

**CATCHMENT AREA TREATMENT PLAN  
FOR  
ROURA-II HYDROELECTRIC PROJECT  
(20.00 MW)  
DISTRICT KINNAUR, HIMACHAL PRADESH**



**PROJECT PERIOD: 2012-13 TO 2021-22**


**TOTAL PROJECT COST RS. 4,01,87,400/-  
PROMOTER: -M/S ROURA NON CONVENTIONAL ENERGY PVT. LTD.**

**SEPTEMBER 2011**

**PREPARED BY : M/S KUT ENERGY (P) LIMITED**

For Roura Non Conventional Energy Pvt. Ltd.

*Jehadil*  
Authorized Signatory

  
Divisional Forest Officer,  
Kinnaur Forest Division,  
At Reckong Ped, (H.P.)

## REPORT ON CATCHMENT AREA OF YULLA KHAD/ RAURA KHAD

A site visit to the catchment of Roura II (20 MW) hydro electric project was undertaken on 21-07-2011 by the A.C.F. Kinnaur along with the field officers & project authorities. His findings are as under:

### Introduction:

The catchment of Raura/ Yulla khad falls in Kalpa Range/ Urni block of Kinnaur Forest Division. The entire catchment falls in the beats namely Runang and Urni of Urni Block.

The UF Yulla, C-252, DPF Shikamo (NC-32), DPF Bragdo NC-31, DPF Tharu (NC-28), DPF Rangle (NC-27), C-253, C-255 forms whole of the catchment of Yulla Khad (most of the compartments are the part of Protection Working Circle).

The track along with the way points is enclosed as Annexure-I. The way point no.184 is at an altitude of 2851m and is the point where weir structure has been proposed. Beyond this point UF Yulla and some portion of NC-27 & NC-28 forms the part of catchment.


### Vegetation:

*Pinus wallichiana*, *cedrus deodara*, *Abies pindrow*, *Picea smithiana*, *Acer japonicum*, *Celtis australis*, *Fraxinus Sp.*, *Pinus gerardiana*, *Quercus leucotrychophora*, *Taxus baccata*, *Principia utilis*, *Artemisia maritima* *Artemisia vestita* & *Daphne oleoides* etc.

### Observation:

1. The area above diversion site (beyond 2851m) is snow bound and steep and does not require interventions.
2. All other plantations to be carried out in the forest area adjoining habitations which are downstream of the proposed weir viz. NC-31 (DPF Bragdo), DPF Shikamo (NC-32), C-252, C-253, C-255 which are relatively more depleted due to their proximity to habitations.
3. There is no scope for Soil Conservation works above the proposed weir structure (up stream), since the area is well stocked on either side of the Nallah with ground flora and grasses besides tree species.  
Moreover the slope is steep and altitude is very high and any kind of engineering structures are not recommended.
4. Since there is not much scope of the works to be done above weir structure (Altitude- 2851m), it is reasonable to divert funds in the CAT Plan of Roura- II HEP for the works downstream.
5. List of activities already undertaken in the area is as under:

S.No.	Soil Conservation Works	Plantations under C.A. (Ha.)	Plantation under NIPCCAT Plan (Ha.)	Pasture Development (Ha.)
1	C-248 (a) Runag Slip	UF Meeru (5ha.)	C-251 (5 ha.)	Runang (5ha.)
2	Runang Slip Ist.	UF Meeru (5ha.)	Chulling (5 ha.)	Runang (5ha.)
3	Runang Slip IInd	UF Runang (5ha.)	Rangle (4 ha.)	
4	Runang Nallah Ist	UF Yeshudhar (5ha.)	UF Runang (5 ha.)	
5	Runang Nallah IInd		UF Runang (5ha)	
6	Tilchuka Slip			
7	Surchodhar Slip			
8	Bijarmang Slip			
9	Chesido Nallah			
10	Kumfingrah Nallah			
11	Cholling Nallah			
12	Hango Slip			
13	Raglo Slip			
14	Bakshang Slip			
	Total	20 Hectares	24 Hectares	16 Hectares

  
 Divisional Forest Officer  
 K. J. K. Forest Division  
 Kollam, Kerala  
 Kollam-686 002



Route :- From Yulla village to the site of Weir dam proposed.

Divisional Forest Officer  
Kinnaur Forest Division,  
At Reckong Pao, (H.P.)



**LIST OF ABBREVIATIONS USED**

BOOT	BUILD OWN OPERATE AND TRANSFER
DPF	DEMARCATED PROTECTED FOREST
UPF	UNCLASSED PROTECTED FOREST
NC	NEW COMPARTMENT
CWP	CIVIL WRIT PETITION
HEP	HYDRO ELECTRIC PROJECT
TD	TIMBER DISTRIBUTION
PES	PAYMENT FOR ENVIRONMENTAL SERVICES
GOHP	GOVERNMENT OF HIMACHAL PRADESH
GIS	GEOGRAPHIC INFORMATION SYSTEM
SYI	SILT YIELD INDEX
NTFPS	NON TIMBER FOREST PRODUCES
FRH	FOREST REST HOUSE
I PATHS	INSPECTION PATHS
B PATHS	BRIDDLE PATH
VFDS	VILLAGE FOREST DEVELOPMENT SOCIETIES
M F P	MINOR FOREST PRODUCE
GPS	GLOBAL POSITIONING SYSTEM
PDA	PERSONAL DIGITAL ASSISTANCE
LTEM	LONG TERM ECOLOGICAL MONITORING SYSTEM
LPG	LIQUID PETROLEUM GAS
PCB	POLLUTION CONTROL BOARD
GOI	GOVERNMENT OF INDIA
JFM	JOINT FOREST MANAGEMENT
IGA	INCOME GENERATION ACTIVITIES
PES	PAYMENT OF ENVIRONMENTAL SERVICES
CBO	COMMUNITY BASED ORGANISATION
UF	UNCLASSED FOREST
B L	BROAD LEAVES
IUCN	INTERNATIONAL UNION FOR CONSERAVTION OF NATURE
VFDC	VILLAGE FOREST DEVELOPMENT COMITTEE
ETF	ECO TASK FORCE
TA	TERRITORIAL ARMY
CAMPA	COMPENSATORY AFFORESTATION FUND MANAGEMENT AND PLANNING
CA	COMPENSATORY AFFORESTATION
NPV	NET PRESENT VALUE
CEC	CENTRAL EMPOWERED COMMITTEE
MOEF	MINISTRY OF ENVIRONMENT AND FOREST
APO	ANNULA PLAN OF OPERATION
PWD	PUBLIC WORKS DEPARTMENT

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### PREFACE

The CAT Plan for Roura II HEP (20 MW) has been prepared keeping in view the general requirement of the Catchment Area, to stabilize the area and to reduce the silt load. However, the detailed planning and micro-planning is required before actual execution of work in consultation with the local people/ communities/ committees to ensure mutually agreed type of work and its scheduling.

Moreover, a comprehensive Catchment Area Treatment Plan for Satluj Basin has been prepared by the H.P. Forest Department through Consultant, which will be approved finally and the prescription prescribed in this CAT Plan will have to be necessarily revised to fit in the prescription of the comprehensive CAT Plan. Therefore, an amount of Rs.20,09,400/- has been kept for the revision/ site specific micro-planning.

Minor changes in this CAT Plan (inter component or across the plan can be made with the concurrence of Pr.CCF.H.P. and within overall ceiling of the amount, for which this CAT Plan has been prepared.

The total catchment area is 49.6 Sqkm. out of which about 16.37 Sqkm. area lies under permanent snow cover. Virtually there is no catchment area above the proposed HEP which requires treatment. However, area down below and adjoining to the Project needs to be treated and accordingly an area identified for treatment is 120 hectare. Approximately which comes to about 2.4 percent of the total catchment area. The area proposed for treatment is less because out of total catchment area of 4960 hectare., 1637 hectare. is under snow cover. As per land use pattern 314 hectare is in Pasture Land, 870 hectare is rocky and barren which cannot sustain any vegetation. Thus, leaving balance effective area for treatment is only 120 hectare.

As it is evident from the visits to the catchment area, forest records, conversation with the local forest officers & local



inhabitants of the area, the catchment area of the project is well stocked & covered under the green cover and hence needs no intervention under this CAT Plan. The fact has also been verified by Divisional Forest Officer, Kinnaur who has also undertaken survey of the area and his report to this effect is also enclosed with the CAT Plan.

As per the new guide lines 20% of the total cost of the project is earmarked for afforestation measures and 25% for soil and water conservation measures .In view of this 45% of the total project cost is being allocated for these works ,where in afforestation is 17% and soil conservation is 28%

The project developer, after consulting the local forest officers, have identified the areas close to the project area which require treatment and are under pressure due to such practices adopted by the inhabitants of the area.. Most of these areas fall below the catchment area of the project and are depicted on the topo sheet.

Further to the above arrangements, a provision for the flexibility in implementation of the CAT Plan is proposed and the scheme of arrangements, implementing authority & approving authority has been defined.

The size of the CAT Plan is to the tune of Rs.4.02 crore.

**UNDERTAKING**

I, Navneet Chadda Authorized signatory of M/s Roura Non Conventional Energy Pvt. Ltd. S.C.O. 140-141, Sector 34-A, Chandigarh, hereby confirm that CAT Plan of Roura-II HEP (20MW) with an outlay of Rs. 40187400/- has been prepared on the basis of the Total Project cost of Rs. 159.2 Crores (One Hundred Fifty Nine Crores & Twenty Lacs Only) as per TEC (Techno Economic Clearance).

The CAT Plan document has been brought out strictly in accordance with the latest guidelines issued for preparation of CAT Plan by GoHP department of Forests


I hereby also confirm that in the event of the increase in total project cost in TEC then the CAT Plan outlay shall be enhanced accordingly to match the consolidated CAT Plan and differential amount of the CAT Plan outlay will be paid by us as and when demanded by the H.P. Forest Department.

Dated: 10/10/2011

Rampur

For M/s Roura Non Conventional Energy Pvt. Ltd.

For Roura Non Conventional Energy Pvt. Ltd.

  
Authorized Signatory  
(Navneet Chadda)  
Authorized Signatory  
S.C.O. 140-141, Sector 34-A, Chandigarh.

### INTRODUCTION

The life of a hydro electric project primarily depends on the rate of soil erosion in the catchment area of the project, its transportation and deposition in the reservoir. Soil erosion occurs due to number of non biotic and biotic factors like, topography of the catchment, soil characteristics, meteorological conditions such as precipitation and its intensity in the form of rainfall and snow fall and its types. It is therefore imperative to control one or more of the most crucial contributors of the factors triggering soil erosion, which will enhance the life of a reservoir. Being environment friendly source of energy, Govt. of India / govt. of Himachal Pradesh has encouraged participation of private sector in a big way, with renewed set of incentives for its exploitation.

The total installed capacity of thermal, Hydel, nuclear and gas power projects in India, as on 31<sup>st</sup> March 2007 is about 1,32,329 MW. The Northern region, comprising of Chandigarh, Delhi, Haryana, Himachal Pradesh, Jammu & Kashmir, Punjab, Rajasthan and Uttar Pradesh, accounts for about 36,359 MW of power. Being a developing country with growing power and energy requirements, the country is experiencing energy shortfall. The untapped hydroelectric potential of Himachal Pradesh provides excellent opportunities for power generation to bridge the gap between demand and supply of power in the Northern Region.

In Himachal Pradesh many small, medium and large hydroelectric projects have been taken up to tap the hydroelectric potential of the state. It also provides excellent opportunities for power generation to bridge the gap between demand and supply of power in the state. The electric power being a vital and essential infrastructure has a significant role to play in economic development and upliftment of people. The state has 21000 MW identified hydroelectric potential, out of which 6370 MW potential had been harnessed so far. Himachal Pradesh has five river basins, which provide an ample scope for development of Hydro power potential. Out of these five basins, Sutlej basin has the highest potential of about 9,227 MW of electricity.

The more the ecological balance is disturbed locally, through the destruction of the mangroves and globally through climatic change,



the more precarious the situation is bound to get. With the conservation perspective coming in to the frame over the past few decades, some of these issues have become more important. Mass movement of land, glacial erosion, monsoon related slides and large cloud bursts are also common phenomena in the tract. Since it is geologically very fragile and seismologically active, it is therefore, imperative to have a well designed plan to address these issues.

One of the essential requirements of Hydro Electric Power generation is the study of availability of water flow with elevation ascertained, dam may be proposed with appropriate design to harness the energy of flow of water. The life of dam is directly affected by the role of siltation, which is major threat to the utility of dam. The siltation is primarily dependent on the physical and biological condition of the catchment area of the project. The more productive is the catchment area, the lesser will be the quantity of silt flowing in to the dam site. The productivity of the catchment area is indicated by the land use pattern and extent of vegetation cover. Therefore, the forest plays the vital role in conserving the water resources.

In view of these facts M/s Roura Non Conventional Energy (P) Ltd. has formulated the CAT Plan for Roura HEP in Kinnaur District in HP. A number of Nallahs join Roura Khad upto its confluence with river satluj, just upstream of Cholling village in Meeru-Yulla valley in District Kinnaur. Hydro Electricity is a clean and renewal resource of energy. With the increase in population in the catchment area, pressure on the forest has also increased many folds. Similarly, the cattle population has also increased many times and has affected the grazing grounds and forests badly. Vast forest cover are being degraded due to excessive exercise of rights by the local people formatting the demands of fuelwood and timber and due to many other developmental activities like construction of roads etc. Improper land use and water management are also factors responsible for denudation. This is leading to break down of the natural equilibrium of the fragile mountain eco system. Lack of vegetal cover is the single largest factor contributing to the land degradation.

With the coming up of the HEP at Meeru, it has become essential that the catchment area be properly treated so that, the silt load in the Roura khad gets reduced. Like many other developmental activities, these

projects while providing planned benefits, could also lead to variety of adverse environmental impacts. It is therefore essential to have proper management of environment so as to maintain the ecological balance in the tract. The Yulla - Meeru valley is endowed with enchanting beauty in its picturesque snow clad peaks, traversing through meadows, where wide flora and fauna, clear blue sky, numerous tracking path and rich cultural heritage of local people are visible. Therefore there is scope of development of Eco tourism.

Various factors affecting the erosion are soil characteristics, meteorological condition, such as annual precipitation, snowfall, intensity of precipitation, wind velocity, exposure condition such as extent & type of vegetative cover & type of the catchment. Controlling one or more factors responsible for erosion as mentioned above can control the process of erosion. The catchment of Roura khad is very steep ground. The slopes where rainfall/ snow fall are the prime factors responsible for erosion, which is severe down below to the extent that the mass movement of soil (land slide) is very common phenomenon. Providing vegetal cover will have two fold effect in erosion control, the first is that it improves the soil matrix through reinforcing and second is that it reduces the intensity of run off. Breaking of slopes through the Bio engineering & civil works like construction of check wall, check dams, retaining wall etc discontinue the slops & prevent mass movement of soil.

