CATCHMENT AREA TREATMENT PLAN

2.1   NEED FOR CATCHMENT AREA TREATMENT

It is a well-established fact that reservoirs formed by dams on rivers are subjected to sedimentation. The process of sedimentation embodies the sequential processes of erosion, entrainment, transportation, deposition and compaction of sediment. The study of erosion and sediment yield from catchments is of utmost importance as the deposition of sediment in reservoir reduces its capacity, and thus affecting the water availability for the designated use. The eroded sediment from catchment when deposited on streambeds and banks causes braiding of river reach. The removal of top fertile soil from catchment adversely affects the agricultural production. Thus, a well-designed Catchment Area Treatment (CAT) Plan is essential to ameliorate the above-mentioned adverse process of soil erosion.

Soil erosion may be defined as the detachment and transportation of soil. Water is the major agent responsible for this erosion. In many locations, winds, glaciers, etc. also cause soil erosion. In a hilly catchment area, as in the present case, erosion due to water is a common phenomenon and the same has been studied as a part of the CAT Plan. Soil erosion leads to:

- Loss in production potential
- Reduction in infiltration rates
- Reduction in water-holding capacity
- Loss of nutrients
- Increase in tillage operation costs
- Reduction in water supply

The CAT plan highlights the management techniques to control erosion in the catchment area of a water resource project. The life span of a reservoir is greatly reduced due to erosion in the catchment area. Adequate preventive measures are thus needed for the treatment of catchment for its stabilization against future erosion.

The total catchment area at proposed Mawphu HEP site is 320 sq km. The sub-watersheds in the catchment area considered for the present study are given in **Figure-2.1**

The catchment area treatment involves

- Understanding of the erosion characteristics of the terrain
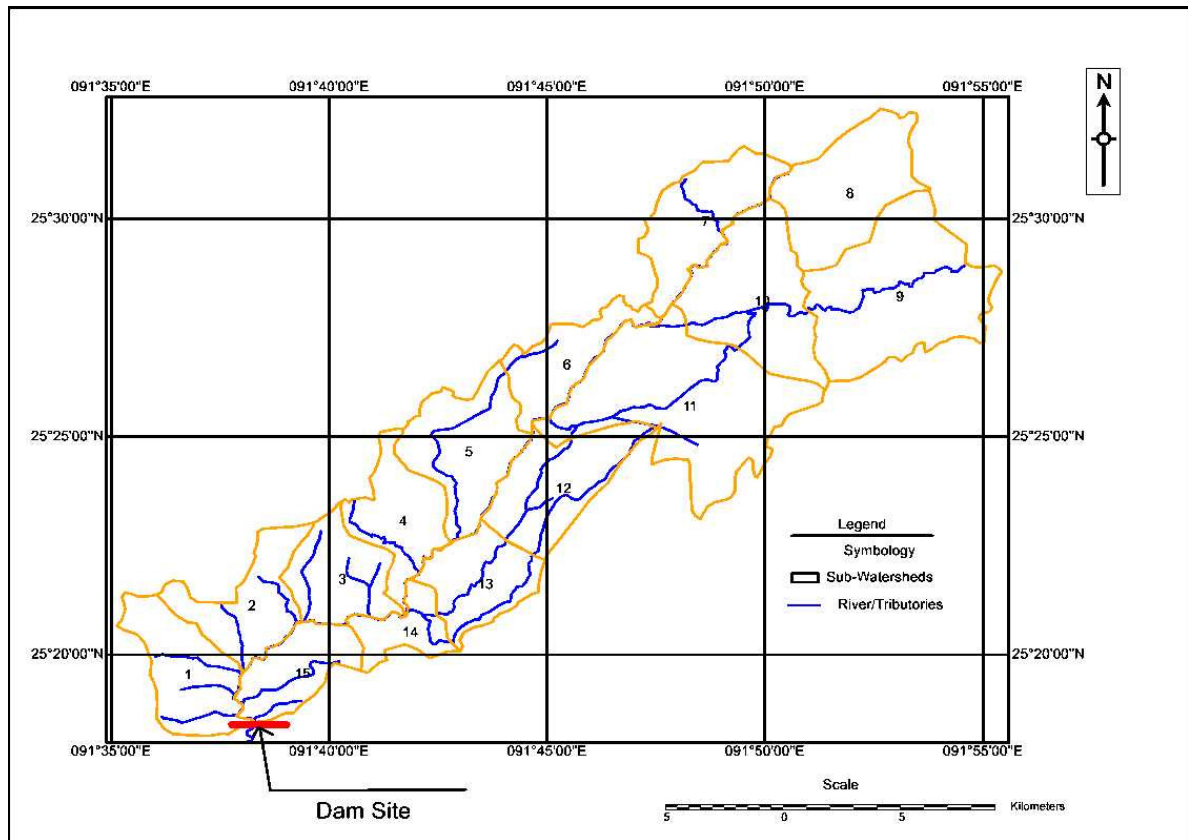- Suggesting remedial measures to reduce the erosion rate.

Figure-2.1: Sub-watersheds for catchment area for Mawphu stage-II HEP

In the present study `**Silt Yield Index' (SYI)**, method has been used. In this method, the terrain is subdivided into various watersheds and the erodibility is determined on relative basis. SYI provides a comparative erodibility criteria of catchment (low, moderate, high, etc.) and do not provide the absolute silt yield. SYI method is widely used mainly because of the fact that it is easy to use and has lesser data requirement. Moreover, it can be applied to larger areas like sub-watersheds, etc.

