5189007/2021/OS-F&WL

FC2- 45617/2016

Forest Headquarters,
Vazhuthacaud,
Thiruvananthapuram - 14.
Ph: 0471-2529243, 2529325
E-mail: apccf-sa.for@kerala.gov.in
Date : 25.05.2021

From

Principal Chief Conservator of Forests,
(Forest Management) &
Nodal Officer, F(C)Act,
Forest Headquarters, Vazhuthacaud,
Thiruvananthapuram – 695014.

To

Principal Secretary,
Forest & Wildlife Department,
Secretariat, Thiruvananthapuram.

Sir,

Sub :- Forest & Wildlife Department – Diversion of 0.95 ha of forest land in Kunjithanny Village in Munnar Division, Idukki District for the implementation of Upper Sengulam Small Hydro Electric Project in favour of Kerala State Electricity Board (KSEB) – Compliance Report - regarding.

Ref :-

1. F.No. 4-KLB 1188/2019-BAN/1238 dated 26.11.2019 of Ministry of Environment, Forest & Climate Change, Regional Office, Banagalore.
2. Letter No. C5-4286/2016 dated 20.05.2021 of Chief Conservator of Forest (High Range Circle) Kottayam.

Kind attention is invited to the subject and references cited. Government of India as per the reference 1st cited above conveyed the in-principle approval (stage I clearance) under section 2 of Forest (Conservation) Act, 1980 for diversion of 0.95 ha of forest land for Upper Sengulam Small Hydro Electric Project submitted by the Chief Engineer, KSEB, Thiruvananthapuram subject to the conditions stipulated therein. Compliance report on the conditions is submitted herewith for forwarding to Regional Office (Southern Zone), Ministry of Environment, Forest & Climate Change, Bangalore for granting final approval (stage II clearance) under section 2 of the Forest (Conservation) Act, 1980.

Sl. No.	Conditions	Compliance report
1.	The legal status of the forest land shall remain unchanged.	Complied.
2.	The boundary of the diverted forest land shall be suitably demarcated on ground at the project cost, as per the directions of concerned Divisional Forest Officer.	Complied.
3.	The State Government shall charge the Net Present Value of the diverted forest land of 0.95 ha from the User Agency as per the orders of the Hon'ble Supreme Court of India dated 28.03.2008 and 09.05.2008 in IA Nos 826 in 566 with related IA's in Writ Petition (Civil) No. 202/1995.	Complied. User Agency made payment of Rs. 4,95,425/- towards Net Present Value and an amount of Rs.63,78,000/- towards the cost of implementation of CAT plan for the forest land diverted in the Corporation Bank account No. 150745615833465 for 0.95 ha of forest land to be diverted.
4.	Additional amount of the Net Present Value (NPV) of the diverted forest land if any, becoming due after revision of the same by the Hon'ble Supreme Court of India in future, shall be charged by the State Government from the User Agency. The User Agency shall furnish an undertaking to this effect.	Complied by User Agency. An undertaking to the effect has been submitted on this behalf.
5.	A detailed Catchment Area Treatment (CAT) Plan shall be prepared as prescribed in para 9.2 of the guidelines issued under Forest (Conservation) Act, 1980 and furnished to Regional	A detailed CAT Plan is prepared and the same is furnished herewith. An amount of Rs. 63,78,000/- towards the cost of

	Office. The cost of implementation of CAT Plan shall be deposited by the User Agency.	implementation of CAT Plan is remitted by the User Agency.
6.	All the funds received from the User Agency under the project shall be transferred/deposited to CAMPA fund only through (https://parivesh.nic.in/).	Complied by User Agency.
7.	The layout plan of the proposal shall not be changed without prior approval of Central Government	Agreed by the User Agency.
8.	No labour camp shall be established on the forest land.	Agreed by the User Agency.
9.	No additional or new path will be constructed inside the forest area for transportation of construction materials for execution of the project work.	Agreed by the User Agency.
10.	The forest area shall be used for the purpose for which it is granted. The total forest area utilized for the project shall not exceed 0.95 ha.	Agreed by the User Agency.
11.	The forest land proposed to be diverted shall under no circumstances be transferred to any other agencies, Department or person without prior approval of Government of India.	Agreed by the User Agency.
12.	The period of diversion under the approval shall be co-terminus with the period of lease to be granted in favour of the User Agency or the project life, whichever is less.	Agreed by User Agency.

13.	The compliance report shall be uploaded on e-portal (https://parivesh.nic.in/).	Complied by User Agency.
15.	Any other condition that the Ministry of Environment, Forest & Climate Change may stipulate from time to time in the interest of conservation, protection and development of Forest and Wildlife.	Will be strictly adhered.

Yours faithfully,

Enclosures: Compliance Report,
CAT Plan, Undertaking
by User Agency.

Principal Chief Conservator of Forests
(Forest Management) & Nodal Officer,
F(C) Act

5189007/2021/OS-F&WL

भारतीय गैर न्यायिक

एक सौ रुपये Rs. 100

रु. 100 ONE HUNDRED RUPEES

सत्यमेव जयते

भारत INDIA

INDIA NON JUDICIAL

കേരളം केरल KERALA BA 869859

UNDERTAKING GIVEN BY THE PROJECT MANAGER, UPPER SENGULAM HYDRO ELECTRIC PROJECT ON BEHALF OF KERALA STATE ELECTRICITY BOARD LTD. BEFORE THE FOREST DEPARTMENT REGARDING REMITTANCE OF NET PRESENT VALUE OF FOREST LAND.

