding major livelihood activities.

7. Capacity Building for Beneficiaries

The capacity building of the livelihood beneficiaries will be covered under the Training plan of IWMP. The expenditure for the training for livelihood

component will be met from the fund earmarked for institution and capacity building.

8. The Livelihood activities

Sl No	Activities	Unit of Measures	Unit cost	Target	Total Cost	Revolving Fund
1	Goat Village	No	22000	80	1760000	1760000
2	Dairy Village	No	70600	48	3388800	3388800
3	Honey Village	No	11075	29	321175	321175
4	Poultry Village	No	2280	371	845952	845952
5	Imitation gold making Unit	No	55000	3	165000	165000
6	Sari Painting Unit	No	53000	2	106000	106000
7	Readymade Garment Unit	No	125000	1	125000	125000
	Total				**6711927**	**6711927**

9. Year wise Treatment Plan

Sl No	Treatment Measures	Unit cost	Target	1st Year		2nd Year		3rd Year		4th Year	
				Target	Amount	Target	Amount	Target	Amount	Target	Amount
1	Goat Village	22000	80	0	0	0	0	39	858000	41	902000
2	Dairy Village	70600	48	0	0	0	0	28	1976800	20	1412000
3	Honey Village	11075	29	0	0	0	0	18	199350	11	121825
4	Poultry Village	2280	371	0	0	0	0	215	490200	156	355752
5	Imitation gold making	55000	3	0	0	0	0	1	55000	2	110000
6	Sari Painting	53000	2	0	0	0	0	1	53000	1	53000
7	Readymade Garment Unit	125000	1		0		0	1	125000	0	0
	Total								**3757350**		**2954577**

10. Major livelihood activities

10.1) Goat Village

Goat rearing is a profitable livelihood activity. It is affordable to the poor families because it needs low capital investment and provides quick return, simple shed is enough to house the goats, goat has high prolific rate, not a seasonal activity but year round activity, milk has high nutrient value and has good demand, meat is lean and has good market price, easy to manage even by women and the goat can be sold at any time. The programme will be implemented by the name Goat Village Programme as Goat rearing will be the lead livelihood activity of the concerned village opted for Goat rearing.

Suitable breed

The major breed in Kerala belongs to Malabari breed as it is well adapted to the agro-climatic conditions of the State. Malabari Goat is in white, brown and black colors. Kidding size is 2-3 kids. Buck weighs about 40-50 kgs and does weighs about 30 kgs

10.2) Dairy Village Programme

Dairying is found to be viable livelihood option for all sections of the society. Since milk has got good demand from households and markets, dairying would be a profitable activity for families. Hybrid varieties are needed to undertake dairying as a livelihood option. Sunandini variety is suitable for the Kasaragod climatic condition. Scientific rearing practice should be followed. A scientific cattle shed has to be constructed and maintained properly by the families. The programme will be implemented by the name Dairy Village Programme as Dairying will be the lead livelihood activity of the concerned village opted for Dairying.

10.3) Honey village programme

Bee-keeping (Apiculture) is being done by farmers as a source of additional income. Rubber and coconut farmers can place beehives in farms and gain a good return from it without any risk. *Apis Cerana* is the most suitable species in Kerala by bee farmers as it produces 7kg to 10kg of honey on an average. In addition to this, honeybees help pollinating process in flowers and plants, a process that sustains vegetation. Coconut, cardamom, cashew, mango, guava, rubber and vegetables are the major crops pollinated by honeybees. The programme will be implemented by the name Honey Village

Programme as Bee keeping will be the lead livelihood activity of the concerned village opted for bee keeping.

10.4) Poultry village programme

Poultry are economic converters of home grown food into both eggs and meat. Poultry manure (droppings) is also a very valuable source of plant nutrients. Eggs have a high protein, nutritious food with very little waste. The suitable variety for Kerala climate is Gramasree. In addition to eggs, the farmer will get poultry dropping, which is a quality organic fertilizer. Other advantages include:

- Availability of fresh eggs ,
- Recycling of household wastes/scraps
- Protein enriched food

The programme will be implemented by the name Poultry Village Programme as Poultry will be the lead livelihood activity of the concerned village opted for Poultry farming.

10.5) Imitation gold making unit

Imitation gold are videly used by the people especially women. Even in local markets imitation gold items are being sold. The technology/method of imitation gold making is simple and the person who wants to engage in the activity of imitation gold making can acquire the skill by attenting training programmes.

10.6) Sari Painting Unit

Saree is a most popular dress item of women in Kerala. Hand painted Sarees has good demand from the buyers. Hand painted sarees is extensively appreciated for its features like outstanding designs, elegant look, durability and excellent finish. By following the latest fashion trends, the saree painting units can fetch good income.

10.7) Readymade garment unit

The textile industry including readymade garments holds important position in the economy. The textiles shops at the towns mainly source the garments from rural as well as urban areas. This is a viable venture for the groups of women in the watersheds as it yields good income.

11. Expected results of the livelihood programme.

Following are the expected results of the livelihood programm

- The implementation of the livelihood programme would provide the families a dependable income source within the watershed area.
- The income level of the families will be improved
- The families would be able to meet their day to day economic needs out of the income they earn from the livelihood activities
- Families can save some money after meeting the day to day living expenses
- The living standard of the families will improve
- The status of the women will be improved
- Improved managerial and leadership capacity of the beneficiaries
- Participation of the beneficiaries in local level development programmes will be improved

Chapter -7

Entry Point Activities

Details of Micro Watershed wise Entry Point Activities

Sl No	Name of Micro Watershed	Entry Point Activity	Location	Gramapanchayath	Amount
1	Chullikkara	Shutter Check dam	Chettukallu	Kallar & Kodom Belur	206136.00
2	Parakkallu	Pond	Puliyilacochi	Kodom Belur	152267.00
3	Kunnumvayal	Pond	Kunnumvayal	Kodom -Belur	380275.00
4	Eladi	Rain Water Harvesting Tank	Eladi	Kodom -Belur	90764.00
5	Attakandam	Pond	Attakkandam	Kodom - Belur	257400.00
6	Edathodu	Pond with Tank	Pallathumala	Kodom-Belur & Balal	194423.00
7	Mundyanam	Pond with Tank	Clayicode	Kodom-Belur	374887.00
8	Anapetty	Shutter Check Dam	Anappetty	Kodom-Belur	397996.00
9	Koovatti	Pond with Tank	Koovatti	Kinanur-Karinthalam	365173.00
10	Malappacheri-Manimunda	Palllam Conservation	Malappacheri	Madikai	124980.00
11	Uthirchankavu	Rain Water Harvesting Tank	Uthirchankavu	Kodom-Belur& Madikai	90764.00
12	Mayyanganam	Water Tank	Kalichanadukkam	Kodom-Belur	209128.00
13	Cheralam	Rain Water Harvesting Tank	Yennappara	Kodom -Belur	139007.00
	Total				**2983200.00**

PS: No convergence with other schemes is proposed for EPA as it has to be implemented separately to motivate the people to take part in the project activities in preparatory stage

Chapter -8

Expected Result

8.1 Result Frame Work of the project

8.1.1 Major activities and outputs

No	Activity	Outputs
1	Community Organizations	Community structures are formed (Watershed Committee, SHG, etc) WC will be registered under societies registration act for the successful undertaking of the project activities and its objectives. The structures formed participate in the planning and implementation of the IMWP
2	Participatory Micro planning for DPR	Present status of the area, analysis of the problems, base line data and bench marks for impact analysis, potentials and limitations, critical assessment of present agri service delivery systems, action strategies and plans. Net plans and farm plans for each household, in GIS platform
3	Capacity building/skill building of the Community based organizations, farmers ,the officials, and people's representatives	Acquisition of knowledge, skill development, development of positive mind set among different stakeholders officials and willingness to accept a facilitating role, good governance, Improved coordination and cooperation among various stakeholders, convergence of schemes, increased people participation in developmental activities
4	Watershed works /soil & water management interventions	Various site specific treatment measures for soil, water and biomass conservation are implemented. This will start addressing the issues such as soil erosion, soil ill health, water degradation, low crop production and productivity, etc.

