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PART 1

CHAPTER 1

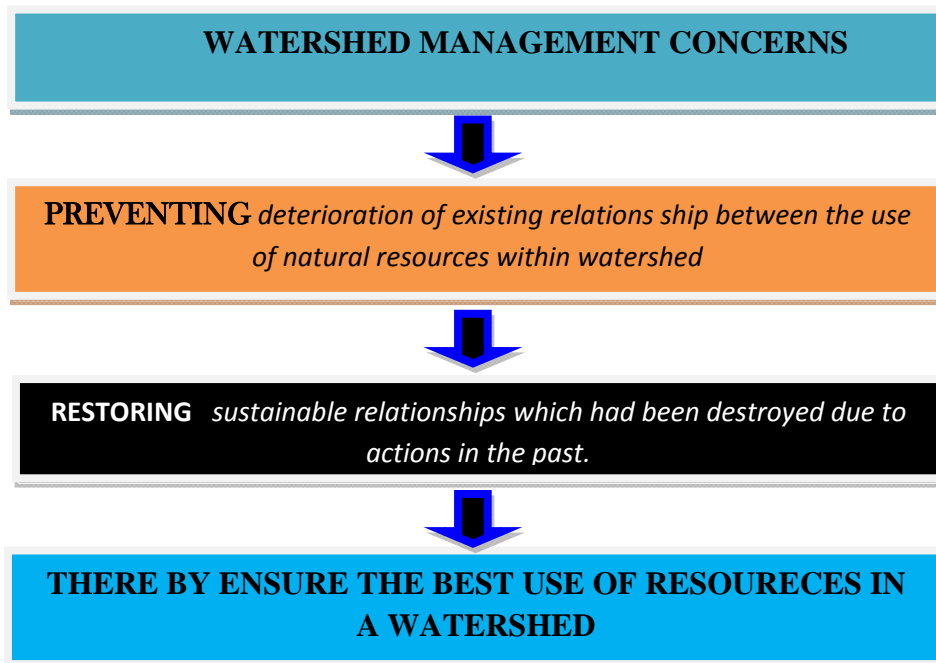
PROJECT BACKGROUND

1 INTRODUCTION

A watershed is an area from which run off, resulting from precipitation flows past a single point into a large stream, river, lake or an ocean. Apart from the abstract factors that the watershed experiences, it is comprised of land, water and biomass. Certain delicate balances are maintained in the ever varying interactions among the environmental factors that each individual watershed is exposed to sustain the well being of it. Every watershed has to be identified as a unique watershed ecosystem. These balances are jeopardized due to disproportionate and irrational interventions of the watershed community. Man spearheads and thus watershed deterioration begins. This basically inflicts upon the water cycle. This has resulted in drinking water scarcity, agricultural drought, fall in farm production, denial of hydel power generation, crisis in industries and ecological problems. Main reasons are topography, intensity and duration of rainfall, land use pattern and population. Watershed development is an integration of technology within the natural boundary of a drainage area for optimum development of land, water and plant resources to meet the basic minimum needs of people in a sustained manner. A developed watershed provides food, fuel, fibre, fodder, fruits, drinking water and employment. Thus scientific water management approach is the only tool to develop a watershed.

Watershed management implies the wise use of soil, water, and bio resources in a watershed to obtain optimum production with minimum disturbance to environment. The basic objective of watershed management is to solve the problems of soil and water based on the concept that all the resources are interdependent and must therefore be considered together. Among all the interventions envisaged in watershed management measures, water resource development and management gain primary importance.

Programme will be sustainable only if it continues to operate after the withdrawal of monetary or technical supports. In Integrated Watershed Management Programme the participation of local community is assured since the different works on private as well importance of “participation” for sustainability in watershed management programmes.



Collective participation of people is very important due to inter dependence of beneficiaries. Transfer of responsibility within their community is a key mandatory for ensuring the sustainability.

2. BASIC PROJECT AREA INFORMATION

Wandoor B1 project includes eight micro watersheds that comes under both Areacode and Wandoor blocks Panchayaths. Among these watersheds Keliyanthodu, Kanjirikundu, Eliyankottupara, Muthirottithodu, Edavazhikundu and Pannipara are within the boundaries of Areacode Block Panchayath. Panarkund and Pullipadam watersheds are within the limits of Wandoor Block Panchayath.

Table.No.1.1: Cluster of 10 watersheds in Areacode Block Panchayath

NAME OF WATERSHED	CODE	Grama Panchayath	Block	TOTAL AREA	TREATABLE AREA
EDAVAZHIKUND	24C15a	Areacode	Areacode & Wandoor	618	618
KANJIRAKUND	24C15b	Edavanna		791	791
KELIYANTHODU	24C15c	Edavanna		196	196
ELIYANKOTTUPARA	24C16a	Edavanna		304	271
MUTHIRITTITHODU	24C17a	Edavanna		660	625
PULLIPADAM	24C18a	Mambad		746	714
PANNIPARA	24C60a	Mambad		482	482
PANARKUND	24C61b	Edavanna, Thiruvalli		544	506
TOTAL				4341	4203

3. NEED AND SCOPE FOR WATERSHED DEVELOPMENT

Loss of vegetative cover followed by soil degradation through various forms of erosion has resulted into lands which are thirsty in terms of water as well as hungry in terms of soil nutrients. All these regions have predominantly live stock centred farming systems; less biomass for animals not only reduces animal productivity but also deteriorates the ecological balance.

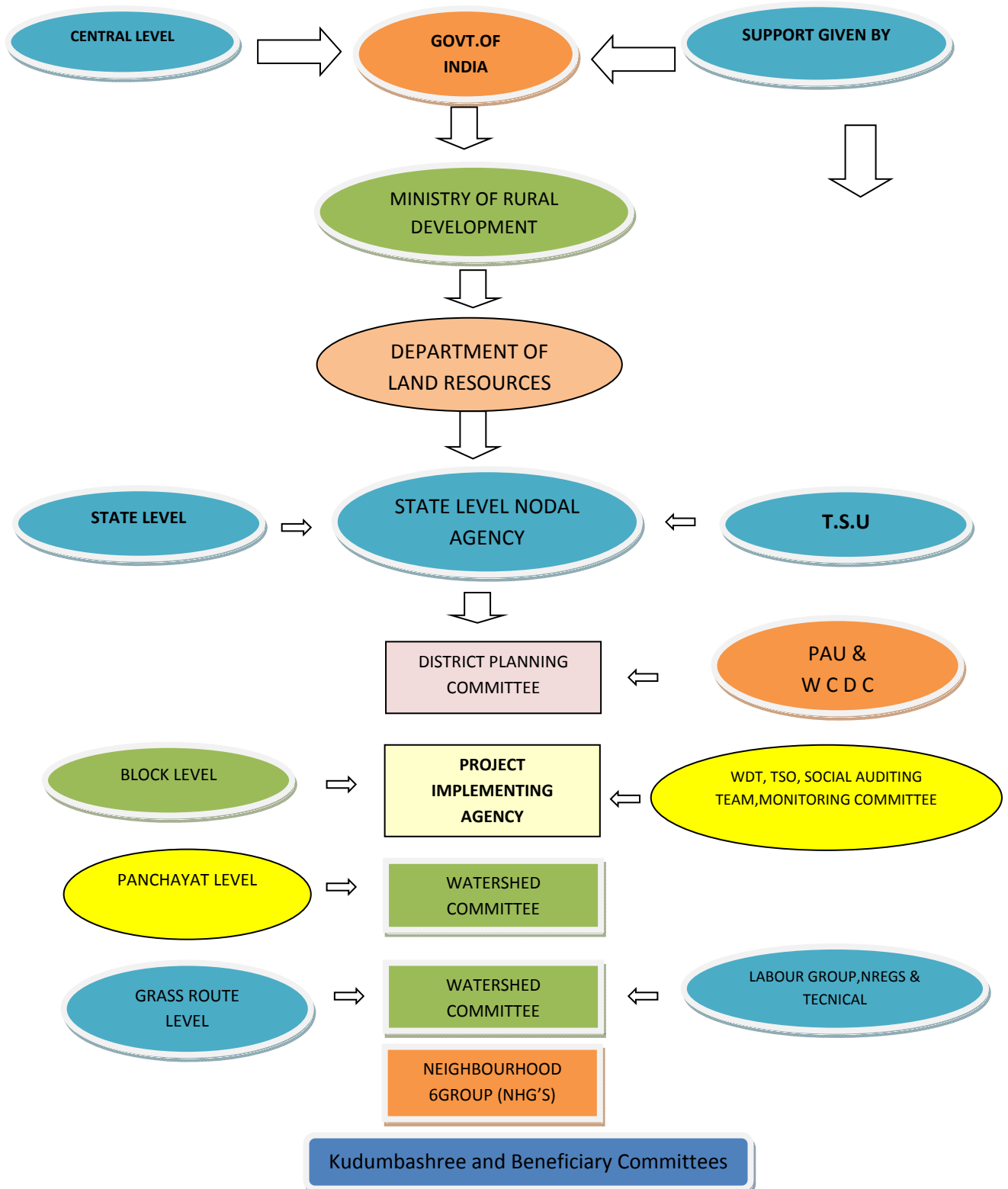
Watershed management has therefore emerged as a new paradigm for planning, development and management of land water and biomass resources with a focus on social and institutional aspects apart from biophysical aspects. Watershed management becomes increasingly important as a way to improve livelihood of people while conserving and regenerating their natural resource. The role and importance of community participation is now accepted. Watershed management programmes therefore should be intimately linked with the people whose socio economic and cultural backgrounds play a decisive role in meaningful planning, implementation and operations of watershed programmes.

4. MAIN OBJECTIVES

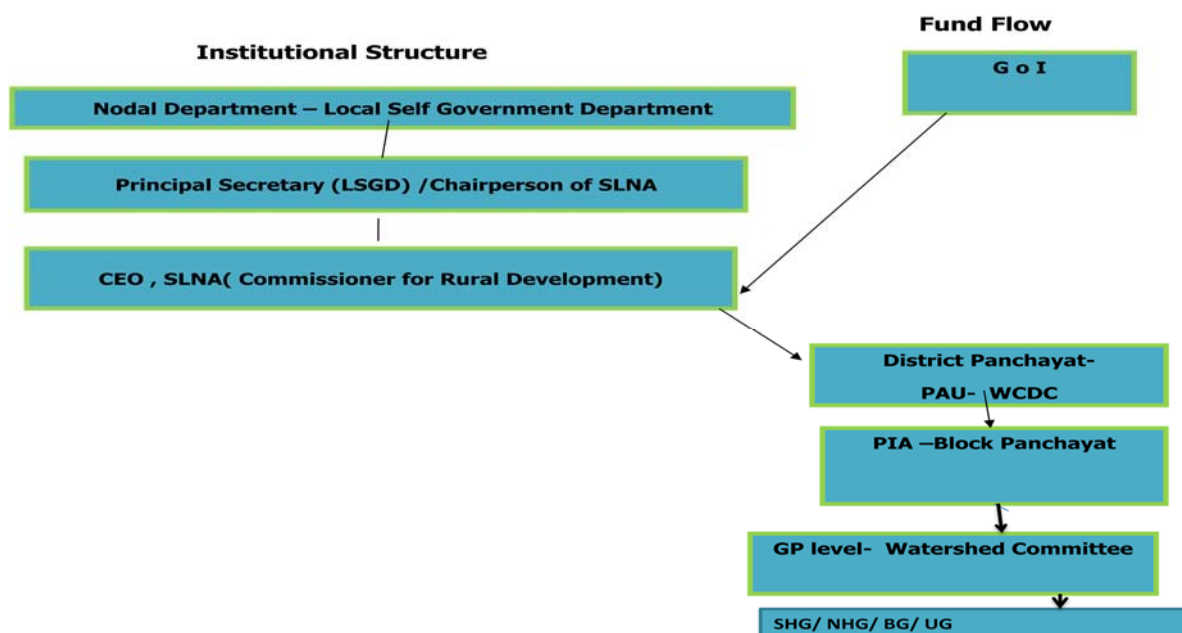
- Main objective of IWMP is to preserve and conserve the ecology, restore and develop degraded natural resources by arresting soil loss, improving soil health and soil moisture.
- Rain water harvesting and recharging of ground water enables multi cropping and introduction of diverse agro based activities help to provide sustainable livelihood to the people residing in watershed area.
- To promote livestock development, fishery management, and to encourage dairying and marketing of dairy products.
- Improving the capacity of community to manage common natural resource.
- Enhancing the efficiency and effectiveness of rain water and runoff use, improve vegetative cover and reduce soil erosion through better rain water management.
- Conserving as much rain water as possible in the place where it falls and also increasing the ground water level to get water throughout the year and maintaining it for sustainability.

- Utilizing the available land to its maximum productivity by adopting various or suitable measures according to the land capability and without any environmental degradation.

5. ORGANIZATIONAL SET UP



6. FUND FLOW



7. FUNDING PATTERN

Sl. No.	Particulars	Percentage of Fund	Amount
01.	Administration Cost	10.00	6304500
02.	Monitoring	1.00	630450
03.	Evaluation	1.00	630450
04.	Entry Point Activities	4.00	2521800
05.	Institution & Capacity Building	5.00	3152250
06.	DPR	1.00	630450
07.	Watershed Development Works	56.00	35305200
08.	Livelihood Activities	9.00	5674050
09.	Production System & Micro Enterprises	10.00	6304500
10.	Consolidation Phase	3.00	1891350
Total		100.00%	63045000

CHAPTER 2

BASIC INFORMATION OF THE PROJECT AREA

1 .GENERAL DESCRIPTION OF THE PROJECT AREA

Areacode and Wandoor Block Panchayath are located in the Northern part of the Malappuram district of Kerala state. It includes seven Grama Panchayats, which are Edavazhikund, Kanjirakund, Keliyanthodu, Eliyankottupara, Muthirottithodu, Pullipadam, Pannipara and Panarkund. The Areacode and Wandoor block regions that extends over the two sides of Chaliyar river clearly shows us the evidence of the existence of a culturally rich society from the ancient times onwards.

The project includes 8 micro watersheds that come under the Areacode-Wandoor Block Panchayats that mainly follow an agrarian culture. The project aims at bringing development in these regions by implementing activities like land & water conservation along with changes in agrarian sector and also by improving means of livelihood.

2. LOCATION AND EXTENT

Wandoor B1 Project area is situated in the Northern part of the Areacode & Wandoor Block. The Cluster area is situated between $11^{\circ} 11' 0''$ N and $11^{\circ} 16' 0''$ North latitude and between $76^{\circ} 50' 0''$ and $76^{\circ} 11' 0''$ in the east longitude. The total extent of the cluster is 4203hectares, which is 1.41 % of the total extent of the district. The cluster area bounded on

The north Urangattiri and Chaliyar Grama Panchayats, east by Edavanna, Mampad and Thiruvalli Grama Panchayats and south by Trikkalangode and Kavanur Grama Panchayath west by Kavanur and Urangattiri Grama Panchayath.

KELA

WANDOOR B1-A

AREACDE AND WANDOOR BLOCKWANDOOR BLOCK

3. PHYSIOGRAPHY

The Wandoor B1 Cluster area coming under the Midlands, lying between the mountains and the lowlands is made up of undulating hills and valleys. This is an area of intensive cultivation. Cashew, Coconut, Arecanut, Tapioca, Banana and Vegetables of different varieties are grown in this area. The total area of the Wandoor B1 cluster is 4341 hectares and the treatable area is 4203 hectares. The highest elevated point is located in the Northern part of the cluster which is Punapara Mala 546 meters from MSL and the lowest point is along the side of Chaliyar. Majority of the area is moderately sloping (1750 hectares) which is 40.8% of the total area. Strongly sloping area covered 1125 hectares which is 27%, Moderaley Steep to steep area covered 1161 hectares which is 18.8 % very steep sloping covered 109 hectares which is 8.6% and very very steep is covered 58 hectares which is 4.8 % of the total area. The below table gives the slope of the entire project area.

Table.No.2.2: Slope of Entire Project area

Slope	Area In Ha	Area At %	% of slope
Moderately sloping	1750	40.8	5-10
Strongly sloping	1125	27	10-15
Moderately steep to steep	1161	18.8	15-33
Very steep sloping	109	8.6	33-50
Very Very steep	58	4.8	>50
Total	4203	100	

Chaliyar river originates from Elembileri hills of Waynad Taluk which is major drain in the cluster area and its important tributary is Cherupuzha, The main river passes through Areacode, Urganttiri, Edavanna, Mampad and Kizhuparamba of Malappuram District before it joins with the sea at Beypore. This river has a total length of about 168kms out of this about 12 km length passes through this cluster area.