As it is evident from the visits to the catchment area, forest records, conversation with the local forest officers & local inhabitants of the area, the catchment area of the project is well stocked & covered under the green cover and hence needs no intervention under this CAT Plan. However due to statutory compulsions, the project developer is bound to make a CAT Plan & carry out the works in the area

**CHAPTER-I****General Description of the Tract****1.1 Name and Location**

Govt. of Himachal Pradesh has entrusted the task of implementation of self identified Roura-II (20 MW) Small hydroelectric project to **M/S. Roura Non Conventional Energy (P) Ltd.**, in the private sector on Build, own, operate and transfer (BOOT) basis.

The Roura-II Small Hydro Electric Project is a runoff the river scheme on Roura Khad, a tributary of Sutlej River in Distt. Kinnaur, H.P. It originates from the snow-capped mountains at an elevation of  $\pm 4500$  mtr and joins the Sutlej River on its right bank at an elevation of  $\pm 1650$  mtr near Chowling bridge in Kinnaur district. The project is located near Yula village, Kinnaur district about 100 Kms. from Rampur Bushahr, Distt. Shimla, H.P. The total length of the khad is about 12 Kms. from its origin to its confluence with Sutlej river and has a total catchment area of about 95.63 Sqkm. The Roura Khad flows in South-East direction till its confluence with Sutlej River at Chowling.

The total catchment area of Roura-II Small hydro electric project diversion site is 49.6 Sq. Km. at an elevation of 2800 mtrs above the mean sea level out of which about 16.37 Sq km lies under permanent snow cover. The permanent snow line is considered as contour line at 4200 mtr. The scheme is located between longitude  $78^{\circ} 9' 4''$  and  $78^{\circ} 8' 22''$  E and latitude  $31^{\circ} 33' 29''$  N and  $31^{\circ} 32' 23''$ . Topo sheet Survey of India No.53 I /2 covers the catchment area.



The entire catchment is sparsely populated because of steep slopping mountain ranges, remote location, inaccessibility and lack of communication network. Roura khad does not support any aquatic life. The scheme shall also not endanger the flora and fauna species in and around the area. No ecological disturbance or backlashes are anticipated that could upset the existing ecological balance in the project area.

### 1.2 Topography and Drainage:

The terrain of the catchment area is mainly mountainous, which can be described as steep to very steep with precipitous slopes. A flat U-shaped valley characterizes the area. It indicates the glacial movement along the valley. The whole area drains into river Sutlej. The terrain is mostly rocky with little rock exposure on both the bank of the Khad. There are few streams which are cutting the rocky terrain and the shapes are almost vertical (60° -90°) at most of the places. In downstream the valley becomes narrow at places showing the cessation of the glacial movements.

### 1.3 Geology and Rock:

The known geological formations in the tract are followings: -

1.	Pre Cambrian	Schistis, gneissos, granites, quartzites (Vaikrita system)
2.	Late Pre Cambrian	Haimanta System-phyllites, quartzites conglomerates, shales and slates.
3.	Silurian	Coral limestone, Quartzites.
4.	Carboniferous	Quartzites and limestones.
5.	Triassic Rhaetic	Limestone, Shales, dolomites etc.
6.	Recent sub-recent	Soils.

The important rock formation in the forest areas are gneisses, schist, phyllites, granites and quartzite's metamorphosed schists occurring principally in the western portion of the Sutlej valley. In the Wanger Gad, there is an outcrop of greenish quartzite which rapidly assumes a gneissic structure. Extensive outcrop of "Granitoid gneiss" are seen beyond Wangtoo along the Hindustan Tibet Road, to this rock type the name "Wangtoo gneiss" is given. Proterozoic rock of Jeori-Wangtoo and Banded Gneissic complex of Rampur, Chail and Jatogh Groups are found in the region. The area lies in the Precambrian-Jeori-Wangtoo Granitoids gneissic complex of the lesser Himalayas. Tectonic plane called Main Central Thrust is extensively developed through out the region though it is not encountered any where in the project area.

#### 1.4 Climate & Rainfall:

The climate of the project area is characterized by the scanty monsoon and falls under climatic Zone-III, classified as arid mountain climate. The precipitation is mostly in form of snow during winter months which can be described as moderate to heavy depending on the altitude. The table showing the average rainfall and snowfall experienced in Nichar Tehsil is given as under:-

##### a) Yearly rainfall data

Name of Tehsil	Year	Rainfall in mm
NICHAR	2000	84.05
	2001	35.49
	2002	55.40
	2003	301.20
	2004	390.89

## b) Monthly rainfall &amp; snowfall data

Name of Tehsil	Months	Rainfall in mm	Snowfall in cm
NICHAR	January	7.05	4.9
	February	11.2	0
	March	2.5	0
	April	41.9	0
	May	94.74	0
	June	29.2	0
	July	43.6	0
	August	97.8	0
	September	17.6	0
	October	27.5	0
	November	5.8	0
	December	12.0	0

## 1.5 Temperature and Humidity:

Data in respect of temperature & humidity is not available. The four seasons are well-defined, the spring (Mid-March up to Mid June) is characterized by frequent showers.

The summer season may be described from mid June to mid September. Intense heat prevails along the banks of Sutlej probably because of large bare rocks and vegetations. The temperature as well as humidity is moderate in the forest belt. The monsoon usually breakup around mid July and continue up to mid-September.

The autumn (mid September up to mid December) is very clear and fine, but dry winds are common with frost at height 7000 ft.



elevation. Owing to increased aridity, the danger of fire is also increased. Snowfall may take place towards the end of the season. The winters last from mid December up to mid March. A lot of frost and heavy falls of snow occur snow may descend down to Sutlej but does not stay along. In the forest belt, the accumulation of snow is often great, but it quickly melts on southern aspects. The end of April, all but the high forests are cleared of snow.

#### 1.6 Land Use Pattern:

No specific land use survey has been carried out in the catchment area. The land use as per the record available has been tabulated for Kinnaur District, which is as under: -

Name of Area	Forest DPF (ha)	Non-Cropped land (ha)	Alpine Pasture (in ha)	Fallow & Grass land (ha)	Culturable Wasteland (ha)	Misc. area (ha)	Total Geographic area (ha)
District Kinnaur	12685	7971	352163	3753	9803	253825	640100

The land use pattern of the catchment area (4960 hectare) is summarized in Table 1

S. No.	Category	Total Area in ha.
1	Demarcated Protected Forest (DPF)	1205
2	Un-demarcated Protected Forest (UPF)	814
3	Culturable waste land	120
4	Pasture land	314
5	Rocky/ barren land	870
6	Area under permanent snow	1637
	<b>Total</b>	<b>4960</b>

## 1.8 Socio-Economic Profile

### Introduction

There are 2 Gram Panchayats namely Meeru and Yulia having 5 villages in an around the project area with a human population of 765 Nos. The animal population is 1412 Nos. Cow, Ox, goat and Sheep are kept by the local people for ploughing milk and meat purpose & the society of the project area comprises mostly of poor people and their main vocation is agriculture, horticulture, animal rearing etc. Horticultural activity is not encouraging due to non-accessibility of motorable road despite the fact that area is considered to be most suited for horticulture crops. The livestock and livelihood of the people depends upon rich natural resources of the area.

The Roura HEP project is being constructed in Roura Khad Catchment. This is a tributary of Satluj basin. The proposed project falls in Nichar Community Block. Random sampling survey has been conducted to study a Socio – Economy of the catchment area. The Secondary & Primary Data collected during the field investigation revealed that the catchment area have general slope ranging from 35% to 85%. The farmers invariably practice mixed farming comprising of horticulture, agriculture, vegetable cultivation and animal husbandry. About less than 5% population of the catchment area has assured irrigation. Farming, therefore, is mostly rain fed. The manures, both chemical as well as organic are applied in insufficient quantities mainly due to lack of purchasing power of the farmers, non-availability of sufficient quantity of organic manure and insufficient soil moisture during the crop growth period.

Rainfall occurs during the monsoon season, therefore, efforts to conserve as much as water is essential. This can be achieved by making liberal use of organic manure & practicing organic farming. This will improve the physical property of the soil thereby improving

the water holding capacity of the soil which will result in more retention of rain water. Which, in turn will lead to reduction in run off losses and thereby reducing silt load in the Roura Khad.

It was also noticed during the field survey that the farmers are growing the field crops on slopy land and cultivation is being done in some places across the contours having slope more than 35 to 40 degree. In order to conserve the rain water in situ, such lands need to be terraced. In the catchment area it is proposed that the farmers should resort to conservation type of farming instead of soil depleting farming process.

The livestock population in the catchment is invariably very high which has put unbearable pressure on the land holding, pasture land and forest land.

The availability of fodder both green as well as dry is less than 50% which leads to pressure on grazing on forest land. The farmers while meeting the need of fodder from the adjoining forest resort to, indiscriminate lopping and felling of trees which has resulted in reduction of forest cover. Over grazing also leads to soil erosion in the tract it is therefore suggested to resort stall feeding. The excessive population of livestock in the catchment area has led to under feeding, malnutrition and insufficient health care of animals. It has resulted into infertility in cattle and farmers abandoned such animals which are causing the stray cattle menace. It is therefore suggested that Gosadans (cattle sheds) are required to be established.

#### **1.9 Demographic Profile of the catchment**

According to the 2001 census of Kinnaur district the total human population is 77007 with 40878 male and 36129 females and sex ratio is 851 female per 1000 males. The density per sqkm is 12 persons. The low density of population is on account of the difficult hills terrain and severe climatic condition in the Kinnaur district.



**Human population of the catchment**

Human population of the catchment area is as under: -

Sr. No.	District	Tehsil	Panchayat	Village	No. of House Hold	Human Population		G. Total
						SC	ST	
1	Kinnaur	Nichar	Meeru	Meeru Khas	137	453	16	469
2	Kinnaur	Nichar	Meeru	Ghumarunang	13	27	2	29
3	Kinnaur	Nichar	Meeru	Chowling	18	39	3	42
4	Kinnaur	Nichar	Yula	Rulang	24	96	6	102
5	Kinnaur	Nichar	Yula	Yula Khas	40	112	11	123
Total:-					232	727	38	765

Total Male 469 No. &amp; Female Population 296

Professional Profile-Employed 121, unemployed 644

**Literacy Profile**

Education Level	No.
Below Matriculation	345
Matriculation, Senior Secondary	324
Graduates	84
Post graduates	12
	765

**Live stock population of the catchment**

Sr. No.	Panchayat	Village	Cattle Population							Total
			Cow	OX	Sheep	Goat	Horse	Donkey	Others	
1	Meeru	Meeru Khas	54	27	18	267	8	3	6	383
2	Meeru	Ghumarunang	69	12	34	123	5	6	2	251
3	Meeru	Chowling	14	3	67	176	7	8	1	276
4	Yula	Runang	6	1	98	213	12	5	6	341
5	Yula	Yula Khas	3	1	90	59	6	1	1	161
			146	44	307	838	38	23	16	1412

## CHAPTER-II

### Present Position of Flora And Fauna

#### 2.1 Forest and Forestry in the Catchment Area

Forest in Himachal Pradesh covers an area of 35,407 sq km. and form about two third of the total geographical area of the state. Due to wide range of altitudes and climatic conditions, several varieties of vegetations form Himalayan meadows to tropical shrub and bamboos forest on low foothills are found in the state.

Forests, apart from being an important source of timber, have other, equally perhaps more important function to perform viz:-

i) Maintenance of ecological balance.

ii) Maintaining the capacity of multi-purpose river valley projects & reservoirs leading to high electricity generation and increasing the life of the projects.

iii) Production of fodder for livestock.

iv) Production of fuel wood for the use of local people.

v) Improvement of water retention capacity leading to more water for drinking & irrigation during dry months.

vi) Reduction of soil loss due to various types of erosion. Indirect reduction of crop losses in down stream areas due to flooding & silting.

According to the National Forest Policy, 66% area in the hills should be covered under forests, but in catchment area the forest cover is hardly 8%. In the catchment area the scope of Afforestation are limited by the fact that the upper reaches of the catchment remain under permanent snow and is under Alpine pasture & other harsh topographical conditions. However, in the areas where the forests have degraded in the past or where tree growth is possible, it has been proposed to carry out plantations in such area. Preference has been given to the to Chilgoza & Deodar plantations keeping in view the site conditions & suitability for raising these species.

## 2.2 Forest Types

With the variation in altitude and aspect, composition & condition of the forest varies a great deal giving rise to various forest types. The forests of Raura falls in climatic zone of dry zone. The forests has been classified into different vegetation types according to "A revised survey of the forest type of India" by H G Champion and S K Seth, the following types are met within the catchment area as follows:-

### Group-13

- C1 Dry broad leaved & coniferous forest.
- C-2(a) Neoza pine forest(Pinus gerardiana)
- C-2(b) Dry Deodar Forest(Cedrus deodara)
- C-4 West Himalayan high level dry blue pine forest.

### Group-15

C-1 Betula/ scrub forest

C-3 Alpine pasture

### Group-16

C-1 Dry alpine scrub

### Type 13-C-1 Dry Broad leaved and coniferous forest (Quercuslex. P. gerardiana):

This type occur between 2000 mtr to 2400 mtr extending 300 mtr lower on cool aspects and 300 mtr high southerly exposures. Upper storey consists of Pinus gerardiana, Cedrus deodara, Quercus, ilex, Acer pictum etc. the common shrubs are Artemisia maritime, A.vulgaris, Daphane oleoides & Lonicera angustifolia etc.

### Type 13-C-2a Neoza pine forest (P.gerardiana):

Neoza pine replaces chil pine near Wangtoo and continues along the Sutlej as par Kanarm. Nearly pure crops locally



mixed with some Deodar are seen. The forest being open a great deal of the surface is bare. These are much frequented by men for the collection of the Neoza seed which has got a ready market. Upper storey consists of *Pinus gerardiana* and occasional *Cedrus deodara*. In the second storey *Fraxinus xanthoxyloides* is common. Among the shrubs *Artemisia martima*, *Daphene oleoides*, *Ephedra gerardiana* & *Ionicera hypoleuca* are common.

**Type 13-C-2b-Dry Deodar Forest:**

This type of forest is confined to Kalpa and a part of Kilba Ranges. The forest lies between 2100 mtr and 3250 mtr elevation. A nearly pure Coniferous forest, broad leaved trees beings confined to the moist ravines. It varies from the complete canopied forests to very open forests of low branching trees depending upon moisture factors. On drier situations it is found mixed with *Pinus gerardiana* but open mixed crops are common especially in the more and tracts where the pine extends much higher up the slopes. Blue pine is frequently present and may occur pure over limited areas, especially at the higher elevations.