5	Soil analysis and soil health cards	The health of the soil is assessed and the farmers are educated on soil nutrient management and its relation with crop production. Farmers are motivated to undertake soil nutrient management practices
6	Farmer participatory seed banks	Seeds of short term crops especially local varieties will be produced and propagated. The seed requirement of the farmers will be met at local level. Availability of quality seeds. Local seed varieties are protected.
7	Irrigation water management and micro irrigation systems	Systems for proper management of the irrigation water are installed. The farmers will be trained on the irrigation systems. Micro irrigation systems are introduced in the villages.
8	Soft ware development for ICT activities	Soft ware for agri services are developed
9	Documenting Indigenous Technical Know how in agriculture and allied sector developing Village Knowledge Bank/Centre and its application	The ITKs are documented and are available for the use of the farmers to improve agricultural practices
10	Process documentation and dissemination of learning	Documentation of the whole process of action – reflection - and action cycles of the process and the learning is disseminated. This will produce Report, Successful Models and case studies
11	Livelihood activities	Livelihood activities are implemented. Families earn income to meet their livelihood expenses

8.1.2 Expected Outcomes

1. Improvement in crop production, agricultural income and living standards
2. Reduction in soil and nutrient loss
3. Increase in ground water level
4. Drinking water availability throughout the year to all the members of the community
5. Biodiversity is protected
6. Application of Information and Communication Technology (ICT) for agriculture improvement

7. Reduction in poverty rate
8. The planning , implementation and operation & maintenance systems and practices of IWMP will become more effective
9. Community, PRIs and officials will learn & develop the skills in doing micro planning, developing and applying result frame work document, participatory monitoring , process documentation, etc that help to improve the efficiency and effectiveness of the projects and programmes.
10. Best practices and norms for using water, soil and other natural resource are developed by the community.
11. The schools in the project area, NGOs and planners will get chance to learn the project results in dissemination programmes and it would be an education process for them
12. Best practices and success stories will be documented and disseminated

8.1.3. Impact

Goal	Impacts	Indicators of Impact
The ultimate goal of the project is to generate sustainable development through management of natural resource base, agricultural production and livelihoods with increased people participation and application of appropriate technology.	The results of the IWMP project will motivate the policy makers, planners and authorities to incorporate such systems in the projects being managed/implemented by them. The learning and success of the project will contribute to policy and advocacy level.	The systems incorporated in other projects of the PRIs and Government. The policy level changes
	Sustained and productive People participation in developmental programmes	Attendance in Grama Sabha, Watershed Committees, UGs and SHGs
		Decisions in the GS, UG, UG, and SHGs
		Watershed management fund and beneficiary contribution
	Capacity building of the community to plan and manage developmental programmes	Awareness and Knowledge about the programme and its guidelines
		The level of functioning of community organizations and timely completion of the interventions and social audit practices

		Number of people acquiring new skills relating to integrated watershed management, production and livelihood systems
		Knowledge on environmental issues and the need for sustainable development
		Quality of maintenance of records, registers and accounts by the community organizations
		Increase in number of deprived and poor people acquiring leadership roles
		Women participation and sharing of responsibilities in Community organizations, programme planning, implementation and monitoring
	Community will exercise pro active control on the developmental projects and programmes which will in turn generate good governance and proper service delivery.	Nature of involvement of technical officials in programme planning, implementation
		Timely Field visits, technical supervision and guidance for the activities and field level problems
		Timely Technical sanction and Administrative sanction
		Timely release of project assistance to the beneficiaries
		Maintenance of records, registers and accounts
	Augmenting the ground water level	Increase in the summer mean Water table
		Increase in the number of perennial wells and ponds
	Sustained availability of drinking water	Number of households that could overcome the drinking water problem
		Number of cases of water borne diseases in the watersheds-

		decreasing trend
		Rate of reduction to the drudgery of women
	Stream flow characteristics	Increase in the number of days of stream flows in the case of non perennial streams
		Increase in the quantity of stream flow and water availability in the upper portions of the watershed
	Soil erosion is reduced	Decrease in the loss of soil per annum per unit area
		Reduction in stream bank erosion and gully erosion
	Soil productivity	Increase in organic matter content of surface horizon
		Increase in the water holding capacity of the soil
		Improvement in the soil infiltration rate
		Improvement in the soil percolation rate
		Improvement in the activity of soil organisms
	Agricultural production and productivity is improved	Increase in the average annual yield from coconut palms
		Increase in the average yield of latex from rubber growing areas
		Increase in the total annual vegetable production of the watersheds
		Increase in the types of fruits and quantity of fruits produced from the watersheds
		Increase in the gross cultivated area
		Increase in the unit production of cereal crops
		Decrease in the cultivable barren and fallow lands
		Adoption of cropping systems

		like crop rotation, mixed cropping, multi level cropping
		Increase in the irrigated area in the watersheds
		Increase in the micro irrigation systems and irrigation pump sets
		Availability of fodder in the watersheds-increase
	Progress in Dairy and animal husbandry	Increase in the cattle population
		Increase in the total milk production of the watershed
		Increase in the milk collection centres and cooperative societies
		Increase in the family income from dairying
		Egg production in the watersheds
		Increase in the poultry, piggery and rabbit rearing units
	Non conventional source of energy is promoted	Increase in the number of bio gas plants
	Proper marketing system is developed	Distance to the markets – decrease
		Number of farmer's markets in the watersheds- increase
	Seed security at local level	The availability of seeds in sufficient quantity and quality to the farmers, locally
	ICT use make the process ease	The level of use of ICT by the farmers

Chapter -9

Detailed Estimate

10.1 – Livelihood Activities

Goat Village
(4 Goat /Unit 3+1 (3 dove + 1 buck) Malabari variety)

Sl no	Particulars	Rate	No	Total cost
1	Cost of goat (Dove) Buck	4000 6000	3 1	12000.00 6000.00
2	Cost of raised platform system(for housing)			6000.00
	Total			**24000.00**

Dairy Village
(2 Cow Unit - High Yield Variety (HF/Jersy)

Sl no	Particulars	Rate	No	Total cost
1	Cost of Cow	25000	2	50000.00
2	Insurance Charge (6.6%)	1650	2	3300.00
3	Transportation cost	525	2	1050.00
4	Construction of Cattle shed - 130 – Sqr ft		130 sqft	12000.00
	Total			**66350.00**

Poultry Village
(Gramasree/Gramalakshmi variety 45 -60 days old -10 Nos per Unit)

Sl no	Particulars	Rate	No	Total cost

1	Cost of Pullets(45-60 days old)including Transportation charge	75	10	750.00
2	Cost of Cage	-	-	1500.00
	Total			**2250.00**

Honey Village

(10 Boxes /Unit)

Sl no	Particulars	Rate	No	Total cost
1	Bee box with bee colony	900	10	9000.00
2	Hive Stand	100	10	1000.00
3	Smoker & Knife	300	1	300.00
4	Extractor(unit cost is 1350,1extractor will be used 2 units)	675	1	675.00
5	Bee vail	100	1	100.00
	Total			**11075.00**