4. CLIMATE AND RAINFALL

The below table summarises the rainfall data of cluster area which is 10 years. From 2002 to 2008, the month of June rain fall is increasing and in 2009 its going decreasing trend again it increasing trend in 2010 and 2011. In the previous year again rain fall going decreasing rend. If we compare year wise the highest rain fall received in 2007 as well as the less rainfall received in 2012.

INTEGRATED WATERSHED MANAGEMENT PROGRAMME (IWMP) – WANDOOR B 1

Table No.2.3: Rainfall (RF) of Cluster area (Wandoor B1)

January	13.10	0.00	0.00	7.40	0.00	0.00	0.00	0.00	4.20	0.00	0.00
February	0.00	0.00	0.00	0.00	0.00	0.00	34.40	0.00	0.00	11.80	0.00
March	0.00	10.20	0.00	0.00	68.60	0.00	175.00	48.00	11.60	2.40	0.00
April	58.00	105.80	119.90	115.20	8.80	25.80	30.80	80.00	58.80	122.00	115.20
May	249.20	119.60	408.40	25.60	453.70	167.00	108.80	103.40	69.60	51.60	8.80
June	413.10	534.40	634.00	698.40	689.80	615.10	641.10	332.30	466.00	809.00	269.20
July	296.40	547.40	281.60	605.90	620.80	1319.00	279.70	965.60	483.40	457.40	331.17
August	423.00	614.60	374.40	213.20	390.80	455.20	177.80	219.60	237.40	410.60	343.20
September	57.80	63.40	140.00	299.80	700.60	498.40	293.80	240.30	182.10	371.60	144.10
October	439.20	281.20	264.40	334.80	251.80	305.60	421.70	290.40	425.20	157.80	107.60
November	141.20	65.00	71.00	155.40	142.00	78.00	13.20	227.40	232.20	137.80	232.20
December	*	0.00	0.00	7.80	0.00	0.00	0.00	2.80	46.80	0.00	46.80
Total (Rain fall in mm)	2091.00	2341.60	2293.60	2463.50	3326.90	3464.10	2176.30	2509.80	2217.30	2532.00	1598.27



Source: Cashew Research Station Anakkayam, Malappuram

4.1 TEMPERATURE

The climate is generally hot and humid. March and April months are the hottest and January and February months are the coldest. The temperature starts rising from January and reaches the peak in the month of March and April and then decreases during the monsoon month and again rising from September onwards. The maximum, minimum and mean temperature of the watershed is 35°C, 18.5°C and 27°C respectively.

Table No.2.4: Monthly wise Temperature in Maximum and Minimum

Month	2002		2003		2004		2005		2006		2007		2008		2009		2010		2011		2012	
	Temperature		Temperature		Temperature		Temperature		Temperature		Temperature		Temperature		Temperature		Temperature		Temperature		Temperature	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
January	33.20	28.50	32.70	*	34.10	18.90	34.40	20.20	34.30	20.60	34.30	18.70	36.00	17.40	34.60	17.79	34.12	18.27	33.97	16.58	33.90	15.70
February	31.20	26.70	34.50	*	35.80	21.20	36.40	21.90	35.90	20.90	35.70	26.90	36.70	21.10	36.17	19.35	32.30	17.16	35.00	16.53	35.17	17.82
March	33.80	27.90	34.90	*	37.70	23.60	32.30	23.70	35.30	22.80	37.50	23.30	35.40	21.10	35.17	20.85	37.12	21.37	36.19	19.37	36.33	20.09
April	33.70	28.80	33.50	*	35.10	22.00	36.10	24.00	36.30	24.80	37.60	23.80	35.90	22.40	35.80	22.29	35.63	20.82	35.16	19.11	36.23	20.28
May	32.30	28.80	35.00	*	31.90	22.60	36.60	24.50	34.80	30.70	35.80	23.60	35.10	22.10	35.60	21.50	34.13	20.82	33.91	20.58	33.00	23.33
June	25.10	22.50	29.30	*	33.80	22.40	31.10	21.90	33.20	22.70	31.00	22.50	31.90	21.40	31.40	20.80	30.58	19.74	28.80	18.65	31.50	19.30
July	29.50	26.50	27.60	*	30.50	21.70	29.20	22.60	30.20	22.00	29.10	21.50	31.70	18.60	30.30	20.24	30.06	19.26	27.43	18.51	30.67	18.67
August	28.70	25.40	28.70	*	31.10	21.70	33.00	22.40	31.20	22.00	30.80	21.60	31.60	21.10	31.50	20.50	30.06	19.48	26.88	18.85	30.41	18.82
September	31.10	28.30	21.09	*	32.40	22.40	21.00	22.60	30.60	22.00	30.60	21.60	31.80	20.40	31.30	21.20	29.82	19.04	27.15	18.45	31.87	18.53
October	30.30	28.60	29.70	*	32.40	22.30	31.10	22.30	32.10	22.00	32.10	21.80	32.70	20.80	32.90	20.43	30.24	19.03	28.25	19.17	33.32	18.73
November	30.50	27.50	31.10	*	33.10	21.80	31.50	22.50	32.40	22.00	33.70	19.60	33.70	20.20	32.30	20.50	30.34	18.26	27.18	17.78	27.15	19.37
December	*	*	27.10	*	33.30	18.40	32.90	21.00	33.30	19.00	34.10	19.50	34.20	18.60	33.50	19.03	32.00	17.81	30.93	15.27	28.25	19.11
Total	339.40	299.50	365.19		401.20	259.00	385.60	269.60	399.6	271.5	402.3	264.40	406.70	245.20	400.54	244.48	386.40	231.06	370.85	218.84	387.80	229.75

Source: Cashew Research Station Anakkayam, Malappuram



4.2 HUMIDITY

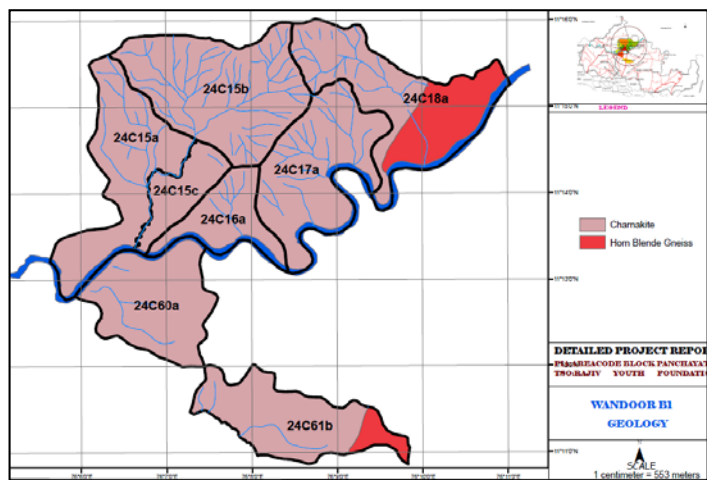
The humidity is more during south –west monsoon i.e., during June to September. The relative humidity ranges from 84 to 94% during morning hours.

4.3 WIND

The wind is predominant from east as well as west during morning and evening hours. The wind speed is more during December to February months.

5. GEOLOGY AND GEOMORPHOLOGY

Physiographically the district can be divided broadly into three types viz: coastal plains (less than 7.5 m), Midland (7.5-75 m) and highlands (above 75 m). As per the state P W D classification. The Salient features of the unit are briefly



described below. Most of the places are underlain by Charnockite and Horn blende gneiss rocks of Archaean Age.

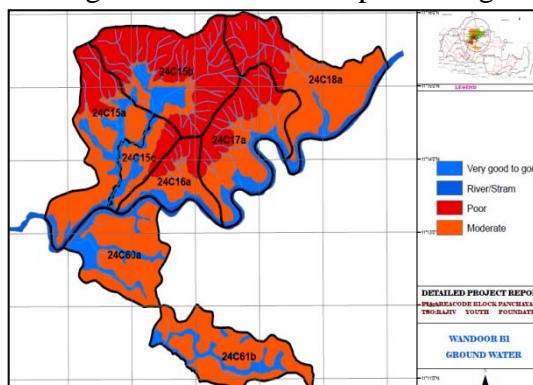
Geology	Area in Ha	At % Ha
Charnockite	3822.41	90.9
Hornblende	380.67	9.1
Total	4203	100

Laterite derived from crystalline rocks

and Tertiary sediments is also found in the cluster area. Wandoor B1 area contains mid land region is characterized by flat topped hillocks with steep 'U' shaped valleys and ridges. The valley form potential area for agriculture including paddy, Arecanut, vegetables, banana and coconut. The hill tops are generally barren and are covered by thick and compact Laterite.

6. GROUNDWATER

The Ground Water occurs under water level conditions. Large number of dug wells and filter point wells tap this aquifer to meet the domestic and agricultural needs. Depth of dug wells varies 3 to 18 meters. Recharge to Ground Water takes place immediately on the beginning of Monsoon. Monsoon starts almost during the end of May and by the starting of June. June to September is the recharging period corresponding to rainfall received in the area. From December onwards water level depletion starts and it reaches peak during the end of May. The above given map showing Ground water condition in the Project area (Wandoor B1).



Groundwater Condition	Area In Ha	At %	Depth in Metres
Moderate	2069.4	49.2	18.30
Very good to good	693.4	16.5	10.58
River/Stream	77.9	1.9	1-2
Poor	1362.4	32.4	Above 18
Total	4203	100	

Most of the area is containing moderate in ground water condition which is 2069.4 hectares of land and the percentage of 49.2. 16.5 % (693.4 Ha) of land under very good to good as well as 32.4 % (1364 ha) of the area under poor in ground water condition. The laterite which occupies the midland region constitutes the potential aquifer because of the porous and highly permeable nature. Ground Water occurs under water table conditions. The depth of dug wells varies from 3 to 15 m. The bottom part the wells are mainly of lithomargic clay and becomes low yielding during peak summer periods.

Table: 2.5: Ground water details of Wandoor B1

GROUND WATER DETAILS OF WANDOOR B1 FROM 2011-2012													
UP LAND	DUG WELL: G.Panchayath												
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
2011	10.26	11.04	11.11	11.3	11.08	9.69	8.76	7.14	8.17	9.64	9.91	10.62	
2012	10.85	11.4	11.61	11.64	11.62	12.1	9.79	8.48	8.04	9.83	10.15	10.4	
MID LAND	BORE WELL: GWD												
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
2011	7.12	7.37	7.7	8.11	8.06	5.22	5.7	3.97	5.2	6.11	6.65	7.28	
2012	7.78	8.04	8.19	8.36	8.15	7.74	5.89	5.27	5.14	6.54	6.79	7.32	
LOW LAND	BORE WELL: GWD												
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
2011	4.85	5.09	4.63	5.63	5.56	2.81	3.51	1.94	3.15	4.21	4.18	4.88	
2012	5.1	5.41	5.69	6.01	6	6	4.19	2.87	2.39	4.27	4.63	4.86	
	SUMMER						MONSOON						
	SOURCE:GWD,MALAPPURAM												

The above table summarises the Ground water details of Wandoor B1.

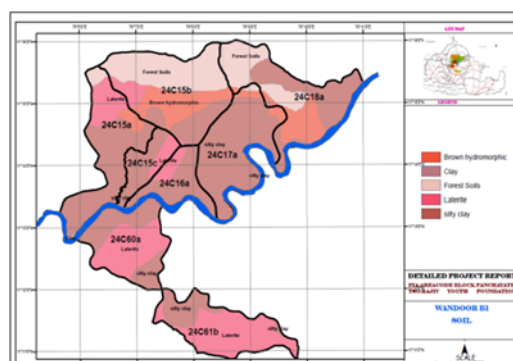
7. EXISTING AREA UNDER IRRIGATION

Source of irrigation	Area irrigated (Ha)
Well	158
Tank	25
Pond	196
Canal	399
Others	800
Total	1578

1578 hectares area is irrigated in Wandoor B1 cluster area.

8. SOILS

Wandoor B1 Watershed Project falls under KE-2 Southern Agro Climatic Zone. The soil is mainly Brown hydromorphic, Silty Clay, Laterite, sand and Forest Soils. The soil is laterite to very whites gray in surface colour. The major crops under cultivation in these areas are Rice, Tapioca, Coconut, Arecanut, Pepper, Banana, and



INTEGRATED WATERSHED MANAGEMENT PROGRAMME (IWMP) - WANDOOR B1

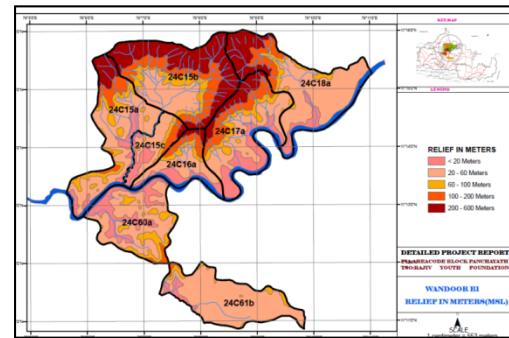
Cashew nut, Rubber, Jackfruit, Mango tree Ginger, Turmeric and Vegetables etc. The below tables is gives the total area and percentage of the cluster area.

Types of Soils	Area In Ha	Area At %
Brown hydromorphic	1188	28.27
Silty Clay	1169	27.81
Laterite	1592	37.88
Forest Soils	254	6.04
Total	4203	100

- Out of 4203 hectares 37.9% (1592 hectares) of land under laterite soil.

9. RELIEF

The highest point is located in Northern part of the Edavazhikund watershed which is 546 mtrs MSL. The below table summarises the Relief in meters, Area in hectares and at % of the area covered. The below 20 meters in cluster area is covers 663.17

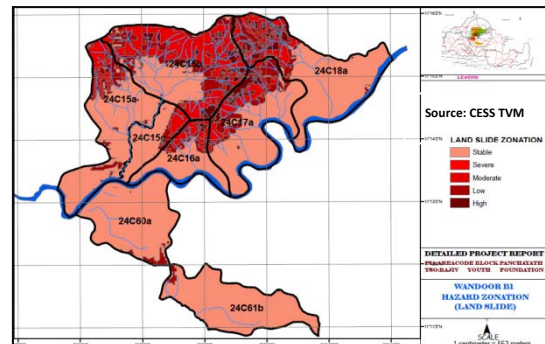


hectares which 15.78% of the total area. The 20-60 meters MSL area is vastly covered which is 45.68 % (1919 hectares) of the total area as well as 16.04% of the area is under 200-600 meters from MSL which is covered by 674.11 hectares.

Relief In Meters	Area In Ha	At %
< 20 Meters	663.17	15.78
20 - 60 Meters	1919.74	45.68
60 - 100 Meters	481.83	11.46
100 - 200 Meters	464.23	11.05
200 - 600 Meters	674.11	16.04
Total	4203	100

10. LAND SLIDE

The northern side of the Edavazhikund, north western side Muthirottithodu and northern side of the Pullipadam watersheds, these areas are coming under severe land slide zonation. The



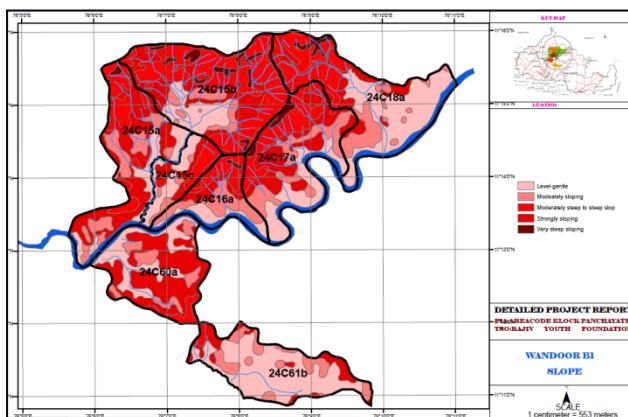
Land Slide Zonation	Area In Ha	At %
Low	492.51	11.72
Stable	2898.40	68.96
Moderate	646.60	15.38
High	149.36	3.55
Severe	16.21	0.39
Total	4203	100

total area of the severe land slide zonation is 16.21 hectares, which is 0.39% of the total

area as well as left other categories of landslide zonations mentioning in the table.

11. SLOPE

The below table summarises the slope in percentage, Area in hectares and area at %. The very very steep sloping covered in 58 hectares, slope of the area is above 50 % and which is coming in 4.8 % of the total area. The Moderately sloping areas coming under 5-10%, which are 1750 hectares of land and 40.8 % of the total area.