**Type 15/c-3 Alpine Pasture:**

Extensive alpine pasture forms a characteristic feature of the tract above the trees line. The limit of their altitudinal distribution is between 3800 and 4550 mtrs., the upper limit extending even to the perpetual snowline. The slopes are usually gentle and bear a thick mat of alpine grasses. The large flocks of sheep and goats graze in these pasture May to September, the area remaining snow bound from November to mid April. The common herbs are *Primula spp.*, *Anemone spp.*, *Gentiana spp.*, *Jurinea spp.*, *Aconitum heterophyllum* etc. The common grasses are *Agrophron spp.*, *Brachypodium Sylyaticum*,

**Bromus, B. Japonicus Poa Spp., Dactylis spp., and Millium effusum etc.**

Broadly, the vegetation types of the State can be divided into tropical, sub-tropical, temperate and alpine vegetation and the vegetation of stony desert. The main forests in the State are dominated by oak, deodar and pine and in some areas the formations are of mixed type. *The Hon'ble Supreme Court of India in CWP No. 202/95 dated 28.03.2008 in T.N. Godavarman Thirumulpad versus Union of India & Others* held that 16 major forest types have been classified by Champion and Seth further grouped into 6 ecological classes depending upon their ecological functions as follows:-

- Eco-Class I--- Consisting of Tropical Wet Evergreen Forests, Tropical Semi Evergreen Forests and Tropical Moist Deciduous Forests.
- Eco-Class II--- Consisting of Littoral and Swamp Forests.
- Eco-Class III--- Consisting of Tropical Thorn Forests and Tropical Dry deciduous Forests.
- Eco-Class IV--- Consisting of Tropical Thorn Forests and Tropical Dry Evergreen Forests.
- Eco-Class V--- Consisting of Sub-Tropical Broad Leaved Hill Forests, Sub-Tropical Pine Forests and Sub Tropical Dry Evergreen Forests.
- Eco Class VI--- Consisting of Montane West Temperate Forests, Himalayan Moist Temperate Forests, Himalayan Dry Temperate Forests, Sub Alpine Forest, Moist Alpine Scrub and Dry Alpine Scrub.

Keeping in view of the above classification of forests the only eco-class V & VI falls in the catchments of the forest in and outside the protected area.

### 2.3 Flora & Fauna

The forest of the catchment comprises Deodar, Kail, Fir, Spruce, Pinus Girardiana, Betula utilis, oak, Ilex, Alders, Rhododendrons, Aesculus indica, Bird Cherry, Mapple, Juglans regia, Pyrus species, wild poplar, Salix, Alnus nitida etc. The under growth is Viola, Indigofera, Desmodium, Rubus spp. Sarcococca, Saligna, Viburnum, Berberis spp, Prinsepia utilis, Prunus Cornuta, and medicinal herbs like Dhoop, Karu, Patish, Bankakri, Hathpanja, and mushaq bala etc. are also found. The forest lies between the Elevation 2000 to 3900 mtr. above mean sea level. About 25% of the catchment area falls under the Alpine pasture. The Alpine pastures are great attraction to the local graziers only who have a right to graze their domestic cattle under the provision of forest settlement report, 1921.

#### Fauna

No major wildlife species are found in the catchment of the project area except common species and birds are found the catchment

**The main wildlife species found in the area are:-**

Mammals	Herbivores	Carnivores
1	Moschus moschiferus (Musk deer)	Panthera pardus (Leopard)
2	Naemorhedus goral (Goral)	Selenarctos thibetanus
3	Pseudois nayaur (Bharal)	Vulpes vulpes (Himalayan Fox)
4		Felis Chaus (Jungle CAT)



Pheasants and Birds	
1	Lophophorus impejanus (Himalayan Monal)
2	Lophura leucomelanos (Kaleej)
3	Alectoris Chukar (Chakor)

In addition to these, a number of reptiles, amphibians and small birds are found in the tract.

#### 2.4 Scope of the Study:-

The main objective of the present study is to plan measures for checking soil erosion thus decrease the silt load in the river channels and the reservoir of the proposed Roura-II Small HEP on Roura Khad a tributary of Sutlej river. Catchment area treatment (CAT) plan is an important document, which portrays the ecological health of the catchment area, sustained use of natural resources, increasing production and protective functions of the existing forests, suggests various soil conservation measures and watershed management programmes required to arrest soil erosion. This is crucial for improving the soil and habitat conditions of free drainage area and to rejuvenate the degraded ecosystems in the catchment. The scope of this study is not only to address all those factors which are directly responsible for soil erosion in the catchment but also to address areas of concern that are indirectly responsible for soil erosion. These issues include fuel and fodder requirements of the local people in the project area. We have suggested a number of indirect and direct methods for the treatment of catchment to arrest soil erosion. The direct measures include engineering and biological method, while the indirect methods include gradual reduction of dependency of local people from natural resources for their daily needs.

## 2.5 Rights of the people

As per Bushahr Settlement a number of rights and concession have been admitted in the near by forests to the local inhabitants, the some important rights are as under:-

### i) Grazing:

In almost all the forests, rights for grazing exist for each demarcated and un- demarcated forests. The field studies conducted indicated that 70% requirements of the fodder are met from the forest area. The settlement provides for free grazing to all animals of the right holders in their own chaks and no ceiling has been fixed on the number of cattle that might be grazed. The graziers availing summer grazing facilities in the alpine pastures are not allowed to graze their animals outside chaks unless allowed as a special concession or through the payment of certain grazing fee. A large number of cattle graze in these forests leading to great damages to the vegetation as well as to the plantations. The right of grazing also comes in the way of taking up more closure for raising plants of different species as the consent of local people is to be obtained before the plantation work is to be undertaken and required closer notification under the Indian Forest Act, 1927.

### ii) Collection of fuel wood:

People have the right to collect dry and fallen wood for their domestic use as per Forest Settlement Report. In the catchment area, people are entirely depend upon fuel wood for their day to day use. Annual consumption of fuel wood per house hold has been assessed to be 6.5 tones during the field survey

### iii) Timber:

People have the right to get timber at nominal rates for construction/ repair/ maintenance of their houses. The Confessional rates were fixed at the time of forest settlement. No limit on the nos.

of tree to be sanctioned was placed. However, no TDs rights have been used by the right holders these days due to ban on any kind of felling of trees imposed by the Hon'ble H.P. High Court.

**iv) Cutting of Grass and lopping of trees:**

People have right to cut grass and lop trees for fodder purpose. Cutting of grass is being done as of present in the forests without paying any fees to the department of Forests.

**v) Minor Forest Produce:**

The local people have rights to collect medicinal plants, herbs, roots, shrubs and other forest produce for bonafide domestic use and for sale to the traders as enshrined in the Bushahr Sutlej valley Forest Settlement Report, 1921 by H.M. Glover. The system of issuance of export permit has been made easier by delegating power on the Pradhan Gram Panchayat concerned.

**2.6 General Condition and Density:**

The composition and condition of the forests is not so good and varies considerably with the altitude and aspect. crop is good in the upper part of the catchment of the project area. However, in the some part of the area, the composition and condition of the forest is not good due to a lot of pressure of the right holders. In the higher reaches, considerable damage is caused to the forest crop in the year of heavy snowfall and good number of trees get uprooted.



## CHAPTER-III

### PROBLEM ANALYSIS AND OBJECTIVES

The study area designed for the catchment area treatment is experiencing all the classic vagaries of the nature on large scale. The terrain and geology of the area susceptible to incidence of land slides, slips/glaciers and water erosion. In Raura catchment a major portion of precipitation is in the form of snow or low intensity storm. Bulk of soil erosion takes place due to scoring action of water running off the surface during melting of snow. The catchment area suffers from two major problems i.e natural ecological and climatologically calamities such as heavy snowfall, avalanches, glaciers, land slides etc and problems created & accelerated by human & live stock pressure. Every snow melt causes glaciers and avalanches which in turn gives rise to road slide erosion by way of slips and slides Soil erosion is thus the major factor that contributes to heavy silt flow in Raura Khad.,

#### 3.1 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 the catchment area of a hilly area like that being considered for the proposed project, land slips/glaciers and water erosion is a common phenomenon and the same has been studied as a part of the catchments area treatment (CAT) Plan. The problem has aggravated in last few years and the silt level in all the rivers and streams have gone up to alarming level in Kinnaur District. This is causing great problems in the power generation and lowering the efficiency of turbines in various hydroelectric projects in the state.

**3.1.1 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.
- ↓ Reduced transport and storage capacity and
- ↓ Reduction in water availability.

**3.1.2 Methodology for the Study of soil erosion:**

Main aim of study involves:

- To study erosion characteristics of the terrain.
- To evolve a proper plan to minimize the rate of erosion.

A comprehensive database on terrain conditions, different type of soil of the catchment, natural resources and socio-economic status etc. is essential to evolve a treatment plan. In high hills variability of site parameters such as topography, soils, land use, climate and rainfall matters. Not all areas contribute equally to the erosion problem; several techniques like manual overlay of spatially index-mapped data have been used to estimate soil erosion in complex topography.

In order to ensure that latest and accurate data is taken for the analysis satellite data has been used for data and ground realities have also been taken into account. Geographic Information System (GIS) is a tool to store, analyze and display various spatial data. GIS is a computerized resource data base system and has a capacity to perform numerous function and operations.

**3.1.3 Study of the Problem:**

The different data layers of the catchment area used for the study are as under:

- Land use classification map
- Correct management practices
- Catchment area map
- Soil map
- Slope map

**3.1.4 Data collection and compilation:**

Ground maps, contour information were collected, scanned, digitalized as registered as per requirement. A computer programme was used to assess the soil loss. The grid size to be used was also decided to match the degree of accuracy required, the data availability and the software and time limitation.

**3.1.5 Estimation of Soil loss:**

Soil loss can be estimated using Silt Yield Index (SYI) method. The application of SYI method for prioritization of sub water sheds in catchment areas involves the evaluation of:

- Geomorphic factors comprising slope and drainage characteristics; landforms and physiographic.
- Surface covers factors governing the flow hydraulics.
- Climatic factors comprising total precipitation its frequency and intensity and
- Management factors

The area of each of the mapping units is arrived at and Silt Yield Index of individual sub-water sheds and computed using following equation: -



## a) Silt Yield Index

$$SYI = \frac{\sum(A_i \times W_i) \times 100}{A_w}$$

Where i = 1 to n

A<sub>i</sub> = Area of ith (EIMU)W<sub>i</sub> = Weightage value of ith unit

n = Number of mapping units

A<sub>w</sub> = Total area of sub-water and

The SYI values for classification of various categories of erosion intensity rates are given in Table 2

TABLE—2

Sr. No.	Category	SYI values
1.	Very high	>1300
2.	High	1200-1299
3.	Medium	1100-1199
4.	Low	1000-1099
5.	Very Low	<1000

## 3.2 Water Shed Management.

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 programmes are to:

- ↓ Increase infiltration into soil;
- ↓ Control excessive runoff;
- ↓ Manage and utilize runoff for useful purpose

The watershed management measures have been classified under the following categories:

- (a) Biological measures
- (b) Bio-Engineering Measures

**a. Biological Measures**

The various measures covered in this category are: -

- Enrichment planting.
- Assisted Natural Regeneration.
- NTFPS Plantation.
- Nursery Development.

**b. Bio-Engineering measures**

- Stabilization of land slides/slips
- Nallah stabilization

**3.3. PRESSURE ON FOREST RESOURCES**

The current problems being faced in forest conservation arises directly from the natural resource dependence of the people inhabiting in forested region in Roura Catchment. These dependencies are becoming immense because of eco-system is going down from the abuse and over use of natural resources. Man is responsible for degrading the forest eco-system. As his number increased and culture and technology advanced, he modified the natural eco-system into an artificial. As a result, many species of flora and fauna have become endangered. It is said that if the present course of environmental degradation is continued, then it will destroy the capability of our natural environment to support a civilized

human society. The depletion of our Wild Life and also the hardships being faced by people dependence on natural resources is due to:-

- (a) Reduction of Biological diversity in forest Eco-System.
- (b) Increasing biotic pressure.
- (c) Increasing demand of forest resources as per Forest Settlement Report, 1921.
- (d) Illicit felling and poaching
- (e) Encroachment on forest land.
- (f) Forest fires.
- (g) Cultural transition
- (h) Collection of minor forest produces.
- (i) Grant of Nautor land etc.

#### **3.4 Grazing:**

Live stock practices in the tract area rather primitive. Incidence of grazing in the high lying alpine pastures as well as in the low lying pasture village pasture lands is very high and fodder resources are fast decreasing. All most all the forests are burdened with the rights of local people to graze their cattle, without any ceiling to the number of cattle which may be allowed to be grazed under the provision of Forest Settlement Report, 1921. This open access to forests for grazing leads to great damage to vegetation, soil as well as to plantations etc. As a result that neither the animal gets sufficient fodder nor the land protected from the subsequent on slaughter of the range on account of over grazing.

#### **3.5 Management of Wild Life in and outside the Protected Area.**

The scientific Wild Life management is based on the biological characteristic of a species. Other considerations such as economic, political, social, humanitarian and sentimental are equally important. Since the exact numbers of various animals found in the tract are not known the fundamental need is to carryout a detailed



survey and population census of species in the area. The causes for the depletion of fauna can be described as under:-

- i) Poaching, hunting, trapping and killing of Wild animals by local inhabitants.
- ii) Biotic interference by man and his cattle especially near habitations coupled with clearing of forest land for agricultural purposes.
- iii) Depletion in the food of herbivorous animals because of lopping of fodder trees by the graziers and local people.
- iv) Natural calamities like drought, storms, heavy snow fall and repeated forest fires etc.
- v) Continuous predation has also caused the depletion of animals.

This affects both herbivorous and carnivores in the Catchments area.

### **3.6 Man- Wildlife Conflict**

Man-Wild Life conflict is a result of gradual degradation of natural resources and the most sufferers are poor, marginalized communities living in an around the Forests of the Catchment area. The problems of animal damage whether it is crop depredation, live stock depredation and human casualties is not as alarming as it is prevalent in other parts of the States or else where in the country. The problem of livestock predation and killing by Leopard and Black Bear is gradually escalating and to some extent appropriate compensation is needed and also environmental awareness programmes for migratory graziers thus need to be developed. Concentrated efforts, education, awareness, research monitoring, policy, law and governance; habitat restoration and development of essentially needed infrastructure to tackle complex issues pertaining to the man animal conflict are required to be implemented on a priority basis.

**3.7 Inadequate Scientific Information:**

Inventory of the flora and fauna of the catchment is yet to be prepared. The status of important habitat types and that of the threatened flora and fauna is not known. No information is available in this regard about the carrying capacity of the forests and alpine meadows in and around the Catchment area. Therefore, in the absence of reliable primary data on various aspects only general type of strategy and approach can be made as management and improvement of the catchment area by carrying out detailed survey of the catchment area. Thus a well designed catchment area treatment plan (CAT) plan is essential to ameliorate the abovementioned adverse process of depletion of biological diversity. An endeavor has been made in the present Plan to address the problem to some extent.

**3.8 Harmful Practices by the Local People.**

The trees near habitations are lopped ruthlessly for the fuel wood and fodder. The grant of Govt. land to landless people is also putting the forest in danger. The forest is experiencing tremendous pressure of human and livestock. The animals roam freely in the forest area tramping and grazing the forest. These results increased rate of soil erosion and degradation of forest manifolds.

These factors have put following problems to the forests:

- i) Excessive soil loss and increase in runoffs.
- ii) Man and Wild Life conflict
- iii) Fuel wood and fodder are becoming scarce.
- iv) Unscientific collection of NTPF which is harmful to the Biodiversity of Catchments area.
- v) Excess grazing.