Imitation Gold Making
(5-10 Persons/Unit)

Sl no	Particulars	Rate	No	Total cost
1	Purchase of Tools , Equipments & Furniture	18000	-	18000.00
2	Purchase of raw materials	25000	-	25000.00
3	Room Rent (Working unit cum Sales centre)	2000	6months	12000.00
	Total			**55000.00**

Saree Painting

(5-10 Persons/Unit)

Sl no	Particulars	Rate	No	Total cost
1	Purchase of Tools , Equipments & Furniture	16000	-	16000.00
2	Purchase of raw materials	25000	-	25000.00
3	Room Rent (Working unit cum Sales centre)	2000	6months	12000.00
	Total			**53000.00**

Readymade Garment

(10 Persons/Unit)

Sl no	Particulars	Rate	No	Total cost
1	Tailoring Machine	5500	10	55000.00
2	Embroidery Machine	10000	1	10000.00
3	Over lock machine	5500	1	5500.00
4	Furniture (Cutting Table ,Rack , Stool, Chairs & Almarah)	22000	-	22000.00
5	Purchase of Cloth	25000		25000.00
6	Room Rent	2500	3months	7500.00
	Total			**125000.00**

10.2– Production System & Micro Enterprises

Vegetable Cultivation

Sl no	Particulars	Rate	No	Total cost
1	Cost of seeds(Bitter-gourd, Brinjal, Cucumber, Ladies finger, Pumpkin, snake gourd, amaranths etc)	1000/Kg	12	12000.00
2	Cost for Organic manure &Application	10/Kg	2490	24900.00
4	Cultural operation & irrigation etc	300/Labour	127	38100.00
	Total			**75000.00/Ha**

Betel vine Cultivation

Sl no	Particulars	Rate	No	Total cost
1	Cost of Cuttings	5/Cutting	20000	100000
2	Cost of Propping	60/No	5000	300000
3	Cost for Organic manure &Application	10/Kg	5000	50000
4	Cultural operation & irrigation etc	300/Labour	350	105000
	Total			**555000/Ha**

Tuber Crop Cultivation

Sl no	Particulars	Rate	No	Total cost
1	Earth work for land preparation & Taking pits	300/Labour	300	90000
2	Cost for Seed	27/Kg	11250	303750
3	Cost for Organic manure &Application	10/Kg	6175	61750
4	Labour charge for cultural operations	300/Labour	150	45000
	Total			**500500/Ha**

Banana Cultivation

Sl no	Particulars	Rate	No	Total cost
1	Cost of Banana Sucker	10/No	2500	25000.00
2	Cost for Organic manure &Application	10/Kg	1250	12500.00
3	Cost of Propping	30/No	2500	75000.00
4	Cultural operation & irrigation etc	300/Labour	125	37500.00
	Total			**150000/Ha**

Fodder Grass Cultivation

Sl no	Particulars	Rate	No	Total cost
1	Cost of Slips (Including cutting charge & transportation	0.9/Slip	25000	22500.00
2	Cultural operation & irrigation etc	300/labour	25	7500.00
	Total			**30000/Ha**

Flori Culture

(Jasminum sambaca variety (Gundumalli)

Sl no	Particulars	Rate	No	Total cost
1	Earth work for Land preparation & digging	300/Labour	250	75000
2	Cost of Planting material	45/Plant	6250	281250
3	Cost for Organic manure &Application	10/Kg	14125	141250
	Total			**497500/Ha**

Pineapple Cultivation

Sl no	Particulars	Rate	No	Total cost
1	Land preparation & taking Trenches	300/Labour	41	12300.00
2	Cost of Sucker	4/Sucker	37500	150000.00
3	Cost for Organic manure &Application	10/Kg	2010	20100.00
4	Cultural operation	300/Labour	30	9000.00
	Total			**191400/Ha**

Azolla Cultivation
(Specification: 2 x 1.5 sizex 2 Tanks)

Sl no	Particulars	Rate	No	Total cost
1	Earth work for Tank preparation	300/Labour	2	600.00
2	Cost for Silpolin sheet & Bricks	1500	2	3000.00
3	Cost for Fertilizer	20/Kg	10	200.00
4	Labour charge for cultural operations	300/Labour	4	1200.00
	Total			**5000.00**

Fruit Processing Unit

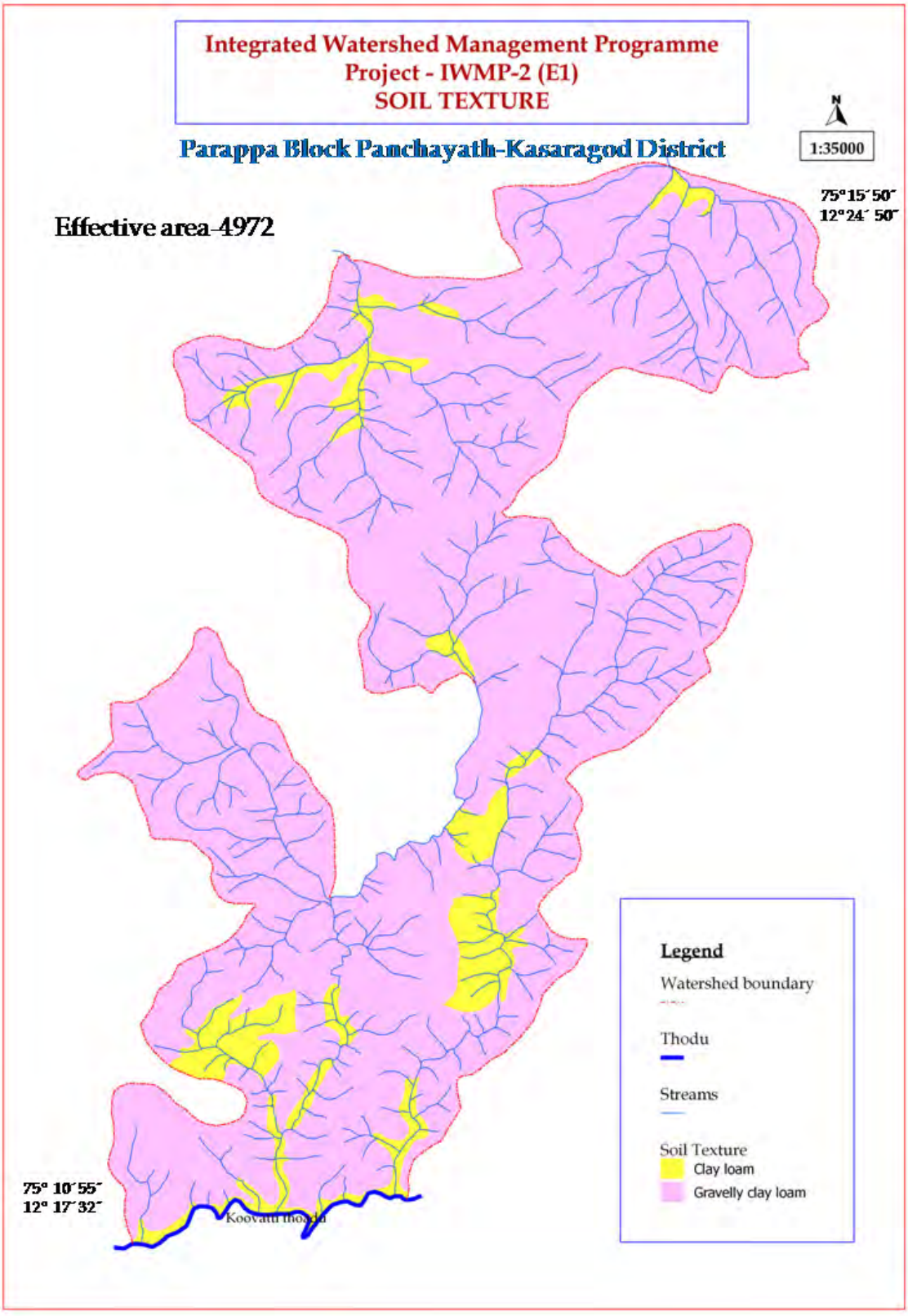
Sl no	Particulars	Rate	No	Total cost
1	Fire-hearth/ stove (Choola)	5000	1	5000.00
2	Gas Stove (2nos)& Connection	7500	-	8000.00
3	Grinding machine &Vessels	25000	-	25000.00
4	Furniture items	7000	-	10000.00
5	Electronic Weighing &Packing /Sealing machine	4500	-	5000.00

