

**Integrated Watershed
Management Programme
(IWMP)**

Detailed Project Report

IWMP-I (D3)

**In Parappa & Kanhangad Block
Panchayats
Kasaragud District
Kerala State**

**SLNA: Commissionerate of Rural
Development, GoK**

PIA: Parappa Block Panchayat

TSO: CRD, Nileshwaram

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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 hectore 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	<i>Watershed Development Works</i>	56
8.2	<i>Livelihood activities</i>	9
8.3	<i>Production system & Micro Enterprises</i>	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. 139/2010/OILSGD 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 into 7 sub groups. From each sub group 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 into 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 visualised 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 Socio-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 field. 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	Pullur,Peria, Kodom,Belur and Kallar
Grama Panchayaths	Pullur-Peria, Kodom-Belur and Kallar
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
95	51	0	225	63	0	0	225	90	75	0	110	225	1084

* { 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 Ha	Total Micro watersheds	Sharing of the area by Blocks			
		Parappa Block	% to the Project total	Kanhangad	% to the Project total
5410	11	4285	79.20	1125	20.8

The project has a total area of 5410 Ha. Of which Parappa has a major share of 4285 Ha. The total area spread over in Kallar, Kodom-Belur and Pullur-Peria Grama panchayats. The watershed is a IVth order watershed. Per hector cost for the treatment of the watershed is Rs.15000/-. Total project cost comes to Rs. 8, 11, 50,000/-

Table 4 Financial outlay of the project

SL No	Components	%	Grant
1	Administration	10	8115000
1.1	<i>Documentation</i>	0.33	267795
1.2	<i>Administration</i>	9.67	7847205
2	Monitoring	1	811500
3	Evaluation	1	811500
4	Preparatory phase	10	8115000
4.1	<i>Entry point activities</i>	4	3246000
4.2	<i>Institution & Capacity building</i>	5	4057500
4.3	<i>Detailed Project Report</i>	1	811500
5	Watershed Works phase	75	60862500
5.1	<i>Watershed Development Works</i>	56	45444174
5.2	<i>Livelihood activities</i>	9	7303421
5.3	<i>Production system & Micro Enterprises</i>	10	8114905
5.4	Consolidation phase	3	2434500
	Grant total	100	81150000

Table 5 Micro Watershed details and Grama Panchayats

Si No	Name of Micro Watershed	Code no.	Rever basin	Effecti ve Area	Gramapanchayat
1	Kanhiradukka m	* 40C 37a&36g	Chandragiri	404	Pullur-Periya & Kodom Belur
2	Iriya	39C 8d	Chandragiri	604	Pullur-Periya & Kodom Belur
3	Kumbala	39C 8e	Chandragiri	264	Pullur-Periya
4	Modagrame	* 38N 3d,f & g	Nileswaram	667	Kodom-Belur
5	Lalur	38N 3e	Nileswaram	517	Kodom-Belur
6	Kuyyangad	* 40C 36a & b	Chandragiri	677	Kodom-Belur
7	Chenthalam	40C 36f	Chandragiri	410	Kodom -Belur
8	Ayarot	40C 34a	Chandragiri	302	Kodom-Belur
9	Kottodi	40C 33c	Chandragiri	417	Kodom-Belur & Kallar
10	Painikkara	40C 33a	Chandragiri	598	Kallar & Kodom-Belur
11	Vannathikkana m	40C 32e	Chandragiri	550	Kallar
Total			5410	5410	

* Micro Watersheds with code No. 40C 37a & 36g are merged

* Micro watersheds with code No. 38N 3d, f & g are merged

* Micro watersheds with code No. 40C 36a & b are merged

The reasons for migration are terrain features (adjacent watersheds), extend of the area and the convenience of the watershed community to manage the watersheds.

Table 6 River basin, Elevation, etc

1	River basin	Chandragiri & Nileswaraam
2	Latitude	12° 21' 25" & 12° 26' 5"
3	Longitude	75° 8' 38" & 75° 19' 55"
4	Highest elevation	550
5	Lowest elevation	50
6	Height difference	500
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

SI No	Soil series	Area in Ha
1	Arathil	2265.70
2	Meeyanganam	1344.38
3	Kalakkara	385.19
4	Edanad	66.54
5	Kolathur	573.46
6	Thekkila	25.42
7	Muttathy	33.58
8	Payalam	279.69
9	Maloth	436.04
Total		5410.00

Table 8 Occurrence of the soil series:

Soil series	Occurrence
Arathil	Strongly sloping to very steeply sloping side slopes of low hills
Meeyanganam	Moderately sloping to very steeply sloping side slopes of low hills
Kalakkara	Along stream banks
Edanad	Gently sloping foot hills of low hills and mounts

Kolathur	Gently to moderately sloping flat low hill tops
Thekkila	Very gently to gently sloping lands along stream banks
Muttathy	Very gently to gently sloping fields
Payalam	Moderately steep to very steep side slopes of hills in upland
Maloth	Soils developed over granite gneiss occur on very steep slopes.

3.1.1.2 General Description of major soil series:

3.1.1.2.1 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.

3.1.1.2.2 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.

3.1.1.2.3 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 Edanad series

These are moderately deep to deep soils occurring on gently to moderately sloping 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 gravelly 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.

3.1.1.2.5 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.

3.1.1.2.6 Thekila Series

These are very deep; fine textured imperfectly drained soils developed from riverine 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.

3.1.1.2.7. Muttathy Series

These are moderately deep to deep imperfectly drained colluvial soils identified on narrow valleys between hillocks, solum depth is 75 to 100cm and is developed from gneissic rocks. Surface layer is dark brown and silty loam to clay loam. Subsurface soil is gravelly clay to clay and pale brown to reddish brown.

3.1.1.2.8. 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.

3.1.1.2.9 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.

These are imperfectly drained soils with slow permeability. Water holding and nutrient holding capacity is good. Paddy is the major crop cultivated in this soil. In some area Arecanut is also grown.

Table 9 Soil texture

SI No	Soil texture	Area in Ha
1	Clay loam	1173.39
2	Gravelly clay loam	3431.02
3	Clay	10.60
4	Gravelly clay	775.51
5	Silty clay	19.48
Total		5410

Table 10 Soil depth

SI No	Soil depth in CM	Area in Ha
1	Shallow (25-50)	26.35
2	Moderately shallow (50-75)	547.15
3	Moderately deep (75-100)	33.30
4	Deep (100-150)	2892.61
5	Very deep (>150)	1910.59
Total		5410

Table 11 Slope grade

SI No	Slope grade	Area in Ha
1	B- Very gently sloppy (1-3 %)	98.46
2	C- Gently sloppy (3-5%)	537.15
3	D- Moderately sloppy (5-10%)	449.08
4	E -Strongly sloppy (10-15 %)	949.67
5	F Moderately steep (15-25%)	1618.23
6	G- Steep Slope - (25-33%)	898.7
7	H- Very steep - (33-50%)	858.71
Total		5410

Table 12 Erosion class

SI No	Erosion class	Area in Ha
1	Slight erosion	599.83
2	Moderate erosion	3538.89
3	Severe erosion	1271.28
Total		5410

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

SI No	LCC	Area in Ha
1	II	120.416
2	III	1340.232
3	IV	1494.495
4	VI	2454.857
Total		5410.00

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 m³/day to up to 50 m³/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 50m³/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 60m³/day in winter period and it reduces to 2 to 20m³/day in summer. Generally large diameter wells are constructed in laterite terrain. In the weathered crystallines, the yield of wells ranges from 1 to 10m³/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 339.50 KM. This is IVth order watershed.

Table 14 Order wise number of streams

SI No	Order	Total No
1	I	156
2	II	28
3	III	8
4	IV	2
Total		194

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 °C		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 °C and minimum temperature ranges from 19.7 to 24.1 °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	282
Govt/ Revenue /Panchayath land	19.2095
Sub Total	301.2095
Privately owned land	
Cropped area	5332.86
Irrigated Area	1138.00
Rain fed Area	4194.86
Fallow Land(Cultivable waste)	20.0005
Waste Land (Uncultivable waste)	37.93
Sub Total	5390.7905
Total	5692.00

Table 18 Land holding pattern

Sl No	Land holding class	Households		Land held	
		Number	% of Total	Ha	% of Total
A. Existing gross holding (Ha)					
1	Landless	0	0	0	0
2	Marginal farmers	1812	45.896	547.5612	10.827
3	Small farmers	2054	52.03	3822.28	75.578
4	Large farmers	82	2.074	687.50	13.595
Total		3948	100	5057.3412	100
Average gross land holding per Household = 1.2809					

Table 19 Major Agricultural Crops

Sl No	Major crops	Area in Ha	Productivity(Kg/Ha)
1	Coconut	789	7334
2	Arecanut	278	1856
3	Rubber	1127	1236
4	Cashew	45	992
5	Pepper	11	292
6	Paddy- First crop	19	2544
7	Vegetables	23	-
8	Banana	15	9037

Table 20 Details of Irrigation devise/method

Sl No	Type of irrigation	Area in Ha	No. of Families
1	Manual	281	259
2	Motorised	1900	1415
3	Drip	26	28
4	Sprinkler	100	138
	Total	2307	1840

Table 21 Live stock resources

Sr No	Category of Livestock	Existing No
1	Indigenous Cows	449
2	Cross breed Cows	558
3	Goat	602
4	Chicks	4001