2.2   APPROACH FOR THE STUDY

A detailed database on natural resources, terrain conditions, soil type of the catchment area, socio-economic status, etc. is a pre-requisite to prepare treatment plan keeping in view the concept of sustainable development. Various thematic maps have been used in preparation of the CAT plan. Geographic Information System (**GIS**) is a computerized resource data base system, which is referenced to some geographic coordinate system. In the present study, real coordinate system has been used. The GIS is a tool to store, analyze and display various spatial data. In addition, GIS, because of its special hardware and software characteristics, has a capacity to perform numerous functions and operations on the various spatial data layers residing in the database. GIS provides the capability to analyze large amounts of data in relation to a set of established criteria. In order to

ensure that latest and accurate data is used for the analysis, satellite data has been used for deriving land use data. Ground truth studies, too, have been conducted.

The various steps, covered in the study, are as follows:

- Definition of the problem
- Data acquisition and preparation
- Output presentation

The above mentioned steps are briefly described in the following paragraphs.

2.2.1 Definition of the Problem

The requirements of the study were defined and the expected outputs were finalized. The various data layers of the catchment area to be used for the study are as follows:

- Slope Map
- Soil Map
- Land use Classification Map
- Current Management Practices
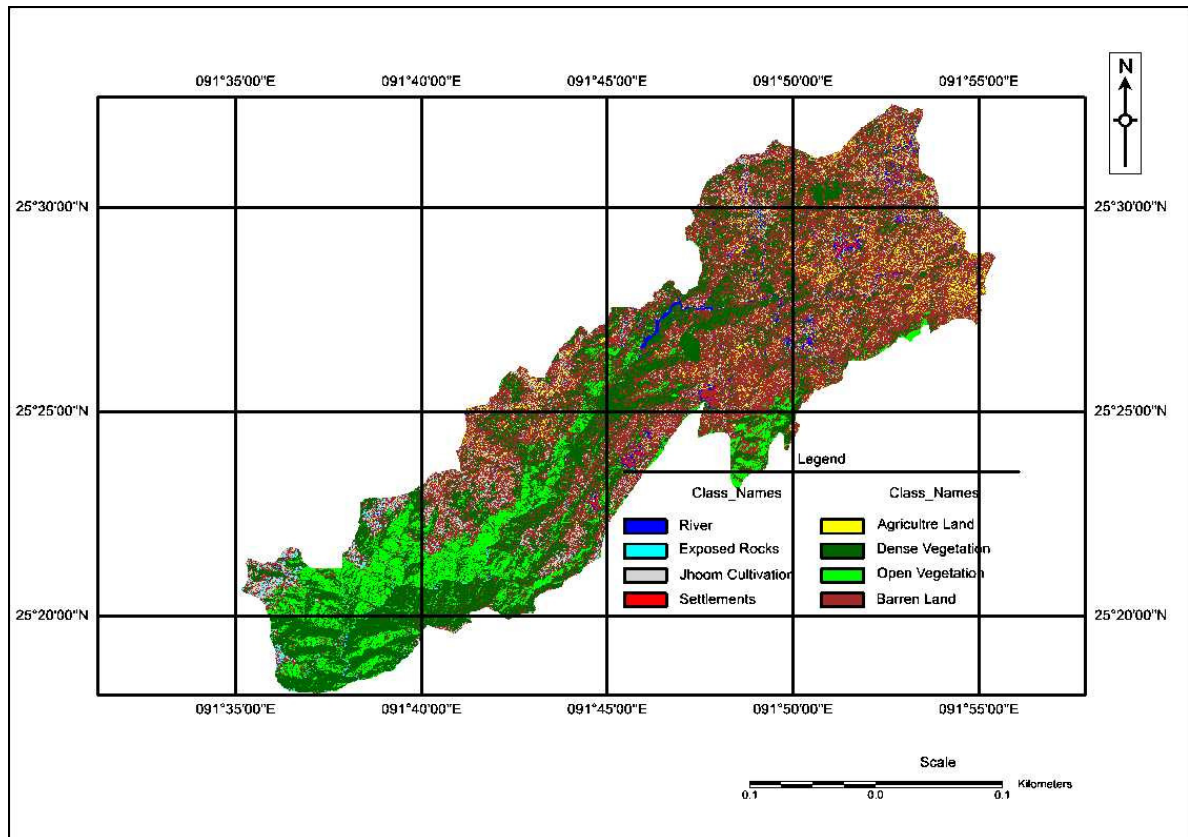- Catchment Area Map

2.2.2 Data Acquisition and Preparation

The data available from various sources has been collected. The ground maps, contour information, etc. were scanned, digitized and registered as per the requirement. Data was prepared depending on the level of accuracy required and any corrections required were made. All the layers were geo-referenced and brought to a common scale (real co-ordinates), so that overlay could be performed. A computer program using standard modeling techniques was used to estimate the soil loss. The formats of outputs from each layer were firmed up to match the formats of inputs in the program. The grid size to be used was also decided to match the level of accuracy required, the data availability and the software and time limitations. Ground truthing and data collection was also included in the procedure.