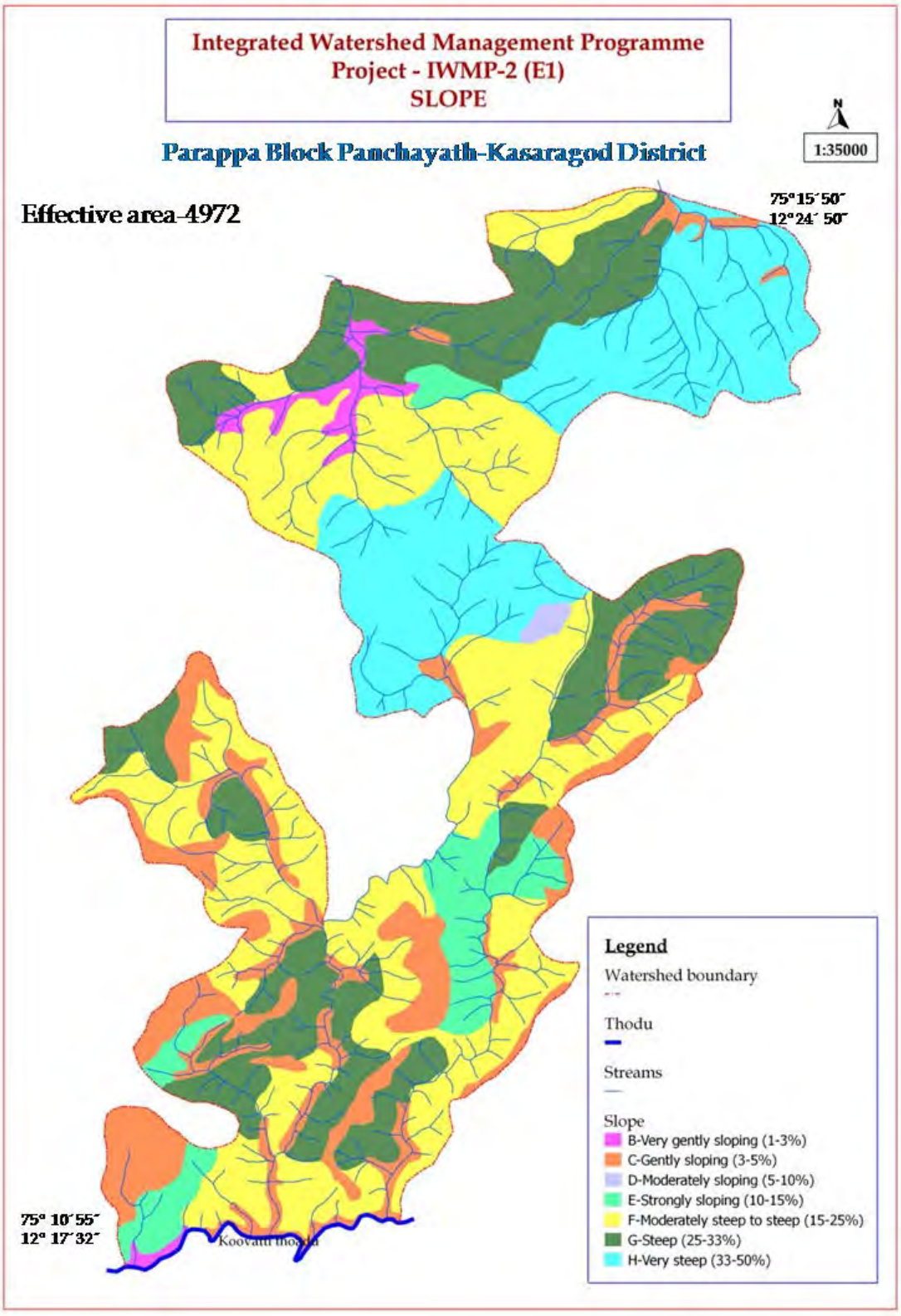
6	Rent for work shed & sales centre	3000	6months	18000.00
7	Working capital	58000		54000.00
	Total			**125000.00**

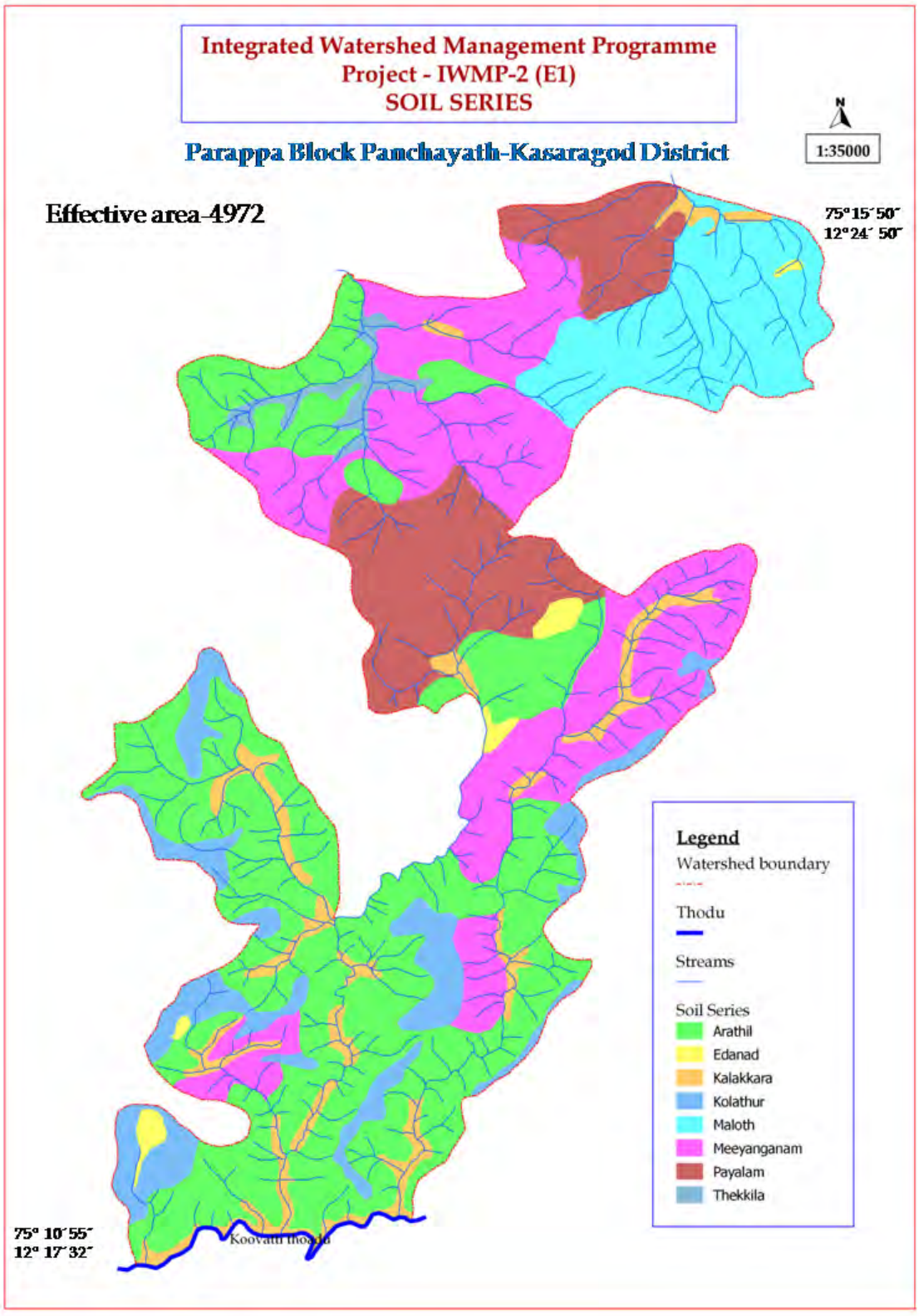
System of Rice Intensification (SRI)