KERALA STATE ELECTRICITY BOARD LTD, the user agency for diversion of 0.95Ha. of forest land for implementation of Upper Sengulam Hydro Electric Project here by undertake to remit the Net Present Value of the above forest land. Also agreed to remit additional net present value, if any, fixed due to revision of rates.

5/1/17

PROJECT MANAGER
Sengulam Augmentation Scheme
K.S.E. Board, Anachal.
IDUKKI - 685565

No. 22460 Rs. 100/-
Date 24-12-16
Project Manager, SAS. KSEB Ltd
Chithirapuram P.O. Anachal

ജി. ശ്രീധരൻപിള്ള
സ്റ്റാമ്പ് വെണ്ടർ
അടിമാലി

23 DEC 2016

5189007/2021/OS-F&WL

भारतीय गैर न्यायिक

एक सौ रुपये Rs. 100

रु. 100 ONE HUNDRED RUPEES

सत्यमेव जयते

भारत INDIA

INDIA NON JUDICIAL

കേരളം केरल KERALA BA 869860

KSEB Ltd. also agreed to remit the amount of penal compensatory afforestation in lieu of the forest land proposed to be diverted.

Sengulam

05/01/2017

5/1/17

PROJECT MANAGER

UPPER SENGULAM HE PROJECT

ANACHAL

No. 32461 Rs. 100/-

Date 24-12-16

ജി. ശ്രീധരൻപിള്ള

സ്റ്റാമ്പ് വെണ്ടർ

അടിമാലി

Project Manager, S.A.S. KSEB Ltd

Chithirapuram P.O Anachal

SUB TREASURY ADIMALI

23 DEC 2016

UPPER SENGULAM SMALL HYDRO ELECTRIC PROJECT

CATCHMENT AREA TREATMENT PLAN

1 CATCHMENT AREA TREATMENT PLAN

1.1 Introduction

The study of erosion and sediment yield from catchment is of utmost importance as the deposition of sediment in reservoir reduces its capacity, thus affecting the water available for the designated use. The eroded sediment from catchment when deposited on stream beds and banks causes braiding of river reach. The removal of top fertile soil from catchment also adversely affects the agricultural production.

Another important factor that adds to the sediment load and which contributes to soil degradation is grazing pressure. Many cattle, sheep, and goats graze the pastures continuously for about six months in a mountainous region.

The lack of proper vegetal cover is a factor to cause degradation and thereby results in severe run off/soil erosion, and subsequently premature siltation of the reservoir. Thus, a well-designed Catchment Area Treatment (CAT) Plan is essential to ameliorate the above-mentioned adverse cause and process of soil erosion. The catchment area treatment involves the understanding of the erosion characteristics of the terrain and suggesting remedial measures to reduce the erosion rate. For this reason, the catchment of the directly draining rivers, streams, tributaries, etc. are treated and the cost is included in the project cost.

The pre-requisite for a watershed management is the collection of multi-pronged data e.g., geology, geomorphology, topography, soil, land use/land cover, climate, hydrology, drainage pattern, etc. The multi-pronged data generated from various published sources and actual data collected from these watersheds on the above-mentioned parameters forms the basis of the Action Plan for Catchment Area Treatment is presented here.

Catchment Area Treatment (CAT) plans for the free draining catchment area of the proposed project has been prepared for areas with high soil erosion intensity. The CAT Plan targets towards overall improvement in the environmental conditions of the region.

All the activities are aimed at treating the degraded and potential areas with severe soil erosion. The plan provides benefits due to biological and engineering measures and its utility in maintaining the ecosystem health. The plan with objectives addresses issues such as prevention of gully erosion, enhancing the forest cover for increasing soil holding capacity; and arresting total sediment flow in the reservoir and flowing waters.

1.2 Objectives

Integrated watershed management plan minimizes the sedimentation of reservoir. The main aim of the Catchment Area Treatment Plan is to rejuvenate various potential and degraded ecosystems in the catchment area for longevity of the reservoir storage capacity. For this purpose, the action plan has been prepared with the following objectives:

1. To facilitate the hydrological functioning of the catchment and to augment the quality of water of the river and its tributaries.
2. Conservation of soil cover and to arrest the soil erosion, floods and siltation of the river along with its tributaries and consequent reduction of siltation in the reservoir of the project.
3. Demarcation of the priority of watersheds for treatment based on soil erosion intensity in the catchment area.
4. Rehabilitation of degraded forest areas through afforestation and facilitating natural regeneration of plants.
5. Mitigation of landslide, landslip and rock falls.
6. Soil conservation through biological and engineering measures to reduce sediment load in river and tributaries, incidentally improving the quality of water.
7. Ecosystem conservation resulting from increased vegetal cover and water retaining properties of soil.
8. To meet the fuel and fodder requirements of local people.
9. Promotion of non-conventional energy device to reduce pressure on forest.
10. Employment generations through community participation and conservation.

1.3 Catchment Area

The proposed **Upper Sengulam Hydro Electric Project** envisages the diversion of water from the tail race of ongoing Pallivasal Extension Scheme and utilization of the discharge from existing Pallivasal Hydro Electric Project along with discharge from ongoing Sengulam Augmentation Scheme for power generation.

In short the catchment area of the Proposed Scheme is arrived as follows

Existing Pallivasal Extension Scheme .... 235.00 Sq.Km

Sengulam Augmentation .... 53.55 Sq. Km

Below the Existing Ramaswamy Iyer Headworks........................11.00 Sq.Km

Existing Sengulam Dam.. 5.18 Sq.Km

A map is appended for ready reference. The total extent of free catchment area to Sengulam Reservoir is about 5.18 Sq.Km .