For the present study, Resourcesat-LISS IV (path 110, row 054, sub scene-D) digital satellite data was used for interpretation & classification. The data has been procured in raw digital format and has been geo-referenced using Survey of India topographical sheets with the help of standard data preparation techniques in standard image processing software. The interpretation of geo-referenced satellite data has been done using standard enhancement techniques, ground checks and experiences of qualified professionals. A detailed ground truth verification exercise has been undertaken as a part of field survey to enrich the image interpretation process. The classified land use map of the free draining catchment area, considered for the study, is shown as **Figure 2.2**. The land use pattern of the catchment area is summarized in **Table 2.1.**

Table 2.1: Land use classification for free draining catchment at diversion site of Mawphu stage-II HEP

Land use/Land cover	Area (ha)	Area (%)
Open Vegetation	3432	10.73
Dense Vegetation	10825	33.83
Exposed Rocks	393	1.23
Agricultural Land	1200	3.75
River/ Water body	442	1.38
Jhoom Cultivation	2096	6.55
Barren Land	13516	42.24
Settlements	96	0.30
Total	**32000**	**100.00**

Figure-2.2: Classified imagery of catchment area for Mawphu stage-II HEP

Derived contours from topographical maps were used for preparation of Digital Elevation Model (DEM) of the free draining catchment area and to prepare a slope map. The first step in generation of slope map is to create surface using the elevation values stored in the form of contours or points. After marking the catchment area, all the contours on the topographical maps were derived. The output of the digitisation procedure was the contours as well as points contours in form of x, y & z points. (x, y - location and z - their

elevation). All this information was in real world co-ordinates (latitude, longitude and height in meters above sea level).

A Digital Terrain Model (DTM) of the area was then prepared, which was used to derive a slope map. The slope was divided in classes of slope percentages. The slope map is enclosed as **Figure-2.3.** The area under different slope categories are given in **Table-2.2**

Table 2.2: Area under various slope category

Slope categories (%)	Area (ha)	Area (%)
0-10	10949	34.22
10-20	10139	31.68
20-30	5408	16.90
30-40	3718	11.62
>40	1786	5.58
Total	**32000**	**100.00**
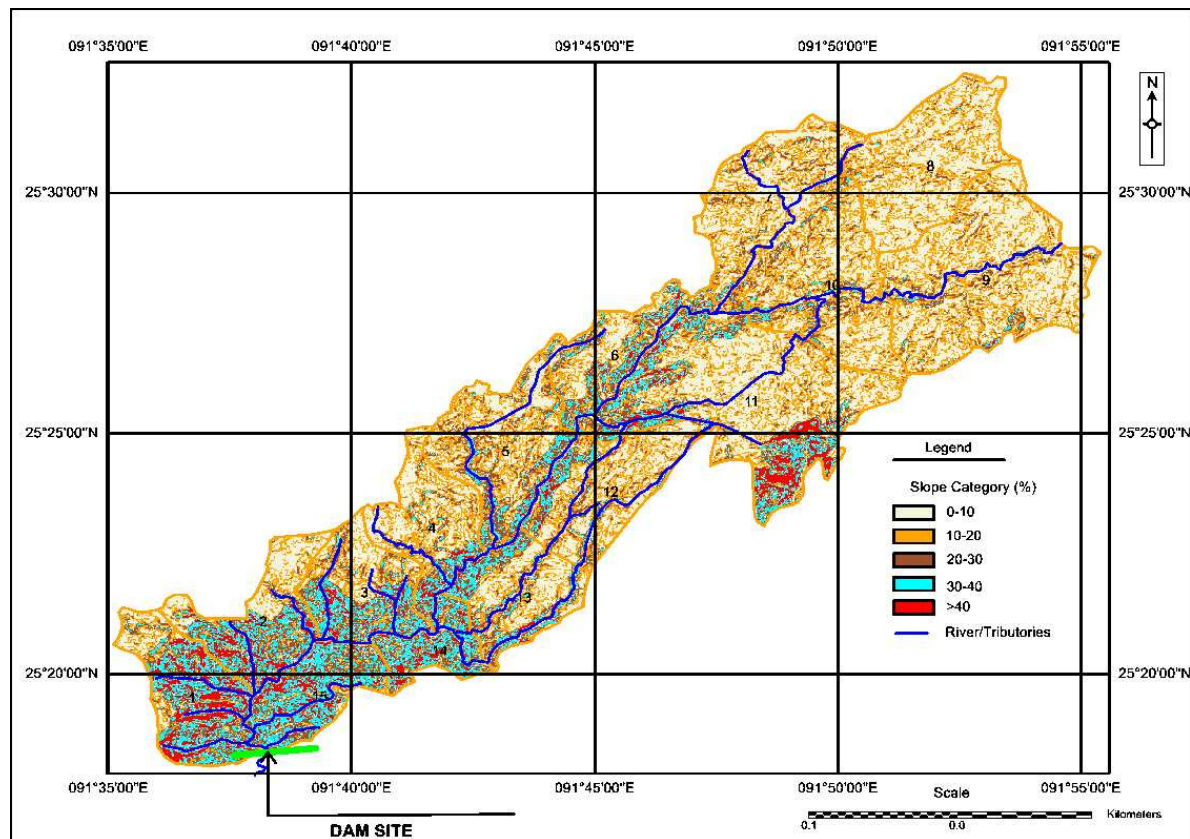
Figure-2.3: Slope Map of catchment area for Mawphu stage-II HEP

2.3   ESTIMATION OF SOIL LOSS USING SILT YIELD INDEX (SYI) METHOD

In `**Silt Yield Index' (SYI)**, method, the terrain is subdivided into various watersheds and the erodibility is determined on relative basis. SYI provides a comparative erodibility criteria of catchment (low, moderate, high, etc.) and do not provide the absolute silt yield. SYI method is widely used mainly because of the fact that it is easy to use and has

lesser data requirement. Moreover, it can be applied to larger areas like sub-watersheds, etc.