**3.9 Eco-Tourism Potential:**

The area being very interior and picturesque, there are very few income generation opportunities for the local people. The Yulla valley in Kinnaur district is also a good potential of Eco-Tourism and is still not explored for this purpose. There is overall deficiency of proper infrastructure for the growth of tourism in the area and basic facilities like FRH, I/Hut, hospitals, boarding & lodging, paths, well developed camping sites & public utility services etc. which further affects eco-tourism in the area. The local people are not aware of the vast potential of eco-tourism. They need basic training about eco-tourism vis-a-vis bio-diversity conservation. It is one of the most important alternative income generation activities besides NTPF's etc.

**3.10 Buildings, Paths and Communication Network:**

The existing buildings, I/Paths and B/Paths are in dilapidated conditions. Their abutments and wooden beams/planks are in worn-out conditions and needs replacement. In addition to these, there is need to construct and maintain new bridges and maintenance of existing I/Paths, B/Paths for effective patrolling/touring in the catchment area. Not only it will provide facilities to the field functionaries but it will also helpful to local people. Also for better management of the Division, Ranges and Beats the conditions of existing I/Paths and B/Paths are to be improved on the priority basis. For successful implementation of CAT Plan and better management the catchment area, the basic infrastructure in the catchment area needed to be improved.

**3.11 Lack of Trained Staff in Wild Life Management:**

There is a lack of professional knowledge/skills of management especially habitat improvement of Wild Animals, procedure for monitoring and evaluation in different event, vegetational changes



overtime and its relationship to changes in prey base species, collection of evidences and biological material, symptoms of important diseases, preventive measures and treatment assessment, techniques and methodologies and bio-diversity impacts etc. The staff is, therefore, left with no option but to undertake a protection job and implementation of various works in the traditional ways. The training in wild life management to the front line staff out side the Protected Area Network is essential.

**3.12 Lack of concern about conservation by the local people:**

As the local population in majority is backward it is apparent that the people have little or no knowledge about the environmental conservation. The local people of the area do not seem to show any concern for the conservation of bio-diversity available in the area. There is no local concern voluntary organization willing to make conservation as a primary issue. Off late the government has realized that the effective implementation of various biodiversity conservation and environmental related programmes can not be achieved their objectives without awareness and concerns of the tribal people. So, there is a need to initiate a dialogue with local people on the conservation of natural resources by formation of VFDS etc. at the village/Panchayat level for conservation of bio-diversity.

**3.13 Limited Employment and Income generation Activities:**

The area was bereft of any road link till very recently, has been dependant only upon the subsistence economy. Most of the agriculture has been for internal consumption and no cash crops are grown in the Catchment area. The only cash crop has been the M.F.P. collection from the forests and sale to traders for supplementing their income under the provisions of the Settlement Report. Formation of society in each Panchayat of the catchment

area for collection and sale of the NTFPs will certainly add in supplementing the income of the local people in an organized manner.

**3.14 Lack of Appropriate Infrastructure Support:**

The area is facing a lack of basic minimum infrastructure support in the field of housing, I/Hut, FRH, Office equipment i.e. Computer, GPS/PDA, Compass, Camping equipment, field equipment and vehicle etc. In the absence of this infrastructural support, the information flow is very slow and erratic in management.

**3.15 Monitoring and Evaluation:**

Monitoring is an important and integral component for effective conservation and management as it provides a ways to track the status of various components of biological diversity and forest eco system over a period of time. The regular feed back through monitoring and evaluation allows better under standing, midway corrections and adoption of appropriate strategies. Dr. Mathur and Uniyal from W.I.I. Dehradun have provided details on the proposed long term ecological monitoring (LTEM) programme must be followed. The desired success could not be achieved in this direction in the absence of adequate man power, scientific and professional knowledge, financial constraint, support from local institutions and participation of local communities. Regular review and evaluation meeting should be arranged to assess the results achieved and future strategies. All the agencies involved in the implementation of the CAT Plan should work in a coordinated effort regularly to evaluate the achievement of desired results.

## CHAPTER-IV

### WILDLIFE MANAGEMENT IN AND OUTSIDE THE PROTECTED AREA

#### 4.1 Introduction

The tract is rich in flora and fauna. The state of Himachal Pradesh is as it embodiment of heaven on earth, replete as it is with lush green forests, high snow covered peaks, beautiful valleys, gushing streams and unpolluted rivers and waters, which is probably why it is the abode of god and goddess. The mountains terrain of Himalayas Ranges from 300 meters to 7000 mtrs and support a variety of forests such as Sal, Pines, Rhododendrons, Oaks, Birch, Deodar, Kail, Fir and Spruce. These forests are home to variety of wild flora and fauna, occupying different habitats and ecological niches. Himachal has 12.6% of its geographical area of 55,673 Sqm. Under the protected area network, an extremely high figure when compared to the national average of hardly 45%. As result, these has been an increase in the number of wild flora and fauna not only within the protected areas but more so outside the protected area network.

Himachal Pradesh is rich in various faunal elements with reports of more that 107 species of mammals, 447 species of birds, 17 species of amphibian and 104 species of fishes. There are carnivore species like leopard (*Panthera pardus*), leopard cat (*Prionailurus benghalensis*), jungle cat (*Felis chaus*), Asiatic black bear (*Ursus thibetanus*) and brown bear (*Ursus arctos*) in the State. The State of Himachal Pradesh is also forms home for seven pheasant species out of the 17 found in the country (48 pheasant species found across the world). These seven species are Western tragopan (*Tragopan malenocephalus*) Himalayan monal (*Lophophorus impeyanus*), Koklas (*Pucrasia macrolopha*), White Crested Kalij (*Lophura leucomelanos*), Cheer (*Catreus wallichii*) and Red Jungle Fowl (*Gallus gallus*). The Western tragopan is state bird of Himachal Pradesh and during 1993-94 Sarahan



pheasantry witnessed first ever breeding of Western Tragopan in captivity in the World.

Biodiversity conservation is on the national agenda which came into force on December, 29, 1993 for nation/states which are signatory to the conservation of Biodiversity. It is well known that the conservation of Biodiversity involves conservation of ecosystem, species, land races and population including conservation of genes. Biodiversity conservation is essential not only for ecological and environmental rejuvenation but also for a sustainable development of forests. These forests regulate the water balance in the lands around and influence the climate to considerable extent. Apart from their ecological functions, they serve as valuable gene pools.

The current problems being placed in wild life conservation arises directly from the natural resources dependence of the people in hebetating forested regions, impoverished population and Hydro-electric project in Sutlej basin. These dependencies are becoming intense because of Eco-System of Sutlej valley is declining at a very fast rate due to over use of natural resources. Therefore need for conservation preservation and management of biological diversity arises because of threats of natural terrestrial and due to various anthropogenic activities and also there are regular conflicts between humans and wild life in the region. These conflicts may further increase as a result of project activities unless proper management practices are not followed. The likely project activities include road construction, blasting, excavation for tunnels quarrying, dumping of excavated materials and human population pressure on land and biological resources. Looking into all these aspects a wildlife management plan has been prepared for the conservation and protection of biodiversity of the region.

**4.2 Improvement and development of wild life: -**

The improvement and development of wild life in the region various activities have been suggested in the plan. This will be achieved by way of plantation of trees, fodder species, fire protection measures, prevention of soil erosion and removal of exotic invasive plant species. Some patches of land may be developed exclusively as "green islands" in the project catchment area. These areas should be out of bound for any human intervention both for local people and domestic animals under the provision of Indian Forest Act, 1927 and these areas should be developed as habitats or corridors for the wild life of the region. The following tasks are suggested. These areas should be out of bound for any human intervention both for local people and domestic animals under the provision of Indian Forest Act, 1927 and these areas should be developed as habitats or corridors for the wild life of the region. The following tasks are suggested.

- Publicity for awareness through Kala Jatha (NukarNatak).
- Fruit bearing and bamboo plantation.
- Anti-poaching measures
- Sign and slogan boards
- Reward/Incentives to informers
- Vaccination of domestic cattle
- Field equipment and medicine for management of wild life—  
Purchase of capture cage, traps, immobilizing gun, darts, drug, ,  
GPS, Compass, Handy Cam, Altimeter, binoculars, sleeping bags  
tents water bottles, pedometer etc.
  
- **Plantation of indigenous:** - Plant species to be carried out to cater to the needs of the fodder and fuel wood. Additionally it will provide much needed vegetation cover on the degraded and base land slopes.
- to increase the fodder and forage availability in the area

- to develop water bodies for wild animals to avoid their coming into human habitations and encounter with human.
- fruit bearing and bamboo plantation.
- to create the fire protection facilities by way of procuring modern fire fighting equipment like gloves, helmets, aprons, shovels, pick axes, beaters, extinguishers, chain saw etc.
- **Bio-engineering measures**—the detailed measures of soil conservation are given in the CAT Plan and the sufficient outlay has been proposed in the component of biological measures of CAT Plan.
- Construction of water pond.
- Anti poaching measures
- Sign and slogan boards
- Reward/Incentives to informers
- Vaccination of domestic cattle
- Field equipment and medicine for management of wild life— Purchase of capture cage, traps, immobilizing gun, drats, drug, protection gun, GPS, Compass, Sony handy Cam, altimeter, binoculars etc.
- Repair of inspection path for effective patrolling and protection of forest and wild life.
- Communication network—for improvement of the vigilance and anti-poaching measures.
- Veterinary & other staff—wild animal care.
- Publicity material for awareness.

#### 4.3 Mitigation of Human Wildlife conflict

(j) Eco-Development Activities

**(a) Village Support Activities**

- (i) Repair of water bowaries.
- (ii) Construction of cattle pond.





- (iii) Compensation against wild life damages.
- (iv) Publicity and awareness.

**(b) Income Generation Activities**

- (i) Animal Husbandry support and diary development.
- (ii) Agriculture and Horticulture support.

**4.4 Management of Biodiversity**

During the construction period, a large numbers of labourers and anticipated to come in the areas, which will exert additional pressure on the biotic resources of the catchment. Also, the noise and pollution levels will increase as a result of construction activities. To avoid and minimize the negative impacts during the construction period, project authorities are advised to prepare strict guidelines as follows.

- (i) Strict monitoring of labourers and associated workers for any activity related to endangering the life or habitat of wild animals and birds.
- (i) Strict restrictions will be imposed on the workers at project sites to ensure that they do not harvest any produce from the natural forests and cause any danger or harm to the animals and birds in the wild.
- (ii) Minimum levels of noise during construction activities will be maintained and no activity will be carried out at night at a project site in the close vicinity of animals/ bird habitats especially in the vicinity of dense forests.
- (1) The fuel wood to the labourers will be provided from plantations meant for the purpose and/ore the provision be made for the supply of the free/ subsidized kerosene/LPG from the depots being set up for this purpose to avoid forest degradation and the loss of animal habitats.

- (iii) The interference of human population will be kept to a minimum and it would be ensured that the contractors do not set up labourer colonies in the vicinity of forests and wilderness areas.
- (1) A mix of incentives for the protection of wildlife and their habitats and strict regulatory framework will be put in place to implement the conservation effort.
- (iv) The project authorities will be bound by the rules and regulations of the Wildlife Protection Acts or any such regulation of the State, which may exist or will be promulgated from time to time for the preservation of habitats and protection of wild animals/biodiversity.
- (v) It will be ensured that the noise levels in no case go above 80-100 dB in the project area. One of the measures that are proposed to be adopted is that the blasting is to be restricted during nights, early mornings and late afternoons, which are the feeding times of most of the fauna. Blasting will be resorted to only if extremely necessary. For this strict blasting regime, i.e. controlled blasting under constant and strict surveillance is to be followed. Some of the suggested methodologies for reduction and mitigation of noise so as to cause as little disturbance to the animals as possible are given below:
  - (a) Only well maintained/new equipment that produces lesser noise would be installed at the work sites.
  - (b) The best way to control the noise is at source. Certain equipment that needs to be placed permanently at one place like generators, etc. would be housed in some enclosed structures to cut off the noise.
  - (c) The heavy equipment like rotating or impacting machines will be based on anti-vibration mountings.
  - (d) Wherever combustion engines are required they will be fitted with silencers.



- (e) The traffic (trucks, etc.) used by the project works will be managed to produce a smooth flow instead of a noise producing stop and start flow. Necessary training/orientation will be provided to the traffic operators/drivers. Sounding of loud horns, etc. in the forested areas will be banned.
- (f) While clearing the land of vegetation for any project work, the project authorities will ensure that the work area has sufficient tree cover around it. It will act as an effective noise absorber. It will be desirable not to cut down or lop big trees around the periphery of the work site. The tree layer will act as noise and air pollution buffer. The tree cover is known to cut off noise by about 3-12 dB at a site depending on the density of vegetation. These measures will be planned in advance and well before starting operation at any site.
- (g) The project authorities will monitor the noise at critical sites from time to time.

## CHAPTER-V

### JOINT FOREST MANAGEMENT (JFM)

#### 5.1 INTRODUCTION

The state of Himachal Pradesh has traditionally been sensitive to the need of involving local people in the conservation and management of the forest resources. This is evident from the Forest Settlements carried out as early as the 19<sup>th</sup> Century when people were provided rights in the forests in lieu of their responsibilities and duties to the forests. The Co-operative Societies of Kangra District are another testimony to this resolve. The participatory approaches received a new impetus in the state with the launch of Social Forestry Umbrella project in mid 1980s as also with the adoption of the National Forest Policy 1988 which brought the people to the centre stage & the constitutional development of power to the PRIs through the 73<sup>rd</sup> amendment. This brought about a paradigm shift in the objectives and management practices for forestry in the state through participatory management modes.

Responding to these new developments, the Government of Himachal Pradesh has approved the new Forest Sector Policy on 02/05/2006. The Forest Sector Policy evolved through a dynamic and consultative process where an extensive evidence gathering process has been followed through primary and secondary sources through a range of stake holders consultations including the forest department, other line departments i.e. horticulture, agriculture, animal husbandry, rural development, research institutions, local communities, representatives of Panchayati Raj Institutions, Non Governmental Organisations, Community based Organisations as well as people's representatives. The new H.P. Forest Sector Policy, 2005 is remarkably different from the earlier State Forest Policy 1980 as it is a response to the emerging needs and aspirations of the people of the state. The new policy has a unique mountain area focus

where livelihoods and decentralization through Panchayati Raj Institutions in management of forests resources from the bedrock on which the policy stands.