1.4 Topography

The Scheme is located at Vellathooval Panchayat in Devikulam Taluk in Idukki District. The project envisages the utilization of the surplus water expected to be available at existing Sengulam Balancing Reservoir of the Sengulam Hydro Electric Project. The area exhibits varied physiographic features with elevation ranging from 1830m in the east to the sea level in the west. The area is characterized by highly undulating topography with steeply dipping hill ranges, meadows, valleys and plains. Major part of the area falls in the hilly ranges of the Western Ghats. The slope of the watershed ranges from nearly plain to steep sloping. Based on the elevation and the terrain features, the area is divided into various physiographic units . The catchment area of the scheme is 304.73 Sq.Km. The entire area lies in between elevations +500.00m and +900.00 m above mean sea level.

1.5 Soil

Soil is an integral part of a terrestrial ecosystem and fulfills numerous functions including the capacity to generate biomass and the filtering or buffering activities between the atmosphere and the groundwater in the biosphere. The word 'soil' means different things to different people but basically it may be defined as the solid material on the earth's surface that results from the interaction of weathering and biological activity on the soil's parent material or underlying hard rock. Soil is a three dimensional body with properties that reflect the impact of (1) climate (2) vegetation, fauna, man (3) relief on the soils (4) parent material over a variable and (5) time span. The nature and relative importance of each of these five 'soil forming factors' vary in time and space. With few exceptions soils are still in a process of change; their 'soil profile' shows signs of differentiation or alteration of the soil material incurred in a process of soil formation or 'pedogenesis'.There is a direct relation between the soil profile and the occurrence and movement of groundwater.

1.6 Land use

1.6.1 Land use-Land Cover Classification

Based on satellite data and topo-sheets, a land-use map was generated and verified in detail during ground surveys i.e. crosschecked with ground truths.

1.6.2 Land use Categories and Erosion

The erosion acts differently in different land-use types. It is important to understand the nature of erosion in a land-use class to further plan for treatment. VIZ PERCENTAGE OF AREA UNDER Agricultural Land, Settlement, Open Forest Land, Dense Forest, River / Water body

1.7 Slope

The slope of a watershed plays an important role in controlling the soil and water retention thereby affecting the land-use capability. The percentage of the slope in a watershed determines the soil erosion susceptibility and forms the basis for classifying different of the watershed into suitable classes for formulating effective soil erosion conservation measures. Broadly, the following slope classes and ranges as per norms of All India Soil & Land Use Survey were adopted to classify the slopes.

Slope Ranges showing the intensity of catchment area

Sr. No	Slope Range (Degrees)	Description
1	0-2	Very Gentle Slope
2	2-5	Gentle Slope
3	5-10	Moderate Slope
4	10-18	Moderately Steep Slope

The data shows that about 78.09% area lies between very gentle to gentle slope category of slope and balance 21.91% falls from moderate slope to moderately steep slope category.

Slope Classes

Sr. No	Description	Slope Range (Degrees)	Area under different class (Sq.Km)	Area(%)
1	Very Gentle Slope	0-2	4.00	77.00
2	Gentle Slope	2-5	1.00	19.00
3	Moderate Slope	5-10	0.10	2.00
4	Moderately Steep Slope	10-18	0.08	2.00
TOTAL			5.18	100

1.8 Methodology Used for the Study

Superimposing topography, slope, soil and land use data/maps, a tentative estimation of erosion prone areas and landslides area in the catchment were made. The vulnerable and problematic areas were identified in different physiographic zones.

These data sets were used for preparation of the thematic maps, calculation of sediment yield index and Erosion Intensity Units.

1.8.1 Soil Loss Using Silt Yield Index (SYI) Method

The Silt Yield Index Model (SYI), considering sedimentation as product of erosivity, erodibility and aerial 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.

Methodology for the calculation of sediment yield index developed by All India Soil & Land Use Survey (Development of Agriculture, Govt. of India) was followed in this study.

(i) Erosion Intensity and Delivery Ratio

• Determination of erosion intensity unit is primarily based upon the integrated information on soil characters, physiography, slope, land-use/land-cover, litho logy and structure. This is achieved through super-imposition of different thematic map overlays. Based upon the field data collected during the field survey and published data, weightage value and delivery ration were assigned to each erosion intensity unit. The composite map for delineating different erosion intensity units was prepared through superimposition of the maps showing soil types, slope and land-use/land-cover. This thematic mapping of erosion intensity for entire catchment was done using the overlay and union techniques. Based on ground truth verification conducted during fieldwork and published data, weightage and delivery ratio was assigned to each erosion intensity units. The composite erosion intensity map was then superimposed on the drainage map with sub-watershed boundaries to evolve CEIU for individual sub-watershed.

Each element of erosion intensity unit is assigned a weightage value. The cumulative weightage values of the erosion intensity units represent approximately the relative comparative erosion intensity within the watersheds. A basic factor of K=10 was used in determining the cumulative weightage values. The value of 10 indicated an equilibrium condition between erosion and deposition. Any value of K (10+X) is suggestive of erosion intensity in an ascending order whereas the value of K (10-X) is suggestive of deposition intensity in descending order.

The delivery ratios were calculated for each composite erosion intensity unit. The delivery ration suggests the percentage of eroded material that finally finds entry into the reservoir or river/stream. Total area of different erosion intensity classes (composite erosion intensity unit) in each watershed was then calculated.

The delivery ratio is generally governed by the type of material, soil erosion, relief length ratio, cover conditions, distance from the nearest stream, etc. However, in the present study the delivery rations to the erosion intensity units were assigned upon their distance from the nearest stream (being the most important factor responsible for delivery of the sediments) per the following scheme.