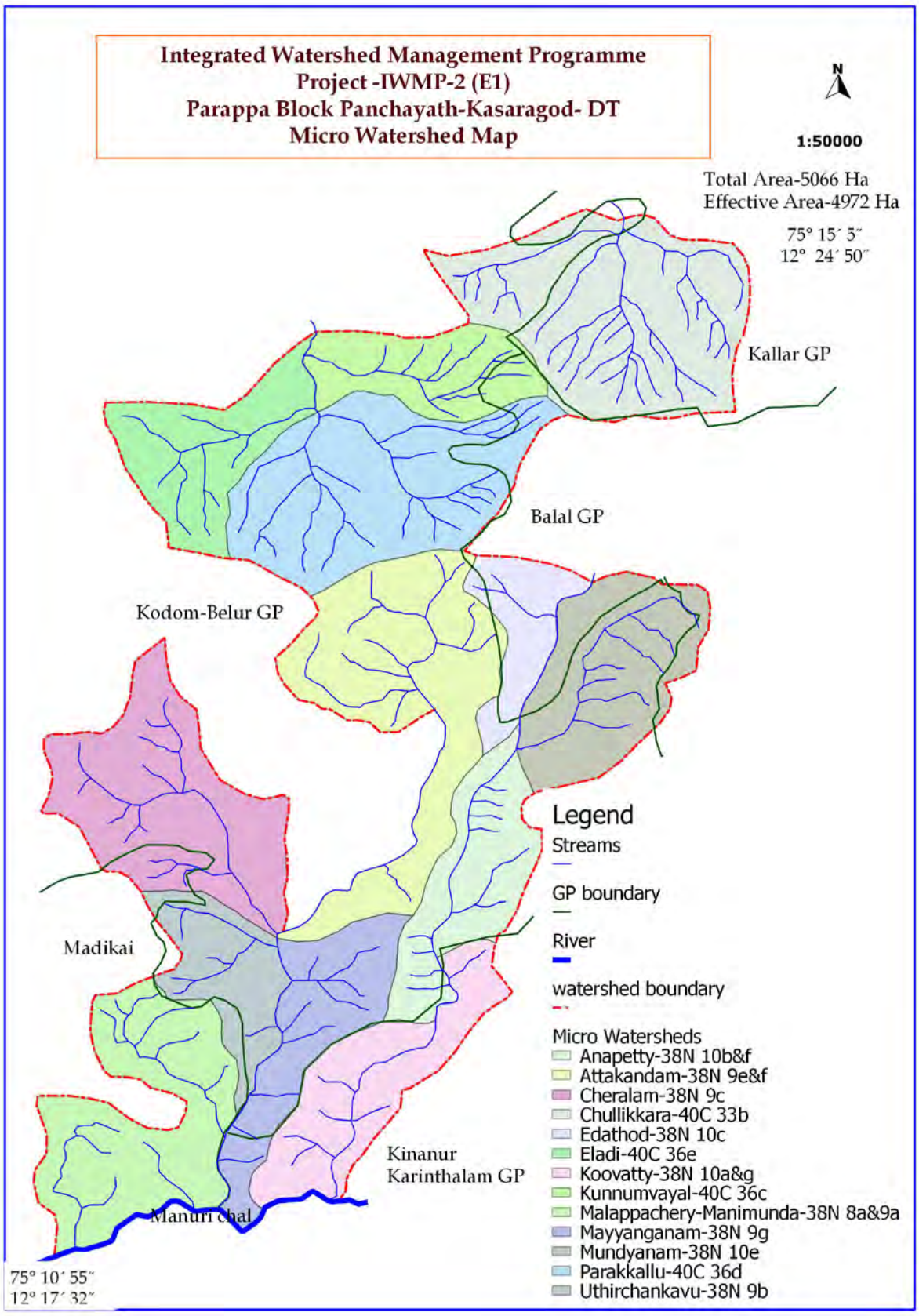
Sl no	Particulars	Rate	No	Total cost
1	Seed	20/kg	10kg	200.00
2	Preparing of nursery bed including the cost of plastic sheet	20/sqm	25sqm	500.00
3	Main field preparation ,tiller operation work	250/hrs	13 hrs	3250.00
4	Lime application	8	600kg	4800.00
5	Organic Manure (FYM/Compost)	1300/mt	5mt	6500.00
6	Fertilizer(90:45:45kg NPK/Ha	-	-	3000.00
7	Transplanting charge	300/labour	28	8400.00
8	Digging of Corner of main field strengthening of field bunds ,lime and O&M application	300/labour	7	2100.00
9	Weeding (Manual or kono weeder)	300/labour	15	4500.00
10	Plant protection measures including PPC cost	-	-	1000.00
11	Technical Support & Supervision	-	-	750.00
	Total			**35000/Ha**