#### 5.2 Date of issue of Govt. Orders on JFM and its Modification

GOI resolution	1990
HP introduced JFM	1992
Date of issuance of 1 <sup>st</sup> JFM orders/ rules	12.05.1993
Date of amendment/ new orders/ rules	23.08.2001

#### 5.3 JFM AT A GLANCE IN HP

No. of JFM Committees 1749 covering an area of about 4246 Sq. Km  
Gender representation in JFM Committees: Women 51.3%; Men 48.7%  
Benefit sharing in JFM areas  
Approximate value of grass, fodder, fuel wood: 08.00 Crores  
Employment Generation: 12.73 crores  
Assets created (cumulative): Rs. 62.37 crores

#### 5.4 JFM and Roura-II HEP CAT Plan:

The emphasis given in the CAT PLAN is on enabling local people to prevent, arrest and reverse degradation of life support systems, particularly land and water, so as to produce biomass in a sustainable manner. Importance of micro planning on watershed basis with community participation will be operationalised during implementation of CAT PLAN Suitable institutional arrangements like Village Forest Development Societies (VFDS) representing various section of communities will be formed. Further, to ensure sustainability of interventions, cost sharing by stake holders will be encouraged, to the extent possible. This establishes the responsibility of various stake holders in the management of resources



Self help groups /women saving and credit groups will be formed from the identified IRDP/BPL families so as to help the people who are most directly dependent on the natural resources. Unless the survival biomass needs of the rural poor people, fuel and order and small timber are satisfied, the forests and pasture developed by the plan would remain vulnerable and unsustainable.

## CHAPTER-VI

### OBJECTIVE AND PROJECT PROPOSAL

#### 6.1 Project Objectives:-

The objectives of the project are summarized as under:-

- ↓ To achieve Sustainable management of forests, bio-diversity conservation and also ecological rehabilitation in the project area leading to and all round eco- development activities on sustainable basis.
- ↓ To initiate measure to rehabilitate the degraded habitat through afforestation of native species and assisting of natural regeneration.
- ↓ To improve alpine pasture land for augmenting grass and fodder availability and to solve the problem of grazier.
- ↓ To carry out soil conservation measure in the Roura Catchments to ensure longevity of Roura-II Hydel Project.
- ↓ To increase the potential/production of the bio-mass in the area and to ensure longevity of Roura-II Hydel Project.
- ↓ To provide employment to the local people by engaging them in project activities such as afforestation, fire, anti poaching, rural infrastructure and other works except soil conservation works.
- ↓ To built the capacity of the Field front line staff in Wildlife management skills by providing training in India to meet the challenges of 21<sup>st</sup> century.
- ↓ To strengthen the extension and follow up activities of the forestry development activities, publicity, motivation and extension programme to be given the desired attention.
- ↓ Initiation of research activities to use and protect natural resources in a scientific way.

↓ In the present plan thrust has been given for sustainable development of the catchments area as well as to protect and conserve the local environment with the active involvement of JFMCs and local people. In the CAT plan equal emphasis has been given to the economic needs of the local people, greening of the region and strengthening the local wildlife management and integrate these activities with a view to finally avoid soil erosion and decrease the silt load in Roura Khad and Sutlej river. Various mechanical and biological measures have been suggested to treat the catchments area to meet the objectives of the CAT plan.

**6.1.1 Plan Period (Project period):**

The CAT plan has been formulated for a period of eleven years including zero year with effect from 2012-13 to 2021-22. For the first two years of the plan not much of works have been prescribed and only establishment of nurseries will be done besides minor works and purchase of some equipments. However, from the second year onwards works will be done in full swing and will gradually take off in the 7<sup>th</sup> year onwards and completed during the Plan period.

**6.1.2 Cost of the Plan:**

The total outlay envisaged for the implementation of this CAT Plan is Rs.4,01,87,400/- including contingencies, Monitoring & Evaluation, Payment for Environmental Services (PES), payment for Eco-Services to the Local Communities and other inflationary trends etc. The total cost of the CAT Plan would be deposited by the Use Agency as per the H.P. Govt direction in this regard.

With increase in Project cost, outlay of CAT plan will be revised accordingly & review will be done every two years as per latest guideline issued by the H.P State Forest department which contains that with increase in project cost outlay of CAT Plan will be revised Proportionality and a review will be done every two years this provision to offset cost escalation has been incorporated in the CAT Plan.



**Project Period:**

The project period would be for 11 years.

**6.1.3 Plan Components:**

The CAT Plan has been designed keeping in view the new guidelines issued by Government of HP and ecological as well as social conditions prevailing in both the project as well as catchments area. The treatment measures emphasize on conservation of catchments through afforestation in blank/ degraded areas, and bio engineering works in soil eroded areas, river bank and Nallahs. It also envisages an active participation of local community as it will provide them employment to add to their economy. Apart from this, management as per the needs of the wildlife along with habitat improvement, anti poaching, fire control coupled with bio engineering works will be undertaken in the catchments area. The CAT Plan for Roura HEP has been designed in view of the latest guide lines and the important activities in this regard to be undertaken during the project period are as under:

1. A map in the scale of 1:15000 scale of the catchment showing the contour lines at 3600mtrs, 3000mtrs, 2700mtrs, 2400mtr, 2100,mtrs, 1800mtrs, & 900mtrs, depicting the administrative and forest boundaries, beats block, range , Road network, drainage of the catchment etc has been prepared.
2. A map showing the forest infrastructure present like buildings, nurseries, plantations & soil & water conservation works for existing and proposed works has been prepared.
3. The prescriptions of the CAT Plan have been made based on the analyses of the current situation of the catchment after extensive field reconnaissance.
4. The size of the CAT Plan is based on the actual extent of the work to be done in the catchment which is almost 2.5% of the total project cost.

This CAT Plan has been designed keeping in view the ecological as well as social conditions prevailing in both the project as well as catchments area. The treatment measures emphasize on conservation of catchments through, enrichment plantation areas and bio engineering works in soil eroded areas and Nallahs. It also envisages an active participation of local community i.e. JFMCs as it will provide them employment to add to their economy. Apart from this, one of the most important parts of successful execution biological diversity and its management as per the needs of the wildlife along with habitat improvement, anti poaching, fire control coupled with bio engineering works in the catchments area. The important activities in this regard to be undertaken during the project period are as under:

**6.2 Improvement of Tree Covers.**

- (a) Nursery development.
  - i. New Nursery development.
  - ii. Maintenance of existing nurseries
- (b) Enrichment plantation.
- (c) Energy Plantation

**6.3 Soil Conservation Works- Engineering and Bio-Engineering measures:**

- ↓ Stabilization of land slides/slips by the way of Bio-engineering and civil works.
- ↓ Stabilization of Nullahs by the way of Bio-engineering and civil works.
- ↓ Soil & Water Harvesting Structure-Van sarovar

**6.4 Payment of Environmental Services (PES)**

**6.5 Research, Training, studies and Capacity Build up**

**6.6 Forest Infrastructure Development, Operational Support & Forest Protection**

- ↓ Maintenance of existing buildings
- ↓ Maintenance of existing bridle and inspection paths.

**(a) Energy saving devices on Cost Sharing**

- ↓ Distribution of LPG Cylinders.
- ↓ Distribution of Solar lights
- ↓ Distribution of induction heaters/cookers

**(c) Construction and repair of existing boundary pillars****(d) Sign and slogan boards****(e) Reward/Incentive to informers****6.7 Management of Wildlife in outside the Protected Area****(a) Improvement & Development of Wild Life**

- Publicity for awareness through Kala Jatha (NukarNatak).
- Fruit bearing and bamboo plantation.
- Anti-poaching measures
- Sign and slogan boards
- Reward/Incentives to informers
- Vaccination of domestic cattle
- Field equipment and medicine for management of wild life—  
Purchase of capture cage, traps, immobilizing gun, darts, drug, .  
GPS, Compass, Handy Cam, Altimeter, binoculars, sleeping bags  
tents water bottles, pedometer etc.

**6.8 Monitoring and Evaluation****6.9 Site specific/Micro Planning****6.10 Contingencies.**



A brief description of each component is as under:

#### 6.10.1 Improvement of Tree Covers.

##### (a) Nursery development.

To raise successful plantation it is necessary to have a good & adequate planting stock. It is proposed to establish/maintenance nursery at Urni and Runang. The nursery shall be raised in the 1<sup>st</sup> year of the project period and will be further maintained till the completion of this Plan period. As far as possible the nursery should be located in planting zone.

Sr. No.	Name of Nursery	Geo reference	Amount
1	Establishment of New Nursery at Urni & Runang	Urni 31 32 09 78 07' 47"	500000.00
		Runang 31 31 18 78 11' 05"	
2	Maintenance of nursery at Urni & Runang		100000.00
<b>G. Total</b>			<b>600000.00</b>

##### (b) Afforestation

Since there is no scope for the normal plantation activities therefore only Enrichment Plantation will be under taken. The aim of this CAT Plan is to conserve in-situ flora and fauna along with the full range of eco-system. Under this scheme blank areas devoid of tree growth, and degraded forests areas is proposed to be planted, for which the choice of species will be mainly governed by the site/location.

**(c) Enrichment plantation.**

There are some forests in the catchments area where in patch density of crop is poor and devoid of overhead shade where planting could be done. In such areas planting of 800 seedlings per hectare is expected to result in full density forests. Extent to such areas is estimated to be 95 ha. Thus, it is imperative that such forest areas are planted by artificial means to increase their stocking to the required level. The detail of the areas identified is as under:-

Sr. No.	Name of Area/ Forest	Name of Beat	Geo reference	Area in Hac.
1	UF Yulla (Deo)	Urni	31 33' 33" & 78 07' 29"	15 hac.
2	C-252 (Deo/Kail)	Runang	31 31' 45" & 78 08' 52"	10 hac.
3	Shikamo (Deo/Kail)	Urni	31 33' 27" & 78 08' 44"	10 hac.
4	Bragdo (Deo/Kail)	Urni	31 33' 30" & 78 07' 42"	10 hac.
5	Tharu (Deo/Kail)	Runang	31 33' 14" & 78 10' 25"	10 hac.
6	NC-27 (Chilgoza)	Runang	31 31' 40" & 78 08' 22"	10 hac.
7	C-252 Deo/Kail	Runang	31 31' 44" & 78 08' 51"	10 hac.
8	C-253 Deo/Kail	Urni	31 33' 29" & 78 07' 41"	10 hac.
9	C-255 Deo/Kail	Urni	31 32' 30" & 78 07' 08"	10 hac.
<b>G. Total</b>				<b>95 hac.</b>

The cost norms on the basis of prevailing schedule rates applicable in Rampur Circle for raising Deodar, Fir, Neoza has been applied.

Per Ha Cost Norms for Enrichment Plantation (800 plants of Deodar/Fir & Neoza Species per ha) Works has been calculated on the Prevailing Schedule of rates applicable in Rampur forest Circle.

Per Hac. Cost Model for Enrichment Planting Deodar/Fir							
S. No	Particulars	Qty	Unit	Rate	unit	Non Tribal	Tribal
1	Survey and demarcation of plantation and area I/C marking of seditions, path preparation of map.	1	Hac	75.05	Hac	75.05	93.81
2	Cutting and preparation of wooden posts 1.8 mtr and 8 to 10 CM dia I/C debarking and fashioning the top 15 cm in conical shape	60	Nos	949.90	Per %	569.94	712.43
3	Carriage of fence posts upto 2 mtr long and 8 to 10 cm dia over distance 0.5 KM	60	Nos	499.95	per % per KM	149.99	187.48
4	Charing and coaltering of the ends of the posts 45cm bottom and 15 cm conical taring	60	Nos	204.90	per % per no.	122.94	153.68
5	Preparation and digging of holes 20-30 cm dia& 45 cm deep	60	Nos	665.10	per %	399.06	498.83
6	Fixing of wooden posts I/C strutting	60	Nos	510.45	per %	306.27	382.84
7	Carriage of barbed wire bundles up hill over an overage distance of 1 km	0.9	qtls	125.10	per qtl per Km.	112.59	140.74
8	Stretching and fixing of barbed wire with U-staple in each strand	540	Rmt	3.45	per Rmt	1863.00	2328.75
9	Interlacing of thorny bushes with barbed wire obtained from planting side	160	Rmt	3.00	per Rmt	480.00	600.00
10	Preparation of inspection path 60 cm wide	150	Rmt	7.5	Rmt	1125.00	1406.25
11	Layout of pits/patches	1	Hac	124.9	Hac	124.90	156.13
12	Digging of pits (45x45x45) cm	800	No	699.9	Per %	5599.20	6999.00
13	Filling of pits (45x45x45) cm	800	No	200.5	Per %	1604.00	2005.00
14	Carriage of Plants in P/bags from Nursery site over an average distance of 1 Km.	800	No	133.25	Per %/Km	1066.00	1332.50



15	Planting of entire Plants I/C ramming raised in P/bags	800	No	160.05	Per %	1280.40	1600.50
16				<b>Sub Total</b>		<b>14878.34</b>	<b>18597.92</b>
17	Add Increase 9.09%					1352.44	1690.55
18	Nursery Cost of P/bags raised Plants	800	No NT	5.55	Per plant	4440.00	5560.00
19			Tribal	6.95			
20	cost of B wire and other material					4300.00	4300.00
				<b>G.Total</b>		<b>24970.78</b>	<b>30148.47</b>
				<b>Or Say</b>		<b>24900.00</b>	<b>30100.00</b>

**B. Maintenance:**

Sl. No.	Name of scheme	Component	Rs
B	Maintenance cost		
	First year Maintenance	Maintenance cost	5950
	Second year Maintenance	Maintenance cost	3960
	Third year Maintenance	Maintenance cost	3010
	Fourth year Maintenance	Maintenance cost	1935
	Fifth year Maintenance	Maintenance cost	1935
		<b>Total Maintenance</b>	<b>16790</b>

Sr. No.	Expenditure Detail	Amount
1.	Enrichment plantation cost with coniferous species (Deo) over 85ha. @ 30100	2558500
2.	<b>Maintenance cost for 5 years</b>	
	1 <sup>st</sup> year maintenance cost for 85 ha. @ 5950	505750
	2 <sup>nd</sup> year maintenance cost for 85 ha. @ 3960	336600
	3 <sup>rd</sup> year maintenance cost for 85 ha. @ 3010	255850
	4 <sup>th</sup> year maintenance cost for 85 ha. @ 1935	164475
	5 <sup>th</sup> year maintenance cost for 85 ha. @ 1935	164475
	<b>Total (New + Maintenance)</b>	<b>3985650</b>

Sr. No.	Expenditure Detail	Amount
1.	Enrichment plantation cost with coniferous species (Chilgoza Pine) over 10ha. @ 37120	371200
2.	<b>Maintenance cost for 5 years</b>	
	1 <sup>st</sup> year maintenance cost for 10 ha. @ 7660	76600
	2 <sup>nd</sup> year maintenance cost for 10 ha. @ 5105	51050
	3 <sup>rd</sup> year maintenance cost for 10 ha. @ 3870	38700
	4 <sup>th</sup> year maintenance cost for 10 ha. @ 2635	26350
	5 <sup>th</sup> year maintenance cost for 10 ha. @ 2635	26350
	<b>Total (New + Maintenance)</b>	<b>590250</b>

**(d) Energy Plantation:**

To provide quick availability of fodder and fuel wood, it is necessary to have high density plantation (5,000 plants per ha) near habitation.