Delivery Ratio (DR) Criteria

Nearest Stream	*Delivery Ratio (DR)*
0- 0.9 km	1.00
1.0 - 2.0 km	0.90
2.1 - 5.0 km	0.80
5.1 - 15.0 km	0.70
15.1 - 30.0 km	0.50

(ii) Sediment Yield Index & Prioritization of Sub-Watersheds

The erosive determinate are the climatic factors and soil and land attributes that have direct or reciprocal bearing on the units of the detached soil material.

The Silt Yield Index (SYI) is defined as the Yield per unit area and SYI value for hydrologic unit is obtained by taking the weightage arithmetic mean of the products of the weightage value and delivery ratio over the entire area of the hydrologic unit by using suitable empirical equation.

Prioritization of smaller hydrological units within the vast catchments is based on the SYI of the smaller units. The boundary values of range of SYI values for different priority categories are arrived at by studying the frequency distribution of SYI values and locating the suitable breaking point. The watersheds/sub-watersheds is 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:

- Climatic factors comprising total precipitation, its frequency and intensity

•Geomorphic factors comprising land forms, physiography, slope and Drainage characteristics

• Surface cover factors governing the flow hydraulics

• Management factors.

The data on climatic factors was obtained for different locations in the catchment area from the meteorological stations whereas the field investigations were required for estimating the other attributes.

The various steps involved in the application of model are:

Preparation of a framework of sub-watershed 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:

Silt Yield Index

SYI = (Ai x Wi x Di) x 100/Aw; where I = 1 to n

Where

Ai = Area of i^{th} (EIMU)
Wi = Weightage value of i^{th} mapping unit

Di = Delivery ratio
n = No. of mapping units
Aw = Total area of sub-watershed

The SYI values for classification of various categories of erosion intensity rates were taken for the present study as:

Priority Category SYI Values

1. Very High >1300
2. High 1200-1299
3. Medium 1100-1199
4. Low 1000-1099
5. Very low <1000

Accordingly, the sediment Yield Index has been calculated for sub-watersheds. The computation of SYI for each SWS is presented

Area (ha)*	*Sediment yield index*	*Priority*
400	1208	High
100	1232	High
10	1168	Medium
8	1033	Low

1.9 Catchment Area Treatment Plan

There are mainly five categories of Land uses for which a proper treatment plan should be developed.

First is the Agricultural Land, as this activity can never be eliminated, because the faulty practice results in heavy loss of fertile soil. Second, being open forestland for obvious conservation reasons. Third is scrub or degraded land, which contributes heavily to the silt load and possibilities exist to bring this area under pastures and other plantation to meet the local demand of fuel and fodder and thus decreasing the biotic pressure on the forests and leading to environment friendly approach of sustainable development. The fourth and most important category is Barren land because with practically no vegetal cover, the area produces huge amount of silt load. The fifth is dense forest land where in a few places soil conservation measures are required. For treatment of catchment area, the areas that require treatment have been delineated from the Composite Erosion Intensity Unit Map. The sum of weightages was reclassified below to further subdivide the area as per the erosion intensity classes. The weightages for Land use, Slope & Soil were summed to get the Erosion Intensity Classes.

Erosion Intensity & Weightages

Erosion Intensity	Sum of weightages
Very severe (E5)	12 to 14
Severe (E4)	9 to 11
Moderate (E3)	6 to 8
Slight (E2)	4 to 5
Negligible (E1)	0 to 3

After exclusion of rocks and inaccessible terrain, only those areas which fall under very severe and severe erosion intensity category would be taken up for conservation treatment measures in very high priority category micro-watersheds, whereas in the rest of micro-watersheds belonging to other priority categories, the area falling under very severe erosion intensity class shall be taken for treatment with biological and engineering measures under the CAT Plan.

Considering the topographic factors, soil type, climate, land-use/land-cover in the catchment area following engineering and biological measures have been proposed to be undertaken with the aim to check the soil erosion, prevent/check siltation of reservoir and to maintain its storage capacity in the long run.

The Erosion Intensity Map of the free draining catchment was generated based on SYI data

Erosion Intensity Categories in Sub-Watersheds (sq km)

Sub Watershed	Delivery Ratio	SYI	Priority
Category 1	0.80	1208	High
Category 2	0.80	1232	High
Category 3	0.80	1168	Medium
Category 4	0.80	1033	Low

1.10 Treatment of Individual Sub-Watershed

There are mainly five categories of land uses for which a proper treatment plan should be developed.

First is the agricultural land as this activity can never be eliminated. And, agriculture activities, if faulty, result in heavy loss of fertile soil. Second, is open forest land for conservation reasons Third is scrub or degraded land, which contributes heavily to silt load. Possibilities exist to bring this area under pastures and plantation to meet local demand of fuel and fodder and thus decreasing the biotic pressure on the forests leading to environment friendly approach of sustainable development. The fourth and most important category is barren land because with practically no vegetal cover the area produces huge amount of silt load. The fifth is dense forest land where a few places soil conservation measures are required.

Areas falling under very severe and severe erosion intensity category would be taken up for conservation treatment with biological, bio-engineering and engineering measures under CAT Plan. In the present case, an area of 1618 ha has been proposed to be treated under the CAT plan. This area includes 1618 ha area of catchment which shall be treated by biological / engineering measures.

Considering the topographic factors, soil type, climate, land-use/land-cover in the catchment area following measures have been proposed to be undertaken with aim to check soil erosion, prevent/check siltation of reservoir and to maintain its storage capacity in the long run.