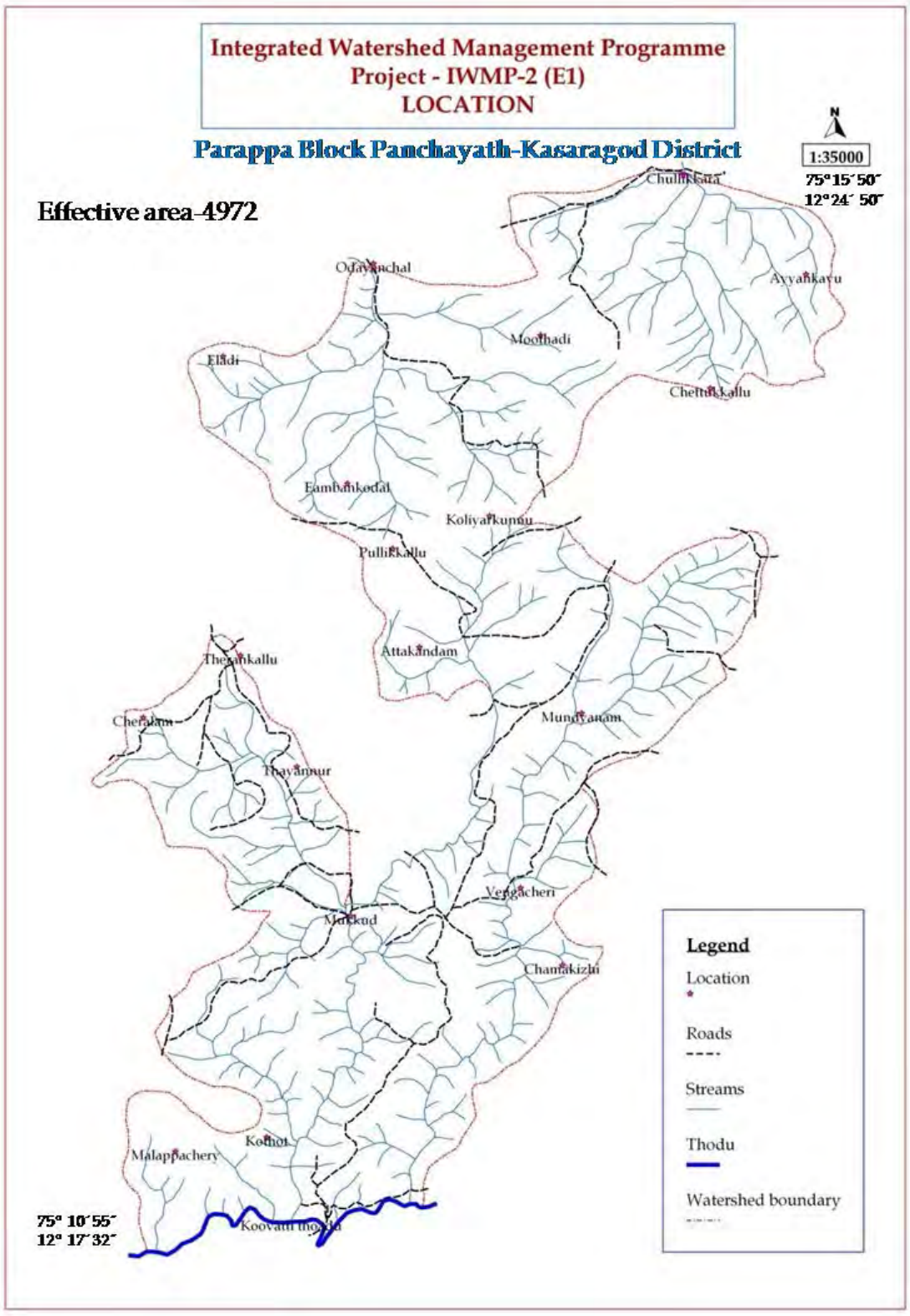
Maps


Integrated Watershed Management Programme
Project - IWMP-2 (E1)
SOIL TEXTURE
Parappa Block Panchayath-Kasaragod District
N
1:35000
75°15´50˝
12°24´ 50˝
Effective area-4972
75° 10´55˝
12° 17´32˝
Legend
Watershed boundary
Thodu
Streams
Soil Texture
Clay loam
Gravelly clay loam


Integrated Watershed Management Programme
Project - IWMP-2 (E1)
SLOPE
Parappa Block Panchayath-Kasaragod District
N
1:35000
Effective area-4972
75°15´50˝
12°24´50˝
75° 10´55˝
12° 17´32˝
Legend
Watershed boundary
Thodu
Streams
Slope
B-Very gently sloping (1-3%)
C-Gently sloping (3-5%)
D-Moderately sloping (5-10%)
E-Strongly sloping (10-15%)
F-Moderately steep to steep (15-25%)
G-Steep (25-33%)
H-Very steep (33-50%)


Integrated Watershed Management Programme
Project - IWMP-2 (E1)
SOIL SERIES
Parappa Block Panchayath-Kasaragod District
N
1:35000
Effective area-4972
75°15´50"
12°24´ 50"
Legend
Watershed boundary
Thodu
Streams
Soil Series
Arathil
Edanad
Kalakkara
Kolathur
Maloth
Meeyanganam
Payalam
Thekkila
75° 10´55"
12° 17´32"


Integrated Watershed Management Programme
Project -IWMP-2 (E1)
Parappa Block Panchayath-Kasaragod- DT
Micro Watershed Map
N
1:50000
Total Area-5066 Ha
Effective Area-4972 Ha
75° 15′ 5″
12° 24′ 50″
Kallar GP
Balal GP
Kodom-Belur GP
Madikai
Kinanur
Karinthalam GP
Manuri chal
75° 10′ 55″
12° 17′ 32″
Legend
Streams
GP boundary
River
watershed boundary
Micro Watersheds
Anapetty-38N 10b&f
Attakandam-38N 9e&f
Cheralam-38N 9c
Chullikkara-40C 33b
Edathod-38N 10c
Eladi-40C 36e
Koovatty-38N 10a&g
Kunnumvayal-40C 36c
Malappachery-Manimunda-38N 8a&9a
Mayyanganam-38N 9g
Mundyanam-38N 10e
Parakkallu-40C 36d
Uthirchankavu-38N 9b