Total 25 hac area has been identified for this treatment as per the detail given below:-

Sr. No.	Name of Area / Forest	Name of Beat	Geo reference	Area in hac.
1	UF Urni	Urni	31 31 15 78 07'23''	10 ha.
2	Rangdul	Runang	31 31 37 78 08' 55''	10 ha.
3	NC-27	Runang	31 31 41 78 08' 21''	5 ha.
	<b>G. Total</b>			<b>25 hac.</b>

The cost estimate for raising of Energy plantation over one ha is as under:

**Per Ha Cost Norms for Energy Plantation:**

**I. Energy Plantation**

Sl. No.	Name of scheme	Component	Rs
A	Energy Plantation-5,000 plants per ha.	Fencing cost	8000
		Planting cost	30000
		Sub-Total Wages	38000
		Material cost	9200
		Cost of plants raised (Rs.3.80/Plant x5000)	19000
		Total	62,200
		<b>Norms per ha</b>	<b>Rs. 66,200</b>

Expenditure Detail	Amount
Energy plantation over 25 ha. @ 66200	16,55,000

**6.10.2 Soil Conservation Works-Engineering and Bio-Engineering measures**

Soil Conservation and bio engineering measures are proposed to stabilize and protect the eroded soils and which further reduces soil erosion. The plant and plant parts (roots, stems) act as the main structural components to reinforce the soil and to provide protection. Soil bio-engineering technique must be a cost-effective solution using locally available material and executable through unskilled or semi-skilled labor. Traditional methods of controlling stream flow and erosion rely on structural practices like rip rap, retaining walls and sheet piles and are often expensive, ineffective or socially unacceptable. Bio-engineering uses live plants alone or in combination with dead or inorganic material, to produce living,



functioning systems to prevent erosion, control sediment and provide habitat. Both structural practices and live vegetation are used to provide erosion protection for hill slopes and stream banks. The techniques outlined in this manual use woody plants that root mostly from dormant plants.

The species selected for bio-engineering should be available locally suitable for that zone. Cuttings and rooted plants are only to be used during the winter months (dormant season) and sodding techniques be used during the (summer season) vegetation season. Various methods are available for hillside and slope stabilization. Methods of seeding are dry-seeding and hydro-seeding. On exposed areas the seed is to be protected with straw in combination with meshes of jute and wire. After seeding, the stabilization can be increased through transplanting of stump sprouting deciduous shrubs or tree species.

With different type of brush layering, loose rock slopes can be stabilized. If the plants are rooted, they are called hedge layer. If they are un-rooted, they are called brush layer. There are numerous different hillside and slope stabilization methods which utilize plants in combination with wood layering, stone and wire combinations, such as planted pole walls, live slope grids, live wooden crib-walls, vegetated stone walls and vegetated gabions.

The budget for soil and water conservation needs to be utilized as under:-

- 50% For Small Engineering works.
- 50% For Bioengineering afforestation works.
  - 50% of the outlay of Bio Engineering for raising nursery plants.
  - 50% of the outlay of Bio Engineering for actual afforestation.

Application depends upon the suitability of soil bioengineering plants and structural techniques. Bio-engineering species can be raised in p-bags and through cuttings (easily sprouting types). Plants raised in nursery

need to be acclimatized to the outdoor environment before planting. Seeding and mulching are not appropriate in areas of flooding, high water flow or rapid changes in water depth, as the mulch and seed will be washed away. Proper seedbed preparation, fertilization and irrigation may be needed to assure seedling survival. Different techniques used are:-

- Grass planting and seeding
- Brush layering, fascines and palisades construction
- Tree and shrub Planting and seeding
- Live vegetative check dams and stone pitching
- Nirgal planting
- Jute netting and mulching

The following criteria will be used for choosing the species:

- Local natural plant species
- Easy availability
- Easy propagation
- High tolerance for refractory soil conditions
- Non palatable or less grazed/browsed by animals
- Bush to medium sized species

#### **AFFORESTATION:**

**SEEDINGS:** For hill and slope stabilization seeding of a grass and herb mixture is done. Deeper, rooted, woody vegetation helps to prevent shallow mass movement. After a first slope stabilization with seeding, some stumps, sprouting deciduous shrubs or trees are transplanted as naked roots, p.bag or root ball plants. Transplanting is to be carried out carefully- the younger a plant is transplanted, the more successful is its root system. Dry-seeding is an easy method where seed ( $10-25 \text{ g/m}^2$ ) and organic fertilizer ( $100 \text{ g/m}^2$ ) are scattered by hand. It can be applied on flat slopes with rough surfaces. On less steep slopes with rough surfaces and no erosion problems seeds of tree and shrub species can be broad cast sown. Seeds of trees and shrubs are

mixed with sand in a ratio of 1:3 and spread as broadcast, pit or row seeding. On steeper slopes where it is necessary to cover the soil quickly, a cover crop seeding is used. Special types of rye (in fall) and barley (in spring) are spread in a mixture of 10 g/m<sup>2</sup> and covered with soil. On this surface normal seed (10 g/m<sup>2</sup>) and organic fertilizer (100 g/m<sup>2</sup>) were spread. On steep slopes which have a smooth surface and mild climate and are also mainly in forests, mostly, hydro-seeding is used. Seed (25 g/m<sup>2</sup>), organic fertilizer (100 g/m<sup>2</sup>), mulch (straw 80 g/m<sup>2</sup>) and an algae product as glue (100 g/m<sup>2</sup>) are mixed in a special barrel with water and pumped out onto the slopes (2 l/m<sup>2</sup>). On very steep slopes it is advisable to fasten a jute mesh on the slope because it fixes the hydro-seed.

**PLANTING VEGETATIVE CUTTINGS:** The vegetative cuttings of such species which can easily and vigorously sprout should be planted in trenches of one meter length and 20cm width X 20cm height, at a spacing of two meters, in staggered design. There will be 800 trenches per ha. Each trench will be filled up and planted with 5 vegetative plant species cuttings collected freshly. There shall be total 4000 cuttings per hectare.

**PLANTATIONS OF BIO-ENGINEERING SPECIES:** The bio-engineering shrubs or plant species which can sprout easily and vigorously or are raised in p.bags of 4"X6" size, raised in nursery beds for 4-6 months period, are used. These shrubs are planted in one meter length trenches of 30cm width X 30cm height, at a spacing of four meters each, in staggered manner. There will be 400 trenches per ha. Each trench will be filled up and planted with 3 shrub plants raised in nursery or fresh cuttings collected from sprouting species. There shall be total 1200 shrubby plants per hectare.

#### **Bio-engineering Works-**

Bio-engineering works shall involve minor soil conservation works, finding of brush wood check dams, patch sowing of grass and legume seed, plantation of bio-engineering species of shrubs, herbs and trees i.e. @1400 shrubs and



500 trees/ha, fencing of the area with live hedge and maintenance for 1 year of shrub species and 2 years for tree species. The cost analysis per ha of bio-engineering works comprising of plantation, seed broadcasting, brush wood check dams, fencing cost and maintenance has been assessed as Rs. 50000 and is given in Table. However, it will vary as per site specific estimates.

**Cost Analysis per ha of Bio-Engineering Works.**

**Bio-Engineering Cost Norms (Per Hectare)**

**(Live Hedge Fencing)**

**A] First Year Operations:**

SI No	Detail of works	Quantity	Rate (Rs)	Amount (Rs)
1	Survey and demarcation plantation area, marking of sections, path and preparation of map.	1 Hectare	75/Hectare	75
2	Preparation of inspection part	200 Rmt	8 per Rmt	1600
3	Live hedge fencing with indigenous species	300 Rmt	10 per Rmt	3000
4	Preparation of gradional trenches/ staggered trenches (1x0.3x0.3m)	700 No./Rmt.	10.00/ Per Rmt	7000
5	Digging of 1400 pits on mounds of trenches (2pits per mound)20x20x20cms	1400 Nos.	100/%	1400
6	Filling of pits 20x20x20 cms	1400 Nos.	60/%	840
7	Planting of 1400 nos. Plants (P Bags) on mounds (2 pits per mound) inclusive of carriage of plants	1400 Nos.	4/ %	5600
8	Preparation of patches of grass/legume sowing (0.3x0.3x0.3m) inclusive of carriage of plants	700 Nos	240/%	1680
9	Sowing of grass/legume seeds in patches	700 Nos	70/%	490
10	Cost of raising plants [P. bags (6"x4")/Root trainings] in the Nursery	1400 Nos	2 per plant	2800
11	Cost of grass/legume seed	10 Kg.	200 per Kg	2000
12	Minor small soil conservation activities as small gully plugging, brushwood check dams etc.	L/S	3000 per ha	3000
	<b>TOTAL</b>			<b>29485</b> <b>or say Rs. 29500</b>

**B] Second Year Operations:**

SI No	Detail of works	Quantity	Rate (Rs)	Amount (Rs)
1	Strengthening/support to live-hedge fence (approx. 30%)	300 Rmt	10 per Rmt	3000
2	Minor small soil conservation activities as small gully plugging, brushwood check dams etc.	L/S	1100/ha	1100
<b>Total</b>				<b>4100</b>

**C] Third Year Operations:**

SI No	Detail of works	Quantity	Rate (Rs)	Amount (Rs)
1	Strengthening/support to live-hedge fence (approx. 30%)	50 Rmt	10 per Rmt	500
2	Digging of pits (60x60x60cm)	500 Nos	700/hundred	3500
3	Filling of pits (60x60x60cm)	500 Nos	280/hundred	1400
4	Carriage of plants raised in Polythene Bags (P bags) of size 4**6", from nursery to roadside by road including loading & unloading over a distance of say 10 Kms.	500 plants (1 trips)	1200/- per trip	1200
5	Carriage of plants (P bags) from roadside to plantation site by manual labour over a distance of 2 kms. (approximately 20% mortality replacement)	300 plants	160%/km	480
6	Plantation of P. Bags plants	500 Nos	160/hundred	800
7	Cost of raising plants in P. bags	500 Nos	3.50/plant	1750
8	Minor small soil conservation activities as small gully plugging, brushwood check dams etc.	L/S	1000/ha	1000
<b>TOTAL</b>				<b>Rs.10630</b>

**D] Forth Year Operations:**

Sl No	Detail of works	Quantity	Rate (Rs)	Amount (Rs)
1	Re-digging of pits (60x60x60cm) – 25% mortality	125 Nos	700/ Hundred	825
2	Filling of pits (60x60x60cm)	125 Nos	200/ hundred	350
3	Carriage of plants raised in Polythene Bags (P bags) of size 4**6", from nursery to roadside by road including loading & unloading over a distance of say 10 Kms.	125 Nos	500/ per trip	500
4	Carriage of plants (P bags) from roadside to plantation site by manual labour over a distance of 2 kms.	125 plants	160/%Km	400
5	Plantation of P. Bags plants	125 Nos	160/ hundred	200
6	Cost of raising plants in P. bags	125 Nos	3.50/plant	440
7	Minor small soil conservation activities as small gully plugging, brushwood check dams etc.	L/S	700/ha	700
<b>TOTAL</b>				<b>3415</b> or say Rs 3400

**E] Fifth Year Operations:**

Sl No	Detail of works	Quantity	Rate (Rs)	Amount (Rs)
1	Re-digging of pits (60x60x60cm) – 15% mortality	75 Nos	700/ Hundred	525
2	Filling of pits (60x60x60cm)	75 Nos	280/ hundred	210
3	Carriage of plants raised in Polythene Bags (P bags) of size 4**6", from nursery to roadside by road including loading & unloading over a distance of say 10 Kms.	75 Nos	500/ per trip	500
4	Carriage of plants (P bags) from roadside to plantation site by manual labour over a distance of 2 kms.	75 plants	160/%Km	240
5	Plantation of P. Bags plants	75 Nos	160/ hundred	120
6	Cost of raising plants in P. bags	75 Nos	3.50/plant	263
7	Minor small soil conservation activities as small gully plugging, brushwood check dams etc.	L/S	500/ha	500
<b>TOTAL</b>				<b>2358</b> or say Rs 2360



## ABSTRACT

SL No	Abstract	Amount (Rs.)
A	First Year Operation	29500
B	Second Year Maintenance Operations	4100
C	Third Year Operations, Planting of 500 Plants	10630
D	First Year maintenance of plants planted in 3 <sup>rd</sup> year	3415
E	Second Year maintenance of plants planted in 3 <sup>rd</sup> year	2360
	<b>Total cost per ha</b>	<b>50005</b>
		<b>Or say Rs. 50000</b>

a) **Land slides/ slips stabilization:**

Land slides are caused by the down hill movements of weathered rock mass, boulders, soil etc. There are various factors natural and man made, which contribute directly or indirectly in producing land slide. The identified areas as per the CAT Plan are to be stabilized through various control measures which would depend upon the size, extent and location of the slip of the area. However in general the following measure shall be applied depending upon the situation in the site/ field.

- i) Construction of check wall/ protection/retaining wall with crate wire to control land slips and toe cutting with brushwood check dams.
- ii) A mixture of soil conservation work with biological measures is required depending upon the site.

The various land slips/ land slides stabilization proposed for treatment is given below:

S. N.	Name of Area	Area-hac	Name of Beat	Geo reference	Area benefitted-ha
1	Rangle	3	Runang	31° 31' 57" / 78° 08' 22"	3
2	Rangdul-I	5	Runang	31° 31' 25" / 78° 08' 50"	5
3	Rangdul-II	5	Runang	31° 31' 22" / 78° 08' 65"	5
4	Yulla	6	Urni	31° 33' 40" / 78° 07' 41"	6
5	Bijarmang	3	Runang	31° 32' 23" / 78° 09' 42"	3
<b>Total</b>		<b>22</b>			<b>22 ha</b>

#### The expenditure of land slide and slips stabilization

Name of work	Amount in Rs
Cost of land slip/ stabilization over 22 ha.	65,77,500

The cost includes raising of local bio-species in the nurseries and planting/ biological intervention. The actual size and expenses may vary as per the site condition prevailing and requirement at the time of execution.

#### b) Nallah Stabilization:

About 5 Nallahs with a length of about 14Kms. are required to be treated depending upon the sites/ location out of the length in the catchments area. The identified areas are given in the CAT Plan shall be stabilized through controlled measures which will depend upon the size, extent and location of the Nallah of the field.

- a) Construction of check dams with protection wall with crate wire to regulate and check/ reduce the speed of flow.

- b) The eroded and effected Nallah will be channelized and protected by the crate wire of check wall and check dams.
- c) Live hedge vegetative spurs along the Nallah shall be put up after one or two years, when the Nallah will be filled by the silt. Local species which are good soil binders like Salix, Alnus nitida, Alianthus, Nirgal, Kashmal, Bhekhal, Seabuck thorn, Rosa spp., Rubus, Debreggessia, Desmodium & Spiraea spp. etc. will be planted.

The details of Nallahs with length in Km are given below:

S. N.	Name of Nallah	Length- Km	Name of Beat	Geo reference	Area benefitted- ha
1	Chhesido	2	Runang	31° 32' 51" / 78° 10' 06"	40
2	Rattan Budha	3	Runang	31° 32' 40" / 78° 10' 10"	60
3	Supurcho	2	Runang	31° 33' 12" / 78° 10' 28"	40
4	Yulla Khad	4	Urmi	31° 33' 34" / 78° 07' 30"	80
5	Resuro	3	Urmi	31° 33' 28" / 78° 07' 55"	60
	<b>Total</b>	<b>14 Km</b>			<b>280</b>

#### Financial Implications

Name of Work	Amount-Rs
Cost of Nallah stabilization over 14Kms.	39,75,800/-

The cost includes raising of local bio-species in the nurseries and planting/ biological intervention.