3.6 Demographic and socio economic status of the families

(Source: PRA & Socio-Economic survey)

1. Total No. of households/ families : 3948
2. Total Population : 18124
3. Average family size : 4

(Source : PRA & Socio-Economic survey)

Table 22 Category of the families:

	SC	ST	OBC	General	Total	APL	BPL
Total No. of Families	101	492	1312	2043	3948	2686	1262
% of Total Families	2.55	12.46	33.23	51.74	100	68.03	31.96

3.7 Profile of the families:

Table 23 Age wise grouping

Sl No	Age group	Male	Female	Total
1	0 - 05	406	445	851
2	06 - 12	685	870	1555
3	13 - 18	972	1193	2165

4	19 - 40	3829	3060	6889
5	41 - 60	2250	2217	4467
6	Above 60	1036	1161	2197
	TOTAL	9178	8946	18124

Table 24 Education

Sl No	Level of Education	Male	Female	Total
1	Literate/Read & Write only	909	1012	1921
2	Primary	1034	1045	2079
3	Upper Primary	1782	1445	3227
4	Secondary School	2889	2438	5327
5	Senior Secondary	1994	1246	3240
6	Graduate & Above	310	416	726
7	Diploma	198	239	437
8	B. Tech	105	256	361
9	Nursing	256	546	802
10	Doctors	1	3	4
	Total	9478	8646	18124

(Source: PRA & Socio-Economic survey)

Table 25 Status of Housing

Total families	Having a house	Not having a house
3948	2632	1316

(Source: PRA & Socio-Economic survey)

Table 26 Condition of Houses

Story		Roof			Floor			Latrine	
Ground floor	First floor	RC C	Tile d	Thatche d	Mud/ordinary	Cement	Tiled/Marble	Yes	No
2554	498	1984	1053	244	231	2273	469/259	361 6	21 1

(Source: PRA & Socio-Economic survey)

Table 27 Income Source of the Families

SI No	Source of Income	Male	Female	Total
1	Agriculture wage labour	618	409	1027
2	Non Agriculture wage labour	490	354	844
3	Agriculture	774	542	1316
4	Govt. Services	159	108	267
5	Other Sources	402	92	494
	Total	2443	1505	3948

(Source: PRA & Socio-Economic survey)

Table 28 Annual Income of the Families

SI No	Annual Income	Total
1	Below - 24000	1778
2	24000 - 40000	682
3	40000 - 60000	393
4	60000 - 80000	588
5	80000 - 100000	308
6	100000 - 120000	114
7	Above 120000	85
	Total	3948

(Source: PRA & Socio-Economic survey)

Table 29 Savings

SI No	Institutions	No. of families
1	Bank/Cooperative societies	1638
2	Post Office	493
3	Kudumbasree	2880
4	Self Help Groups	531
5	Kury(Local Chit)	1380
6	Chit funds(Registered Chit funds)	178
7	LIC	1677
8	Others	18

(Source: PRA & Socio-Economic survey)

Table 30 Credit availed

SI No	Purpose	Total Families	Total loan amount	Repayment status	
				Regular	Default
1	Agriculture	1089	142283802	787	302

2	Marriage	100	10579500	86	14
3	Housing	367	44882150	264	103
4	Educational	226	12448300	192	34
5	Others	90	9779500	54	36
	Total	1872	219973252	1383	489

(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
980	322	236	129	77	278	16

(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 where 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.

1.1.1 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.

1.1.2 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.

1.1.3 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

1.1.4 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.

1.1.5 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 and slope grade

4.1.1. Area treatment measures

- Earthen Bund (EB) (Slope grade - B - D)
- Water Percolation Pit - (Slope grade - A - E)
- Husk Pit (Slope grade A-C)
- Water Collection Pit
- Stone Pitched Bund (Slope grade Above E)
- Stone Bund Heightening (Slope grade Above E)
- Roof Top Rain Water Harvesting Tank -
- Pallam Conservation
- Farm Pond/Percolation Pond
- Construction of “Madakkam”
- Water Collection tank
- Agro Horti

4.1.2. Drainage 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 Measurs

Sl No	Treatment Measures	Unit of Measures	Target	IWMP Grant	WDF contribution
A	Area Treatment				
1	Horticulture	Ha	3.8	1127640	90211
2	Contour bunding	Ha	177.98	14008341	1052979
3	Staggered Trenching	Ha	19.24	906288	74195
4	Farm Pond	No	28	1736000	147560
5	Percolation Tank	No	148	1241570	100232
6	Others	No	19	760000	64600
	Sub Total			19779838	1529777
B	Drainage line Treatment				
7	Gully Plugging	CuM	151.7	165706	13256
8	Loose Boulder Check Dams	CuM	1853	2022555	161804
9	Retaining wall	CuM	14575.4	23476076	1878086
	Sub Total			25664337	2053147
	Total (A+B)			45444174	3582924

Sub activity wise details

SI No	Treatment Measures	Unit of Measures	Unit cost	Target	IWMP Grant	WDF contribution
A	Area Treatment					
1	Horticulture	Ha		3.8	1127640	90211
<i>a</i>	<i>Agro Horti/Agro Forestry</i>	<i>No</i>	<i>60</i>	<i>18794</i>	<i>1127640</i>	<i>90211</i>
2	Contour bunding	Ha		177.98	14008341	1052979
<i>a</i>	<i>Earthen Bund</i>	<i>Rm</i>	<i>43.57</i>	<i>3845</i>	<i>167527</i>	<i>14240</i>
<i>b</i>	<i>Stone Pitched Bund</i>	<i>M2</i>	<i>100.46</i>	<i>136425</i>	<i>13705219</i>	<i>1027891</i>
<i>c</i>	<i>Stone Bund Heightening</i>	<i>M2</i>	<i>100.46</i>	<i>1349.74</i>	<i>135595</i>	<i>10848</i>
3	Staggered Trenching	Ha		19.24	906288	74195
<i>a</i>	<i>Water Percolation Pit</i>	<i>No</i>	<i>108.79</i>	<i>5220</i>	<i>567884</i>	<i>45431</i>
<i>b</i>	<i>Husk Trench</i>	<i>No</i>	<i>163.48</i>	<i>2070</i>	<i>338404</i>	<i>28764</i>
4	Farm Pond	No		28	1736000	147560
<i>a</i>	<i>Farm Pond</i>	<i>No</i>	<i>62000</i>	<i>28</i>	<i>1736000</i>	<i>147560</i>
5	Percolation Tank	No		148	1241570	100232
<i>a</i>	<i>Water Collection Pit</i>	<i>No</i>	<i>1955.79</i>	<i>88</i>	<i>172110</i>	<i>13769</i>
<i>b</i>	<i>Water Collection Tank</i>	<i>No</i>	<i>25000</i>	<i>5</i>	<i>125000</i>	<i>10625</i>
<i>c</i>	<i>Madakkam</i>	<i>No</i>	<i>7500</i>	<i>50</i>	<i>375000</i>	<i>30000</i>
<i>d</i>	<i>Pallam Conservation</i>	<i>No</i>	<i>150000</i>	<i>3</i>	<i>450000</i>	<i>36000</i>
<i>e</i>	<i>Pallam Conservation</i>	<i>No</i>	<i>56306</i>	<i>1</i>	<i>56306</i>	<i>4786</i>
<i>f</i>	<i>Pallam Conservation</i>	<i>No</i>	<i>63154</i>	<i>1</i>	<i>63154</i>	<i>5052</i>
6	Others	No		19	760000	64600
<i>a</i>	<i>RWH Tank</i>	<i>No</i>	<i>40000</i>	<i>19</i>	<i>760000</i>	<i>64600</i>
	Sub Total				19779838	1529777

B	Drainage line Treatment					
7	Gully Plugging	CuM		151.7	165706	13256
<i>a</i>	<i>Gully Plugging</i>	<i>No</i>	<i>808.32</i>	<i>205</i>	<i>165706</i>	<i>13256</i>
8	Loose Boulder Check Dams	CuM		1853	2022555	161804
<i>a</i>	<i>Loose Boulder Check Dams</i>	<i>No</i>	<i>4771.48</i>	<i>233</i>	<i>1111755</i>	<i>88940</i>
<i>b</i>	<i>Loose Boulder Check Dams with wing wall</i>	<i>No</i>	<i>9200</i>	<i>99</i>	<i>910800</i>	<i>72864</i>
9	Retaining wall	CuM		14575.4	23476076	1878086
<i>a</i>	<i>Retaining wall</i>	<i>RM</i>	<i>2254.93</i>	<i>10411</i>	<i>23476076</i>	<i>1878086</i>
	Sub Total				25664337	2053147
	Total (A+B)				45444174	3582924

4.3. YEAR WISE TREATMENT PLAN

Sl No	Treatment Measures	Unit of Measures	Target	1st Year		2nd Year		3rd Year		4th Year	
				Target	Amount	Target	Amount	Target	Amount	Target	Amount
A	Area Treatment										
1	Horticulture	Ha	3.8	0	0	1.51	454620	2	625620	0.29	47400
2	Contour bunding	Ha	177.98	12.76	1004600	68.95	5429061	66	5197554	30.27	2377126
3	Staggered Trenching	Ha	19.24	0	0	13.67	644226	2	95327	3.57	166734
4	Farm Pond	No	28	7	434000	8	496000	8	496000	5	310000
5	Percolation Tank	No	148	23	254226	51	459112	36	343027	38	185204
6	Others	No	19	0	0	14	560000	4	160000	1	40000
B	Drainage line Treatment										
7	Gully Plugging	CuM	151.7	88	96190	55	59816	8.7	9700	0	0
8	Loose Boulder Check Dams	CuM	1853	516	564004	751	819919	417	454260	169	184373
9	Retaining wall	CuM	14575.4	5114	8237259	3365	5420852	2665	4293387	3431.4	5524542