The SYI model, considering sedimentation as product of erosivity, erodibility and arial extent was conceptualized in the All India Soil and Land Use Survey (AISLUS) as early as 1969 and has been in operational use since then to meet the requirements of prioritization of smaller hydrologic units within river valley project catchment areas.

The erosivity determinants are the climatic factors and soil and land attributes that have direct or reciprocal bearing on the unit of the detached soil material. The relationship can be expressed as:

Soil erosivity = f (Climate, physiography, slope, soil parameters, land use/land cover, soil management)

Silt Yield Index

SYI is defined as the Yield per unit area and SYI value for hydrologic unit is obtained by taking the weighted arithmetic mean over the entire area of the hydrologic unit by using suitable empirical equation.

Prioritization of Watersheds/Sub-watersheds

The prioritization of smaller hydrologic units within the vast catchments is based on the SYI of the smaller units. The boundary values or range of SYI values for different priority categories are arrived at by studying the frequency distribution of SYI values and locating the suitable breaking points. The watersheds/ sub-watersheds are subsequently rated into various categories corresponding to their respective SYI values.

The application of SYI model for prioritization of sub-watersheds in the catchment areas involves the evaluation of:

- a) Climatic factors comprising total precipitation, its frequency and intensity,
- b) Geomorphic factors comprising land forms, physiography, slope and drainage characteristics,
- c) Surface cover factors governing the flow hydraulics and
- d) Management factors.

The data on climatic factors can be obtained for different locations in the catchment area from the meteorological stations whereas the field investigations are required for estimating the other attributes. The various steps involved in the application of model are:

- Preparation of a framework of sub-watersheds through systematic delineation
- Rapid reconnaissance surveys on 1:50,000 scale leading to the generation of a map indicating erosion-intensity mapping units.

- Assignment of weightage values to various mapping units based on relative silt-yield potential.
- Computing Silt Yield Index for individual watersheds/sub-watersheds.
- Grading of watersheds/sub-watersheds into very high, high, medium, low and very low priority categories.

The area of each of the mapping units is computed and silt yield indices of individual sub-watersheds are calculated using the following equations:

a. Silt Yield Index

To calculate SYI, the methodology developed by All India Soil & Land Use Survey (Department of Agriculture, Govt. of India) has been followed, where each erosion intensity unit is assigned a weightage value. When considered collectively, the weightage value represents approximately the relative comparative erosion intensity. A basic factor of K = 10 was used in determining the weightage values. The value of 10 indicates a static condition of equilibrium between erosion and deposition. Any addition to the factor K (10+X) is suggestive of erosion in ascending order whereas subtraction, i.e. (10-X) is indicative of deposition possibilities.

Delivery ratios were adjusted for each of the erosion intensity unit. The delivery ratio suggests the percentage of eroded material that finally finds entry into reservoir or river/ stream. Area of each composite unit in each sub-watershed was then estimated.

SYI was calculated using following empirical formula:

$$SYI = \frac{\sum (A_i * W_i) * D_i * 100}{A_w}; \quad \text{where } i = 1 \text{ to } n$$

where

Ai	=	Area of ith unit (EIMU)
Wi	=	Weightage value of ith mapping unit
n	=	No. of mapping units
Aw	=	Total area of sub-watershed.
Di	=	Delivery ratio

Delivery ratios are assigned to all erosion intensity units depending upon their distance from the nearest stream. The criteria adopted for assigning the delivery ratio are as follows:

Nearest Stream	Delivery Ratio
0 - 0.9 km	1.00
1.0 - 2.0 km	0.95
2.1 - 5.0 km	0.90
5.1 - 15.0 km	0.80
15.1 - 30.0 km	0.70

The SYI values for classification of various categories of erosion intensity rates are given in **Table 2.3.**

Table-2.3: Criteria for various erosion intensity rates

Priority categories	SYI Values
Very high	> 1300
High	1200-1299
Medium	1100-1199
Low	1000-1099
Very Low	<1000

The erosion category of various watersheds in the catchment area as per a SYI index has been estimated. The objective of the SYI method is to prioritize sub-watershed in a catchment area for treatment. The area under very high and high erosion categories is to be treated at the project proponent's cost. Hence, CAT plan shall be suggested for very high and high erosion categories, as a part of the EIA study, the expenses of which have to be borne by project proponents.