1.10.1 Activities to be undertaken

1.10.1.1 Normal Afforestation

In critically degraded areas, plantation of locally useful diverse and indigenous plant species such as timber plantation species, fodder species, fuel wood species, grasses, shrubs and legumes, medicinal and aromatic plants would be undertaken. The forestation will include rising of multi-tier mixed vegetation of suitable local species in the steep and sensitive catchment areas of rivers/streams with the objective of keeping such areas under permanent vegetative cover. Furthermore, degraded areas would also be brought under vegetation cover. Suitable trees of economic value to local people shall be raised in the degraded forest areas near to villages with the objective of supplementing income of the villagers. With a view to conserve and augment the state's rich medicinal plant resources in its natural habitat through adaptive and participatory management of the local people, cultivation of high priority medicinal plant species shall be undertaken. Thrust shall be given to organic cultivation of medicinal plants.

Effective fencing would also be provided for protection of saplings. Before any new area is taken up, eradication of weeds and unpalatable grass species is important. It is, therefore, recommended that some parts of the pasture should be closed for seeding purpose only.

1.10.1.2 Enrichment Plantation

There are a few locations within forest in the catchment area where the crown density is poor and plantation can be done to increase the patch density of crop. In such areas, plantation of adequate seedlings is likely to create dense forest.

1.10.1.3 High Density Energy Plantation

In order to reduce the biotic pressure on the forest areas near the villages, high-density energy plantation in forest areas and barren areas under the village can help in long way to solve the ever increasing problem of scarcity of fodder and fuel wood in hilly areas. To overcome the problem of scarce availability of fodder and fuel it is proposed to bring substantial area by planting adequate number of suitable fast growing species.

1.10.1.4 Treatment of Pasture

The restoration and management of degraded pasture is a vital objective, both to provide sufficient habitat for spatial movement of the spillover species outside and within catchment area and to provide biological resources to the local populace. The pastures have their own unique significance in the geophysical, environmental and socio-economic set-up of the region. They are the prime and continual source of herbage for the wild herbivores which are prey base for carnivores, cattle, sheep and goats. These pastures are extensively grazed by the live stocks of the local people. The large scale and indiscriminate grazing of these pasture over a prolong time has left these pastures ominously degraded. The palatable grasses are no more than a few inches tall and the other related pasture species have also started showing signs of stress. Because of continuous and heavy pressure of grazing, barren patches have developed over vast areas and soil erosion is rampant in these pastures. There is an imperative need to address this abysmal and alarming situation immediately before these pastures are brought to such a condition, where, their rejuvenation becomes impossible. Owning to traditional rights of the grazers, it is difficult to restrict the number of animals grazing there. Thus, the only alternative left is to increase the productivity of these pastures to cope with the grazing pressures. The situation warrants for a realistic survey and allied research in context of entire grazing issues and formulation of an action plan for corrective measures within the gambit of the state policy on the subject matter. Till such time the following recommendations are made for the management of pastures.

Assessment of the carrying capacity of the pastures through surveys so as to ascertain allowable size of live stocks.

Periodical field checking of the size of the herds mentioned in the permits so as to avoid misuse by some permit holders.

Public awareness.

Periodical closure of areas in pastures for the proliferation of seeds of desirable grass species.

Implementation of rotational deferred grazing system to derive the advantage of early nutritive growth and rest period during the growing season.

Interaction with the local people and so that a sort of social fencing could be achieved.

1.10.1.5 Nursery Support

In order the meet the huge requirement of saplings required under biological / bio-engineering measures and reservoir rim treatment new nursery has to be developed along with support to the existing nurseries which shall also augment the supply of saplings for the works proposed.

1.11 Cost Analysis of Different Works Under Biological Measures

1.11.1 Afforestation

Out of the total stock to be planted under afforestation, suitable percentage shall be tree species having medicinal values including appropriate percentage of fruit bearing wild species useful to wildlife shall also be planted. The cost analysis per hectare of afforestation, with five strands barbed wire fencing stretched across RCC fence posts inclusive of maintenance for ten years has been worked out. The rate analysis is as per labour wage per day with annual enhancement as per sanctioned schedule for forestry works and for other works as per present schedule of rate. The cost of materials has been adopted as per prevalent market rates. Plantation under normal afforestation component shall be carried through identified user groups in catchment area. Plantations will be maintained for five years.

The cost of works under normal afforestation component encompassing the free draining catchment area of the project has been assessed as Rs. 48.60 lakh. Cost Estimate for Afforestation Measures @ Rs 270000/ha. The details are as described below

Total Area 18.00 ha

Year wise cost forecasted for raising Compensatory Afforestation Plantation

Cost in Rupees

Year	Cost/Ha	Total Cost for 18.00 ha	Remarks
1	1,00,000.00	18,00,000.00	Planting and 1st Year
2	60,000.00	10,80,000.00	2nd Year Maintenance
3	40,000.00	7,20,000.00	3rd Year Maintenance
4	10,000.00	1,08,000.00	4th Year Maintenance
5	10,000.00	1,08,000.00	5th Year Maintenance
6	10,000.00	1,08,000.00	6th Year Maintenance
7	10,000.00	1,08.000.00	7th Year Maintenance
8	10,000.00	1,08,000.00	8th Year Maintenance
9	10,000.00	1,08,000.00	9th Year Maintenance
10	10,000.00	1,08,000.00	10th Year Maintenance
Total	2,70,000.00	48,60,000.00	

1.11.2 Enrichment Plantation

The cost analysis of enrichment plantation per hectare with appropriate species of plants and protection of thorny bushes / twigs for individual plant, with maintenance cost was assessed .The cost of works under enrichment plantation for the free draining catchment area of the project was also got assessed if required to be undertaken. The cost of material is as per prevalent market rates and incorporated under item 1.11.1.