Integrated Watershed Management Programme
Project - IWMP-2 (E1)
LOCATION
Parappa Block Panchayath-Kasaragod District
Effective area-4972
N
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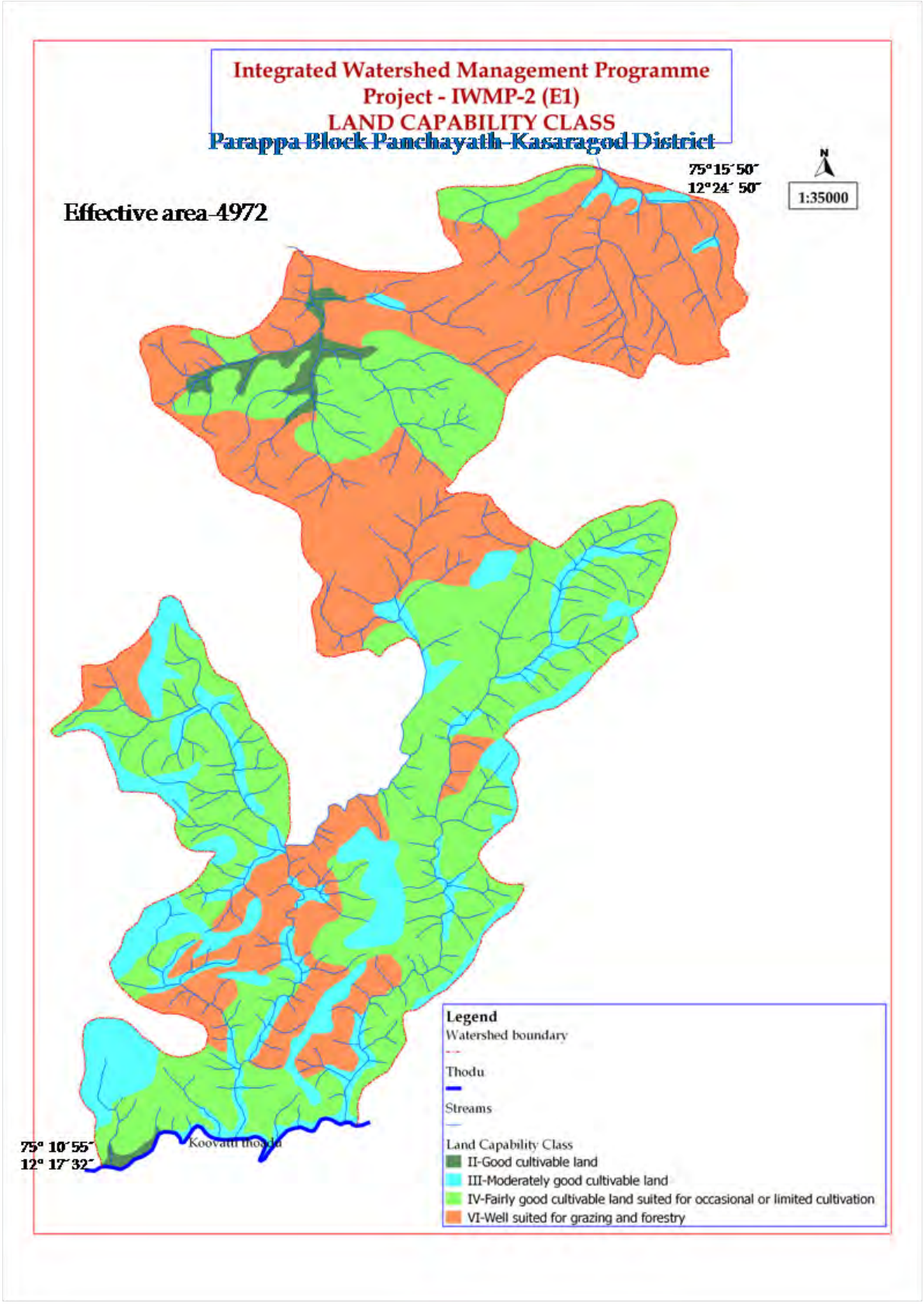
75°15´50˝
12°24´ 50˝
Chullikana
Odayanchal
Ayyankavu
Moothadi
Elidi
Chettikallu
Eambankodal
Koliyarkunnu
Pullikkallu
Attakandam
Thenankallu
Cheralam
Mundyanam
Thayannur
Veggacheri
Markud
Chamakizhi
Kothot
Malappachery
Koovathi thodu
75° 10´55˝
12° 17´32˝
Legend
Location
Roads
Streams
Thodu
Watershed boundary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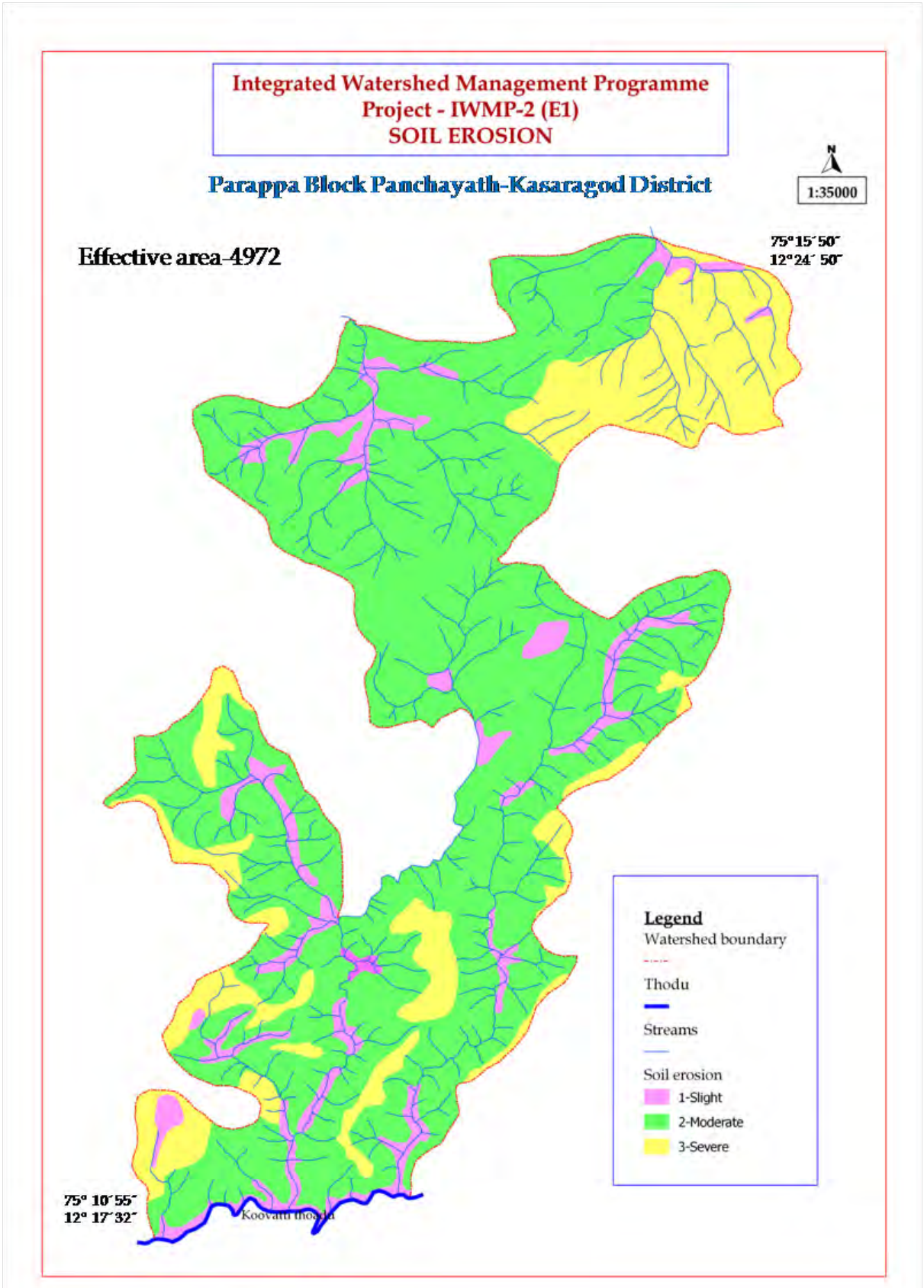
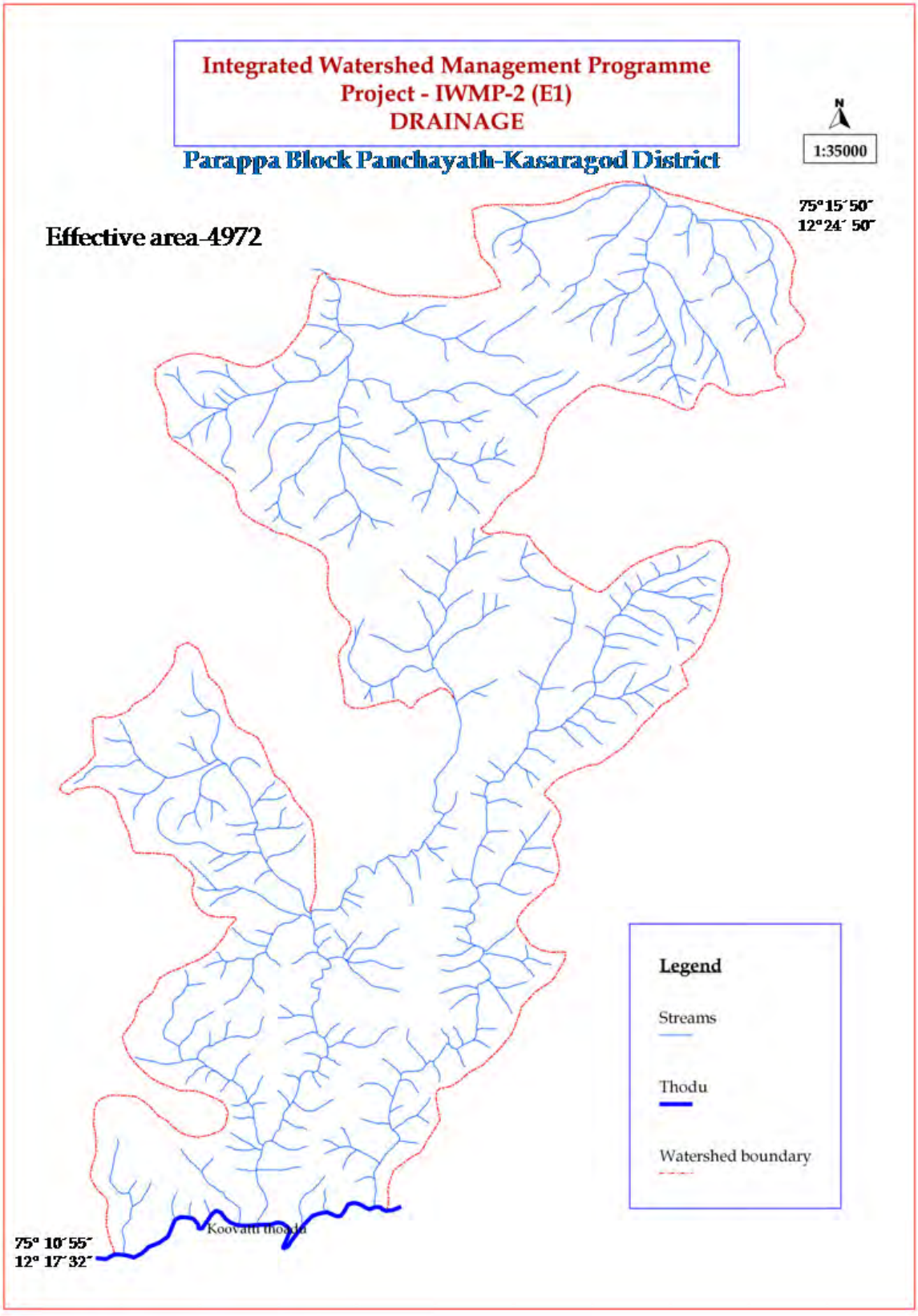
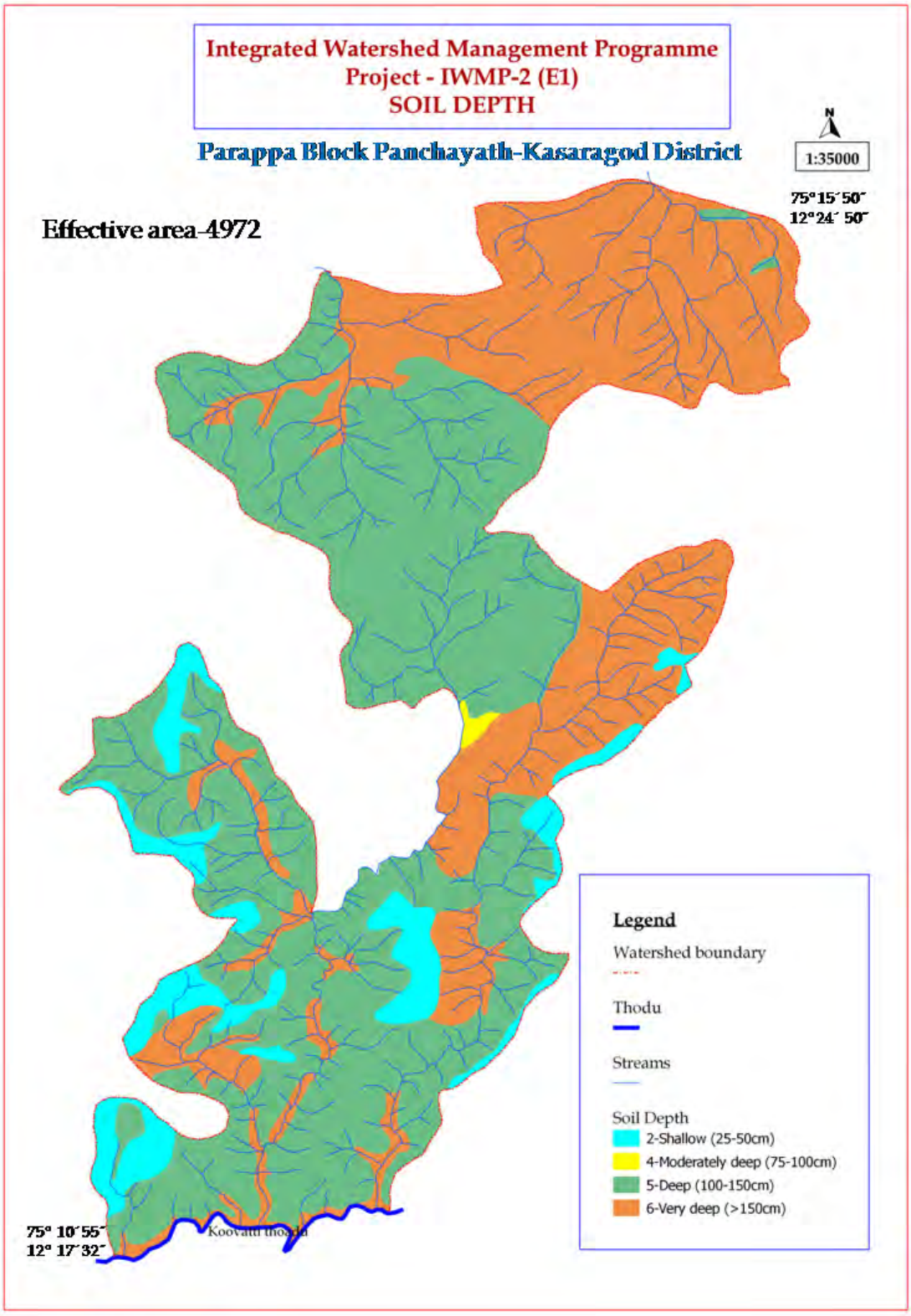
Project - IWMP-2 (E1)
LAND CAPABILITY CLASS
Parappa Block Panchayath-Kasaragod District
75°15´50"
12°24´50"
N
1:35000
Effective area-4972
75° 10´55"
12° 17´32"
Koovatti thodu
Legend
Watershed boundary
Thodu
Streams
Land Capability Class
II-Good cultivable land
III-Moderately good cultivable land