(c) **Soil and water harvesting structure—Construction of Van Sarovar:-**

The demand on the water resources of the state has been increasing with every passing year. The state is faced with a situation of water stress i.e. manifested by apparent moisture stress in vegetation and forest. Keeping in view of these facts the Hon'ble Forest Minister during the CF's Meeting on 7<sup>th</sup> & 8<sup>th</sup> July 2009 stressed upon the Forest Department to construct Van Sarovar in the forest area to conserve and augment water resources of the forest in the State of Himachal Pradesh. The basic idea of the Van Sarovar scheme is to trap rain water on hill sides, increase percolation and to build water retaining structures to store the excess water runoff in streams. The component and design of the scheme is to be followed as direction given by the department time to time as per availability and requirement of the site. The provision of Rs.7.00 lakh has been made in the CAT Plan for construction of one number van Sarovar in the identified location.

**6.10.3 Payment of Environmental Services (PES):**

It is a new concept as a reward for good conservation behavior by upstream community living in the catchments area of the project. The PES will be based on the result of monitoring of the following aspects and effectiveness of conservation measures between communities.

- Silt load (total, seasonal and average assessment).
- Survival % of plantation.
- Freezing land use.
- Better Agriculture, Horticulture and Animal Husbandry practices in the catchment areas.

Procedure for implementing PES is yet to be evolved. However, 15 % of the CAT Plan outlay has been kept for PES.

Following works are suggested under PES:

- Distribution of Fruit plants.
- Value addition facilities for the local raw materials.
- Span for carriage of /commodity/local produce.
- Maintenance/improvement of village paths.
- Maintenance/improvement of bowries.
- Incentivisation for rotational grazing in pastures.
- Eco-tourism activities.
- Income generating activities.
- Soil Conservation works in the private land to be treated through the individuals
- Distribution of G.I Pipe one each to house-hold instead of felling of green deodar trees for hoisting religious flag in their houses

Details and mechanism as well as year wise phasing of these activities has not been prescribed because this will depend on the degree of support provided by the local people in implementation of CAT plan and providing environmental support. As the CAT Plan progresses, these activities may be decided/changed/amended and there after executed.

Catchment specific study will be made to identify proposals and activities to be undertaken under PES and once these activities are approved by the Forest Department, these will be implemented with the amount kept under PES.

#### **6.10.4 Research, studies & Training:**

The forest area is unique and rich in Bio-diversity due to diverse physiographic and climatic condition. Whereas the prominent indigenous woody component includes Deodar, Kail, Fir, Spruce Betula utilis, the grassland are mainly composed of a large variety of grass and

herbaceous plants which have immense medicinal values. However, not much is known about the floral diversity, ecological and environmental impact of the area, as no comprehensive work on the subject has been conducted and published as yet. It is utmost important that a base line information about the floral diversity, ecological studies and composition is generated to guide future conservation action. Funds will be allotted to implementing agency, who will determine the study areas with focus on present scenario during the plan period. The implementing agency will contact most appropriate agency, institution to conduct their research activities from the institution like HFRI Shimla, WII, Dehradun and any recognized university in India. Priority will be given to undertake research studies in the following subject:

- (a) Socio-Economic Studies of the villages dependent on the forest resources.
- (b) Environmental impact Assessment of grazing and biotic interference.
- (c) Identification of habitat for pheasants.

A lump-sum provision of Rs.20,09,400/- have been made for this component. Year wise and Division wise allocation shown in the schedule is only indicative and funds may be used as per actual requirement of research activities proposal/plan, submitted by the candidate/institution, which is duly approved by the component authority. First preference will be given to the in service candidate who having a knowledge and experiences on forestry and wildlife management and conservation.

#### **6.10.5 Infrastructure Build up & Forest Protection:**

- a) For the optimum management of Forest resources of the tract, it is essential that the field infrastructure of the Forest Department adequately developed. The forest path/bridle path and buildings in the region are the important lines of communication in these difficult terrains and to keep



them in serviceable condition it is highly desirable but due to paucity of funds many existing paths are in a State of neglect. The following building are required to be maintained

1. Inspection Hut Runang - Rs.1,50,000/-
2. Forest Guard Hut Urni - Rs 1,00,000/-
3. Forerst Guard Hut Runang - Rs 1,00,000/-
4. B.O.Quarter Urni - Rs.1,00,000/-

b) Maintenance of Paths:- The condition of the existing Paths in the Catchments area is not good and requires maintenance /upkeep.

The following paths requires maintenance:-

- (i) Yulla to Meeru - Rs 1,00,000/-
- (ii) Meeru to Gorme - Rs 1,00,000/-
- (iii) Meeru to Kashti - Rs 1,00,000/-
- (iv) Yulla to Roura Kanda - Rs 1,50,000/-

c) Vehicles and operational support.

A provision has been made in the CAT Plan to provide support to the implementing agency in the form of establishment charges, office expenses, vehicle for better implementation of CAT Plan, Computers and equipments etc.

Sr. No.	Description of items	Qty.	Amount-Rs
1	Establishment Cost( Reimbursement of Salary & Contractual amount to Contractual Staff)	L/s	36,48,000/-
2	Provision of vehicle	L/S	6,00,000/-
3	Office Equipment's ( Computer,- 1 Nos along with accessories,GPS - 4Nos	L/S	1,00,000 /-
4.	Office expenses .	L/S	1,73,100 /-
5.	Maintenance of Motor Vehicle	L/S	1,00,000 /-
6.	Amenities to staff & labour	L/S	90,000 /-
	<b>Total</b>		<b>47,11,100 /-</b>

**PROTECTION OF FORESTS****(a) Energy Saving Devices:**

In order to reduce the pressure on forest resources in and around the catchments of the project area, it is proposed to provide alternative sources like LPG Cylinders on subsidized rate (50% cost to be borne by the beneficiaries) to poor local people, construction of crematoria along with fuel wood store and distribution of solar lights etc. in each villages of PhanchaPanchayat. The component wise detail is given below: -

- |   |         |
|---|---------|
| 1. Distribution of LPG Cylinders              | 85 Nos. |
| 2. Distribution of Solar lights               | 6 Nos.  |
| 3. Distribution of Induction heater & Cookers | 30 Nos. |

**(b) Construction/Repair of existing boundary pillars/chak pillars :**

For protection of protected areas from encroachments near the cultivations, the existing boundary pillars are to be repaired and new intermediate pillar/chak pillars are to be constructed along the boundary of cultivated land and jurisdiction of the protected forest areas. An outlay for Rs. 50,000/- is proposed to be incurred during the plan period.

**(c) Sign and Slogan Boards**

It is recommended that the sign and slogan boards must be put up at selected sites. All these sign and slogan boards must be in Hindi and English Languages in the form of an appeal to the local people, aware them the importance of Wildlife conservation under the provision of Wildlife (Protection) Act, 1972, Indian Forest Act, 1927 & Forest Conservation Act, 1980 etc. All such development works which are taking place in the project area must be properly displayed at the site of execution e.g. plantation work, nursery, pasture development, soil conservation works etc.

Therefore, an amount of Rs. 32,000/- has been proposed for this purpose during the plan period.

**(d) Reward/ Incentives to Informers:**

Reward/ incentive to informers for control of illegal trade/ illicit felling of trees is required for proper protection of forest and wildlife. Without help or association of the local people, forest guards alone are helpless to protect or detect the forest and wildlife offences. It is necessary to make people aware about the biological and ecological hardships which the fauna of the tract is facing. The people should be encouraged by providing them suitable rewards/incentives for giving information about the offender/culprits. An outlay for Rs. 45,000/- is proposed to be incurred during the plan period.

**6.10.6 Management of Wildlife in and outside the Protected Area**

**(a) Improvement and Development of wildlife**

The need for conservation, preservation and management of biological diversity arises because of threats to natural terrestrial and aquatic ecosystems due to various anthropogenic activities. The area heavily degraded will be closed with physical barriers and will be planted with bamboo, fruit trees, fruit bearing shrubs or shrubs with fodder values, herbs and grasses depending upon the site to be planted so far as practical. Increase biomass production especially on degraded common lands adjoining to villages by planting grass/B.L. trees. Plantation must use local and indigenous species since exotics species have long term negative impacts on the environment. For the improvement and development of wildlife the following activities shall be carried out during the plan period

- a Fruit bearing and bamboo plantation.
- b Publicity for awareness through Kala Jatha (NukarNatak).
- c Carrying out of wildlife census outside PAs



- d Anti-poaching measures
- e Reward/ Incentives to informers
- f Vaccination of domestic cattle
- g Field equipment and medicine for management of wild life, Purchase of capture cage, traps, immobilizing gun, darts, drug, GPS, Compass.

**Fruit bearing and bamboo plantation:**

Since all wildlife in nature live in complex web of linkage with other organism, the proper evaluation of habitat of each species followed by the proper management is very essential. The plant life provides congenial home to wildlife therefore the habitat of wildlife in core zone area is to be improved by supplementing the Bamboo/fruit bearing shrubs or shrubs with fodder values, herbs and also supported by minor soil conservation works. For this purpose bushes, shrubs & herbs forests are to be maintained and no grass should be removed from the home range of the wildlife so that habitat of wildlife could be prescribed & protected. Nirgal Bamboo and fruit bearing shrubs or shrubs with fodder value and grasses will be planted as per site location; the blank area in the forests in high reaches along ridge should be maintained as pasture land by sowing suitable indigenous grasses for the need of wild herbivores which are prey base for the carnivores. The nirgal bamboo/shrubs/herbs in the under storey is very important for conservation of pheasants which are highly endangered species i.e. Western Tragopan and Cheer Pheasants etc. The detail plantation programme has already been given in the component of Biological Measures—Improvement of tree cover in order to achieve the objective and reduce the pressure from the forest area.

**(i) Engagement of Anti-Poacher:**

The forest area is required to be guarded against poaching throughout the year. In order to curb nefarious activities poachers,

anti poaching measures like construction of check post/chowkies and joint patrolling is to be organized by engaging ex-serviceman and local un-employed youth. Local youth are to be trained and engaged them to give assistance to field staff and clues regarding poaching in a project/ sanctuary area. A forest guard will have two wild life watchers while going on patrolling in the forests. These wild life watchers are to be engaged seasonally and for a short duration so that they will not claim regularization of their services. These wild life watchers will also act as local informers. Therefore, an amount of Rs.144000/- is required to meet this purpose during the plan period.

**(ii) Vaccination of domestic cattle:**

Due to use of water holes/ponds and grazing by the live stock in the forests and vice versa may lead the wild animals to health hazards. Therefore an effective vaccination programme is recommended for foot and mouth disease in sheep and goats and other cattle adjoining to the Sanctuary areas. The migratory grazier must also be vaccinated before entered to the Sanctuary area. The veterinary department must be associated for this purpose. The staff should be trained in pathological problems and collection of samples. Therefore, an amount of Rs. 80,000 is required to meet this purpose during the plan period.

**(iii) Field equipment and medicine for management of wildlife**

The rich and unique bio-diversity of catchment area is under tremendous pressures and stress due to ever increasing demographic pressure. Increasing conflicts between Wildlife and local communities is a major factor that leads to antagonism among the people and discourage the forest official to appropriately enforce the existing laws.

The State of Himachal Pradesh has experienced escalation in the human-wildlife conflict in the last one decade. Almost all PAs in the State are surrounded by private land or other man-modified

habitats where the presence of several wild animals, particularly predators i.e. Leopard and Black Bear is intolerable. These species increasingly venture into human settlements and cultivated areas in search of food and cause loss of human lives or injuries, livestock predation or extensive damage to the horticulture/agriculture crops and other private properties. The escalation in the human-wild life conflict is an outcome of shrinkage, fragmentation and degradation of habitats. Special field training/workshop on wildlife damage control with emphasis on use and handling of animal repellants, deterrents, snares, traps, capture devices nets and accessories and power fencing etc. need to be organized. Besides above staff should be well equipped with all necessary capture traps and squeeze cages and immobilizing equipments required for capture and handling of problem of Leopard. The equipment will help in capturing of such animals and release them in their natural habitat or zoo under the provision of Wildlife (P) Act, 1972

The field equipment and medicine will be purchased by the project authority and made available to the Division.

- (1) Physical capture cages, traps, immobilizing gun, darts, drugs.
- (2) Animal rescue, translocation/transportation.
- (3) Capture devices net and accessories etc.
- (4) Field measurement-GPS/PDA, altimeter, pedometer, compass, Handy cam, Census equipments.
- (5) Binoculars and spotting scope etc.
- (6) Medicines

Therefore, an amount of Rs. 250000/- is required to meet this purpose during the plan period.



**(b) Mitigation of Human-Wildlife Conflict**

The communities of this project area largely occupied forestry region where for a long period in their history, they have lived in isolation but in harmony with the nature. They draw their sustenance largely from the forests for their day to day consumption and their livelihood. Their life is connected one way or the other with forest and wildlife, right from birth to death. We cannot deny the needs of the society as the local people who live in harmony with the forests; environment and ecologically they cannot be disregarded. Mitigation of Wildlife problems in hilly area is very complicated and therefore there is urgent need for development of livelihood approach that can minimize or reduce the man Wildlife conflict to tolerable level. In order to achieve their objectives and reduce the pressure from forest and maintain ecological balance, the conservation of wild life along with eco-development activities in the adjoining Sanctuary area. The following important mitigative measures are to be undertaken in the regard area as under: -

**(i) Publicity for awareness through Kala Jatha (NukarNatak)**

For the wide publicity of wild life in the Non Protected areas, Publicity through organizing Kala Jatha (NukarNatak) will be organized and lump sum provision of Rs 45,400/- for the same is kept for this purpose.

**(ii) Carrying out of wildlife census outside PAs**

It is proposed to carry out wildlife census during every alternate years in the key areas to know the density of the key species of the wildlife present outside the protected areas and particularly in the project area so that these can be further improved and developed from the management point of view. A lump-sum provision of Rs.90000/- have been kept for this purpose.

(iii) **Wildlife compensation against damages:**

Wildlife damages on human life and property is a major cause of alienation of local communities from wildlife conservation. Timely payment of compensation against the depredation of wildlife goes a long way in eliciting local support. There are instances of damage to apple tree/ crops, bee keeping farming, agricultural crops etc. whereas we are meeting the compensation for damage to domestic cattle and human loss/injury by wild animals only. Therefore, an amount of Rs.2,00,000/- has been proposed for this purpose during the plan period.