Sub activity wise Year Plan

SI 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		3.8	0	0	1.51	454620	2	625620	0.29	47400
<i>a</i>	<i>Agro Horti/Agro Forestry</i>	<i>No</i>	<i>60</i>	<i>18794</i>	<i>0</i>	<i>0</i>	<i>7577</i>	<i>454620</i>	<i>10427</i>	<i>625620</i>	<i>790</i>	<i>47400</i>
2	Contour bunding	Ha		177.98	12.76	1004600	68.95	5429061	66	5197554	30.27	2377126
<i>a</i>	<i>Earthen Bund</i>	<i>Rm</i>	<i>43.57</i>	<i>3845</i>	<i>0</i>	<i>0</i>	<i>2750</i>	<i>119776</i>	<i>550</i>	<i>23965</i>	<i>545</i>	<i>23750</i>
<i>b</i>	<i>Stone Pitched Bund</i>	<i>M2</i>	<i>100.46</i>	<i>136425</i>	<i>10000</i>	<i>1004600</i>	<i>51500</i>	<i>5173690</i>	<i>51499</i>	<i>5173589</i>	<i>23426</i>	<i>2353376</i>
<i>c</i>	<i>Stone Bund Heightening</i>	<i>M2</i>	<i>100.46</i>	<i>1350</i>	<i>0</i>	<i>0</i>	<i>1349.74</i>	<i>135595</i>	<i>0</i>	<i>0</i>	<i>0</i>	<i>0</i>
3	Staggered Trenching	Ha		19.24	0	0	13.67	644226	2	95327	3.57	166734
<i>a</i>	<i>Water Percolation Pit</i>	<i>No</i>	<i>108.79</i>	<i>5220</i>	<i>0</i>	<i>0</i>	<i>3570</i>	<i>388380</i>	<i>463</i>	<i>50370</i>	<i>1187</i>	<i>129134</i>
<i>b</i>	<i>Husk Trench</i>	<i>No</i>	<i>163.48</i>	<i>2070</i>	<i>0</i>	<i>0</i>	<i>1565</i>	<i>255846.2</i>	<i>275</i>	<i>44957</i>	<i>230</i>	<i>37600</i>
4	Farm Pond	No		28	7	434000	8	496000	8	496000	5	310000
<i>a</i>	<i>Farm Pond</i>	<i>No</i>	<i>62000</i>	<i>28</i>	<i>7</i>	<i>434000</i>	<i>8</i>	<i>496000</i>	<i>8</i>	<i>496000</i>	<i>5</i>	<i>310000</i>
5	Percolation Tank	No		148	23	254226	51	459112	36	343027	38	185204
<i>a</i>	<i>Water Collection Tank</i>	<i>No</i>	<i>25000</i>	<i>5</i>	<i>0</i>	<i>0</i>	<i>2</i>	<i>50000</i>	<i>3</i>	<i>75000</i>	<i>0</i>	<i>0</i>
<i>b</i>	<i>Madakkam</i>	<i>No</i>	<i>7500</i>	<i>50</i>	<i>0</i>	<i>0</i>	<i>20</i>	<i>150000</i>	<i>10</i>	<i>75000</i>	<i>20</i>	<i>150000</i>
<i>c</i>	<i>Water Collection Pit</i>	<i>No</i>	<i>1955.8</i>	<i>88</i>	<i>21</i>	<i>41072</i>	<i>27</i>	<i>52806</i>	<i>22</i>	<i>43027</i>	<i>18</i>	<i>35204</i>
<i>d</i>	<i>Pallam Conservation</i>	<i>No</i>	<i>15000</i> <i>0</i>	<i>3</i>	<i>1</i>	<i>150000</i>	<i>1</i>	<i>150000</i>	<i>1</i>	<i>150000</i>		<i>0</i>
<i>e</i>	<i>Pallam Conservation</i>	<i>No</i>	<i>56306</i>	<i>1</i>	<i>0</i>	<i>0</i>	<i>1</i>	<i>56306</i>		<i>0</i>		<i>0</i>
<i>f</i>	<i>Pallam Conservation</i>	<i>No</i>	<i>63154</i>	<i>1</i>	<i>1</i>	<i>63154</i>		<i>0</i>		<i>0</i>		<i>0</i>
6	Others	No		19	0	0	14	560000	4	160000	1	40000
<i>a</i>	<i>RWH Tank</i>	<i>No</i>	<i>40000</i>	<i>19</i>	<i>0</i>	<i>0</i>	<i>14</i>	<i>560000</i>	<i>4</i>	<i>160000</i>	<i>1</i>	<i>40000</i>

B	Drainage line Treatment											
7	Gully Plugging	CuM		151.7	88	96190	55	59816	8.7	9700	0	0
<i>a</i>	<i>Gully Plugging</i>	<i>No</i>	<i>808.32</i>	<i>205</i>	<i>119</i>	<i>96190</i>	<i>74</i>	<i>59816</i>	<i>12</i>	<i>9700</i>	<i>0</i>	<i>0</i>
8	Loose Boulder Check Dams	CuM		1853	516	564004	751	819919	417	454260	169	184373
<i>a</i>	<i>Loose Boulder Check Dams</i>	<i>No</i>	<i>4771.5</i>	<i>233</i>	<i>70</i>	<i>334004</i>	<i>87</i>	<i>415119</i>	<i>47</i>	<i>224260</i>	<i>29</i>	<i>138373</i>
<i>b</i>	<i>Loose Boulder Check Dams with wing wall</i>	<i>No</i>	<i>9200</i>	<i>99</i>	<i>25</i>	<i>230000</i>	<i>44</i>	<i>404800</i>	<i>25</i>	<i>230000</i>	<i>5</i>	<i>46000</i>
9	Retaining wall	CuM		14575.4	5114	8237259	3365	5420852	2665	4293387	3431.4	5524542
	<i>Retaining wall</i>	<i>RM</i>	<i>2254.9</i>	<i>10411</i>	<i>3653</i>	<i>8237259</i>	<i>2404</i>	<i>5420852</i>	<i>1904</i>	<i>4293387</i>	<i>2450</i>	<i>5524542</i>

4.4. Activities proposed:

4.5.1 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. Earthen bund

These are the low cost earthen barriers/structures to prevent soil erosion, where the percentage of slope is less than 15%, and sufficient quantity of stones for constructing contour bunds are not available in the locality. For strengthening/reinforcing the bunds suitable plants will be planted.

4.4.1.3. Water collection pits & Water Percolation Pit

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

4.4.1.4. 'Pallam' Conservation

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

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 Ferro-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. Proposed Activites

- Vegetable Cultivation
- Betel vine cultivation
- Pineapple Cultivation
- Tuber Crops Cultivation
- Banana Cultivation
- Floriculture
- Azolla Cultivation
- Fodder grass cultivation
- System of Rice Intensification (SRI)
- Farmers Participatory “ Seed Bank”
- Fruit Processing Unit
- Agri- Marketing Centre
- Ready made Garment
- Imitation Gold Making

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	11.02	826305	78499
2	Betel vine Cultivation	Ha	555000	1.62231	900382	85536
3	Tuber crop Cultivation	Ha	500500	6.91722	3462069	328897
4	Banana Cultivation	Ha	150000	8.2792	1241880	117979
5	Fodder Grass Cultivation	Ha	30000	7.2361	217083	20623
6	Flori Culture	Ha	497500	0.06	29850	2836
7	Pineapple Cultivation	Ha	191400	0.20768	39750	3776
8	Azolla Cultivation	No	5000	7	35000	3325
9	Fruit Processing Unit	No	125000	4	500000	47500
10	Readymade Garment Unit	No	125000	2	250000	23750
11	Imitation gold making	No	55000	1	55000	5225
12	Agri Marketing Centre	No	250000	1	250000	23750
13	Farmers Participatory " Seed Bank"	No	300000	1	300000	28500
14	System of Rice Intensification (SRI)	Ha	37500	0.2023	7586	721
	Total				8114905	770916

5.3. Year wise Treatment Plan

SI 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
1	Vegetable Cultivation	Ha	75000	11.017	0	0	4.5	337500	5.2273	392048	1.2901	96757.5
2	Betel vine Cultivation	Ha	555000	1.6223	0	0	1.37231	761632	0.1	55500	0.15	83250
3	Tuber crop Cultivation	Ha	500500	6.9172	0	0	3.4154	1709408	1.95	975975	1.55182	776685.9
4	Banana Cultivation	Ha	150000	8.2792	1	150000	4.5	675000	1.62	243000	1.1592	173880
5	Fodder Grass Cultivation	Ha	30000	7.2361	0	0	4.1738	125214	0.7546	22638	2.3077	69231
6	Flori Culture	Ha	497500	0.06	0	0	0	0	0.06	29850	0	0
7	Pineapple Cultivation	Ha	191400	0.2077	0	0	0.2077	39750	0	0	0	0
8	Azolla Cultivation	No	5000	7	0	0	7	35000	0	0	0	0
9	Fruit Processing Unit	No	125000	4	0	0	3	375000	1	125000	0	0
10	Readymade Garment Unit	No	125000	2	0	0	1	125000	1	125000	0	0
11	Imitation gold making	No	55000	1	0	0	1	55000	0	0	0	0
12	Agri Marketing Centre	No	250000	1	0	0	0	0	1	250000	0	0
13	Farmers Participatory "Seed Bank"	No	300000	1	0	0	1	300000	0	0	0	0
14	System of Rice Intensification (SRI)	Ha	37500	0.2023	0	0	0.2023	7586	0	0	0	0
	Total					150000		4546090		2219011		1199804

5.4. Activities 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°C and a maximum of 40°C. The important varieties cultivated are Thulasi, Venmani, Arikodi, Kalkodi, Karilanchi, Karpuram, Chelanthikarpuram, Koottakkodinandan and Perumkodi. Betel has got good market demand locally.