2.4   WATERSHED MANAGEMENT – AVAILABLE TECHNIQUES

Watershed management is the optimal use of soil and water resources within a given geographical area so as to enable sustainable production. It implies changes in land use, vegetative cover, and other structural and non-structural action that are taken in a watershed to achieve specific watershed management objectives. The overall objectives of watershed management programme are to:

- Increase infiltration into soil
- Control excessive runoff
- Manage & utilize runoff for useful purpose

• Following Engineering and Biological measures shall be suggested for the catchment area treatment depending upon the requirement and suitability:

a. Afforestation

- Normal Afforestation
- River Plantation
- Development of nurseries
- Pasture management
- NTFB Plantation

b. Soil & Water Conservation

- Check Dam
- Contour Bunding
- Nallah Bunding
- Landslide Control Measures
- Silt monitoring stations
- Drainage line treatment

c. **PES & Eco-tourism**

- Provision be made for conducting catchment specific study to identify proposals and activities to be undertaken under PES
- implementation of these identified activities (Catchment specific study to identify proposal and its implementation

d. **Research Training and Capacity Building**

- Training and Capacity Building of Staff and communities
- Site Specific research

e. **Infrastructure Development**
- Holistic Support to Staff
- Operational Support to Staff
- Maintenance of Departmental Buildings and inspection paths
- Landslide Control Measures
- Silt monitoring stations

f. **Forest Protection**
- Forest fire protection
- Construction and repairs of Boundary policies
- Promotion of Non-Conventional energy devices
- Wildlife Management Plan
-

2.5   CATCHMENT AREA TREATMENT (CAT) PLAN

In the present report, CAT Plan as per the slope, land use pattern, soil characteristics has been suggested based on the prioritization of sub watersheds using SYI method. The CAT plan has been suggested for Sub-watersheds with high and medium erosion categories as the cost for treatment for such watersheds is to be borne by the project proponents. The objective of the SYI method is to prioritize sub-watershed in a catchment area for treatment. The erosion category of various watersheds in the catchment area as per a SYI index is given in **Table-2.4.** The details are shown in **Figure-2.4**. The area under different erosion categories is given in **Table-2.5.**
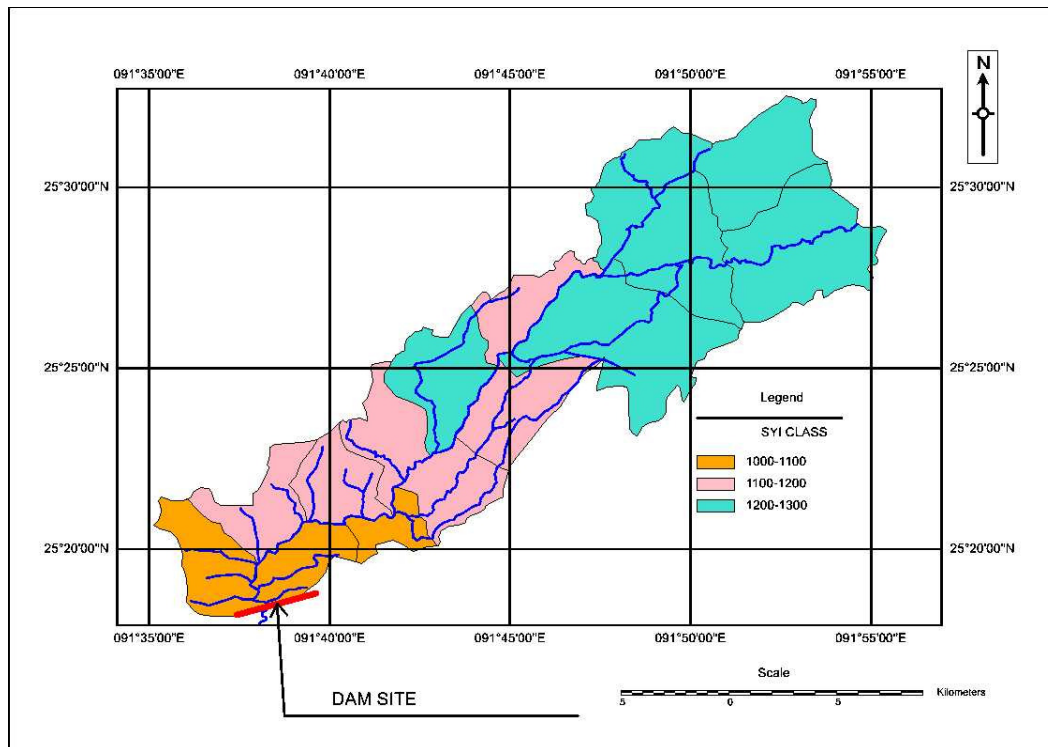
Figure-2.4: Prioritisation of Sub Watersheds for catchment area for Mawphu stage-II HEP

Table-2.4: Erosion intensity categorization as per SYI classification

Watershed number	Area (ha)	SYI values	Category
W1	1846	1080	Low
W2	1641	1150	Medium
W3	1569	1160	Medium
W4	1613	1170	Medium
W5	2246	1210	High
W6	1372	1180	Medium
W7	1960	1210	High
W8	2479	1230	High
W9	3982	1220	High
W10	2857	1230	High
W11	4681	1220	High
W12	2039	1180	Medium
W13	1556	1170	Medium
W14	828	1080	Low
W15	1333	1070	Low
Total	**32000**		

Table-2.5:Area under different erosion categories

Category	Area (ha)	Area (Percentage)
Low	4007	12.52
Medium	9789	30.59
High	18204	56.89
Total	**32000**	**100.00**

The area under high erosion category has to be treated by the project proponents, which accounts for about 57% of the total free draining catchment area. Sub-watershed wise proposed treatment measures in these sub watersheds superimposed over SOI toposheets are given in Table and have been shown in **Figure 2.5.** It is proposed that treatment measures shall be implemented by the Forest Department; State Govt. of Meghalaya. The CAT plan will be implemented over a period of five years.