Slope	Area In Ha	Area At %	% of slope
Moderately sloping	1750	40.8	5-10
Strongly sloping	1125	27	10-15
Moderately steep to steep	1161	18.8	15-33
Very steep sloping	109	8.6	33-50
Very Very steep	58	4.8	>50
Total	4203	100	

12. AGRICULTURE LAND USE

Table.No.2.6: Agriculture land use of Cluster area

SL.NO	CROP Pattern	AREA in Hectares	PRODUCTION in Tonnes
1	COCONUT	2132	24148
2	AREACANUT	817	1690
3	BANANA	320	13500
4	PADDY	321	1872
5	VEGETABLES	110	325
6	PEPPER	41	17.75
7	CASHEW NUT	121	37400
8	TUBERS	128	4830
9	GINGER&TURMERIC	43.5	348
10	RUBBER	170	1984
	Total	4203	84130.75

Source: Department of Agriculture, Kerala

Figure No.2.4: Agriculture area of Wandoor B1

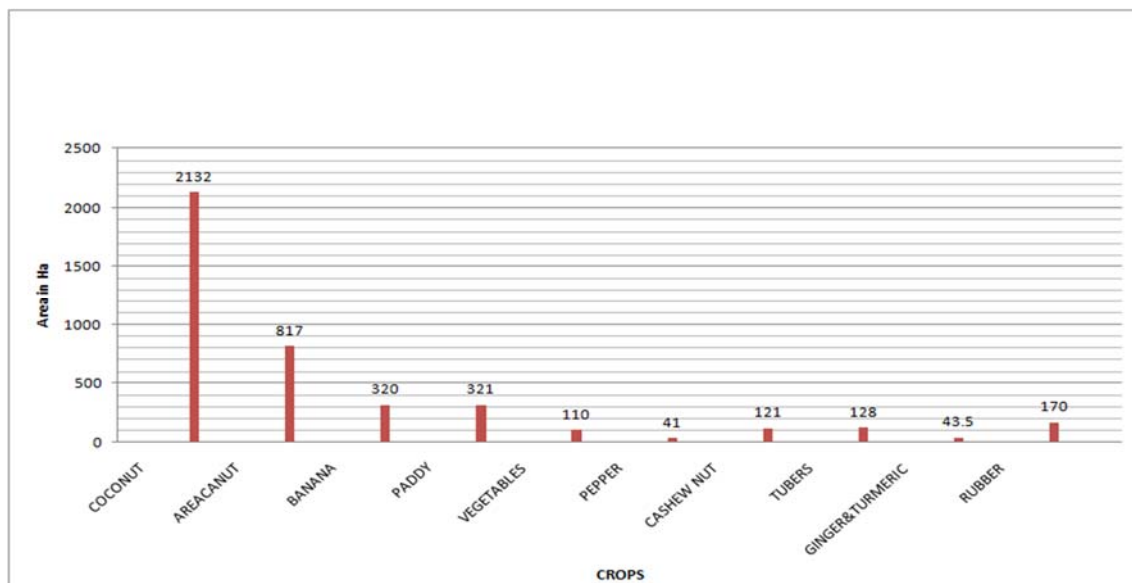
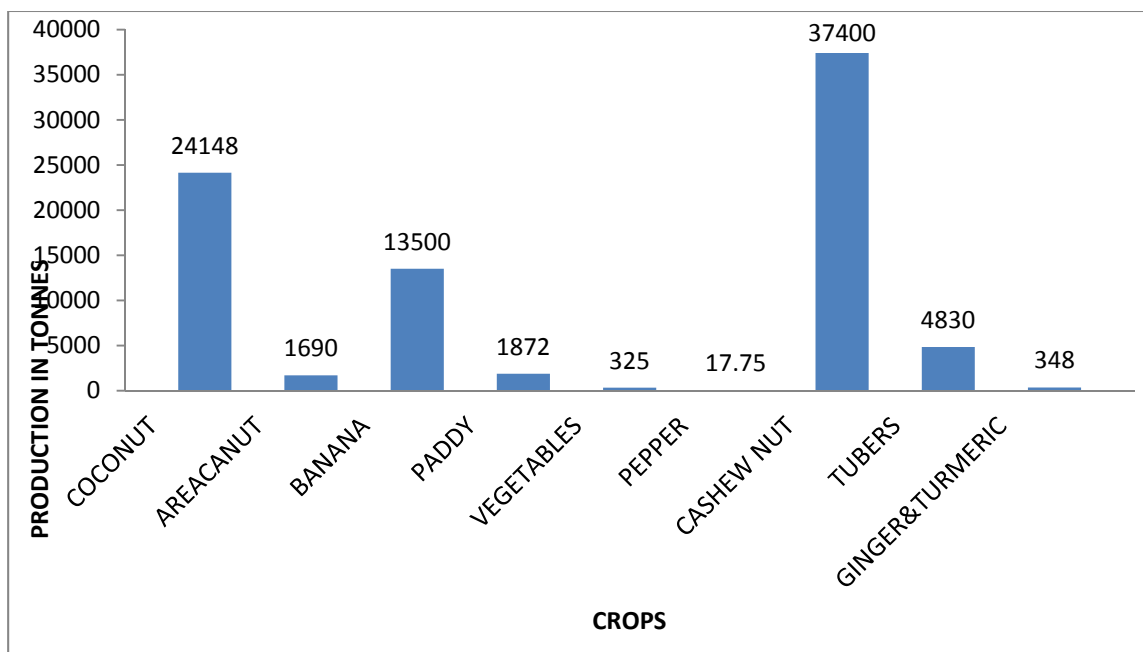


Figure No.2.5: Agriculture Crops Production



The above showing table and figure summarising the agriculture area, Crops and Production of the cluster area of Areacode and Wandoor Block Panchayats.

- Production and area of Coconut is very high in the cluster area.
- Cashew nut production is very high which above 37 thousand tonne.
- Pepper is lowest production in the cluster area.
- Banana Production is also very high in the cluster area.

13. EXISTING LAND USE OF THE CLUSTER AREA

Table.No.2.7: Type of Land use in Cluster area

LAND USE	Area in Ha	At %
COCONUT	2132	50.7
AREACANUT	817	19.4
BANANA	320	7.6
PADDY	321	7.6
VEGETABLES	110	2.6
PEPPER	41	1.0
CASHEW NUT	121	2.9
TUBERS	128	3.0
GINGER&TURMERIC	43.5	1.0
RUBBER	170	4.0
Total	4203	100.0

Source: Kerala State Land use Board and Google earth Pro

- 50 % of the area is under Coconut which is 2132 hectares.
- 19.4 % of the area is under Arecanut dominant which is 817 hectares.
- Only 321 hectares (7.6%) of land is under paddy cultivation.

14. DETAILS OF WASTE LAND

SL.NO	WATERSHED	EXTENT OF WASTE LAND	
		CULTIVABLE	UNCULTIVABLE
1	EDAVAZHIKUND	253	77
2	KANJIRAKUND	434	2
3	KELIYANTHODU	60	9
4	ELIYANKOTTUPARA	106	24
5	MUTHIRITTITHODU	342	44
6	PULLIPADAM	173	28
7	PANNIPARA	0	37
8	PANARKUND	21	7

15. DRINKING WATERSUPPLY AND IRRIGATION

Table. No.2.8: Source of Drinking water and Availability o in Months

Sl no	Watershed Area	Source of drinking water	Availability in months
1	EDAVAZHIKUND	Open Well, Bore well, Jalanidhi Drinking water supply scheme	9-10
2	KANJIRAKUND	Open Well, Bore well, and Drinking water supply scheme	9-10
3	KELIYANTHODU	Open Well, Bore well, and Drinking water supply scheme	9-10
4	ELIYANKOTTUPARA	Open Well, Bore well, and Drinking water supply scheme	9-10
5	MUTHIROTTITHODU	Open Well, Bore well, and Drinking water supply scheme	9-10
6	PULLIPADAM	Open Well, Bore well, and Drinking water supply scheme	9-10
7	PANNIPARA	Open Well, Bore well, and Drinking water supply scheme	9-10
8	PANARKUND	Open Well, Bore well, and Drinking water supply scheme	9-10

Chaliyar is one of the rivers which doesn't get dried up in the drought season. It is one source of drinking water in the cluster area. People residing in a number of nearby cluster also depend on this river for irrigation and drinking purposes. Though the river is water rich, the water level depletes during summer and there used to be severe shortage.

16. TRANSPORTS AND COMMUNICATION

The Wandoor B1 project areas major regional linkages area Edavanna to Areacode, Edavanna to Manjeri and Edavanna to Nilambur. The distances from Edavanna to Manjeri 12 Kms, Edavanna to Nilambur 13 kms, and Edavanna to Areacode 11km The distance from Edavanna to nearest Airport is 27 Km. The nearest railway station is Nilambur which is 13.3 Km. The state highway which is S.H 34 and 28 passing through this water shed.

17. SOCIO ECONOMIC CONDITIONS

Table .No 2.9: Population details

SL NO	Watershed	Population				SC			ST		
		Houses	Total	Male	Female	Total	Male	Female	Total	Male	Female
1	EDAVAZHIKUND	461	3229	1600	1629	28	12	16	64	30	34
2	KANJIRAKUND	497	2985	1497	1488	288	140	148	361	176	185
3	KELIYANTHODU	982	5894	2947	2968	122	56	66	nil	nil	nil
4	ELIYANKOTTUPARA	682	4110	2040	2070	208	100	108	nil	nil	nil
5	MUTHIROTTITHODU	435	2687	1343	1388	260	125	135	nil	nil	nil
6	PULLIPADAM	1096	6596	3298	3312	1182	580	602	nil	nil	nil
7	PANNIPARA	976	4603	2301	2400	484	230	254	nil	nil	nil
8	PANARKUND	736	4456	2200	2256	380	180	200	391	191	200

Wandoor B1 Cluster watershed project has a total of 5865 Households with a population of 34560 (*as per Base Line*). Out of 34560 populations 17226 are male and 17511 female. The sex ratio is 1021 female to 1000 male. There are 1126 BPL families. The average family size is 7. The total literacy rate is 95% male literacy rate is 96 percent and female literacy rate is 93 percentages. The major castes in the Cluster are Muslims, Nair, Thiyyas, Ezhavas, Scheduled Caste and Scheduled Tribe.

18. BPL, LAND LESS, SMALL AND MARGINAL FARMERS AND SC &ST POPULATION

Table .No 2.10: BPL, Land Less, Small and Marginal Farmers and Sc &St Population

SL NO	WATERSHEDS	BPL	LAND LESS	FARMERS		SC			ST		
				SMALL	MARGINAL	Total	Male	Female	Total	Male	Female
1	EDAVAZHIKUND	320	25	226	113	28	12	16	64	30	34
2	KANJIRAKUND	327	18	326	120	288	140	148	361	176	185
3	KELIYANTHODU	685	16	136	88	122	56	66	nil	nil	nil
4	ELIYANKOTTUPARA	120	21	228	126	208	100	108	nil	nil	nil
5	MUTHIROTTITHODU	286	16	256	76	260	125	135	nil	nil	nil

INTEGRATED WATERSHED MANAGEMENT PROGRAMME (IWMP) - WANDOOD B1

6	PULLIPADAM	263	21	324	59	1182	580	602	nil	nil	nil
7	PANNIPARA	218	11	296	86	484	230	254	nil	nil	nil
8	PANARKUND	219	12	213	98	380	180	200	391	191	200

19. INFRASTRUCTURE FACILITIES

Table.No.2.7: School Details in Cluster area

Name	Type	Govt	Private	Total
Schools	+2	4	3	7
	H.S	6	4	10
	UP	5	3	8
	LP	6	4	10

There are 7 plus two schools in this cluster area out of this 7 under govt and left 3 under Private as well as high school 10, 8 UP and 10L.P schools in this area.

19.1 MEDICAL

There are 5 govt Hospitals in this cluster area

19.2 CREDIT

- Canara Bank Edavanna
- Federal Bank Edavanna
- South Malabar Grameen Bank
- Edavanna Service Sahakarana Bank
- Pathappiriyam Bank
- Nilamboor co –operative Urban Bank
- State Bank of Travancore Mampad Grameen Bank
- Service Sahakarana Bank Mampad
- Vanitha Service Sahakarana Bank
- SMGB Areacode
- Canara Bank Vettelappara
- Manjeri Co –operative Bank

These are the credit facilities available in this cluster area.

19.3 MARKETING

- Edavanna
- Pathappiriyam
- Odaayi
- Munduthodu
- Pannipara
- Mampad

These are the major marketing centres of Wandoor B1 Cluster area.

20. ANIMAL HUSBANDRY AND DAIRYING

Table. No.2.8: Animal Population of the Grama Panchayats of Cluster area

Sl.No	Name of Village	Buffalo		Cow		Total Milk/yr	Goat		Poultry
		No.	Milk(lit/yr)	No.	Milk(lit/yr)		No.	Milk(lit/yr)	
1.	Edavanna	117(m&f)	20475	855(m&f)	820800	841275	1924	48100	13281
2.	Mampad	34	5950	1176	1128960	1134910	1603	40075	10190
3.	Areacode	86 (m&f)	15000	452(m&f)	388800	403800	668	20040	4509
4	Urngattiri	90	16890	345	32234	49124	1234	34543	3456

Source: Kerala Veterinary Department

The above table summarises the availability of animal population and their productivity. Milk production is more seen in Mampad Grama Panchayats. Buffalo population is more found in Mampad and Urangattiri Grama Panchayaths. Goat Population is very high in Edavanna Grama Panchayath. Poultry is more seen in Edavanna Grama Panchayath.

21. LAND HOLDING SIZE

Table No.2.9: Land holding size

Land holding size	Number of Families
0-5 Cents	2565
5-50	1500
50-250	950
250-500	500
Above 500	350

The distribution of ownership holding of land in cluster area is extremely unequal. Table above shows, the proportion of households in different size-classes of ownership holdings and the proportion of area owned by households in each size-class. The land holding size 0-5 cents, the total families are 2565. The above 2 hectares of landholders are 350 in this watershed area

CHAPTER-3

WATERSHED ACTIVITIES

1. INSTITUTION BUILDING AND PROJECT MANAGEMENT

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

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

1. Watershed Cell cum Data Centre (WCDC)
2. Project Implementation Agency (PIA)
3. Watershed Development Team (WDT)
4. Watershed Committee (WC)
5. Neighbourhood Groups
6. Self Help Groups (SHGs)
7. User Groups (UGs)

2. STATE LEVEL NODAL AGENCY

A committed State Level Nodal Agency (SLNA) is constituted by the State Government with Agricultural Production Commissioner as the Chairman and Rural Development Commissioner as the CEO.

3. WATERSHED CELL CUM DATA CENTER (WCDC)

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

Mobilisation/ Management & Accounts appointed on the basis of their qualification and expertise on contract/deputation/transfer etc.

4. PROJECT IMPLEMENTING AGENCIES

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

5. WATERSHED DEVELOPMENT TEAM

Watershed Development Team is an integral part of the PIA and is set up by the PIA as per the directions of SLNA. WDT has 4 members, broadly with knowledge and experience in agriculture, soil science, water management, social mobilization and institutional building. WDT functions in close collaboration with the team of experts at the district and state level. **6**

6. WATERSHED COMMITTEE

It is a committee that is constituted by Watershed Grama Sabha to implement the watershed project with technical support of WDT in the micro watershed area. The watershed committee has to be registered under the Society Registration Act/1860. The Watershed Grama Sabha of the Panchayath selects the chairman of the watershed committee with the secretary who will be an employee nominated by the Grama Panchayath, preferably the Village Extension Officer. The Watershed Committee (WC) will comprise of at least 9 members, half of the members shall be representatives of SHGs and User Groups, SC/ST community, women and landless persons in the village. One member of the WDT shall also be represented in the Watershed Committee (WC). Where the Grama Panchayath covers more than one village, they would constitute a separate subcommittee for each village to manage the watershed development project in the concerned village. Where a watershed project covers more than one Grama Panchayath, separate committees will be constituted for each Grama Panchayath.

The Watershed Committee was formed in all the 8 micro watersheds of IWMP-1 project area. The IWMP-1 is a cluster of 3 Grama Panchayats coming under Areacode and Wandoor Block Panchayats. Watershed Committee members are briefed about the project objectives and a workshop is also conducted in this regard at every Panchayath. The watershed committee has a pivotal role to play during and after the project implementation period. The Watershed Committee has a separate bank account to receive funds for watershed projects and will utilise the same for undertaking its activities.

7. NEIGHBOUR HOOD GROUPS

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

No	Name of Grama Panchayath	Water shed name	No. of wards in full	No. of wards in part	No. of households	No.NHGs
1.	Edavanna	Kanjirikundu Keliyanthodu Eliyanthottupara Muthirottithodu Pannipara	17	11	5200	60
2	Urangattiri	Edavazhikund	2	1	461	6
3	Edavanna &Thiruvalli	Panarkund*	3	2	736	23
4	Mampad	Pullipadam	2	3	1096	12

8. SELF HELP GROUPS

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

various homogenous communities of women based on their livelihood separately. Each group discussed their basic problems with their facilitators.