5.4.3. Tuber crop cultivation

Tuber crops are important 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. Pineapple cultivation

Pineapple is a tropical fruit having juiciness, vibrant tropical flavour and immense health benefits. Pineapple contains considerable calcium, potassium, fibre, and vitamin C. It is low in fat and cholesterol. It is also a good source of vitamin B1, vitamin B6, copper and dietary fibre. Pineapple is a digestive aid and a natural Anti-Inflammatory fruit. All these merits of pineapple provide greater scope for cultivation of the crop.

5.4.5. 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 condition. Common varieties cultivated are Nendran (clones), Robusta, Poovan, Palayankodan and Njalipoovan. Under the project we propose Banana cultivation.

5.4.6. Floriculture

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. 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.

5.4.9. 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 × 25 cm) whereas in conventional paddy cultivation requires 20 kg seed per acre. (1 acre= apprx 0.4 ha).

5.4.10. Farmers Participatory Seed Bank for short term crops and vegetables (Mainly local variety seeds for conservation and popularisation)

Seeds will be produced through the farmers. The seed requirement of the local farmers will be met by the seed bank maintained by the community. Scientific seed storage and preservation facilities will be provided and it will be maintained by the local people. The aim is to make available the location specific seed varieties at the appropriate time at appropriate quantities. The traditional seed varieties of grains, millets, grams in the locality will be collected and preserved as a germ plasm for future research and development. The seed varieties, and specimens of local flora and fauna and their details will be exhibited in the Seed bank for education purposes.

5.4.11. Fruit processing

Fruits are part of our diet but they are perishable items. To overcome 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.

5.4.12. Agri. Marketing centre

The watershed is agriculture predominant area. Various agriculture produces such as rubber, coconut, arecanut, fruits, vegetables are being marketed by the farmers. As of now, it is being marketed mainly at outside markets. We cannot claim that the farmers are getting fair price for their produces. To address this issue, under the project Agri. Marketing centre is proposed under the joint ownership of the farmers. The farmers can sell their produces at this centre for fair price.

5.4.13. 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.

5.4.14. Imitation gold making

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.

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.

1. 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.

2. 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.

3. 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	Revolving Fund
1	Goat Village	No	24000	61	1464000
2	Dairy Village	No	66350	71	4710850
3	Honey Village	No	11075	26	287950
4	Poultry Village	No	2250	270	607625
5	Imitation gold making Unit	No	55000	1	55000
6	Sari Painting Unit	No	53000	1	53000
7	Readymade Garment Unit	No	125000	1	125000
	Total				7303425

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	24000	61	0	0	0	0	32	768000	29	696000
2	Dairy Village	66350	71	0	0	0	0	39	2587650	32	2123200
3	Honey Village	11075	26	0	0	0	0	13	143975	13	143975
4	Poultry Village	2250	270	0	0	0	0	128	288000	142	319625
5	Imitation gold making	55000	1	0	0	0	0	1	55000	0	0
6	Sari Painting	53000	1	0	0	0	0	0	0	1	53000
7	Readymade Garment	125000	1	0	0	0	0	1	125000	0	0
	Total								3967625		3335800

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) Saree 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.

10.6) Ready made 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.

10.7) Imitation gold making unit

Imitation gold are widely 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 attending training programmes.

11. Expected results of the livelihood programme.

Following are the expected results of the livelihood program

- 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	Kanhiradukkam	Pond with Tank for Drinking Water Supply	Kanhiradukkam	Pullur Periya	402280.00
2	Kumbala	Farm Pond	Kariya	Pullur Periya	42685.00
3	Iriya	Pallam Conservation	Kattumadam	Pullur Periya	86216.00
4	Modagram	Pond with Tank	Modagram	Kodom-Belur	279580.00
5	Lalur	Pond with Tank	Lalur	Kodom- Belur	399902.00
6	Kuyyangad	Installation of Tricho derma Unit	Kuyyangad	Kodom- Belur	267652.00
7	Chenthalam	Construction of Pond	Moorikkada	Kodom-Belur	398353.00
8	Ayarot	Water Tank	Ayarot	Kodom-Belur	327842.00
9	Kottodi	Construction of Pond	Kottodi	Kallar	92379.00
10	Painikkara	Shutter check dam	Kanhirathadi	Kallar	349111.00
11	Vannathikkanam	Paddy field protection wall cum Tractor path	Vannathikkanam	Kallar	600000.00
	Total				3,246,000.00

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 stag

Chapter -8

Expected Outcome

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	The health of the soil is assessed and the

	cards	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 Expected 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
		Attendance in Grama Sabha, Watershed Committees, UGs and SHGs
	Sustained and productive People participation in developmental programmes	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

Livelihood Activities

10.1.1- Goat Village

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

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

10.1-2- Dairy Village

(2 Cow Unit - High Yield Veriety (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 Cattleshed - 130 - Sqr ft		130 sqft	12000.00
	Total			66350.00

10.1.3- 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 Transpotation charge	75	10	750.00
2	Cost of Cage	-	-	1500.00
	Total			2250.00

10.1.4- 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 veil	100	1	100.00
	Total			11075.00

10.1.5 - 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

**10.1.6- Saree Painting
(5-10 Persons/Unit)**

Sl no	Particulers	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

10.1.7 Ready made Garment

(10 Persons/Unit)

Sl no	Particulers	Rate	No	Total cost
1	Tailoring Machine	5500	10	55000.00
2	Embroidery Machine	10000	1	10000.00
3	Overlock machine	5500	1	5500.00
4	Furnitures(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

9.6.1 - Vegetable Cultivation

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

10.2 .2 - Betelvine 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 Oranic manure &Application	10/Kg	5000	50000
4	Cultural operation & irrigation etc	300/Labour	350	105000
	Total			555000/Ha

10.2.3- 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 Oranic manure &Application	10/Kg	6175	61750
4	Labour charge for cultural operations	300/Labour	150	45000
	Total			500500/Ha

10.2.4 - Banana Cultivation

Sl no	Particulers	Rate	No	Total cost
1	Cost of Banana Sucker	10/No	2500	25000.00
2	Cost for Oranic 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

10.2.5 - Fodder Grass Cultivation

Sl no	Particulers	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

10.2.6 - Flori Culture

(Jasminum sambaca variety (Gundumalli))

Sl no	Particulers	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 Oranic manure &Application	10/Kg	14125	141250
	Total			497500/Ha

10.2.7 - Pineapple Cultivation (Mouricious variety)

Sl no	Particulers	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 Oranic manure &Application	10/Kg	2010	20100.00
4	Cultural operation	300/Labour	30	9000.00
	Total			191400/Ha

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

Sl no	Particulers	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

10.2.9 - Fruit Processing Unit

Sl no	Particulars	Rate	No	Total cost
1	Fire-hearth/ stove (Choola)	5000	1	5000.00
2	Gas Stove (2nos)& Connection	8000	-	8000.00
3	Grinding machine & Vessels	25000	-	25000.00
4	Furniture items	10000	-	10000.00
5	Electronic Weighing &Packing /Sealing machine	5000	-	5000.00
6	Rent for work shed & sales centre	3000	6months	18000.00

7	Working capital	54000		54000.00
	Total			125000.00

10.2.10 - Women Managed Agri-Marketing Centre (5Women)

Sl no	Particulars	Rate	No	Total cost
1	Rent for Store & Sales room (including electricity charge)	5500	12months	66000.00
2	Cost of Initial Purchase	95000	-	95000.00
3	Minimum Furniture(Table Weighing machine, Chairs)	25000	-	25000.00
4	Honorarium for sales persons	5000	12Months	60000.00
5	Stationery (Bill , Account books etc)& Name board	4000	-	4000.00
	Total			250000.00

10.2.11 - Farmers Participatory Seed Bank Programme

Sl no	Particulers	Rate	No/Qty	Total cost
1	Seed cost(average 20g seed /cent x 1250 cents-5 Ha)	1000	25Kg	25000.00
2	Cost of organic manure/fertilizer/PPC and cultural operations	150	1250cent	187500.00
3	Material cost of 'Pandals'	23500	-	23500.00
4	Storage methods & Record keeping (700 gauge poly bags/punching machine/files & records)	10000		10000.00
5	Seed storage infrastructure (electronic weighing machine, drying mats, steel rack, glass chamber, vessels, moisture metre, etc)	20000		20000.00

6	Training and exposure visit to seed bank for selected persons(to be conducted commonly at district level)	10000		10000.00
7	Room rent @ Rs 2000x 30 months	2000	12 Months	24000.00
	Total			