1.11.3 High Density Energy Plantation

The cost analysis of high density energy plantation per hectare with plantation of appropriate species of plants, with five strand barbed wire fencing stretched across RCC fence posts, was assessed . The cost of works under high-density energy plantation for each of the SWS forest, encompassing the free draining catchment area of the project, was also got assessed if required to be undertaken. Cost Estimate for High Density Energy Plantation has also been incorporated under item 1.11.1.

1.11.4 Pasture Reclamation

The pasture reclamation by rotational closure with live hedge fencing, sodding with local grass and legume plants inclusive of maintenance has also been proposed if required to be carried out. The cost of works under treatment of pastures for the free draining catchment area of the project has been assessed and suitably incorporated under item 1.11.1

1.11.5 Nursery Support

In the light of the fact that the CAT plan entails plantation over an large extent of area, a huge requirement of saplings / plants is comprehended. Such requirement shall have to be met out from the existing nurseries which are too inadequate to meet the requirement. Being a mountainous area the suitable sites for developing new nurseries are not too many. Besides, the free of cost saplings shall be distributed to the Joint Forest Management group for raising horticulture crops and private pasture development.

Availability of quality planting material well in time and near the areas where afforestation is to be undertaken, remains a major constraint in implementation of large scale afforestation. The existence of various hydroelectric projects/proposed, will certainly lead to the necessity establishment of decentralized nurseries through credit support. The Cost Estimates for Implementing Nursery Support is reckoned as Rs. 5.0 lakh.

Sl No	Item	Quantity	Rate	Amount (Rs)
1	LPG connection	20	2500	50000.00
2	Solar Cooker	20	800	16000.00
3	LED Bulbs (20x2x2)	80	80	6400.00
Total				72400.00
say				0.73 lakhs

1.12.1 Training and Extension Programme

There is a need to keep all members of the existing registered Forest Development Committee(s) at grass root level and committees to be constituted in other Pancahyat(s) and NGOs involved in programme implementation so that they can play an active role in implementation of the CAT plan by associating with the development work in their areas. For this purpose, people need to be trained in respect of different measures for habitat improvement by afforestation techniques, nursery development, pasture development, soil conservation and moisture retention works, horticulture development and agriculture practices in respect of land under the CAT plan with special thrust to local technique with the use of indigenous material without deteriorating ecology of the area. The technique of river-training work needs to be explained properly so that desired results are achieved. For this purpose, a training programme has to be properly devised and carried out at range office for which a provision of Rs. 0.30 lakh is being made. The activity is spread over two years.

1.12.2 Provision for Mobilizing User Groups

Based on the ground truth reality in each of the Forest Development Committee(s) at grass root level or Society falling under the different sub-watersheds, mobilizing the user groups will be of utmost importance to involve them in afforestation and other agreed activities of the CAT Plan. For this purpose, a provision of Rs. 0.20 lakh is being made. The activity is designed to be accomplished within one year.

1.12.3 Funds for Educational Activities related to Medicinal Plant Sector

A provision of Rs. 0.20 lakh is earmarked for various conservation and educational activities related to medicinal plant sector. This activity is planned to be spread over two years.

1.12.4 Development of Eco-tourism

Trekking routes with camping facilities can help to boost eco-tourism in the area. Concept of "Homesteads" can be promoted. Such host families who are enterprising and having reasonable traditional accommodation in the Panchayat en-route to good eco-treks can accommodate tourists on payment basis. Such financial support to rural people can boost the activity. Involvement of local youths can provide self-employment services like guides, porters, and making arrangements for boarding and lodging of eco-tourists. The poor families can earn wages by pottering or other small works. Ecotourism societies can be formulated under the overall control of the special purpose vehicle (SPV) arrangement for anchoring the eco-tourism activities. There exists scope for eco-tourism in the area where tourists can see its wild virgin and pristine glory and catching the everlasting enthralling moments in their mind while enjoying and learning the nature. Therefore, a provision of Rs 0.45 lac is made on this as there are existing activities in place and is planned to be completed within four years

1.12.5 Provision for Floristic Survey and Forestry Research

Though a provision has been made in environment monitoring plan for ecosystem monitoring including environmental studies during construction and post constructional stages respectively, an additional provision of Rs 0.25 lakh is made for carrying out floristic survey of the area after complete implementation of CAT Plan, i.e., immediately after the fifth year of maintenance. This activity is planned to be completed within two years

1.12.6 Capacity Building

Since the effectiveness of the biological and engineering measures and their proper implementation will depend on the understanding and preparedness of the forest staff. It is important that the Forest Department makes efforts to sensitize the staff on implementation and management of plantation issues, soil conservation, flood protection works and also provide guidance and encourage them to build requisite capacities. Capacity building can be achieved through training programmes for which a provision of Rs. 0.20 lakh has been made in the plan. This activity is to be completed within one year

1.13 Institutional Mechanism

1.13.1 Role of Project Proponent

The forest department would implement the Catchment Area Treatment Plan. A joint inspection group is suggested that would include officers drawn from State Forest Department of and officials from the Environment Management Unit / Office of the Project Manager of the project , KSEBL. The management will have liaison with the forest officials. As far as the financial disbursement to undertake activity involvement of various stake holders and collaborative public participation should be encouraged to have transparency in the system.

1.13.2 CAT Implementation

The designated Environmental Officer of KSEBL would coordinate with the forest department for the implementation of the proposed Plan. The Environment Officer would evaluate/monitor financial aspects. The modalities of financial disbursement would be the responsibility of Forest Department as the Cost of CAT Plan is remitted by KSEBL to CAMPA account. The implementation of CAT Plan should have enough flexibility and should be subject to changes as per requirements of specific ecosystem and periodic gains. A monitoring committee as per the MoEF&CC guidelines if required.