The major problems identified are:

- a) Lack of proper credit facilities due to low intervention of formal financial credit institution.
- b) Excessive exploitation of weaker section by money lenders
- c) Lack of attitude for saving among poor people due to complex and rigid conventional financial institution structures.
- d) Lack of small micro-loans without collaterals and high interest rates.
- e) Lack of knowledge on credit, thrift activity and banking. With a view point of these problems it was planned to organize these women into a group consisting of 5 to 20 in each groups. It was planned to have some capacity building training regarding SHG activities. It was also proposed to have some livelihood activities which will promote women empowerment. This included Bakery units, Garments making, Mushroom Production, and Vermi compost activities with forward and backward linkage. This will ultimately lead into better human development in the village.

9. USER GROUPS

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

10. WATERSHED DEVELOPMENT FUND (WDF)

One of the mandatory conditions for the selection of villages for watershed project is people's contributions towards the watershed development fund. The contribution of WDF shall be a minimum 10 % of cost of NRM works executed on private land only. However, in case of SC/ST, small and marginal farmers, the minimum contribution shall be 5 % of cost of NRM works executed on their land. This contribution would be acceptable either in cash at the time of execution of works or voluntary labour. A sum equivalent to the monetary value of the

voluntary labour would be transferred from the watershed project account to the WDF bank account that will distinct from the watershed committee (WC) bank account. User charges, sales proceeds and other contributions, disposal amounts of intermediate usufruct rights shall all so be deposited in the WDF bank account. Income earned from assets created under the project on common property resources shall also be credited to WDF.

11. WATERSHED ACTIVITIES

Watershed restoration on the other hand is aimed at restoring already impacted watersheds to their natural state through the monitoring of pollution and regulations to reduce further pollution. Watershed restoration programs also work often to repopulate the watershed with its native plant and animal species.

12. BASELINE SURVEY

To access the impact of any watershed development programme a detailed baseline survey has to be conducted. This acts a benchmark for any intervention during and post implementation of any development programme. A detailed baseline survey was undertaken which involved household census survey, Bio-physical survey and Village level data collection from all villages. Household census survey includes a detailed questionnaire which had been filled by visiting each and every household in the village. This gave in the details of the demographic profile of the village, the literacy percentage, SC/ST population, number of BPL household, cattle population and net consumption rate in the village, average milk production of the cattle and various schemes running and their benefits

13. PARTICIPATORY RURAL APPRAISALS

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

Following methodologies were adopted for find out the feasible community based activities. They are:

- 1) Participatory Rural Appraisal (PRA)

- 2) Household survey
- 3) Primary & Secondary Data collection
- 4) NHG formation
- 5) Group gathering and Meetings
- 6) Trainings/ Awareness creation
- 7) Field Visit

PRA Programmes were the significant and enthusiastic exercise to enhance the village level planning of IWMP. These exercises were conducted in all watersheds for the internal support to extend and carry out of the progressive characteristics of IWMP Programmes. Its initiation has been helped to internalize the features like people centered Project through the Participatory approach. It has also envisaged the present needs and future thrusts of society. Other noteworthy tips are the Watershed community has realized their strength and capacity to take up such projects without external supports. The following tools were applied in the process of DPR Preparation.

- Social and Resource Mapping
- Transact Walk
- Ranking and Prioritizing of Public works
- Socio Economic Dimension Ranking (Sample)
- Problem Tree Analysis
- Resource Inflow and Out Flow
- Pair wise and Matrix
- Livelihood Planning

Significance of the Participatory Rural Appraisal (PRA)

This information is the main source to finalize the intervention strategies. Apart from these peoples participation can be ensured to analyze the ground reality. First hand and secondary data collection will help us the strategy formulation.

Following steps were followed for the preparation of the plan:

- Delineation of watershed map from the topo sheet
- Collection of cadastral map from revenue department

- Formation of study team and training
- Watershed based PRA
- Identification of public works and field level measurement
- Secondary data collection from agriculture and other department
- Consolidation of the data collected from the field
- Preparation of the DPR and PRA reports
- Submission of the DPR to SLNA

14. USE OF GIS AND REMOTE SENSING FOR PLANNING

Use of various high science tools has been promoted at various stages of watershed development.

15. GIS

Geographical Information System (GIS) has been used for prioritization process. Various layer maps were created like Geo-morphological, Soil, Drainage, land use, Ground water Status, Drinking water situation and Slope percent. These were all given proper weight age according to the DoLR specification. This helped in prioritization of various watershed areas.

16. GPS

Global Positioning System (GPS) has been used for boundary identification and the major bench mark of the watersheds area. After using the GPS, it can connect to Google earth and we can derive data which is taken from the field.

17. REMOTE SENSING IMAGERIES AND TOPOSHEET

Remote sensing imageries are used for the identification of physical and anthropogenic changes in the watershed areas, the temporal changes can be identified with the help of Toposheet and imageries.

18. PLANNING

A action plan matrix was been formulated by taking into account various features like the slope percent, soil depth, soil texture, soil erosion in the area for wasteland, forest land and agricultural land. Global positioning System (GPS) was used to identify each and every water conservation structures available in the project area. This was used to create a map. Contour Map of vertical interval of 1 meter at a scale of 1:8000 was used for identifying various locations for soil and water conservation structures.

19. HYDROLOGICAL MODELLING

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

Details of Scientific Planning and Inputs in IWMP projects

List of scientific criteria/ inputs used	Whether scientific criteria was used
(A)Planning	
Cluster approach	Yes
Whether technical back-stopping for the project has been arranged? If yes, mention the name of the Institute.	Yes
Baseline survey	Yes
Hydro-geological survey	Yes
Contour mapping	Yes
Participatory Net Planning (PNP)	Yes
Remote sensing data-especially soil/ crop/run-off cover	
Ridge to Valley treatment	Yes
Online IT connectivity between Project and DRDA cell/ZP	Yes
Availability of GIS layers	
1. Cadastral map	Yes
2. Village boundaries	Yes
3. Drainage	Yes
4. Soil (Soil nutrient status)	Yes
5. Land use	Yes
6. Ground water status	Yes
7. Watershed boundaries	Yes
8. Activity	Yes
Crop simulation models [#]	
Integrated coupled analyzer/ near infrared visible spectroscopy/ medium spectroscopy for high speed soil nutrient analysis	
Normalized difference vegetation index (NDVI)#	
Weather Stations	yes
(B)Inputs	
1. Bio-pesticides	
2. Organic manures	Yes
3. Vermi compost	
4. Bio-fertilizer	
5. Water saving devices	Yes
6. Mechanized tools/ implements	
7. Bio-fencing	Yes
8. Nutrient budgeting	
9. Automatic water level recorders & sediment samplers	From GWD Mlpm
Any other (please specify)	

20. ACTIVITIES PROPOSED

20.1. ENTRY POINT ACTIVITIES

Entry point activity is the first step of IWMP which helps to find out needs of people. Watershed development can be successful only with people's participation. We can assure the participation of people by convincing them the importance of EPA and what all benefits they will get from this. The most specific thing is to build a good rapport with the people residing in the area with this they should believe in the activities. Nobody expect that watershed activities can find out a speedy solution for the problems because of this most of the people don't show interest in the implementation of watershed activities. People had lost their belief because of partial implementation of activities. So through EPA we have to change these view points and situation. Sometimes people can't fully understand some projects or what they mean by the activities in the project so to make awareness about EPA is important. We have found out the EPA work through NHG formation and watershed committee formation. EPA Work started means that the project is implemented here. EPA works is found out through the discussion with watershed committee members. And the EPA work is done on the basis of peoples need

21. WATERSHED DEVELOPMENT WORKS:

Watershed development works are to be done during second phase of watershed project. A multi-tier ridge to valley sequence approach should be approached towards implementation of watershed development projects.

22. NATURAL RESOURCES MANAGEMENT

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

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

This phase is the heart of the programme in which the DPR will be implemented.

Some of the important activities included in this phase are:

- a. Ridge Area Treatment : All activities required to restore the health of the catchment area by reducing the volume and velocity of surface runoff, including Regeneration of vegetative

cover in forest and common land, afforestation, Staggered trenching, contour and graded bunding, bench terracing etc.

b. Drainage line treatment with a combination of vegetative and engineering structures, such as earthen checks, brushwood checks, gully plugs, loose boulder checks, gabion structures, under dykes etc.

c. Development of water harvesting structures such as low-cost farm ponds, nalla bunds, check-dams, percolation tanks and ground water recharge through wells bore wells and other measures.

22.1 GULLY PLUG:

The gully plugging measures include vegetative plantings and brushwood check dams, boulder checks, earthen bunds or a combination of both and sand bag plugs etc. The principle is to capture runoff from a broad catchment area, thus transferring low rainfall into utilizable soil moisture, and to prevent soil erosion. Slowing of the flow of water helps in settling down organically rich soil.

Benefits:

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

22.2 CONTOUR TRENCHING:

It is a simple, and a low-cost method of checking the velocity of runoff in the ridge area of any watershed. A contour trench is a trench dug along a contour line.

Objectives:

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

Contour trenches serve to collect the rainwater that falls in the ridge area. This way the soil moisture profile in the area adjacent to the trench gets improved.

22.3. CONTOUR EARTHEN BUNDS

Contour bunding is a simple and low cost method of checking the velocity of runoff in the ridge area of any watershed. A contour bund is a bund constructed along a contour line. Making a bund along such a line increases the chances of containing runoff for a longer period of time within the bund.

Objectives:

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

Along with the water, eroded fertile topsoil also gets deposited in the bund. It is, therefore, important to combine contour bunding with appropriate vegetative measures.

22.4 RAINWATER HARVESTING FROM ROOFTOP CATCHMENTS

Rooftop Rain Water Harvesting is the technique through which rain water is captured from the roof catchments and stored in reservoirs. Harvested rain water can be stored in sub-surface ground water reservoir by adopting artificial recharge techniques to meet the household needs through storage in tanks.

22.5 WELL RECHARGE

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

22.6 BIOGAS PLANTS

Biogas has a wide variety of uses and can be used as a relatively low-cost fuel for the generation of energy and heating purposes, such as cooking. Biogas is a renewable fuel, so it qualifies for renewable energy subsidies in some parts of the world.

22.7. CHECK DAMS

The main advantage of check dam is that it cuts off the runoff velocity and reduces erosive activity and the water stored improves soil moisture of the adjoining areas allows percolation to recharge the aquifers.

22.8. PERCOLATION PONDS

Percolation pond, like an irrigation tank, is a structure to impound rainwater flowing through a watershed, and a waste weir to dispose of the surplus flow in excess of the storage capacity of lake created.

23. LIVELIHOOD SUPPORT SYSTEM

One of the key features of the watershed development includes focused priority on livelihood activities for landless/asset less persons. Nine percent of the total project cost has been assigned to support the livelihood activities for landless/asset less households. This

component aims to maximize the utilization of potential generated by watershed activities and creation of sustainable livelihoods and enhanced incomes for households within the watershed area. This will facilitate inclusiveness through enhanced livelihood opportunities for the poor through investment into assets, improvements in productivity and income, and access of the poor to common resources and benefits and augment the livelihood strategy at household level.

23.1 PLANNING AND IMPLEMENTATION

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

Planning

- i. An awareness drive was undertaken at Grama Panchayath level for communication & sensitization of the target beneficiaries
- ii. A “Livelihood Action Plan” (LAP) was prepared for availing the funds under the livelihood component.
- iii. The livelihood action plan was prepared by analyzing the socio-economic conditions and existing livelihood capitals of the watershed, during the situation analysis by means of PRA and focus group discussion, in order to facilitate collection of information to feed into the livelihood action planning process. Livelihood action plan contains schedule of activities, interventions, no. of SHGs to be assisted and expected outcome.
- iv. To promote convergence, the PIA has worked in close association with other Employment generating programmes such as MGNREGS, NRLM, Kudumbashree, VFPC, NHM, etc.

23.2 . MODE OF OPERATION

- I. The livelihood action plan will be implemented through Self Help Groups and/or their federation. However financial support to enterprising individuals was also be considered subject to a maximum of 10% of the funds under the livelihood component.
- ii. Livelihood activities will be carried out either through the existing SHGs having good performance or new SHGs formed with a group of 5-20 persons.
- iii. SHGs selected for implementing livelihood action plan will be homogeneous in terms of their existing livelihood capitals, common interest and need.
- iv. SHGs can undertake any permissible activity jointly as a group or the group may decide to support individual(s) for the activities under the umbrella of the main SHG. In case of

individual support under the SHGs, the individuals will be accountable to the main SHG for finances and performance.

v. The financial support to enterprising individuals who prepare and submit a viable livelihood proposal, will be considered by Watershed Cell cum Data Centre (WCDC) on the recommendation of the Watershed Committee (WC). The plan has to be approved by the WCDC before extending financial support. However, support to individuals should not exceed a maximum of 10 % of funds under the livelihood component.

23.3. FUNDING PATTERN

The funding pattern under the livelihood components will be as follows

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

23.4. CAPACITY BUILDING FOR BENEFICIARIES

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

23.5. MAJOR INTERVENTIONS

- Poultry
- Dairy
- Tailoring Unit
- Goat Rearing
- Mushroom cultivation
- Food processing Unit

24. PRODUCTION SYSTEM MANAGMENT ACTIVITIES

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

The objective is to

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

24.1 ELIGIBILITY FOR AVAILING THE PRODUCTION SYSTEM FUNDS:

- a. Individual land holders/owners can avail the benefits of production system on their private land. The small and marginal farming households, women headed farming households, SC & ST farmers will be given preference based on the wealth ranking exercise conducted during PRA. Those households whose land is in close proximity to the developed natural resources may be preferred to make full use of natural resource potential.
- b. Selection of beneficiaries will be done by PIA, in consultation with WC.
- c. Beneficiaries having common interest will be organized into User Groups to pool and manage their resources as well as manage aggregating their produce for effective disposal and marketing, besides maintaining their natural resource base. This may also provide a means for deciding resource use arrangements based on equity and sustainability.
- d. The funds were earmarked for cost intensive farming system based livelihood activities/interventions such as aquaculture, agriculture, horticulture, agro forestry, animal husbandry, agro-processing, value addition, etc.
- e. The beneficiary contribution of farmers will be 20 percent for general category and 10 percent for SC/ST.

24.2. CAPACITY BUILDING FOR BENEFICIARIES

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

24.3. MAJOR INTERVENTIONS SUGGESTED

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

- Vermi compost
- Spices cultivation
- Tuber crops
- Poly house

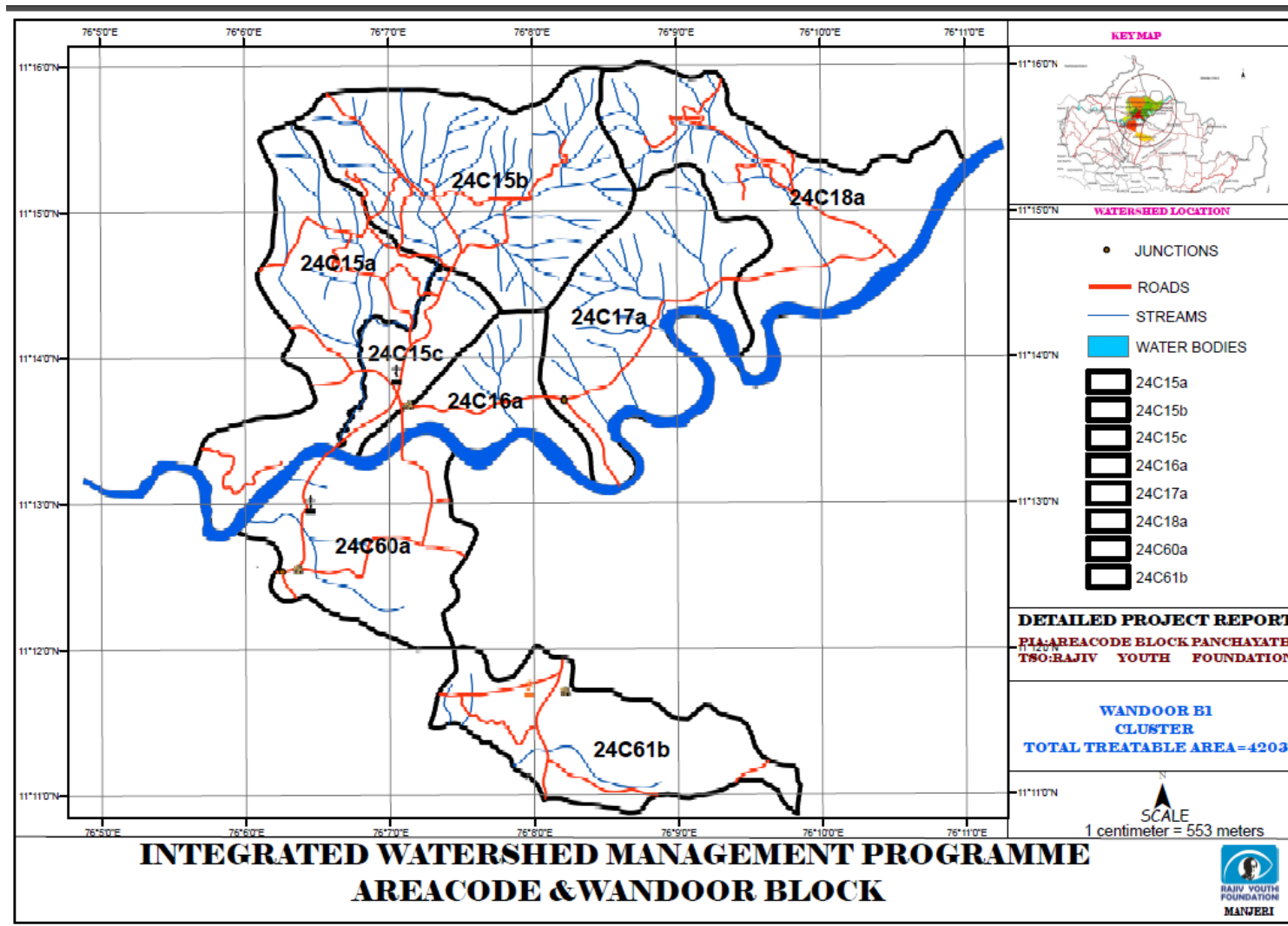
- Banana cultivation
- Vegetable garden
- Fodder crops
- Inter crops