10.2.12 - 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-1 (D3)
SOIL TEXTURE**

Parappa Block Panchayath-Kasaragod District

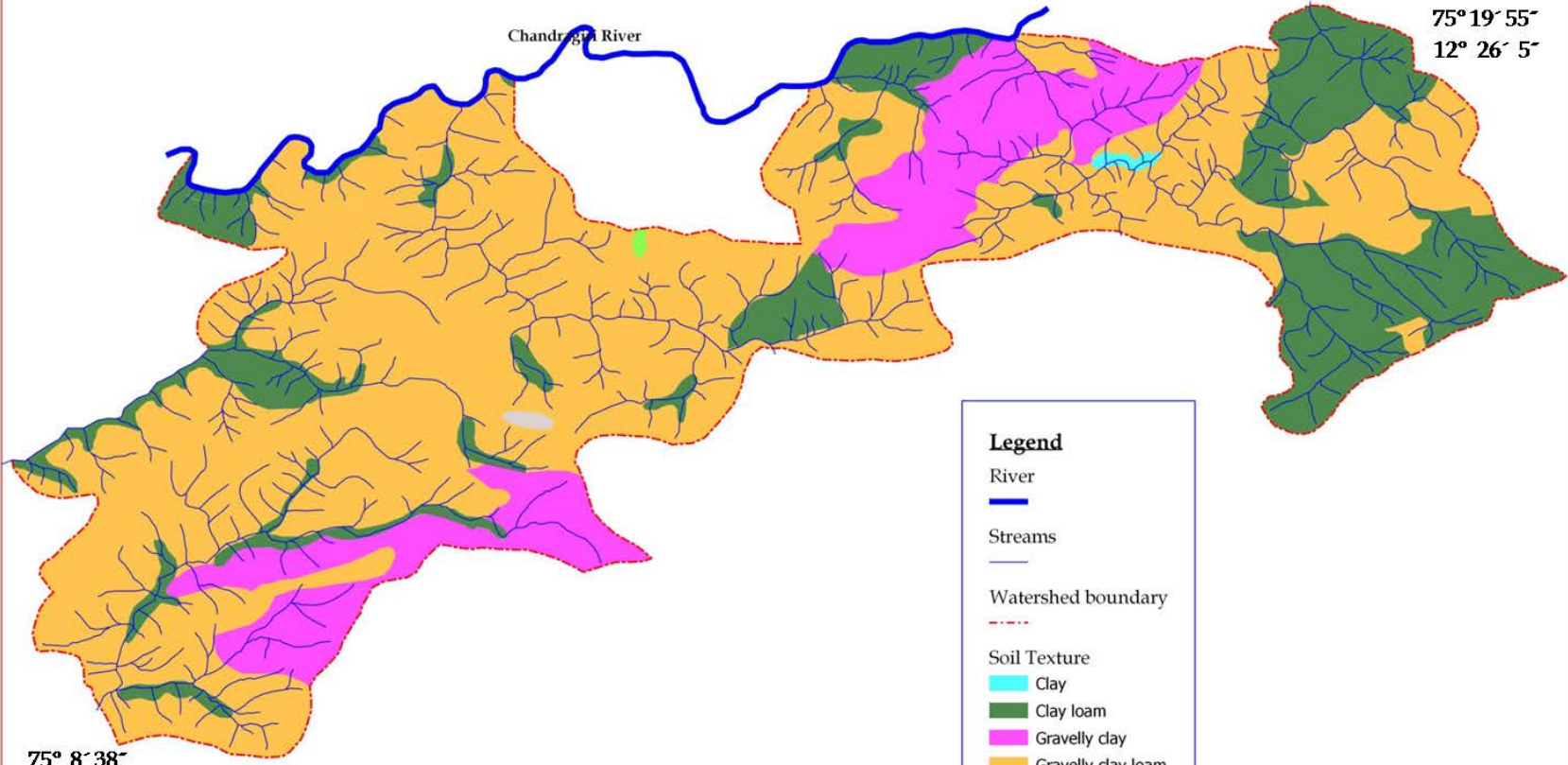


Effective area-5410

75° 19' 55"

12° 26' 5"

Chandragiri River



75° 8' 38"
12° 21' 25"

Legend

River



Streams



Watershed boundary



Soil Texture

Clay



Clay loam



Gravelly clay



Gravelly clay loam



Silty clay



Waste land



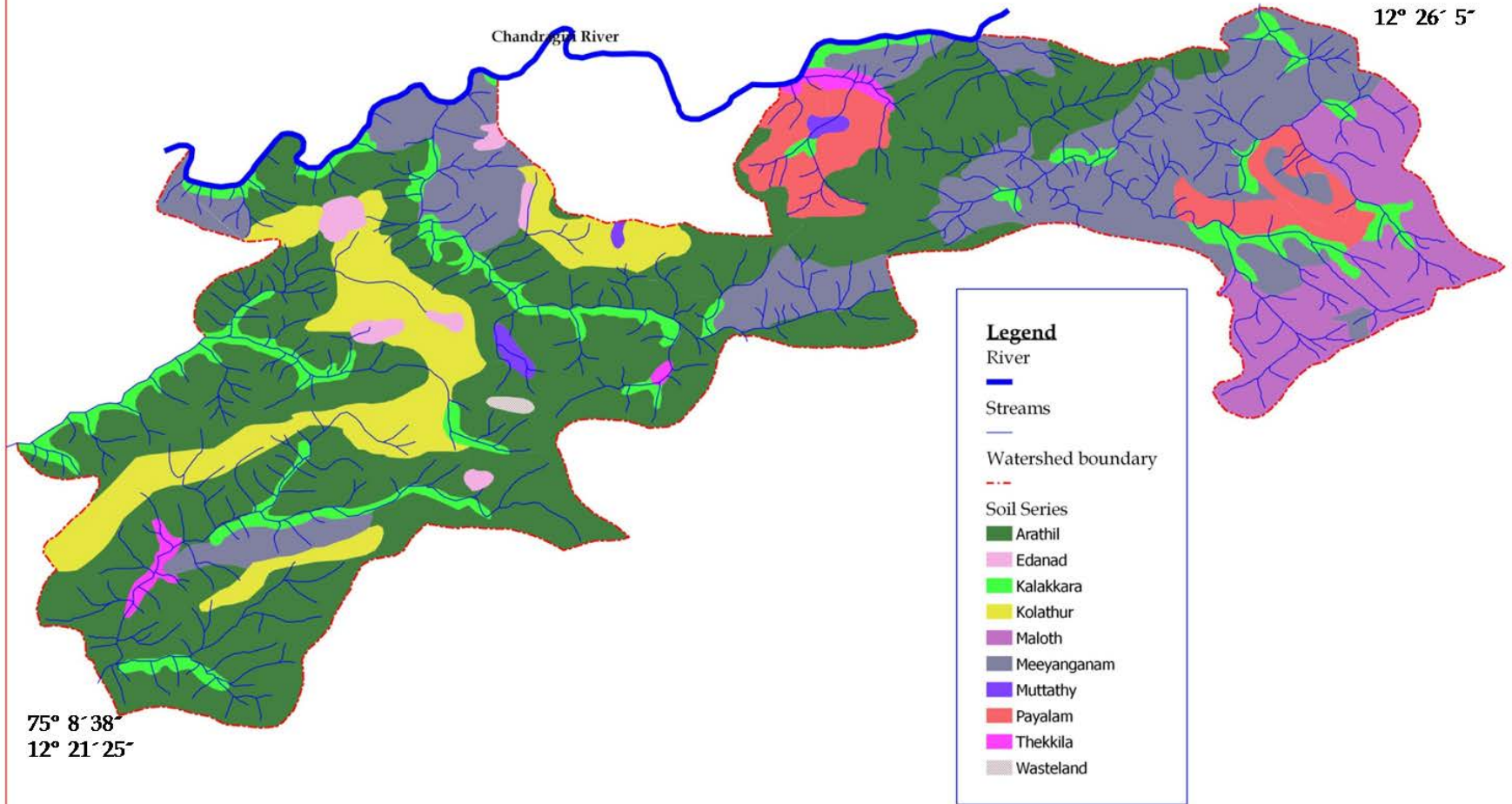
**Integrated Watershed Management Programme
Project - IWMP-1 (D3)
SOIL SERIES**



Parappa Block Panchayath-Kasaragod District

Effective area-5410

75° 19' 55"
12° 26' 5"