1.13.3 Project Monitoring and Reporting Procedures

It is suggested that meetings may be held every three months to resolve problems arising in plan implementation. A Joint committee may be formed with the representatives of KSEBL and State Forest Department; the team members must ensure implementation and monitoring of the CAT works and review the progress from time to time. In addition, the work done may be published through public awareness campaigns. Visual and print media may be also be used to gain maximum benefit by beneficiaries. Such efforts would resolve conflicts which otherwise are potential sources for project delays.

1.14 Summary of Cost of Works

The cost of all works proposed in the CAT plan is enumerated in Table below

Cost Estimate of CAT Plan

S. No.	Particulars	TARGET	
		Physical	Amount (Rs. In Lac)
1.	*Habitat treatment works under free draining catchment* *Biological Measures*		
(a)	Normal afforestation/Enrichment Plantation/High Density energy plantation/Pasture reclamation as appropriate (18 ha @ Rs. 270000/ ha)	18 ha	48.60
(b)	Nursery support		5.00
	Sub- total (1)		53.60
2.	*Engineering Measures*		
(a)	Brush wood check dams	10 Nos	6.30
(b)	Staggered trenching	2 ha	1.05
	Sub- total (2)		7.35
3.	Fuel wood saving devices	20 households	0.73
4.	Training and Extension Programme	30 days	0.40
5.	Mobilizing user groups	20 days	0.30
6.	Funds for Educational activities related to medicinal plant sector	15 days	0.30
7.	Development of Eco-tourism	120 days	0.45
8.	Provision for floristic survey and forestry research	20 days	0.35
10.	Capacity building	30 days	0.30
	Sub- total (3)		2.83
	Grand Total		63.78
	Say Rs. 63.78 lac		

DIVISIONAL FOREST OFFICER
MUNNAR DIVISION
DEVIKULAM

Project Manager
Sengulam Augmentation Scheme
KSEB Ltd., Anachal.
PIN-685565

1.15 Year wise physical & financial targets of treatment measures for CAT Plan

Sl No	Treatment Measures	Year 1		Year 11		Year III		Year IV		Year V		Year VI		Year VII		Year VIII		YearIX		Year X		TOTAL	
		Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	Phy	Fin	PHY	FIN
1	**Biological Measures**																						
a	Normal Afforestation / Enrichment Plantation / High Density Energy Plantation / Pasture Reclamation	18 ha	18.00		10.80		7.20		1.80		1.80		1.80		1.80		1.80		1.80		1.80	18 ha	48.60
b	Nursery Support		1.00		1.00		1.00		1.00		1.00												5.00
2	**Engineering Measures**																						
a	Brush Wood Check Dams	10 Nos	6.00		0.15		0.15															10 Nos	6.30
b	Contour Bunding /Staggered trenching	2 ha	1.00		0.025		0.025															2 Ha	1.05
	Other Components																						
3	Fuel Wood saving devices	20 house holds	0.69				0.04															20 Nos	0.73
4	Training and Extension Programme				0.20		0.20																0.40
5	Mobilizing User Groups				0.15		0.15																0.30
6	Funds for Educational activities related to medicinal plant sector				0.20		0.10																0.30
7	Development of Eco-Tourism				0.20		0.15		0.05		0.05												0.45
8	Provision for floristic Survey & forestry research								0.20				0.15										0.35
9	Capacity Building				0.15		0.15																0.30
	Total		26.69		12.875		9.165		3.05		2.85		1.95		1.80		1.80		1.80		1.80		63.78

Project Manager
Sengulam Augmentation Scheme
KSEB Ltd., Anachal,
PIN-685565

Approved

DIVISIONAL FOREST OFFICER
MUNNAR DIVISION
DEVIKULAM

Chief Conservator of Forests
High Range Circle, Kottayam

'5189007/2021/OS-F&WL

1095

GEORGI P. MATHACHEN IFS
Chief Conservator of Forests

Office of the Chief Conservator of Forests
High Range Circle, Kottayam- 686 006
☎ 0481 2312448 (O)
FAX 0481 2312591
ccf-hrc.for@kerala.gov.in

Dated : 20.05.2021

No. C5-4286/2016

To

The Principal Chief Conservator of Forests (FM) &
Nodal Officer, F(C) Act 1980
Thiruvananthapuram

Sir,

Sub:- KFD – Munnar Division-F(C) Act 1980- Diversion of forest land for Upper Sengulam Small Hydro Electric Project – Stage I clearance- NPV, CAT Plan cost remitted by the user agency- reg

Ref:- (1) F. No. 4-KLB 1188/2019-BAN/1238 dated 26.11.2019 of the MoEF & CC, Regional Office (Southern Zone) Bangalore.
(2) That office file No. FC2-45617/2019.
(3) Letter No.L/M7-2820/2015 dated 23.04.2021 of the Divisional Forest Officer, Munnar.

3/6.

Kind attention is invited to the references cited. The User agency, KSEB Ltd has remitted an amount of Rs.68,73,425/- to the CAMPA account, Rs.4,95,425/- as NPV and Rs.63,78,000/- as the cost of implementation of CAT Plan for the forest land to be diverted under this proposal. KSEB Ltd has also furnished the undertaking agreeing to remit additional NPV, if any, for the diversion. The boundary of the forest land to be diverted is surveyed and demarcated. As such, the conditions (2), (3), (4) and (5) laid in the stage I clearance (ref: 1), are fulfilled. Copy of the chalan and undertaking are submitted herewith for kind further action.

1/6/21

2/6/21

Yours faithfully,

Chief Conservator of Forests
High Range Circle, Kottayam.