IV-Fairly good cultivable land suited for occasional or limited cultivation
VI-Well suited for grazing and forestry


Integrated Watershed Management Programme
Project - IWMP-2 (E1)
SOIL EROSION
Parappa Block Panchayath-Kasaragod District
N
1:35000
Effective area-4972
75°15´50˝
12°24´50˝
Legend
Watershed boundary
Thodu
Streams
Soil erosion
1-Slight
2-Moderate
3-Severe
75° 10´55˝
12° 17´32˝
Koovathi thodu


Integrated Watershed Management Programme
Project - IWMP-2 (E1)
DRAINAGE
Parappa Block Panchayath-Kasaragod District
N
1:35000
75°15´50˝
12°24´ 50˝
Effective area-4972
Legend
Streams
Thodu
Watershed boundary
75° 10´55˝
12° 17´32˝


Integrated Watershed Management Programme
Project - IWMP-2 (E1)
SOIL DEPTH
Parappa Block Panchayath-Kasaragod District
N
1:35000
75°15´50"
12°24´50"
Effective area-4972
Legend
Watershed boundary
Thodu
Streams
Soil Depth
2-Shallow (25-50cm)
4-Moderately deep (75-100cm)
5-Deep (100-150cm)
6-Very deep (>150cm)
75° 10´55"
12° 17´32"
Koovattithodu