**Integrated Watershed Management Programme
Project - IWMP-1 (D3)
SOIL DEPTH**

Parappa Block Panchayath-Kasaragod District

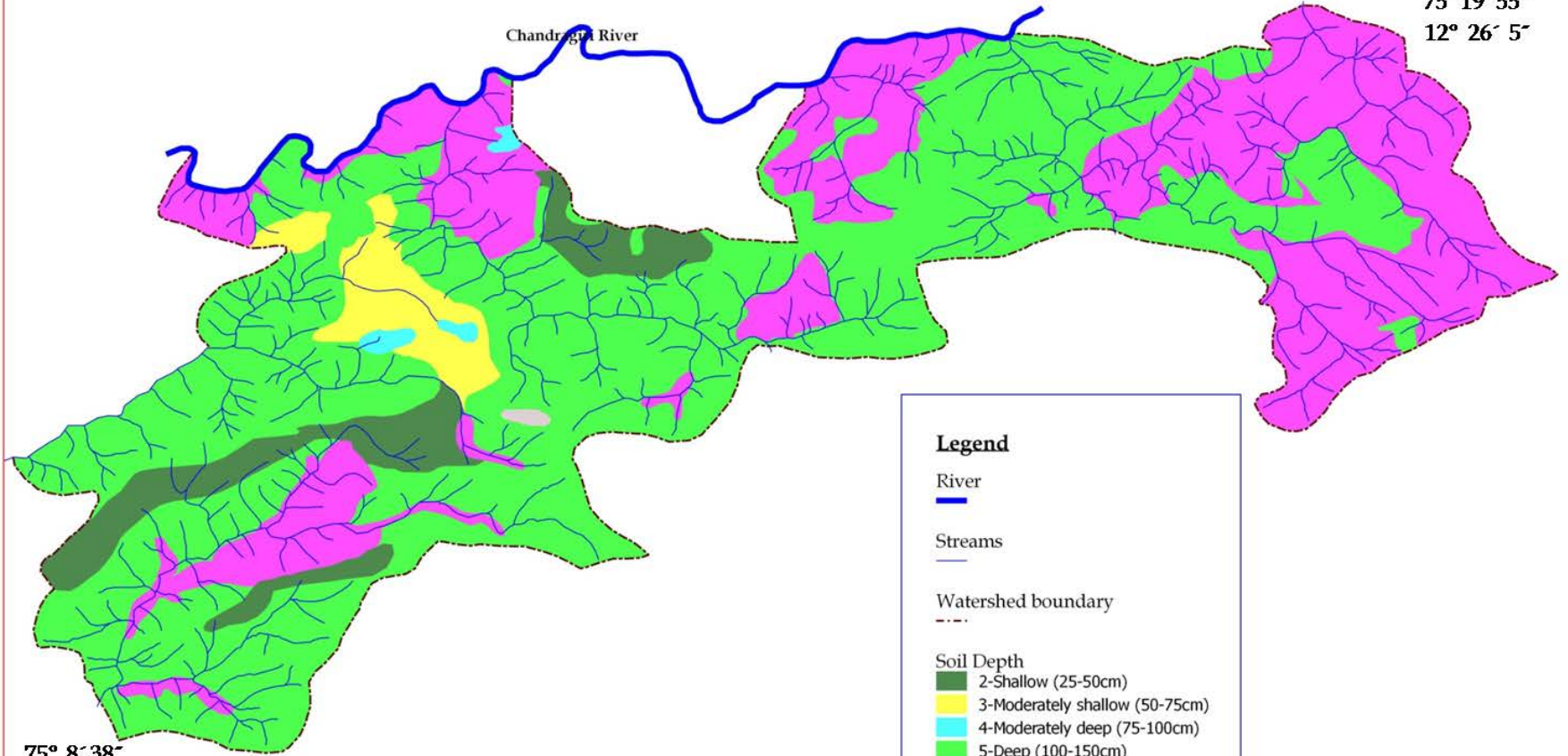


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Effective area-5410

75° 19' 55"

12° 26' 5"



75° 8' 38"
12° 21' 25"

Legend

River



Streams



Watershed boundary



Soil Depth

- 2-Shallow (25-50cm)
- 3-Moderately shallow (50-75cm)
- 4-Moderately deep (75-100cm)
- 5-Deep (100-150cm)
- 6-Very deep (>150cm)
- 7-Waste land

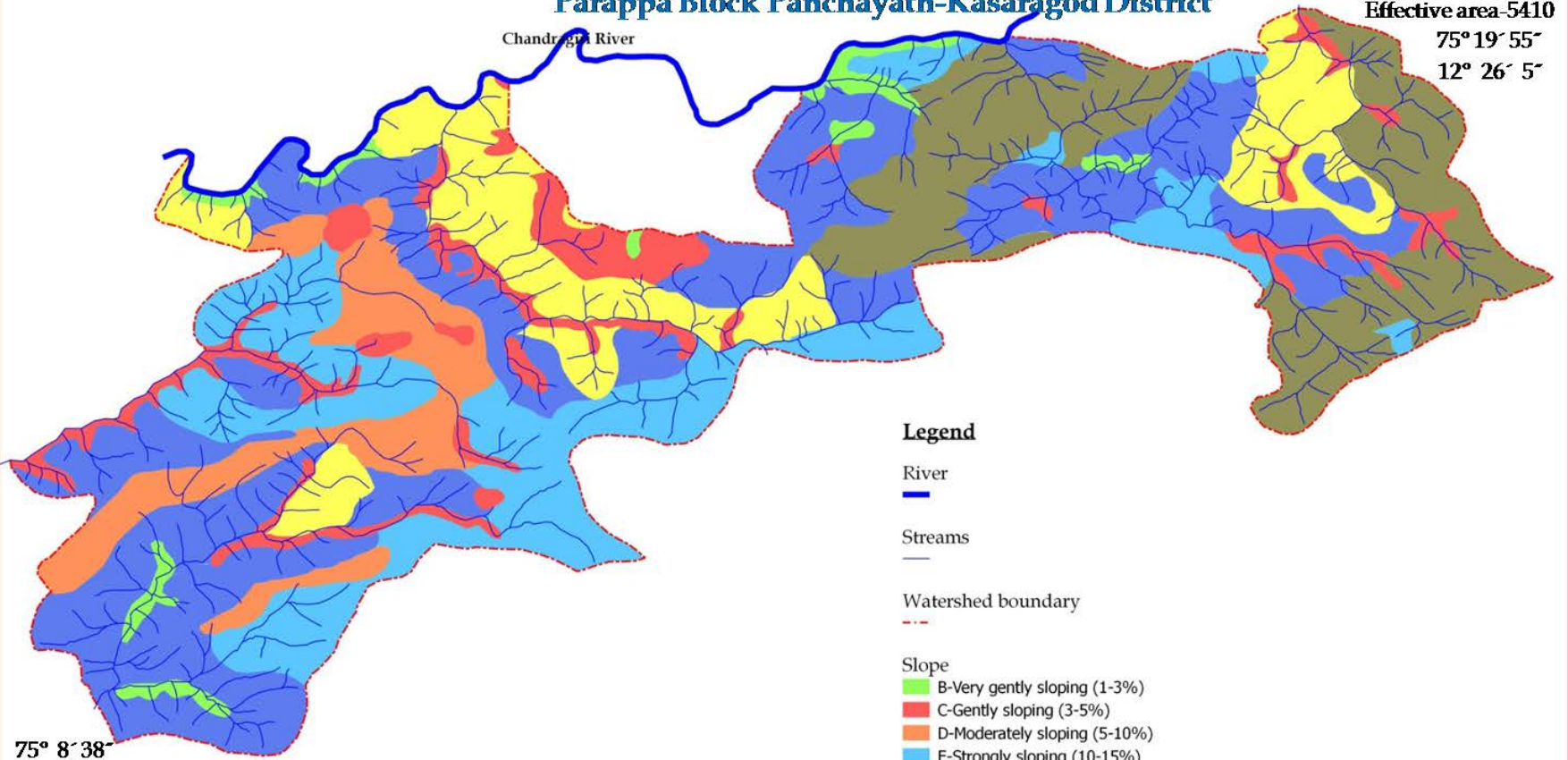
**Integrated Watershed Management Programme
Project - IWMP-1 (D3)
SLOPE**

Parappa Block Panchayath-Kasaragod District

N
1:50000

Effective area-5410
75° 19' 55"
12° 26' 5"

Chandragiri River



75° 8' 38"
12° 21' 25"