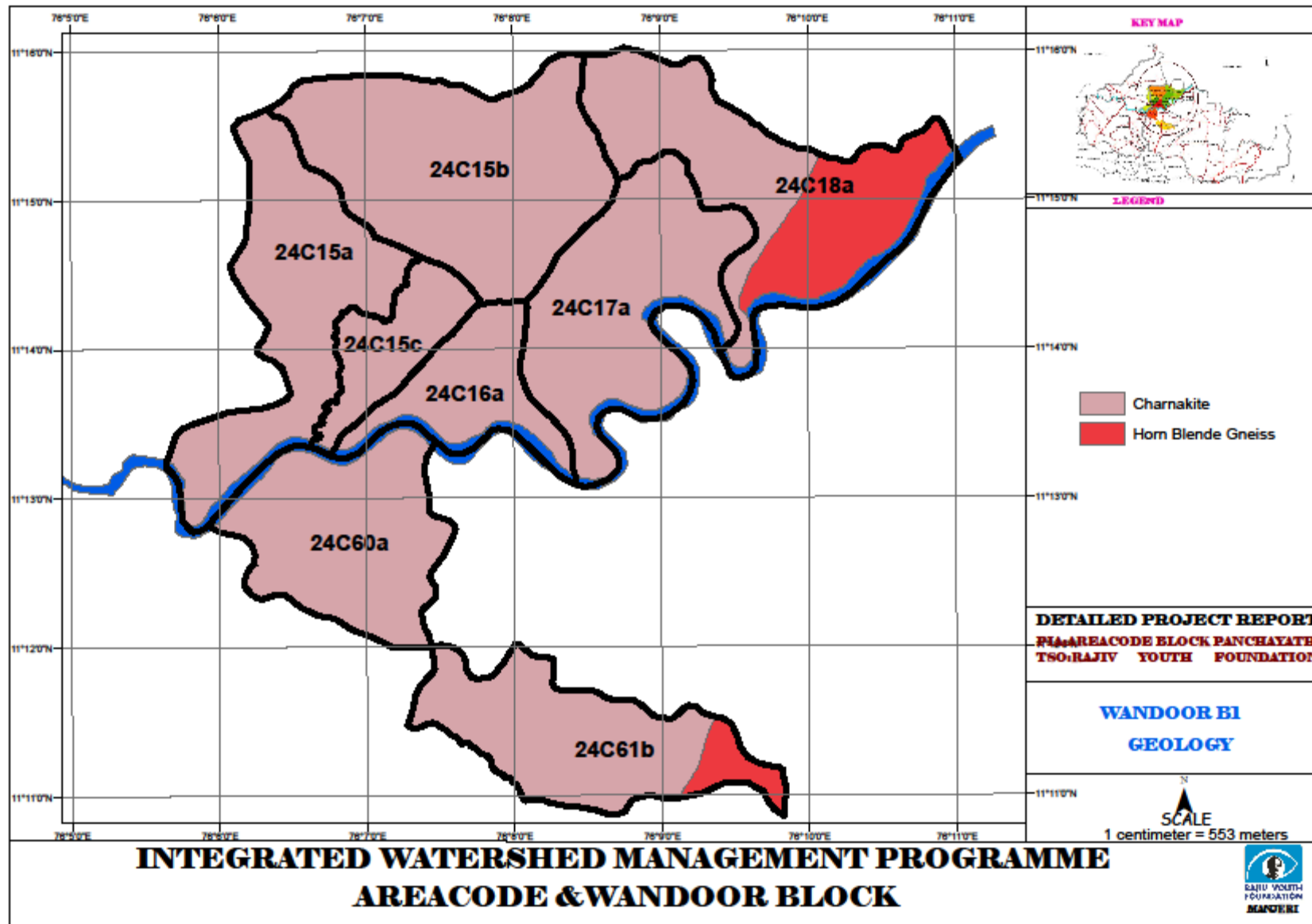
PART II

INDIVIDUAL

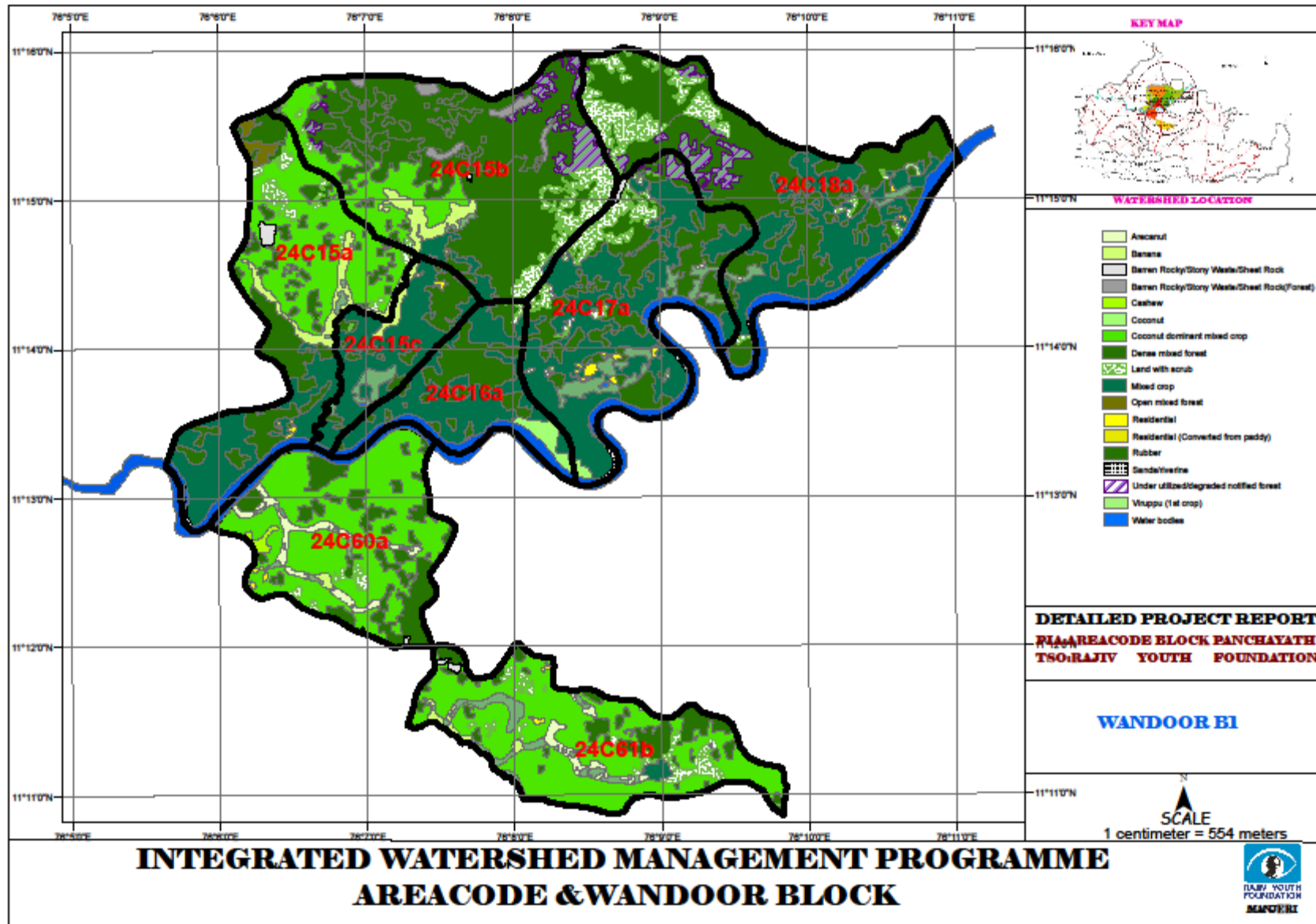
WATERSHEDS

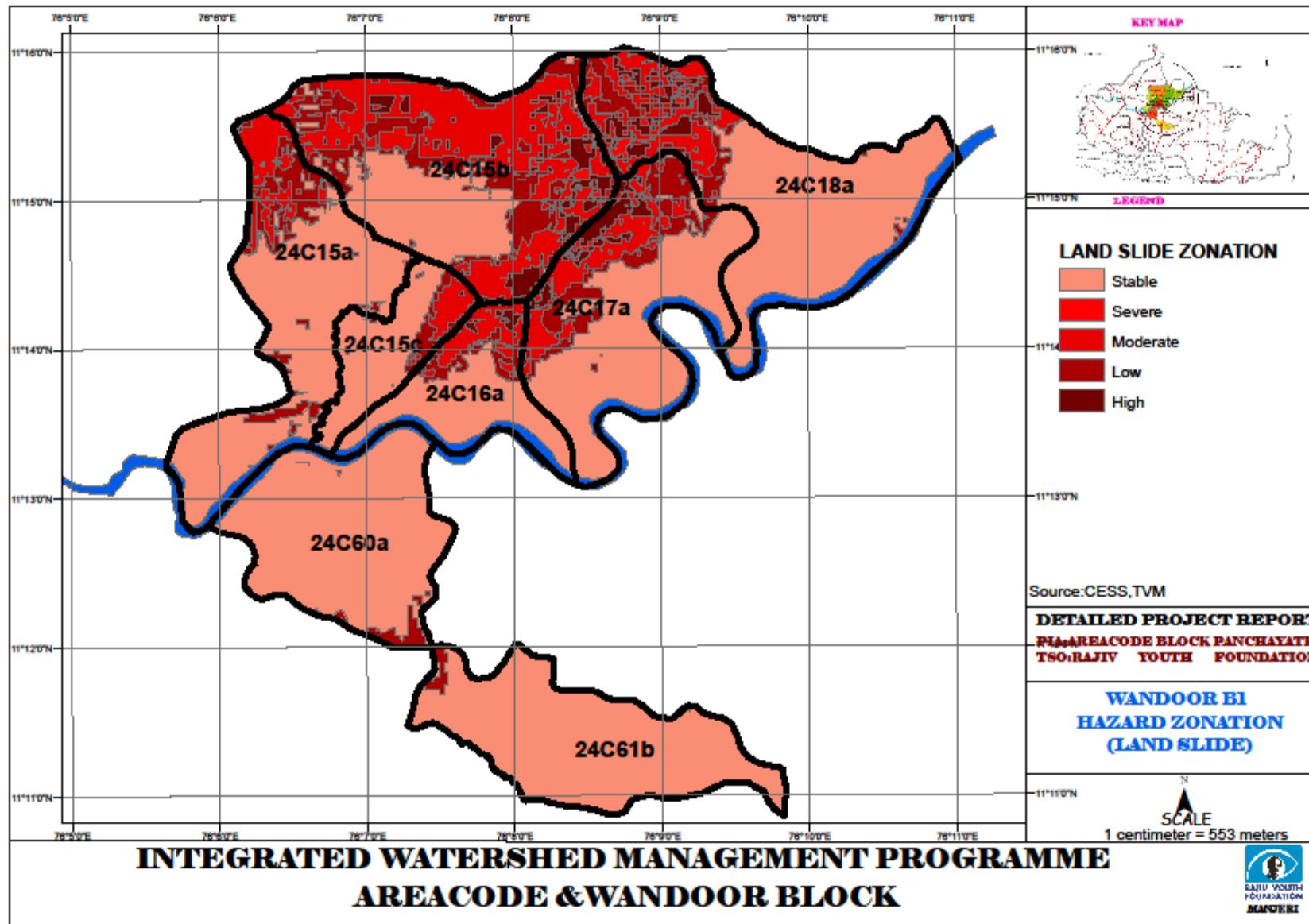
1. INDIVIDUAL WATERSHED BASED DETAILS

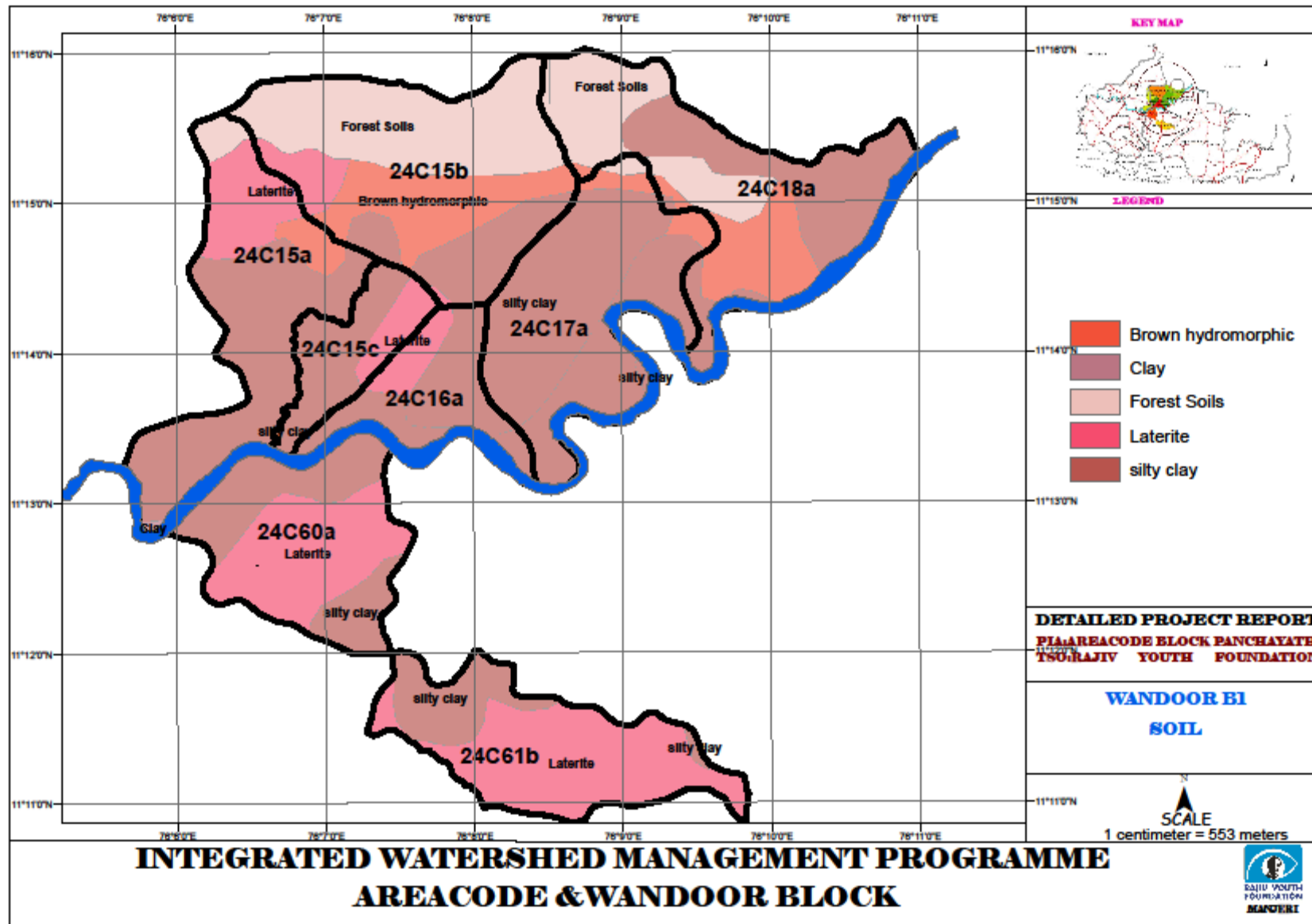




INTEGRATED WATERSHED MANAGEMENT PROGRAMME (IWMP) - WANDOOR B1







2. LONGITUDINAL AND LATTITUDINAL EXTENTIONS OF INDIVIDUAL WATERSHEDS

NAME OF WATERSHED	CODE	Grama Panchayath	Block	TOTAL AREA	TREATABLE AREA	LATITUDE	LONGITUDE
EDAVAZHIKUND	24C15a	Urangattiri	Areacode	618	618	11°13'0"N to 11°15'0"N	76°5'0"E to 76°8'0"E
KANJIRAKUND	24C15b	Edavanna		791	791	11°15'0"N to 11°16'0"N	76°7'0"E to 76°8'0"E
KELIYANATHOD	24C15c	Edavanna		196	196	11°13'0"N to 11°15'0" N	76°7'0"E to 76°8'0"E
ELIYANAKOTTUPARA	24C16a	Edavanna		304	271	11°13'0"N to 11°14'0"N	76°7'0"E to 76°8'20"E
MUTHIROTTITHOD	24C17a	Edavanna		660	625	11°13'0"N to 11°15'0"N	76°8'0"E to 76°10'0"E
PULLIPADAM	24C18a	Mampad		746	714	11°14'0"N to 11°16'0"N	76°9'0"E to 76°11'0"E
PANNIPARA	24C60a	Edavanna		482	482	11°12'0"N to 11°13'0"N	76°6'0"E to 76°8'0"E
PANARAKUND	24C61a	Edavanna, Mampad		544	506	11°11'0"N to 11°12'0"N	76°8'0"E to 76°9'0"E