Figure-2.5: CAT Measures for catchment area of Mawphu stage-II HEP

2.5.1 Afforestation

An amount of Rs. 1418.45 lakh has been earmarked for various afforestation measures. The details are given in Table-2.6.
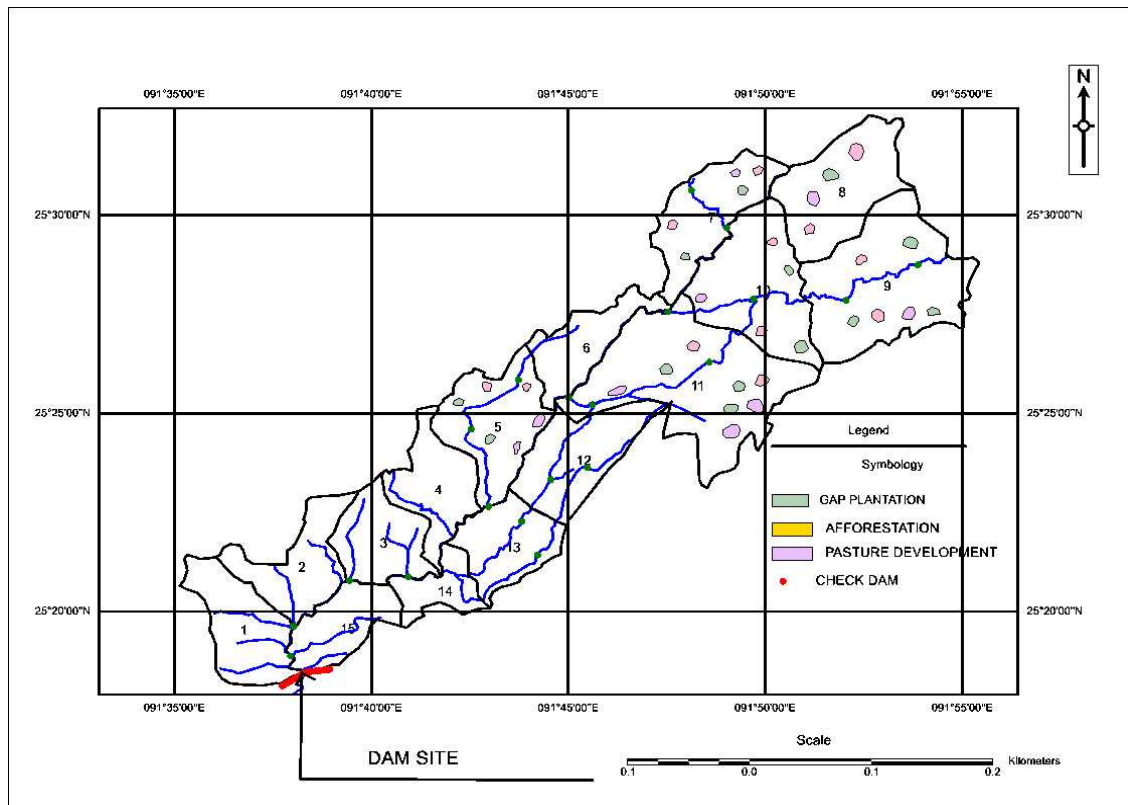
Table-2.6: Cost-Estimate for implementation of afforestation measures as a part of CAT Plan

S. No.	Item	Unit Rate (Rs.)	Unit	Target	
				Physical	Financial (Rs. lakh)
1.	Afforestation	70,000/ha	ha	480	336.0
2.	Maintenance of afforestation area	12,000/ha	ha	480	57.6
3.	Enrichment Plantation	60,000/ha	ha	386	231.6
4.	Pasture development	30,000/ha	ha	860	258.0
5.	Nursery development	10,00,000/ no.	no.	7	70.0
6.	Vegetative fencing	65,000/km	km	25	16.25
7.	Watch and ward for 5 years @ 15/ persons	11,000/man-month	Man-months	900	99.0
8.	Rim Plantation	Lump sum			200.0
9.	Social Forestry	Lump sum			150.0
	Total				**1418.45**

2.5.2 Soil & Water Conservation Works

An amount of Rs. 423.2 lakh has been earmarked for various Soil & Water Conservation measures. The details are given in Table-2.7.

Table-2.7: Cost estimate for implementation of Soil & Water Conservation measures as a part of CAT Plan

S. No.	Item	Unit Rate (Rs.)	Unit	Target	
				Physical	Financial (Rs. lakh)
1.	Check Dams	2,00,000	Nos.	20	40.0
2.	Landslide Control Measures				200.0
3.	Drainage line treatment				100.0
	Total				**340.0**

2.5.3 Silt Observation points

Four silt observation locations for regular monitoring of silt load coming in tributaries of sub-watersheds falling under high and very high categories have been suggested. This would ensure monitoring efficacy of implementation various treatments measures suggested as in CAT plan. Monitoring would be undertaken for a period of 10 years including 5 years for CAT plan implementation period. An amount of Rs. 83.2 lakh has been earmarked for this purpose. The details are given in **Table-2.8.**

Table-2.8: Cost earmarked for establishing Silt Observation points

S. No.	Parameter	Cost (Rs. lakh)
1	Cost of one laboratory – Rs 5,00,000/- for silt analysis per laboratory	5.0
2	One observation hut @ Rs 5.0 lakh	5.0
3	Cost for hiring services of one person (Average salary- Rs 10,000/- for 10 years) considering 10% escalation per year	19.1
4	Cost for hiring services of supervisor one person (Average salary Rs. 20,000/- for 10 years) considering 10% escalation per year	38.2
5	Consumables for the measurement Rs. 1.0 lacs per year for next 10 years, considering 10% escalation per year	15.9
	Total	**83.2**

2.5.4 Research Training and Capacity Building

An amount of Rs. 50 lakh has been earmarked for Training & Capacity building of forest staff as well as local community through State Forest Training Institutes and reputed non-governmental organizations.