Legend

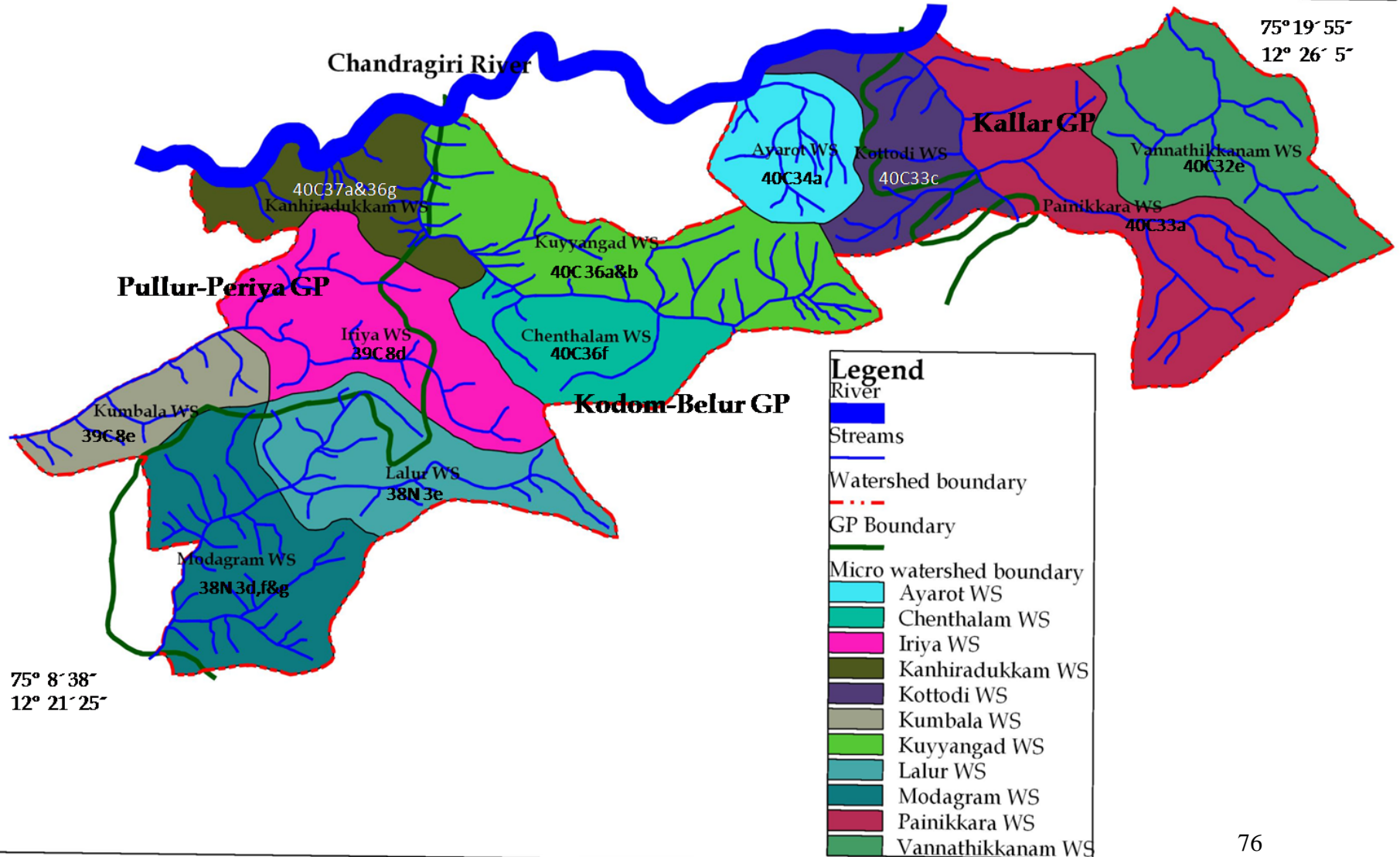
- River
—
- Streams
—
- Watershed boundary

- 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 (IWMP) - Project -IWMP-1(D3)

Parappa Block Panchayath-Kasaragod-Dt
Micro Watersheds

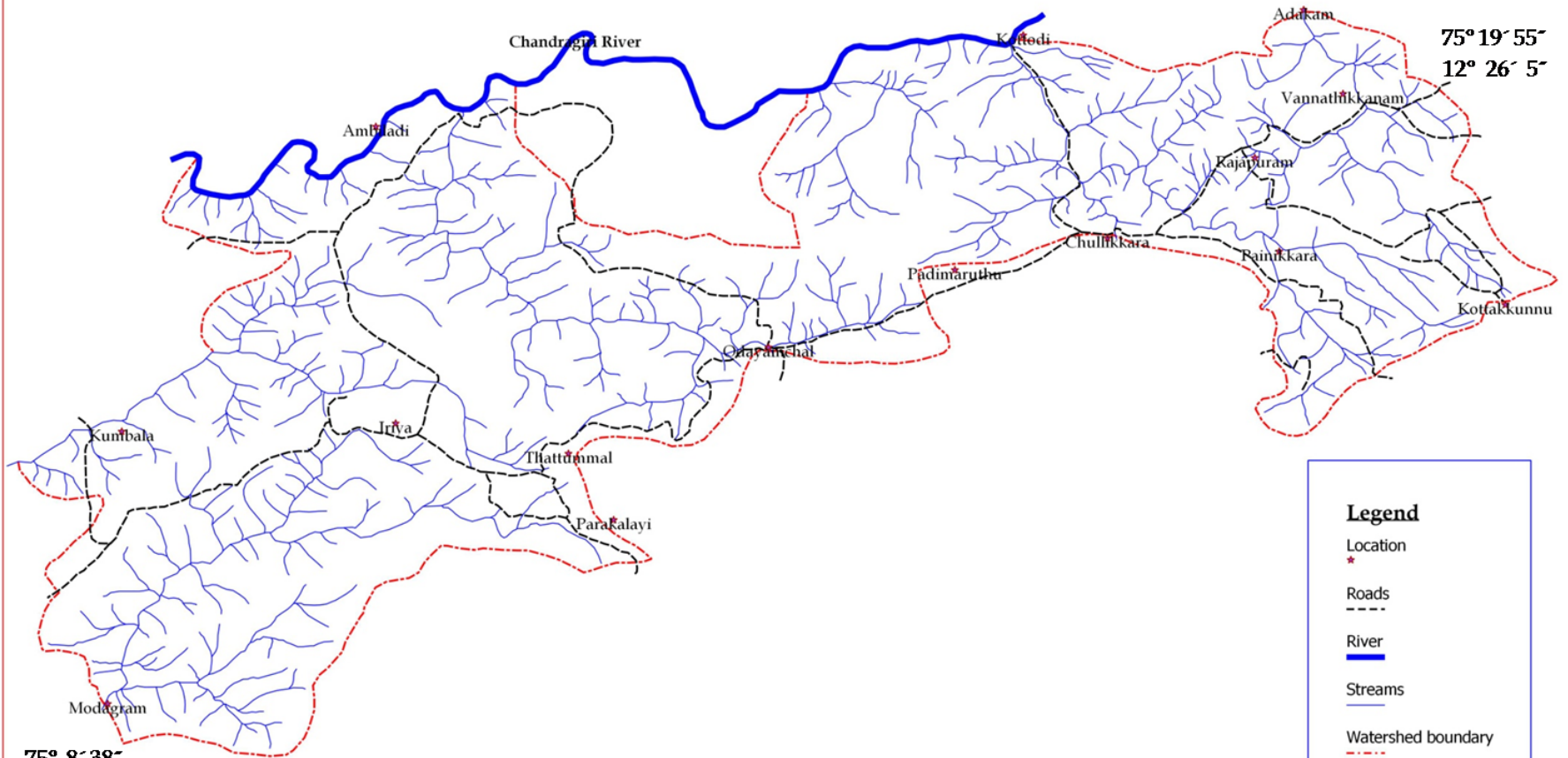
Effective area-5410Ha



**Integrated Watershed Management Programme
Project - IWMP-1 (D3)
LOCATION**

Parappa Block Panchayath-Kasaragod District

N
1:50000
Effective area-5410



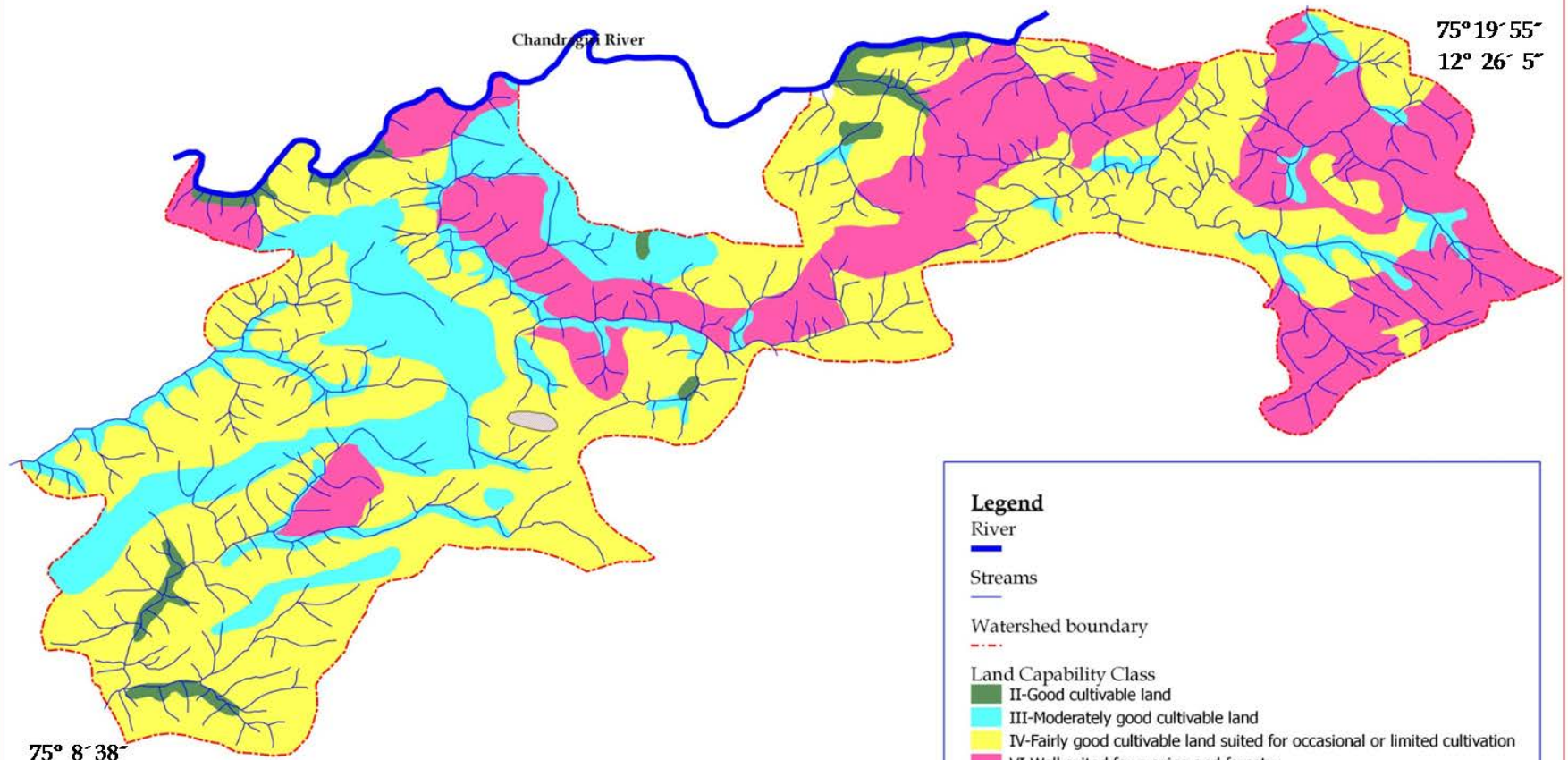
**Integrated Watershed Management Programme
Project -IWMP-1 (D3)
LAND CAPABILITY CLASS**