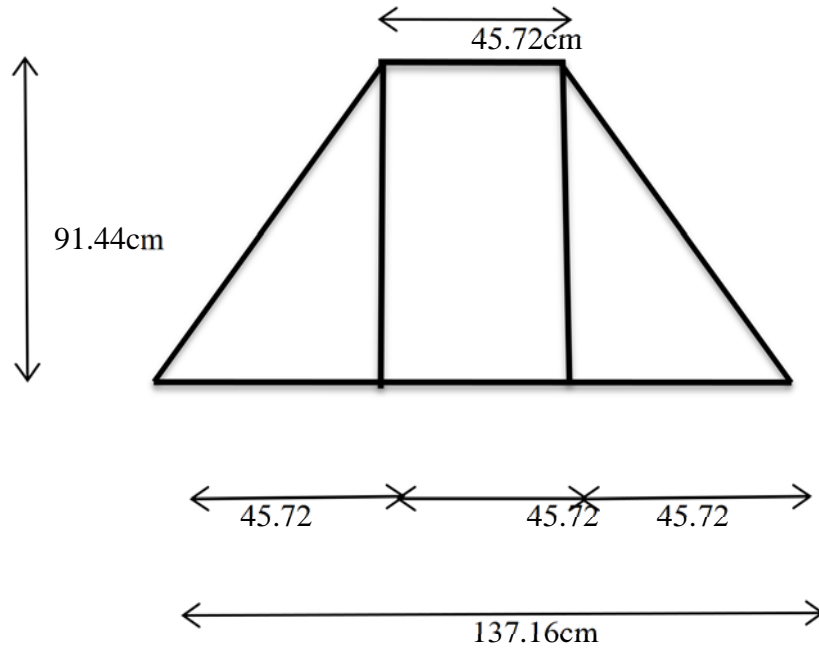
3. WATERSHED LEVEL DETAILS

NAME OF WATERSHED	CODE	Grama Panchayath	Block	TOTAL AREA	TREATABLE AREA	TOTAL AMOUNT
EDAVAZHIKUND	24C15a	Areacode	Areacode & Wandoor	618	618	9270000
KANJIRAKUND	24C15b	Edavanna		791	791	11865000
KELIYANTHODU	24C15c	Edavanna		196	196	2940000
ELIYANKOTTUPARA	24C16a	Edavanna		304	271	4065000
MUTHIRITTITHODU	24C17a	Edavanna		660	625	9375000
PULLIPADAM	24C18a	Mambad		746	714	10710000
PANNIPARA	24C60a	Mampad		482	482	7230000
PANARKUND	24C61b	Edavanna, Thiruvali		544	506	7590000
					4341	4203

PART III

**SKETCHES, ANNUAL ACTION PLAN, EXPECTED OUTCOME,
WITHDRAWAL, MIS AND CONCLUSION**

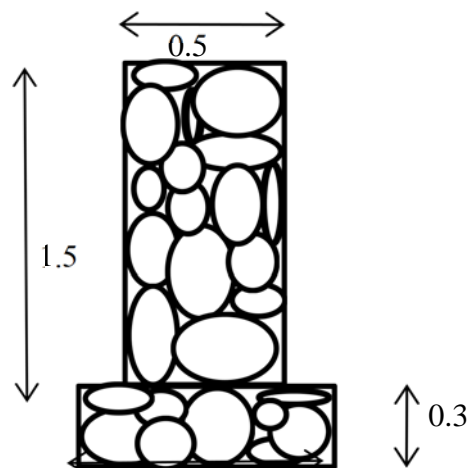
EARTHEN CONTOUR BUND



$$\left(\frac{1.3716 + 0.4572}{2} \right) * 0.9144 * 100 = 83.61 m^3/Rm$$

For 83.61m³/100Rm 16.4man is required =16.4*240 =3937/100Rm

SIDE PROTECTION USING STONES 1



Earthwork excavation in ordinary soil for sil removal

$$1 \quad x \quad 1 \quad x \quad 0.7 \quad x \quad 0.30 = 0.21m^3$$

Say Rs 818/10m³ @ .21m³

17.13

Dry rubble masonry for foundation and superstructure of retaining wall including all cost conveyance and all labour charges complete

$$\text{Foundation,} \quad 1 \quad x \quad 1 \quad x \quad 0.70 \quad x \quad 0.30 = 0.21m^3$$

$$\text{Basement} \quad 1 \quad x \quad 1 \quad x \quad 0.50 \quad x \quad 1.50 = \underline{0.75m^3}$$

$$0.96m^3$$

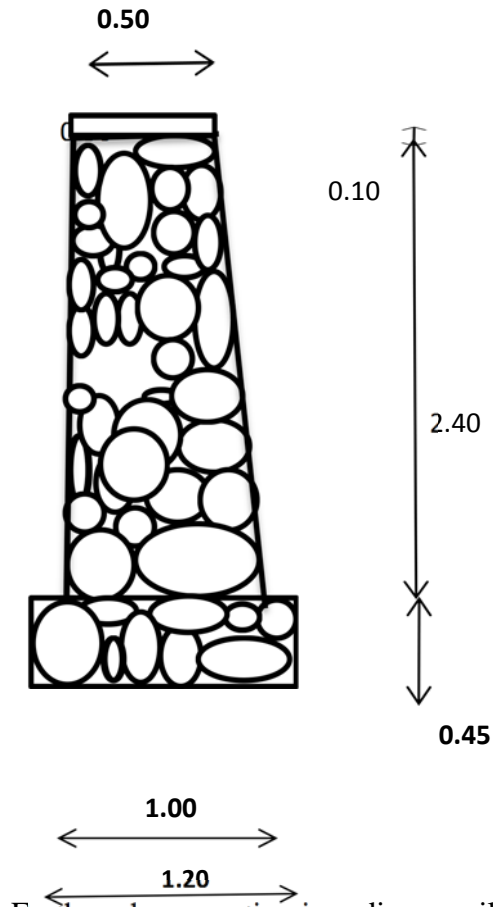
Say Rs.1208/m³ @ 0.96m³

1159.68

TOTAL

1177/m

SIDE PROTECTION USING STONES 2



Earthwork excavation in ordinary soil for silt removal

$$1 \times 1 \times 1.20 \times 0.45 = 0.54\text{m}^3$$

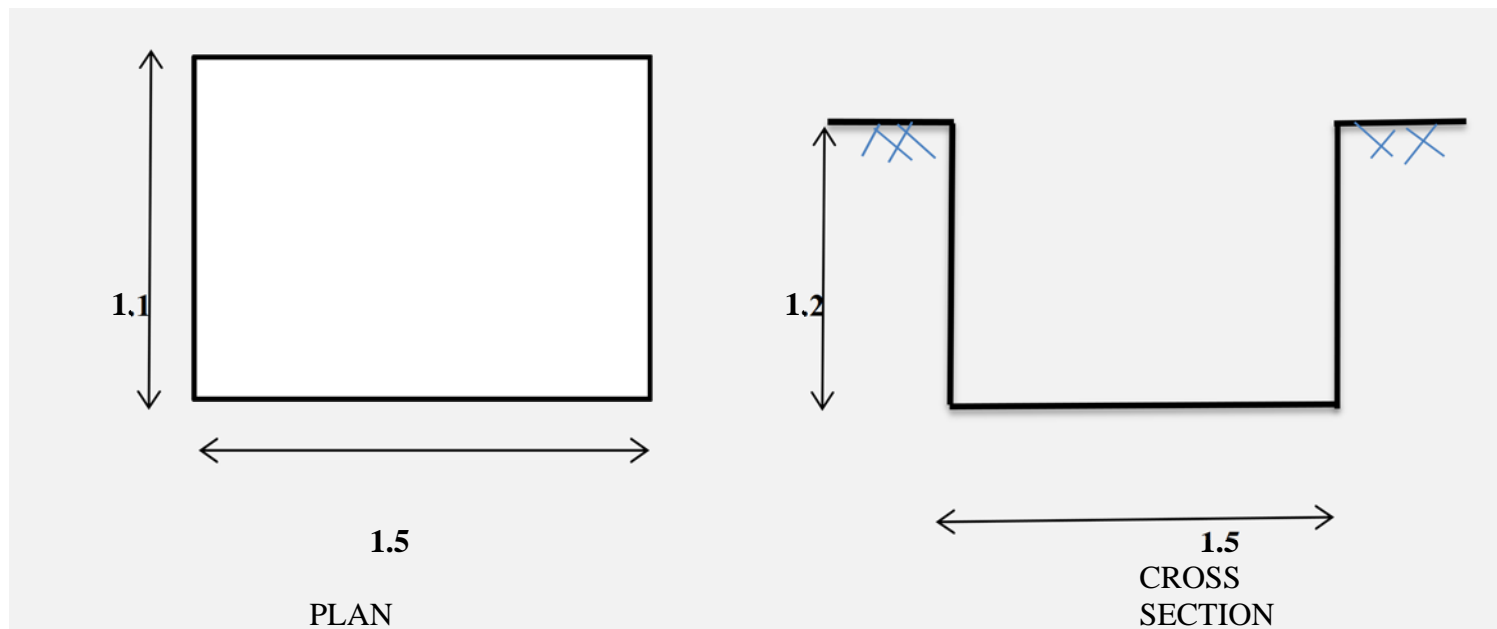
Say Rs 818/10m³ @ .54m³

44.17

Dry rubble masonry for foundation and superstructure of retaining wall including all cost conveyance and all labour charges complete

Foundation, $1 \times 1 \times 1.20 \times 0.45 = 0.54\text{m}^3$

Basement	1	x	1	x	$\frac{1 \times 0.50}{2}$	x	2.40	=	<u>1.80m³</u>
									2.34m ³
Say Rs.1208/m³ @ 2.34m³									2826.74
Cement concrete 1:3:6 using 20mm metal (for top belt)	1	x	1	x	0.50	x	0.10	=	0.05m ³
Say Rs.50/dm³ @ .05m³									250.00
TOTAL									3121/m
<u>SOAK PIT</u>									



Earthwork excavation in ordinary soil for silt removal

$$1.5 \times 1.1 \times 1.2 = 1.98\text{m}^3$$

Say Rs 818/10m³ @ 1.98m³

166

Providing and fixing 110mm PVC pipe 10kg/cm² for closet connection

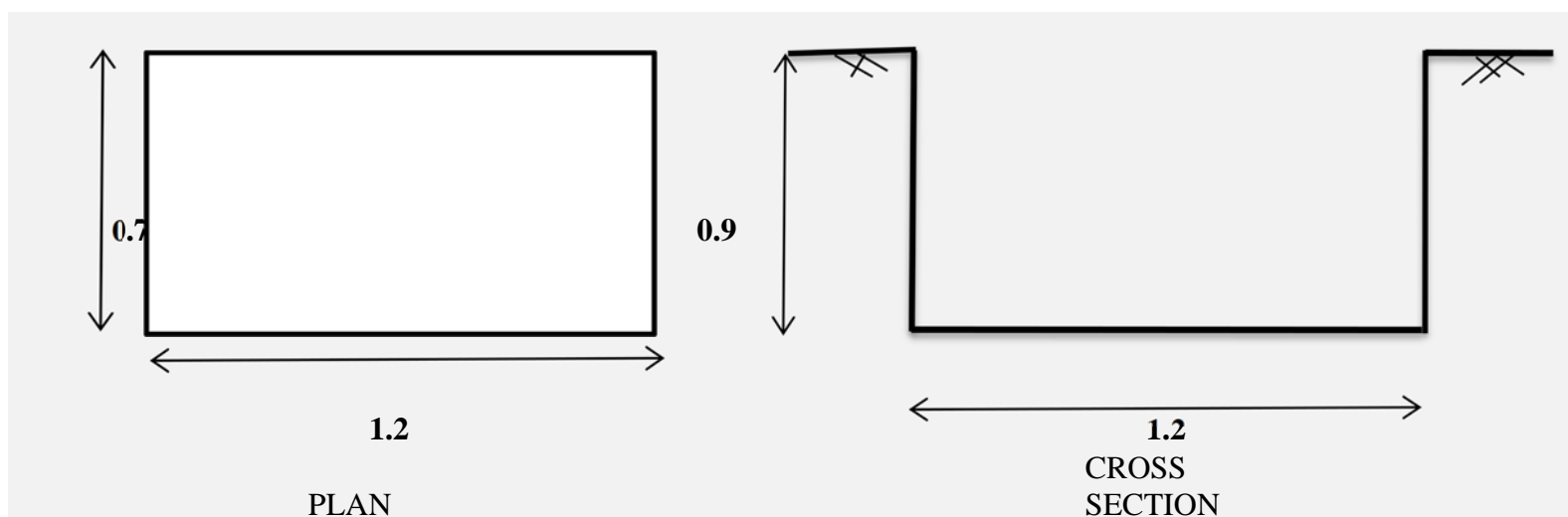
Say Rs 319/m @ 3m

957

TOTAL

1123

WATER ABSORPTION PIT



Earthwork excavation in ordinary soil for silt removal

$$1.2 \times 0.7 \times 0.9 = 0.756\text{m}^3$$

Say Rs 818/10m³ @ .756m³

61.425

INTEGRATED WATERSHED MANAGEMENT PROGRAMME (IWMP) – WANDOOR B 1

WASTERSHD WISE FUNDING PATTERN

NAME OF WATERSHED	CODE	TOTAL AREA	TREATABLE AREA	TOTAL AMOUNT	EPA AMOUNT	NRM	PSM	LSS	ADMINISTRATIVE COST	MONITORING	EVALUATION	INSTITUTION & CAPACITY BUILDING	DPR	CONSOLIDATION PHASE
EDAVAZHIKUNDU	24C15a	618	618	9270000	370800	5191200	927000	834300	927000	92700	92700	463500	92700	278100
KANJIRAKUNDU	24C15b	791	791	11865000	474600	6644400	1186500	1067850	1186500	118650	118650	593250	118650	355950
KELIYANTHODU	24C15c	196	196	2940000	117600	1646400	294000	264600	294000	29400	29400	147000	29400	88200
ELIYANKOTTUPARA	24C16a	304	271	4065000	162600	2276400	406500	365850	406500	40650	40650	203250	40650	121950
MUTHIROTTITHODU	24C17a	660	625	9375000	375000	5250000	937500	843750	937500	93750	93750	468750	93750	281250
PULLIPADAM	24C18a	746	714	10710000	428400	5997600	1071000	963900	1071000	107100	107100	535500	107100	321300
PANNIPARA	24C60a	482	482	7230000	289200	4048800	723000	650700	723000	72300	72300	361500	72300	216900
PANARKUNDU	24C61b	544	506	7590000	303600	4250400	759000	683100	759000	75900	75900	379500	75900	227700
TOTAL		4341	4203	63045000	2521800	35305200	6304500	5674050	6304500	630450	630450	3152250	630450	1891350

FOUR YEAR ANNUAL ACTION PLAN (In Rupees)