2.5.5 Infrastructure Development

The total budget kept for infrastructure development for Forest department during the implementation of CAT Plan is Rs. 139.75 lakh. The details are given in Table-2.9.

Table-2.9: Cost summary for the Operational Support to Forest

S. No.	Component/Item	No.	Unit Rate (Rs. lakh)	Total Cost (Rs. lakh)
1	Vehicle Including operation and maintenance	3 No.	10.0	30.0
2	Office Expenditure	-	Lumpsum	20.0
3	**Office Equipment**			
	Dual Core computer with UPS & Laser Jet Printer,	5 No.	0.75	3.75
	Photocopier machine	2 No.	3.0	6.0
	Office Furniture	-	Lumpsum	5.0
4	GPS	5 No.	3.0	15.0
5.	Maintenance of Departmental buildings			30.0
6.	Maintenance of Forest roads/inspection paths			30.0
	Total			**139.75**

2.5.6 Forest Protection

An amount of Rs. 100 lakh has been earmarked for implementation of various Forest Protection measures. The details are given in Table-2.10.

Table-2.10: Cost summary for Forest Protection measures

S. No.	Component/Item	No.	Unit Rate (Rs. lakh)	Total Cost (Rs. lakh)
1	Fire protection measures			50.0
2	Distribution of Non-conventional Energy and Fuel Saving Devices in catchment area on a cost-sharing basis, such as, LPG, Tandoors, Pressure cookers and Solar devices	-	Lumpsum	50.0
	Total			**100.0**

2.5.7 Monitoring and Evaluation

Monitoring and evaluation is very essential for the various types of activities in CAT plan on daily, monthly and annual basis for proper execution of planned works. This will also include the recording of silt data at 2 gauge and discharge stations proposed in Catchment Area.

M & E studies including impact evaluation studies should be scheduled for the later years of the CAT Plan implementation calendar. Indicators for Monitoring impact of CAT Plan would include:

- Change in silt load.
- Survival of plantations
- Changes in land-use [private holdings]
- Changes in man-animal conflicts.
- Trend of fire incidences in vulnerable areas.

A provision of **Rs.100.0 lakh** has been earmarked for Monitoring and Evaluation.

2.5.8 Site Specific Working Plan

Site specific micro-plans shall be prepared to address specific natural resource base livelihood activities of the local communities. The emphasis will be laid on strengthening the natural resource base of the area by promoting indigenous flora. Micro-level disaster mitigating measures will be identified and promoted under this activity. A provision of **Rs. 100.0 lakh** has been earmarked for this activity.

2.6 COST ESTIMATE

The cost required for implementation of various measures is Rs. 2331.40 lakh. The details are given in Table 2.11.

Table-2.11: Cost earmarked for implementation of CAT plan

S.No.	Activity	Amount (Rs. lakh)
1	Afforestation	1418.45
2	Soil & Water Conservation Works	340.0
3	Silt observation Point	83.2
4	Research Training and Capacity Building	50.0

S.No.	Activity	Amount (Rs. lakh)
5	Infrastructure Development	139.75
6	Forest Protection	100.0
7	Monitoring and Evaluation	100.0
8	Site Specific Working plan	100.0
	Total	**2331.40 say Rs. 23.31 crore**

2.7 SCHEDULE FOR IMPLEMENTATION OF CAT PLAN

It is proposed to implement the CAT Plan in 5 years. The year wise implementation of physical and financial targets is given in Table-2.12.

Table-2.12: Year-wise implementation schedule for CAT Plan

S. No.	Activity	Year											
		Year I		Year II		Year III		Year IV		Year V		Total	
		Phy.	Fin. (Rs. lakh)	Phy.	Fin. (Rs. lakh)	Phy.	Fin. (Rs. lakh)	Phy.	Fin. (Rs. lakh)	Phy.	Fin. (Rs. lakh)	Phy.	Fin. (Rs. lakh)
A.	**Biological Treatment Measures**												
i)	Afforestation	280 ha	196.0	200.0 ha	140.0	-	-	-	-	-	-	480 ha	336.00
ii)	Maintenance of afforestation area	-	-	-	25.0	-	15.0	-	7.5	-	5.1	-	57.6
iii)	Enrichment Plantation	100 ha	60.0	100 ha	60.0	100 ha	60.0	86 ha	51.6	-	-	386 ha	231.60
iv)	Pasture Development	300 ha	90.0	300 ha.	90.0	260 ha	78.0	-	-	-	-	860 ha	258.0
v)	Nursery Development	5 No.	50.0	2 No.	20.0	-	-	-	-	-	-	7 No.	70.00
vi)	Vegetative Fencing	15 km	9.75	10 km	6.5	-	-	-	-	-	-	25 km	16.25
vii)	Watch and ward	180 man-months	19.8	180 man-months	19.8	180 man-months	19.8	180 man-months	19.8	180 man-months	19.8	900 man-months	99.00
viii)	Rim Plantation	-	100.0	-	50.0	-	50.0	-	-	-	-	-	200.00
ix)	Social Forestry	-	75.0	-	75.0	-	-	-	-	-	-	-	150.00
	Sub-Total (A)		**600.55**		**486.3**		**222.8**		**78.9**		**24.9**		**1418.45**
B.	**Soil & Water Conservation Works**												
i)	Check Dams	7	14.0	7	14.0	6	12.0	-	-	-	-	20.0	40.0
ii)	Landslide	-	100.0	-	50.0	-	50.0	-	-	-	-	-	200.00