Parappa Block Panchayath-Kasaragod District



Effective area-5410

75° 19' 55"
12° 26' 5"



75° 8' 38"
12° 21' 25"

Legend

- River
- Streams
- Watershed boundary
- 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
 - Waste land

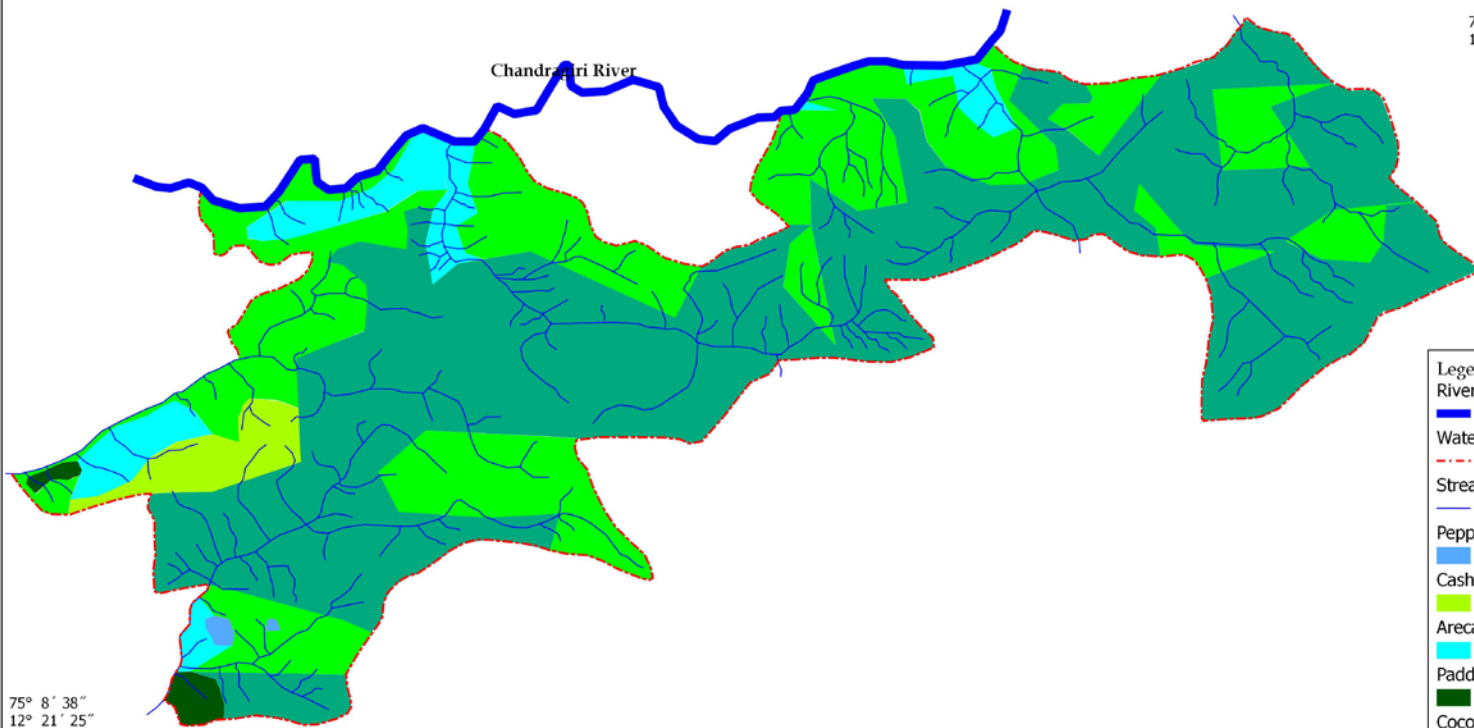
Integrated Watershed Management Programme
Project -IWMP-1(D3)
Parappa Block Panchayath-Kasaragod -Dt
Land use Map



Effective area-5410Ha

75° 19' 55"
12° 26' 5"

Chandrabhri River



75° 8' 38"
12° 21' 25"

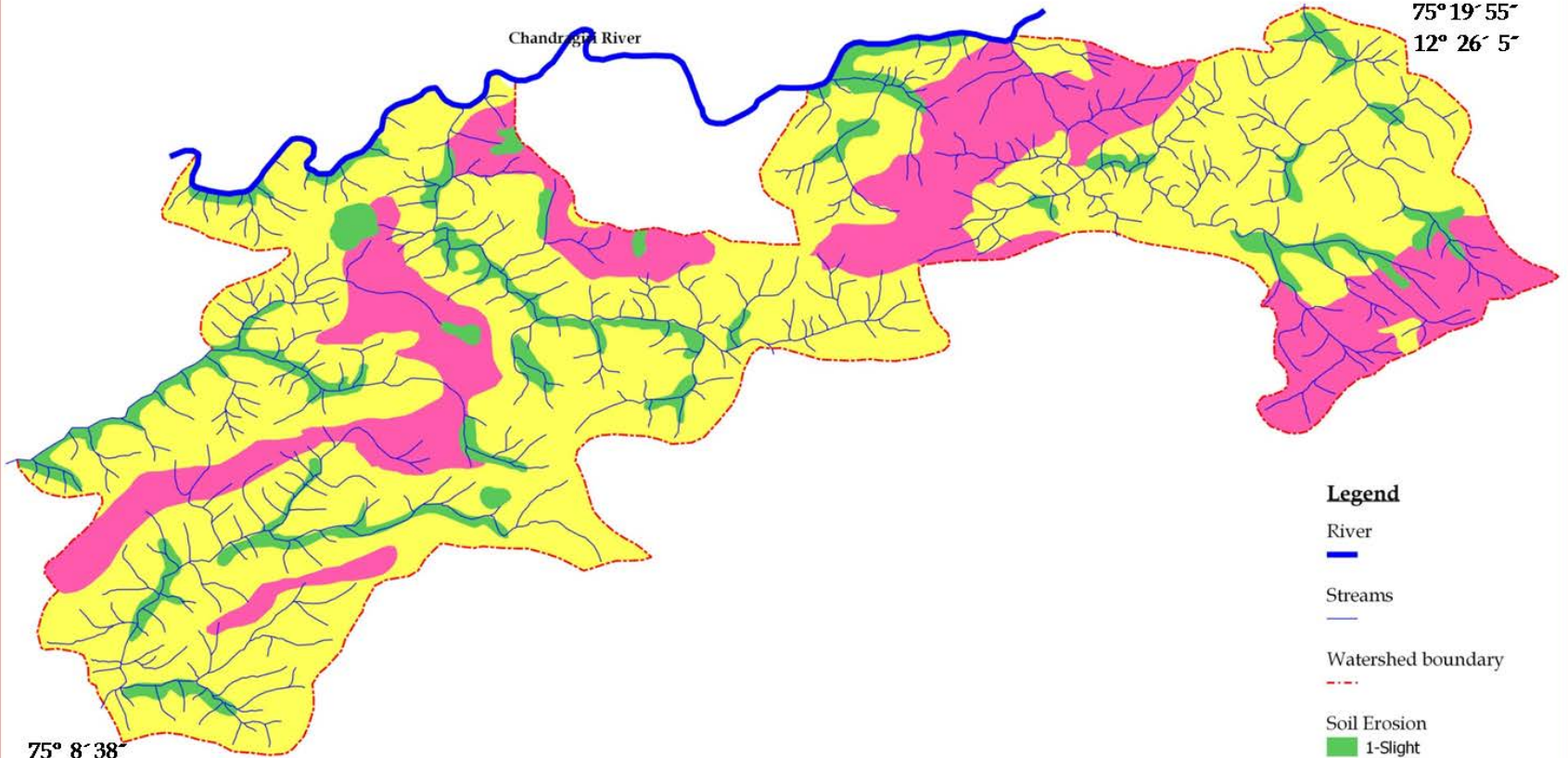
- Legend
- River
 - Watershed boundary
 - Streams
 - Pepper
 - Cashew
 - Arecanut
 - Paddy
 - Coconut
 - Rubber

**Integrated Watershed Management Programme
Project - IWMP-1 (D3)
SOIL EROSION**

Parappa Block Panchayath-Kasaragod District



Effective area-5410
75° 19' 55"
12° 26' 5"



75° 8' 38"
12° 21' 25"

Legend

- River
- Streams
- Watershed boundary
- Soil Erosion
 - 1-Slight
 - 2-Moderate
 - 3-Severe