YEAR	Total treatable area - 4203		EVALUATION	ENTRY POINT ACTIVITY	INSTITUTION & CAPACITY BUILDING	DPR PREPERATION	(In Rupees)	Total amount - 4203 X 15000/ HA = 63045000			
	ADMINISTRATION	MONITORING						LIVELIHOOD ACTIVITIES	PRODUCTION SYSTEM 7 MICRO ENTERPRISES	CONSOLIDATION PHASE	TOTAL IWMP PROJECT
FIRST	1260900	126090	63045	2521800	1260900	630450	10087200	1702215	1260900	0	18913500
%	2.00	0.20	0.10	4.00	2.00	1.00	16.00	2.70	2.00		30.00
SECOND	1576125	157612.5	157612.5	0	1260900	0	9456750	1134810	1891350	0	15635160
%	2.50	0.25	0.25		2.00		15.00	1.80	3.00		24.80
THIRD	1576125	157612.5	157612.5	0	630450	0	9456750	1702215	1891350	0	15572115
%	2.50	0.25	0.25		1.00		15.00	2.70	3.00	0.00	24.70
FOURTH	1891350	189135	252180	0	0	0	6304500	1134810	1260900	1891350	12924225
%	3.00	0.30	0.40				10.00	1.80	2.00	3.00	20.50
TOTAL	6304500	630450	630450	2521800	3152250	630450	35305200	5674050	6304500	1891350	63045000
%	10.00	1.00	1.00	4.00	5.00	1.00	56.00	9.00	10.00	3.00	100.00

INTEGRATED WATERSHED MANAGEMENT PROGRAMME (IWMP) – WANDOOR B 1

EPA-FIRST YEAR (In Rupees)					
SL.NO	WATERSHED	TYPES OF WORK	SURVEY NO.	IWMP FUND	TOTAL
1	EDAVAZHIKKUND	THALAVAZHIKKODE POND CONSTRUCTION	92/2	192200	
		BIO GAS - GLPS,PAVANNA	493/1	40000	
			TOTAL	370800	370800
2	KANJIRAKUND	CONSTRUCTION OF OPEN WELL - KALLEMOOCHI	124	474600	474600
			TOTAL	474600	474600
3	KELIYAMTHOD	SIDE PROTECTION - PALLICHOLA	168/2	117600	117600
				117600	117600
4	ELIYANKOTTUPARA	SIDE PROTECTION - ATHANIKKAL CHOLA	291/4	62600	
		REPAIR OF VELLACHAL WELL	70/314	100000	
			TOTAL	162600	162600
5	MUTHIROTTITHODU	CONSTRUCTION OF OPEN WELL - KOLAPPAD MUTHIROTTITHOD		187500	Priority
		CONSTRUCTION OF OPEN WELL - MUNDENGARA CHITTIPPARA	86/2	187500	
			TOTAL	375000	375000
6	PULLIPPADAM	CONSTRUCTION OF OPEN WELL - ODAYIKKAL	66/3	428400	
			TOTAL	428400	428400
7	PANNIPPARA	CONSTRUCTION OF COMPOUND WALL - PANNIPPARA ANGANWADI	68/13	42700	
		CONSTRUCTION OF OPEN WELL - CHEVIDUKUZHANGANWADI	51/7/1	246500	
			TOTAL	289200	289200
8	PANARKUND	CONSTRUCTION OF OPEN WELL - NELLANI	162/1		
			TOTAL	303600	303600
EPA TOTAL				2521800	

ANNUAL ACTION PLAN - NRM WORKS (In Rupees)					
SL.NO	WATERSHED	YEAR WISE	IWMP FUND	WDF	TOTAL
1	EDAVAZHIKKUND	FIRST YEAR	1483200	164800	1648000
		SECOND YEAR	1390500	154500	1545000
		THIRD YEAR	1390500	154500	1545000
		FOURTH YEAR	927000	103000	1030000
		TOTAL	5191200	576800	5768000
2	KANJIRAMKUND	FIRST YEAR	1898400	210933.333	2109333.3
		SECOND YEAR	1779750	197750	1977500
		THIRD YEAR	1779750	197750	1977500
		FOURTH YEAR	1186500	131833.333	1318333.3
		TOTAL	6644400	738267	7382666.7
3	KELIYAMTHOD	FIRST YEAR	470400	52266.6667	522666.67
		SECOND YEAR	441000	49000	490000
		THIRD YEAR	441000	49000	490000
		FOURTH YEAR	294000	32666.6667	326666.67
		TOTAL	1646400	182933.333	1829333.3
4	ELIYANKOTTUPARA	FIRST YEAR	650400	72266.6667	722666.67
		SECOND YEAR	609750	67750	677500
		THIRD YEAR	609750	67750	677500
		FOURTH YEAR	406500	45166.6667	451666.67
		TOTAL	2276400	252933.333	2529333.3
5	MUTHIROTTITHODU	FIRST YEAR	1500000	166666.667	1666666.7
		SECOND YEAR	1406250	156250	1562500
		THIRD YEAR	1406250	156250	1562500
		FOURTH YEAR	937500	104166.667	1041666.7
		TOTAL	5250000	583333.333	5833333.3

INTEGRATED WATERSHED MANAGEMENT PROGRAMME (IWMP) – WANDOOD B 1

6	PULLIPPADAM	FIRST YEAR	1713600	190400	1904000
		SECOND YEAR	1606500	178500	1785000
		THIRD YEAR	1606500	178500	1785000
		FOURTH YEAR	1071000	119000	1190000
		TOTAL	5997600	666400	6664000
7	PANNIPPARA	FIRST YEAR	1156800	128533.333	1285333.3
		SECOND YEAR	1084500	120500	1205000
		THIRD YEAR	1084500	120500	1205000
		FOURTH YEAR	723000	80333.3333	803333.33
		TOTAL	4048800	449866.667	4498666.7
8	PANARKUND	FIRST YEAR	1214400	134933.333	1349333.3
		SECOND YEAR	1138500	126500	1265000
		THIRD YEAR	1138500	126500	1265000
		FOURTH YEAR	759000	84333.3333	843333.33
		TOTAL	4250400	472266.667	4722666.7

INTEGRATED WATERSHED MANAGEMENT PROGRAMME (IWMP) – WANDOOB B 1

ANNUAL ACTION PLAN- PSM WORKS (In Rupees)					
SL.NO	WATERSHED	YEAR WISE	IWMP FUND	WDF	TOTAL
1	EDAVAZHIKKUND	FIRST YEAR	185400	20600	206000
		SECOND YEAR	278100	30900	309000
		THIRD YEAR	278100	30900	309000
		FOURTH YEAR	185400	20600	206000
		TOTAL	927000	103000	1030000
2	KANJIRAMKUND	FIRST YEAR	237300	26366.6667	263666.67
		SECOND YEAR	355950	39550	395500
		THIRD YEAR	355950	39550	395500
		FOURTH YEAR	237300	26366.6667	263666.67
		TOTAL	1186500	131833	1318333.3
3	KELIYAMTHOD	FIRST YEAR	58800	6533.33333	65333.333
		SECOND YEAR	88200	9800	98000
		THIRD YEAR	88200	9800	98000
		FOURTH YEAR	58800	6533.33333	65333.333
		TOTAL	294000	32666.6667	326666.67
4	ELIYANKOTTUPARA	FIRST YEAR	81300	9033.33333	90333.333
		SECOND YEAR	121950	13550	135500
		THIRD YEAR	121950	13550	135500
		FOURTH YEAR	81300	9033.33333	90333.333
		TOTAL	406500	45166.6667	451666.67
5	MUTHIROTTITHODU	FIRST YEAR	187500	20833.3333	208333.33
		SECOND YEAR	281250	31250	312500
		THIRD YEAR	281250	31250	312500
		FOURTH YEAR	187500	20833.3333	208333.33
		TOTAL	937500	104166.667	1041666.7

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6	PULLIPPADAM	FIRST YEAR	214200	23800	238000
		SECOND YEAR	321300	35700	357000
		THIRD YEAR	321300	35700	357000
		FOURTH YEAR	214200	23800	238000
		TOTAL	1071000	119000	1190000
7	PANNIPPARA	FIRST YEAR	144600	16066.6667	160666.67
		SECOND YEAR	216900	24100	241000
		THIRD YEAR	216900	24100	241000
		FOURTH YEAR	144600	16066.6667	160666.67
		TOTAL	723000	80333.3333	803333.33
8	PANARKUND	FIRST YEAR	151800	16866.6667	168666.67
		SECOND YEAR	227700	25300	253000
		THIRD YEAR	227700	25300	253000
		FOURTH YEAR	151800	16866.6667	168666.67
		TOTAL	759000	84333.3333	843333.33

ANNUAL ACTION PLAN -LSS WORKS (In Rupees)

SL.NO	WATERSHED	YEAR WISE	IWMP FUND	WDF	TOTAL
1	EDAVAZHIKKUND	FIRST YEAR	250290	27810	278100
		SECOND YEAR	166860	18540	185400
		THIRD YEAR	250290	27810	278100
		FOURTH YEAR	166860	18540	185400
		TOTAL	834300	92700	927000
2	KANJIRAMKUND	FIRST YEAR	320355	35595	355950
		SECOND YEAR	213570	23730	237300
		THIRD YEAR	320355	35595	355950
		FOURTH YEAR	213570	23730	237300
		TOTAL	1067850	118650	1186500
3	KELIYAMTHOD	FIRST YEAR	79380	8820	88200
		SECOND YEAR	52920	5880	58800
		THIRD YEAR	79380	8820	88200
		FOURTH YEAR	52920	5880	58800
		TOTAL	264600	29400	294000
4	ELIYANKOTTUPARA	FIRST YEAR	109755	12195	121950
		SECOND YEAR	73170	8130	81300
		THIRD YEAR	109755	12195	121950
		FOURTH YEAR	73170	8130	81300
		TOTAL	365850	40650	406500

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5	MUTHIROTTHODU	FIRST YEAR	253125	28125	281250
		SECOND YEAR	168750	18750	187500
		THIRD YEAR	253125	28125	281250
		FOURTH YEAR	168750	18750	187500
		TOTAL	843750	93750	937500
6	PULLIPPADAM	FIRST YEAR	289170	32130	321300
		SECOND YEAR	192780	21420	214200
		THIRD YEAR	289170	32130	321300
		FOURTH YEAR	192780	21420	214200
		TOTAL	963900	107100	1071000
7	PANNIPPARA	FIRST YEAR	195210	21690	216900
		SECOND YEAR	130140	14460	144600
		THIRD YEAR	195210	21690	216900
		FOURTH YEAR	130140	14460	144600
		TOTAL	650700	72300	723000
8	PANARKUND	FIRST YEAR	204930	22770	227700
		SECOND YEAR	136620	15180	151800
		THIRD YEAR	204930	22770	227700
		FOURTH YEAR	136620	15180	151800
		TOTAL	683100	75900	759000

EXPECTED OUTCOME

Integrated Watershed management programme is a scientifically prepared, scientifically implemented and scientifically monitored programme using all modern gadgets and parameters. It is aimed at attaining a sustainable development of a project area in terms of natural resource management.

The proposed activities in 4203 Hectares of Wandoor B1 watershed are aimed at ensuring optimum natural resource management and restoration of the fragile eco system. The Outcomes of the project can be summarized as below:

- Renovation/ construction of ponds as part of entry point activity shall increase the ground water recharging and availability of water for domestic and agriculture activities.
- Activities under NRM such as Paddy field bunds, Centripetal terracing, mulching, earthen contour bunds, water absorption pits, stone pitched bunds, bio fencing etc shall reduce the run off velocity and reduce the soil erosion. Besides, the water recharging pits shall increase the ground water recharging and reduce the water scarcity in the project area.
- Activities under LSS are proposed such that each activity shall supplement the income of the beneficiaries; at the same time contribute to the natural system replenishment in the area. For Example. Dairy farming in the area shall be an opportunity to enhance the income of the stake holders and it shall help in increasing the nutrient content of the soil. Increasing the income of the beneficiaries shall reduce the burden on the environment for firewood/fodder grass. Similarly increase in household income shall help to practice healthier and eco friendly practices in life.
- Thrust for vegetable cultivation in households and school vegetable gardens shall be useful in increasing the vegetable production in the area thus ensuring the supply of organic and toxic residue free vegetables. This shall have a positive impact in the health status of the general population.
- Medicinal plants cultivation shall be an additional income to the farmers, at the same time it shall ensure the availability of the medicines needed for the preparation of various ayurvedic preparations. A number of medicinal plants at the verge of extinction can also be protected through this effort.

- A novel effort in dairy farming is proposed under this project termed as Ernad Fresh Milk. Under this scheme, each farmer shall be supplied with two cows, and state of the art cattle shed with automatic drinkers and climate control systems. Milk shall be collected from the producers directly, packed in bottles and shall be sold as fresh without adding any preservatives. This system shall ensure higher price for the farmers as well as quality milk for the consumers.
- Bio Gas plants proposed under the project serve two purposes. Proper disposal of waste as well as production of energy for household consumption. This opens an excellent opportunity for convergence as well –ie, with Total sanitation mission which shall bear a subsidy of 75% of the total cost.

The expected outcome of the project include the overall increase in the standard of living of the people in the watershed by mitigating the various constraints in the development of the natural resources which will increase the productivity of various activities. The end result will be increase in the employment and income of the farm households and as well as landless households.

EMPLOYMENT

Employment has always been a problem in the village. The principle occupations of the people are dry land agriculture, animal husbandry and casual labour work. However, rainfall being very limited and erratic, agriculture suffers, i.e. best they can take only a single crop, which keeps them partially engaged for about 4 months. Lack of fodder makes animal husbandry does not keep them engaged full time. Thus the people mainly depend upon casual labour either in the village itself or outside it.

MIGRATION

Low rainfall results in very little fodder availability in the locality. The relatively well off farmers bring fodder from nearest markets, collectively; but the resource poor cannot afford it. On account of agriculture and animal husbandry providing only part time employment for some part of the year, the people migrate for a better half of the year for wage labour. Employment opportunities in the local area as mentioned above will ensure lessening seasonal migration from the area.

GROUND WATER TABLE

Rain fall has been scanty but demand for ground water has been increasing all the time. The ground water table thus has depleted over the years. Presently it stands at 8-15 m. Proper harvesting structures and percolation tanks would go long way in increasing water table from 15m in the pre-project level to 5m in the post-project level period.

DRINKING WATER

The village has dug wells on which they depend for their drinking water. In fact the Government of Kerala provided so many drinking water schemes to the entire block & district. Even though after the post-project level, due to the renovated & new forming water harvesting structures, the wells also increasing its water table. So, the post project level, people of this watershed, expect has no shortage of drinking water even during summer months.

AGRICULTURE

Agriculture primarily depends upon water. The village surface water is scanty due to low rainfall. All this can change with the integrated land and water management during the watershed project.

LIVESTOCK

The village has quite a good of livestock population. The interventions like provision of good quality cows and goats, the establishment of a fodder bank and other such related activities would raise up the dairy development in the watershed. It is expected that the post-project level period would see a substantial increase in livestock population and yield from them.

MANAGEMENT

As the production of animal is increases according to high quality animals demand for good quality fodder, concentrate, water, housing and care is needed more .If this is not fulfilled, then animal husbandry can have a loss in terms of less meat production as well as economic losses. After Completion of all activities, each Watershed Development Project is expected to achieve the following results by the end of the project period. All the activities that are planned for the treatment and development of the drainage lines, arable and no arable

lands in the watershed area are completed with the active participation and contribution of the user groups and the community at large. The user groups have willingly taken over the operation and maintenance of the assets created and made suitable administrative and financial arrangements for their maintenance and further development. All the members of the Watershed Committee and staff such as Watershed Secretary and Volunteers have been give orientation and training to improve their knowledge and upgrade technical/management and community organizational skills to a level that is appropriate for the successful discharge of their responsibilities on withdrawal of the Watershed Development Team from the Project.

The village community would have been organized into several homogeneous self-help groups for savings and other income generation activities, which would have achieved sufficient commitment from their members and built up financial resources to be self-sustaining. The increase in cropping intensity and agricultural productivity reflecting in overall increase agriculture production. Increase in income of farmers and landless labourers in the project area and Increase in groundwater table due to enhanced recharge by watershed interventions.

Expected outcomes due to implementation of IWMP in the Areacode/Wandoor Block

Expected / Estimated Outcomes				
No.	Item	Unit of Measurement	Pre-Project Status	Expected Post Project Status
1	Depth to Water Table (Midland, Highland Av. Min Max)	Meter	3-5-8 7-10-11	Depth to WT to be reduced by 1m in Mid lands and 1-1.5 m in High lands
2	Ground water Recharge	MCM	1986	2268
3	Quality of Drinking water	Qualitative	Fluoride / Nitrates contamination, Saline & Brackish Water in some villages of the Project Area	Clean and Safe drinking water. (Through recharge of ground water through project interventions & through convergence)
4	Availability of Drinking Water-problem affected villages	8	Nil	Reduced concentration of dissolved salts, less incidence of turbulence better bacteriological quality etc.