S. No.	Activity	Year											
		Year I		Year II		Year III		Year IV		Year V		Total	
		Phy.	Fin. (Rs. lakh)	Phy.	Fin. (Rs. lakh)	Phy.	Fin. (Rs. lakh)	Phy.	Fin. (Rs. lakh)	Phy.	Fin. (Rs. lakh)	Phy.	Fin. (Rs. lakh)
	Control Measures												
iii)	Drainage line treatment	-	50.0	-	25.0	-	25.0	-	-	-	-	-	100.00
	Sub-Total (B)		**164.0**		**89.0**		**87.0**						**340.0**
C.	**Silt Observation Points**												
vi-a)	Setting of one laboratory	1 No.	5.0	-	-	-	-	-	-	-	-	1 No.	5.00
vi-b)	One observation hut	1 No.	5.0	-	-	-	-	-	-	-	-	1 No.	5.00
vi-c)	*Cost of hiring one person (Average Salary Rs. 10,000/- for 10 years) considering 10% escalation per year	-	1.20	-	1.32	-	1.45	-	1.60	-	1.76	-	19.10
vi-d)	*Cost of hiring one supervisor (Average Salary Rs. 20,000/- for 10 years) considering 10% escalation per year	-	2.40	-	2.64	-	2.90	-	3.20	-	3.52	-	38.20

S. No.	Activity	Year											
		Year I		Year II		Year III		Year IV		Year V		Total	
		Phy.	Fin. (Rs. lakh)	Phy.	Fin. (Rs. lakh)	Phy.	Fin. (Rs. lakh)	Phy.	Fin. (Rs. lakh)	Phy.	Fin. (Rs. lakh)	Phy.	Fin. (Rs. lakh)
vi-e)	*Consumables (Rs.1.0 lac per year for next 10 years and considering 10% escalation per year)	-	1.0	-	1.1	-	1.21	-	1.331	-	1.46	-	15.9
	Sub-Total (C)		14.6	-	5.06	-	5.56	-	6.131	-	6.74	-	83.2
D.	Research, Training & Capacity Building	-	10.0	-	10.0	-	10.0	-	10.0	-	10.0	-	50.00
	Sub-Total (D)	-	10.0	-	10.0	-	10.0	-	10.0	-	10.0	-	50.00
E.	**Infrastructure Development**												
i)	Vehicle including O&M	3 No.	18.0	-	3.0	-	3.0	-	3.0	-	3.0	3 No.	30.00
ii)	Office Equipment	-	14.75	-	0	-	0	-	0	-	0	-	14.75
iii)	Office Expenditure	-	4.0	-	4.0	-	4.0	-	4.0	-	4.0	-	20.00
iv)	GPS	5 No.	15.0	-	0	-	0	-	0	-	0	5 No.	15.00
v)	Maintenance of Departmental Buildings	-	6.0	-	6.0	-	6.0	-	6.0	-	6.0	-	30.00
vi)	Maintenance of Forest Roads/Inspection Pattern	-	6.0	-	6.0	-	6.0	-	6.0	-	6.0	-	30.00
	Sub-Total (E)		63.75	-	19.0	-	19.0	-	19.0	-	19.0	-	139.75

S. No.	Activity	Year										
		Year I		Year II		Year III		Year IV		Year V		Total	
		Phy.	Fin. (Rs. lakh)	Phy.	Fin. (Rs. lakh)	Phy.	Fin. (Rs. lakh)	Phy.	Fin. (Rs. lakh)	Phy.	Fin. (Rs. lakh)	Phy.	Fin. (Rs. lakh)
F	**Forest Protection Measures**												
i)	Fire Protection Measures	-	25.0	-	25.0	-	-	-	-	-	-	-	50.00
ii)	Distribution of Non-conventional Energy and Fund Saving Devices	-	25.0	-	25.0	-	-	-	-	-	-	-	50.00
	Sub-Total (F)		**50.0**	**-**	**50.0**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**100.0**
G	Monitoring & Evaluation	-	20.0	-	20.0	-	20.0	-	20.0	-	20.0	-	100.00
	Sub-Total (G)	**-**	**20.0**	**-**	**20.0**	**-**	**20.0**	**-**	**20.0**	**-**	**20.0**	**-**	**100.00**
H	Site specific Working Plan	-	50.0	-	25.0	-	25.0	-	-	-	-	-	100.00
	Sub-Total (H)	**-**	**50.0**	**-**	**25.0**	**-**	**25.0**	**-**	**-**	**-**	**-**	**-**	**100.00**
	Grand Total	**-**	**972.9**	**-**	**704.36**	**-**	**389.36**	**-**	**134.031**	**-**	**80.64**	**-**	**2331.4**