Encl: As above.

Copy to the Divisional Forest Officer, Munnar.

NEFT RTGS CHALLAN

AGENCY COPY

NEFT / RTGS CHALLAN for Ad-HOC CAMPA

Date : 16-03-2021

Agency Name.	KERALA STATE ELECTRICITY BOARD LTD
Application No.	5615833465
MoEF/SG File No.	NO.4-KLB1188/2019-BAN
Location.	KERALA
Address.	office of the Chief Engineer, Civil , Investigation & Planning, 2nd Floor,KSE Board Ltd, Vyhduthi Bhavanam, Pattom, ThiruvananthapuramThiruvananthapuram
Amount(in Rs)	6873425/-

Amount In Words :Sixty-Eight Lakh Seventy-Three Thousand Four Hundred and Twenty-Five Rupees Only

NEFT/RTGS to be made as per following details;

Beneficiary Name:	KERALA CAMPA
IFSC Code:	CORP0000371
Pay to Account No.	150745615833465 Valid only for this challan amount.
Bank Name & Address:	Corporation Bank Lodhi Complex Branch, Block 11,CGO Complex, Phase I, Lodhi Road, New Delhi -110003

- This Challan is strictly to be used for making payment to CAMPA by NEFT/RTGS only

BANK COPY

NEFT / RTGS CHALLAN for Ad-HOC CAMPA

Date : 16-03-2021

Agency Name.	KERALA STATE ELECTRICITY BOARD LTD
Application No.	5615833465
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- This Challan is strictly to be used for making payment to CAMPA by NEFT/RTGS only

After making successful payment, User Agencies may send a line of confirmation through Email: helpdeskcampa@corpbank.co.in

Print Back

Executive Engineer
Civil Circle, K.S.E.Board Ltd.
Kothamangalam

State Bank of India
Kothamangalam Town

Executive Engineer
Civil Circle, K.S.E.Board Ltd.
Kothamangalam

UTR No. SBINR52021041220516439 / Cheque No. 637270 / dt. 12/4/2021
Rs. 6873425/-

5189007/2021/OS-F&WL

भारतीय गैर न्यायिक

भारत

पचास रुपये

रु.50

FIFTY RUPEES

RS.50

सत्यमेव जयते

INDIA

INDIA NON JUDICIAL

കേരളം केरल KERALA

CB 155651

UNDER TAKING EXECUTED BY THE PROJECT MANAGER, UPPER SENGULAM HYDRO ELECTRIC PROJECT ON BEHALF OF KERALA STATE ELECTRICITY BOARD LTD BEFORE THE FOREST DEPARTMENT REGARDING THE ADDITIONAL AMOUNT OF NET PRESENT VALUE.

KERALA STATE ELECTRICITY BOARD LTD, the user agency for the diversion of 0.95 Ha of forest land in Kunjithanni Village in Munnar, Forest Division

Place: Anachal

Date: 19.04.2021

PROJECT MANGER

Project Manager
Sengulam Augmentation Scheme
KSEB Ltd., Anachal.
PIN-685565

No. 838 Rs. 50/-

Date 16/04/2021

ജി. ശ്രീധരൻപിള്ള
സ്റ്റാമ്പ് വെണ്ടർ
അടിമാലി

Project manager, KSEB Ltd Anachal

Sengulam Augmentation Scheme Chithirapuram

15 APR 2021

भारतीय गैर न्यायिक

भारत

पचास रुपये

FIFTY RUPEES

रु. 50

Rs. 50

सत्यमेव जयते

INDIA

INDIA NON JUDICIAL

കേരളം केरल KERALA

CB 155654

for the implementation of Upper Sengulam Hydro Electric Project has remitted an amount of Rs 4,95,425/- as Net Present Value of the land to be diverted as per the Letter No 1/M7-2820/2015 dated 27/2/2021 of Divisional Forest Officer, Munnar Division, Devikulam vide Challan application no 5615833465 dated 16.03.2021 in KERALA CAMPA Account.

Place: Anachal

Date: 19.04.2021

OFFICE OF THE PROJECT MANAGER K.S.E. BOARD CHITHIRAPURAM P.O. ANACHAL SENGULAM AUGMENTATION SCHEME

[illegible]

PROJECT MANGER

Project Manager
Sengulam Augmentation Scheme
KSEB Ltd., Anachal.
PIN-685565

No. 841 Rs. 50/-

Date 16/04/2021

ജി. ശ്രീധരൻപിള്ള
സ്റ്റാമ്പ് വെണ്ടർ
അടിമാലി

TREASURY ADIMALY

Project manager. KSEB Ltd Sengulam augmentation scheme, Chithirapuram, Anachal

5 APR 2021

5189007/2021/OS-F&WL

भारतीय गैर न्यायिक

भारत

पचास रुपये

रु. 50

FIFTY RUPEES

RS. 50

सत्यमेव जयते

INDIA

INDIA NON JUDICIAL

കേരളം केरल KERALA

CB 155653

The Project Manager Upper Sengulam HEP, on behalf of KSEBL hereby undertake that the additional amount of the Net Present Value (NPV) of the diverted land if any becoming due after revision of the same by the Honorable Supreme Court of India in future shall be remitted as and when charged by the State Government from the user agency.

Place: Anachal

Date: 19.04.2021

PROJECT MANGER

Project Manager
Sengulam Augmentation Scheme
KSEB Ltd., Anachal.
PIN-685565

ജി. ശ്രീധരൻപിള്ള
സ്റ്റാമ്പ് വെണ്ടർ
അടിമാലി

No. 840 Rs. 50/-

Date 16/04/2021

Project manager. K.S.E.B Ltd Sengulam