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				are the major expected post project benefits
5	Increase in Irrigation Potential	Lakh Ha	1.2	1.4
6	Change in Cropping Pattern	Type	Paddy lands are left fallow and conversion paddy lands for other uses. Single cropped in a considerable part.	Paddy land conversion to be curtailed Single tier systems to be converted into multi tier cropping systems, Mon cropping systems to Mixed cropping systems and Single cropped areas to be converted to Multiple cropped areas. Food crop production will be improved.
7	Productivity of Rice	Kg/Ha	321	1575
	Area under Single Crop	Ha	189	191
	Area under Double Crop	Ha	84	85
	Area under Multiple Crop	Ha	870	875
	Area under tree plantation	Ha	2282	2900
	Area under Horticulture(Fruits)	Ha	100	120
	Area under Fuel & Fodder	Ha	150	186
	Milk Production	Lakh Tonnes	2.5	3
	SHGs	No.	101	120
	Livelihoods Activities	No.	32	39
	Per capita Income at current prices (2012-13)	Rs.	14520	15620

WITHDRAWAL PHASE

While preparing the detailed project report, the Gram Sabha/Gram Panchayath, under the technical guidance of WDT, shall evolve proper Exit Protocol for the watershed development project. The Exit Protocol shall specify a mechanism for maintenance of assets created, augmentation including levy and collection of user charges, utilization of the Watershed Development Fund etc. Mechanism for equitable distribution and sustainability of benefits accrued under the watershed development project should also be clearly spelt out in the Exit Protocol. While approving the Action Plan for the watershed, the ZP/DRDA shall ensure that the detailed mechanism for such Exit Protocol forms part of the Action Plan/Treatment Plan.

The last two years are the Consolidation and Withdrawal Phase of the Watershed development programme. This is the crucial phase of the project as the local institutions will be trained to manage the project independently after withdrawal of the Government Institutions from the project area.

The main purpose of this phase is to create innovative nature based, sustainable livelihoods and raise productivity levels of the augmented resources and local economic development plans developed during the watershed works phase.

The activities those will be under taken during this phase are:

1. Completion of various works under taken during work phase.
2. Consensus among the villagers to take up any new works out of any unspent amount.
3. Preparation of Project completion report with details about status of each asset.
4. Documentation of successful experiences as well as lessons learnt for future use.
5. Evolving mechanisms to improve the sustainability of various interventions made in the project area.
6. Formulation of mechanisms for allocation of user right over common property resources.
7. Formulation of mechanisms to collect user charges for common property resources.
8. Creation of awareness and building capacity of the community to repair, maintain and protection of common property resources.
9. Training the user groups for optimum utilization of the developed natural resources.
10. Up scaling of successful experiences related to farm production system and off farm livelihood activities undertaken through revolving fund under the project as well as credit and technical support from external institutions.

11. Evolving marketing arrangements of the farm produce as well as the off-farm and other micro enterprises.
 12. Formation of Farmers' Federation for credit, input procurement, sale of local produce etc.
 13. Forward and backward linkage of the SHGs and User groups for sustainable livelihoods.
 14. Formulating mechanisms for empowering Watershed Committee and its smooth management in a long run.
 15. Formulating mechanism for utilising the Watershed Development Fund
- The subsequent activities are planned to be carried out during this stage.

1. Documentation: It is proposed to document the activities carried out during the watershed implementation period. It will help to maintain the records and identify and propagate the successful activities carried out under the project.
2. Up-Scaling of successful experiments: It is proposed to identify the best practices carried out during the project period and up-scaling the same as per feasibility and propagate the same among others members of the watershed area.
3. Evaluation: Evaluation is a very important activity to assess the success of implementation of the project. It is proposed to carry out evaluation at the following levels.
 - a. Social Audit: It is proposed to conduct the social audit of the programme at the watershed level where the Gram Sabha will evaluate the programme where the beneficiaries should explain their benefits and current status of the activity. The watershed committee should place the books of accounts of watershed programmes for approval.
 - b. Evaluation by external agency : An external agency with experience in implementation and monitoring and evaluation of watershed projects should be assigned for the evaluation of the watershed programme The proper and regular monitoring and evaluation of the project can trim down the improper implementation of activities so that the quality can be controlled at the right time. The chapter extends with the appropriate post-project techniques for project sustainability and research and documentation for maintaining the records, locate the loop falls in implementing and follow up the project with a new and suitable adaptation for the area development.

PLANS FOR MONITORING

To control the activities at the stage of implementing, proper plans was formed for monitoring and Evaluation. Project monitoring is one of the important components in watershed development programmes. The broad objectives of a watershed project demand good

monitoring framework. A monitoring framework is suggested within the capacity of watershed development teams and watershed committees. No great deal of training, human resources or instruments are expected to be employed. The monitoring should actually assist the project team to provide a guideline for improvement in the activities and output the project. Selection of an appropriate measure for the given area and ensuring the quality of project measures are to be given great attention at the time of monitoring.

THREE TIERS OF MONITORING:

The following three tiers of monitoring are planned: First Tier (Monitoring of activities): This will be carried out by PIA along with WDT and WC to monitor the implementation of all activities as per the action plan. The monitoring also aims at ensuring that the quality of work is as per the guidelines prescribed for each activity.

SECOND TIER (MONITORING OF OUTPUTS):

To check the outputs of the activities, PIA along with WDT monitors as per the logical frame work. The indicators are selected considering the broad objectives of the project. One can adopt or modify these as per requirement at the time of implementation. The output level indicators needs to be devised by the project team based on the outcome level indicators on. Outputs need to be monitored frequently, may be once in a quarter/ six months.

THIRD TIER (MONITORING OF OUTCOMES):

Project Implementation Agency along with the WC will monitor the overall outcomes of the objectives as per the logical frame. The outcomes level monitoring will start in the second year and continue on an annual basis. Most of the information can be available from the sets of output level indicators. Participatory methods will be used at the time of monitoring the activities. The methods of collecting sample data for the monitoring activities will be clearly

documented in the monitoring report. The detail of the monitoring system is presented in the table as under.

VIGILANCE AND MONITORING COMMITTEES

1. For every work sanctioned under the Scheme, there should be a local vigilance and monitoring committee, composed of members of the locality or village where the work is undertaken, to monitor the progress and quality of work while it is in progress. The Gram Sabha will elect the members of this committee and ensure that SC/STs and women are represented on it.
2. The Implementing Agency should apprise this committee of estimates regarding the work, time frame and quality parameters. The final report of the committee should be attached

along with the Completion Certificate of the work, and should also be placed at the next meeting of the Gram Sabha in the Panchayats where work has been executed.

3. Local beneficiary committees may also be constituted for effective articulation of their entitlements and their access to them. The PIA members will be responsible for ensuring that local monitoring committees/beneficiary committees are constituted.

RESEARCH SUPPORT IN WATERSHED MANAGEMENT:

Watershed management requires the support of research. Watershed projects will be used as on-farm sites for research designed and implemented with significant involvement of farmers and extension workers to produce site-specific technological solutions. This leads to problems in adoption and up-scaling of research findings within specific watersheds. There is also the question of up-scaling technologies and approaches beyond a designated watershed. At the same time, researchers will be able to relate research activities to the real problems facing farmers or to capture the locally developed or modified technologies. Yet there is a need to give technologies appropriate technical and scientific definition and to disseminate them widely.

FARMER ORGANIZATION AND EMPOWERMENT:

The management of natural resources requires strong and effective farmer organizations. Such organizations empower farmers and create a good foundation for the transfer, adoption and use of information on new technologies. They also help in negotiating for inputs at favourable prices. Strong farmers' organizations can be a conduct for services that meet felt needs. These needs include information to improve production and marketing, credit, and demand driven approaches that ensure ownership and sustainability of interventions. Farmers' organization allows the use of participatory approaches that recognize local capacity and indigenous knowledge. It incorporates the aspirations and perceptions that influence decision-making, while giving farmers an important role in planning and implementation of watershed management activities.

Such participation is important for the success, continuity and sustainability of the resource management programmes. Often a successful watershed knits together many aspects of the people's lives apart from purely technical issues. Many conservation and basic group production initiatives have widened into a social movement dealing with matters such as weddings, funerals, care for the elderly and the disadvantaged, and other issues in the community. The initial natural resources focus also widens into a set of integrated activities such as the improvement of houses, provision of water and electricity, acquisition of improved tools, seeds and livestock, all in the name of watershed management.

Empowerment of farmers therefore allows farmers to demand services and to ensure the continued role of the state in supporting watershed development.

USE OF TRADITIONAL INSTITUTIONS AND INDIGENOUS KNOWLEDGE:

Experience has shown that to effectively reach the farmers and to create viable watershed management options, it is important to respect indigenous knowledge and combine it with the formal modern science and technology. Local traditional institutions should be part and parcel of the process. For instance, there is a lot of under-used indigenous knowledge about climate, soils, biodiversity and other production conditions that confront farmers. A lot of research findings are abstract to extension providers and farmers alike. Such findings need to be married with indigenous knowledge and disseminated in a language that farmers and members of traditional institutions can understand.

WITHDRAWAL MECHANISM:

1. At the end of the project, The Watershed Committee is to take the responsibility for post project management .For which the Memorandum of Agreement is to be formulated between the PIA and Watershed Committee basing on the following terms and conditions.
2. The list of assets created under EPA, NRM, Farm production system and Livelihood support system is to be prepared with joint signature of the Chairman, Secretary of the Watershed committee and PIA. The Watershed Committee will retain one copy of the list for future reference.
3. The amount lying unspent as on closing date will be transferred to the Watershed Development Fund.
4. Watershed Committee will be authorised to use only one Bank account i.e WDF account.
5. Yearly auditing of the accounts by the Chartered Accountant will be mandatory and to be adhered strictly.
6. The office bearer of the Watershed Committee shall involve all the community irrespective of caste, creed and religion.
7. The Gram Sabha shall have the right to decide the user charges to be collected from the beneficiaries which shall be deposited under the watershed development fund.
8. The cost of repair and maintenance of the assets created out of NRM component shall be borne out of Watershed development fund by using maximum 50% of the amount collected in a year.
9. The WDF account will primarily run as revolving fund.
10. No individual beneficiary should be granted any sort of grant or financial assistance in any form.

11. The SHGs and UGs shall have the eligibility to take loan from the WDF with marginal interest as decided by Gram Sabha.
12. The Watershed Committee is also at their liberty to start new profit making ventures by utilising WDF as security deposit and the profit earned should go to the WDF.
13. The remuneration for the Watershed secretary will be finalised in the Gram Sabha.
14. The Watershed Committee may collect financial assistance from any other sources to augment the WDF. All donations, interests, fines and fees shall be deposited in the WDF.
15. The WDF shall be jointly operated by the Chairman and Secretary of the watershed committee.
16. All the expenditure shall be authenticated by the Watershed committee.
17. Annual meeting of the Gram Sabha is mandatory. However it may meet at any time if required.
18. The Watershed Committee should meet in every quarter to review the income and expenditure.
19. Any change in the Watershed Committee or its office bearer shall be made once it is resolved in the Gram Sabha. The Gram Sabha should believe in rotational leadership.
20. All the group representatives, at least one from each group shall be ensured in the Watershed Committee.
21. The decision approved and resolved in the Gram Sabha will only be implemented by the Watershed Committee.
22. In case of any embezzlement of fund, the Administrative system shall proceed according to Rules and Laws.
23. In the event of Gram Sabha and watershed Committee become defunct, the assets created under the project and WDF will be transferred to the Panchayats.

PROJECT SUMMARY

The present IWMP-1 scheme is covered the area of Wandoor and Areacode, Areacode and Wandoor Blocks of District Malappuram, Kerala. It is sanctioned in year 2010-11. The Cluster area is situated between 11° 11' 0" N and 11° 16' 0" North latitude and between 76° 5' 0" and 76° 11' 10" in the east longitude. The project consists of 8 micro watersheds namely, Edavazhikund/24c15a, Kanjirikundu/24c15b, Keliyanthodu /24c15c, Eliyankottupara /24c16a, Muthirottithodu/24c17a, Muthirottithodu/24c17a, Pullipadam/24c18a, Pannipara/24c60a, Panarkund/24c61a with total geographical area of 4203ha, out of which 4341ha is treatable with total outlay of Rs. 63045000 under Integrated Watershed Management Programme. The Project Implementing Agency (PIA) is Areacode Block Panchayath, Malappuram, and Kerala. The selected micro-watershed falls in agro-climatic zone of KE-1 Northern Zone. The micro-watersheds of IWMP-1 have average elevation varying between 5 to 423 m above mean sea level. General topography of the watershed is moderate to gentle sloping terrain. Spatial distribution of different slope categories is prepared using Arc GIS software. Slope was divided into 3 classes' viz. 10-15, 15-35, and above 35, the dominant slope inclination category in the micro-watershed is 10-15 per cent (42.25%) followed by 15-35 per cent (28.50%) and more than 35 (29.5%). The watershed is dominated by cow and goat variety of livestock's. In the present scheme to achieve the sustainable development, all kinds of activities related to natural resource management, production systems and livelihood options for asset less people have been discussed in detail. The total cost of the project is Rs. 63045000. The deficit amount will be made through convergence of different development schemes sponsored by Central and State Govt. All the activities of natural resource conservation are marked on the map of proposed plan map of the watershed.

Major crops of the watershed are Coconut, Arecanut, and Cashew nut, Rubber, Paddy, Banana, Vegetables, Ginger and Medicinal Plants. The dominant trees such as Jackfruit, Mango, Nutmeg and Teak etc., Participatory Rural Appraisal (PRA) exercise was conducted to understand the problems and prospect in the area.

Integrated Watershed management implies rational utilization of natural resources for optimal and sustained production with minimum hazard to environment. It requires collection and analysis of information from multiple services to ensure sustainable economic and social progress of a watershed. A multi-tier ridge to valley sequence approach should be approached towards implementation of watershed development projects. Main objective of this is to

slowing down the velocity of runoff, checking soil erosion, improving local soil moisture profile and to make soil fertile by different types of treatments.

The project also plans for creation of both wage employment and self employment opportunities. Wage employment would be created by engaging people in watershed physical works like construction of bunds, ponds, plantation, etc. Self employment would be created by providing the people with cash support in the form of direct livelihood activities like agriculture, animal husbandry and enterprise development.

- **Natural Resource Management works:**

Activities such as Centripetal bunds, Paddy field bunds, Centripetal terracing, mulching, earthen contour bunds, water absorption pits, stone pitched bunds, live fencing etc. are proposed in this project under Natural Resource Management works.

- **Production System Management:**

Activities which can add to the restoration of nature resources as well as having good market for the products are proposed in production system management. Most of them are having local demands, while some of them like school vegetable garden result in creation of public assets. The activities include bee keeping, mushroom farming, fodder grass cultivation, Azolla cultivation, banana cultivation, spices cultivation, agro nursery etc.

- **Livelihood support System:**

Livelihood support forms an integral part of Watershed management since it wins the confidence of the stakeholders in the area and ensures a healthy management of the local environment. The activities are selected on the basis that it shall add to the environmental enhancement of the project area as well as supplement the income of the people in the project area.

Project implementation mainly depends upon the watershed committees and other community organizations. Watershed committee and various User Groups have been formulated for post operation and maintenance of assets created during project period. Major emphasis will be on equity and sustainable benefit of the project even after implementation stage. A proper link-up will be built during project period with various institutes and capacity building organization. They will act as a key player during post implementation for scaling up the successful experience during project.

CONCLUSION

Integrated Watershed management implies rational utilization of natural resources for optimal and sustained production with minimum hazard to environment. It requires collection and analysis of information from multiple services to ensure sustainable economic and social progress of a watershed.

Watershed Management is the holistic approach for the conservation of the natural resources ensuring the participation of the local community and applying the scientific resource management practices utilizing state of the art geo spatial technologies. This approach has been widely employed for the eco-restoration projects all over the nation. This project is scientifically prepared on the basis of all datas derived from the project area through GIS mapping as well as those collected from the baseline survey conducted in the project area.

In short implementation of IWMP in Areacode and Wandoor Blocks shall help in eco-rejuvenation of the area and sustainable development with optimum resource management. It shall increase the ground water recharge and increase the water availability. It shall increase the soil cover and reduce soil erosion. It shall increase the soil fertility and increase the agriculture production from the area. Availability of fresh vegetables shall improve the health status of the local residents as well as reduce the dependence on neighbouring states for the purpose. Availability of preservative free fresh milk shall be a boon to quality conscious consumers at the same time it shall fetch good returns to the farmers as well. Biogas plants shall ensure proper disposal of waste as well as supply energy for the household consumption. Bee Keeping and Mushroom cultivation are two new livelihood options proposed in the report. Thus implementation of intensive watershed development shall bring about positive changes in all spheres of life and thus pave way for the sustainable development in the command area.