(c) **Extension of Sarahan Pheasantry at Gopalpur**

The Sarahan Pheasantry was established during the year 1987-88 comprising total area of Pheasantry about 11-12-37 hac. and is located near the Nalati Stadium about half km. from the famous "MAA BHIMAKALI" Temple at Sarahan. It was initially setup as rescue and rehabilitation centre for the Wild Western Himalayan fauna driven from the habitations for food due to snow fall at higher reaches. It was only where the captive breeding of Western red listed Pheasants was added during the year 1990-91 and construction of enclosure was taken up with special attention to pen, hygiene and feed etc. During the year 1993-94 Sarahan Pheasantry witnessed the first ever breeding of Western Tragopan in captivity in the World. It is the only Sarahan Pheasantry in the World where this rare endangered species kept in captivity at Sarahan Pheasantry. And now the presents Sarahan Pheasantry proposed to be established conservation breeding project of Western Tragopan will lead the World in Pheasants re-introduction programme under the guidelines of IUCN besides to standardize techniques for the conservation breeding of red listed pheasant of the western Himalayas. The Sulej valley has, over the years, come to be recognized as having large scale potential for generation of

Hydro Electric Power Project. The Project authorities are under obligation to fund available in lieu of disturbance and maintenance of ecological balance cause during the project activities in the Sutlej catchment. Keeping in view of this facts and reason the development and management of ex-situ conservation of breeding centre for endangered species will therefore be made during the plan period.

The Hon'ble Chief Minister of Himachal Pradesh has decided in the meeting held on 10.08.2007 that an alternative site for conservation breeding of Western Tragapon at Gopalpur may be setup to avoid any out breaking disease etc. Accordingly the transfer an area of 6.3 hac. from DFO Rampur to DFO Wildlife Sarahan has already been made by the order of Pr. CCF H.P. along with all assets and infrastructure to establish the alternative site of SarahanPheasantry at Gopalpur. The fencing works of alternative sites of SarahanPheasantry had already been commenced and it was decided in the meeting that funds will be met from the CAT Plan of each Hydro Power Project in Sutlej Valley so that the objective of the conservation breeding at alternative site at Gopalpur could be achieved.

Therefore a provision of Rs. 12.00 lac has been made for this purpose during the plan period and funds will be utilized with the approval of the competent authority under the supervision of the CZA New Delhi.

**6.10.7 Monitoring and Evaluation:**

The regular in house quarterly monitoring will be conducted/ organized during the plan period in addition to third party monitoring. The internal Monitoring Committee would be constituted as below:

1. Conservator of Forests Rampur, Chairman.
2. DFO Wild Life Sarahan, Member.



3. A.C.F. Kinnaur, Member
4. Representative of PRI, Member
5. Representative of user agency, Member
6. Range Officer Kalpa, Member
7. D.F.O. Kinnaur, Member Secretary

The committee would need to ensure the implementation and monitoring of the catchments area works and review progress from time to time. The implementing agency upon its approval will provide a copy of the approved APO giving details such as list of areas along with the works to be taken up and their costs to each member of the committee. The committee shall strive to make the monitoring process transparent. Meeting of this committee shall be convened at least thrice in a year or as and when required in emergency with due approval from members and higher competent authorities. All non official members shall be entitled to TA/DA as per rates approved and being followed by D.C. Kinnaur. Beside this the 3<sup>rd</sup> party monitoring of the CAT Plan works will also be done. The indicator for monitoring impact of the CAT Plan will include:-

- i) Change in silt load
- ii) Survival of plantations
- iii) The changes in the water discharge in nature springs
- iv) Change in land – use ( Private holdings)
- v) Changes in man animal conflicts
- vi) Status & functioning of User group
- vii) Trend of fire incidence in vulnerable areas

All the expenditure incurred on this shall be met from this head of Monitoring and Evaluation. 5% of the cost of CAT Plan has been kept reserved for this purpose. Therefore an outlay for Rs. 20,09,400/- is proposed to be incurred under the scheme during the plan period.

**6.10.8 Site specific/Micro Planning:**

In the proposed CAT Plan, activities of plan are given component wise and area specific. Further site specific Micro Planning will be required at the time of execution of CAT Plan with the consultation of JFMCs. Moreover, if certain new techniques/innovations occur in due course of time, these can be taken up as per requirement of site and particular Location. Therefore 5% of total CAT Plan outlay amounting to Rs. 20,09,400 is proposed for this purpose during the plan period.

**6.10.9 Contingencies:**

5% of the total CAT plan outlay has been earmarked as contingency to cover any unforeseen situation/activities and a provision of Rs 20,09,400/- have been kept for the purpose.

## CHAPTER-VII

### ORGANIZATION STRUCTURE AND IMPLEMENTATION

- 7.1 This CAT Plan will be implemented by the H.P. Forest Department through the Conservator of Forests, Rampur Circle-cum-Project Director under Satluj Valley Watershed Development Society. At the field level the actual implementation will be done through D.F.O. Kinnaur, having territorial jurisdiction over the areas covered under this Plan. The DFO Kinnaur will be assisted by the regular staff posted under them and may also hire local consultants on short term basis for implementation of the CAT Plan.

In compliance of Hon'ble Supreme Court of India, an agency called "CAMPA" compensatory afforestation fund management and planning authority has been created on the recommendations of the Central Empowered Committee (CEC) for examining the issues pertaining to compensatory afforestation net present value of diverted forest land, other monies recoverable received to be utilized for carrying out the above works.

In compliance of Hon'ble Supreme Court of India, an agency called "CAMPA" compensatory afforestation fund management and planning authority has been created on the recommendations of the Central Empowered Committee (CEC) for examining the issues pertaining to compensatory afforestation net present value of diverted forest land, other monies recoverable received to be utilized for carrying out the above works.

The Govt. of India, Ministry of Environment and Forests, have notified Governing Body and Executive Body for function of the CAMPA. Mean a while a bill has been introduced in the Lok Sabha (Parliament) to lay down



the CAMPA (Compensatory afforestation Forest management and Planning Authority) Rules. The monies on account of the CA, NPV and CAT Plan are now to be deposited in the above fund and spent in the manner provided by the MOEF. In compliance to the instructions contained in Ministry of Environment and Forests, Government of India's letter No. 1-58/09-MoS(l/c)-E&F dated 15<sup>th</sup> July 2009, the Governor of Himachal Pradesh is pleased to reconstitute "State Compensatory Afforestation Fund Management and Planning Authority (hereinafter referred to as State CAMPA) vide H.P. Govt. Notification no FFE-B-F(2)-72/2004-Pt-II intended as an instrument to accelerate activities for Compensatory afforestation, forest resource management, preservation of natural forests, management of wildlife, infrastructure development in the sector and allied works.

State CAMPA would provide and integrated framework for utilizing multiple sources of funding and activities relating to protection and management of forests and wildlife. Its prime task would be regenerating natural forests and building up the instruction engaged in this work. The State Forest Department would be modernized to protect and regenerate the forests and wildlife habitat.

The functions of State CAMPA shall be include funding, overseeing and promoting Compensatory afforestation done in lieu of diversion of forest land for non-forestry use under the Forest (Conservation) Act, 1980 and also the execution of Catchment Area Treatment plans. The State CAMPA shall function through a Governing Body, as Steering Committee and an Executive Committee. The Governing Body shall lay down the board policy framework for the functioning of State level CAMPA and review its working from time to time. The Steering Committee shall monitor the progress of the utilization of funds released by the State CAMPA and approved the Annual Plan of Operation (APO) prepared by the Executive Committee. The State level executive Committee shall take all steps for

giving effect to the State CAMPA and overarching objectives and core principles, in accordance with the rules and procedures approved by the Steering Committee and the approved APO. The State level Executive Committee shall supervise the works being implemented in the State out of the funds released from the State CAMPA and be responsible for proper auditing of both receipt and expenditure of funds. An independent system for concurrent monitoring and evaluation of the works implemented from the State CAMPA funds shall be evolved and implemented to ensure effective and proper utilization of funds.

The works will be executed strictly in accordance with the State CAMPA Notification dated 03.08.2009 through the Conservator of Forests-cum-Project Director. The implementation will be at field level by the DFO Kinnaur having jurisdiction over the area under the plan in Kinnaur Forest Division. The limit of execution of work will be Forest Beat, Forest Block and Kalpa territorial Forest Range.

The works will be carried out as per the annual plan operations to be prepared on the basis of year wise phasing out of the physical & financial targets. The APOs will be got approved from the State CAMPA through the Pr. CCF as envisaged in the CAMPA Notification.

As multi disciplinary approach is to be adopted in this project, as such involvement of local communities with close liaison with Agriculture, Rural Development, Panchayati Raj, PWD and Animal Husbandry Departments. Roura-II Small HEP (P) Ltd. Authorities will be associated for implementation of this Plan and during the monitoring and evaluation process.

#### **7.2 Implementation Staff:**

The existing staff of Kinnaur Forest Division will be involved for the implementation of CAT Plan works in addition to their own duties. However, for proper execution of works and utilization of the money for the

treatment of the catchments area DFO will be authorized to engage staff on contract basis with the approval of Project Director-cum-C.F. Rampur.

**7.3 Cost Escalation:**

The present cost projections are based on the prevailing wage rates. The cost of the project will escalate and when wage rates are hiked by the H.P. Government from time to time. In such an eventuality cost for proportionate increase in the cost of material and wages for funding will be submitted to the user agency by the implementing agency and differential amount will be met by the user agency during the plan period.



## CHAPTER-VIII

## COST ESTIMATE

**8.1 Total Project Cost:**

Cost of the various component have been worked out on schedule rate for the year 2009-10 with recent wage hike as applicable in Rampur Forest Circle H.P. Forest Department. The detail of expenditure for various components has been shown in the respective chapter. Total project cost for 11 years will be as under:-

Year	Amount (Rs.)
Zero year	5,20,000
First year	41,00,750
Second year	80,50,250
Third year	92,98,250
Fourth year	59,70,900
Fifth year	37,24,300
Sixth year	25,34,600
Seventh year	18,47,900
Eighth year	19,88,175
Ninth year	18,19,425
Tenth year	3,32,850
G. Total Cost of CAT Plan	4,01,87,400

**8.2 Annual Phasing:**

Annual phasing of works to be carried out in Roura HEP as per approved CAT Plan is attached along with the Cost module, year wise planning and activity wise Percentage of Financial Outlay of CAT Plan is attached as Annexure – I to XI

Year Wise Phasing for execution of CAT Plan for Roura II (20 MW) H.E.P., Kinnaird Forest Division.

Name of component	Zero year		1st Year		2nd Year		3rd Year		4th Year		5th Year		6th Year		7th Year		8th Year		9th Year		10th Year		Total	
	Phy- ha/km/ no	Fin- Rs	Phy- ha/km/ no	Fin- Rs	Phy- ha/km/ no	Fin- Rs	Phy- ha/km/ no	Fin- Rs	Phy- ha/km/ no	Fin- Rs	Phy- ha/km/ no	Fin- Rs	Phy- ha/km/ no	Fin- Rs	Phy- ha/km/ no	Fin- Rs	Phy- ha/km/ no	Fin- Rs	Phy- ha/km/ no	Fin- Rs	Phy- ha/km/ no	Fin- Rs	Phy- ha/km/ no	Fin- Rs
<b>Afforestation measures improvement of tree cover</b>																								
(a) Nursery development (i) extension and maintenance of existing Urml & Runang Nurseries	2	200000	2	150000	2	150000	2	100000																600000
(ii) Enrichment planting																								
(i) New																								
(ii) Maintenance																								
1st Year																								
2nd Year																								
3rd Year																								
4th Year																								
5th Year																								
Energy Plantation																								
(i) New																								
TOTAL (1)	200000	150000	150000	150000	150000	1304000	1304000	45	1304000	45	1304000	10	371300											
(ii) Soil conservation works - Engineering & Bio Engineering measures (i) Stabilization of land slides /dips (ii) stabilization of nails	5	1496250	5	1496250	5	1496250	4	1195000	4	1195000	3	893750												
(iii) Soil & water harvesting structure - Construction of rain serevat	2	565000	4	1140000	4	1140000	2	565000	2	565000	2	565000												
TOTAL (2)		2061250		3336250		2636250		1760000		1459500		1459500												
Payment of Eco - services for Rouram Conventional Energy Pvt. Ltd.				508100		800000		850000		900000		750000		750000		750000		750000		670000				6028100
TOTAL (3)				508100		800000		850000		900000		750000		750000		750000		750000		670000				11251300

For Rouram Conventional Energy Pvt. Ltd.  
Authorized Signatory





**Year-Wise Phasing for execution of CAT plan for Roura II (20 MW) H.E.P., Kinnair Forest Division.**

Sl. No	Name of component	Zero year		1st Year		2nd Year		3rd Year		4th Year		5th Year		6th Year		7th Year		8th Year		9th Year		10th Year		TOTAL		
		Qty- ha/ha/m/ha	Rs	Qty- ha/ha/m/ha	Rs	Qty- ha/ha/m/ha	Rs	Qty- ha/ha/m/ha	Rs	Qty- ha/ha/m/ha	Rs	Qty- ha/ha/m/ha	Rs	Qty- ha/ha/m/ha	Rs	Qty- ha/ha/m/ha	Rs	Qty- ha/ha/m/ha	Rs	Qty- ha/ha/m/ha	Rs	Qty- ha/ha/m/ha	Rs			
I.	Distribution of solar lights	-	-	-	-	-	-	-	-	1	10000	1	10000	-	-	1	10000	1	10000	1	10000	1	10000	6	60000	
		-	-	-	-	-	-	-	-	-	1	10000	1	10000	-	-	1	10000	1	10000	1	10000	1	10000	6	60000
II.	Distribution of induction heater /cooker	-	-	-	-	-	-	-	-	-	5	10000	-	-	-	5	10000	-	-	-	5	10000	5	10000	30	60000
		-	-	-	-	-	-	-	-	-	5	10000	-	-	-	5	10000	-	-	-	5	10000	5	10000	30	60000
III.	Construction of new and repair of existing boundary pillars /chka pillars	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50000	
		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	50000
IV.	Sign and Slogan boards raised /scenic to industries	-	-	2	10000	2	10000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4	40000
		-	-	2	10000	2	10000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	4
TOTAL (I+II+III+IV)		-	41000	-	66000	-	50000	-	45000	-	45000	-	45000	-	45000	-	45000	-	45000	-	45000	-	45000	-	417000	
		-	41000	-	66000	-	50000	-	45000	-	45000	-	45000	-	45000	-	45000	-	45000	-	45000	-	45000	-	417000	
Management of wild life in and outside the protected area		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	6028100	
(a) Improvement and development of wild life		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	144000	
(i) Engagement of anti poacher		-	-	-	18000	-	18000	-	18000	-	18000	-	18000	-	18000	-	18000	-	18000	-	18000	-	18000	-	18000	80000
(ii) Vaccination of domestic cattle		-	-	-	100000	-	100000	-	100000	-	100000	-	100000	-	100000	-	100000	-	100000	-	100000	-	100000	-	100000	250000
(iii) Field equipment and medicines for management of wildlife		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	250000	
(b) Mitigation of human Wild life Conflict		-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	45400	
(i) Publicity & awareness through kala artha (Nidhar mata)		-	5400	-	10000	-	12000	-	6000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	45400	
(ii) Carrying out of wild life census outside PA		-	-	-	-	-	130000	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	90000	
(iii) Compensation against wild life damages		-	-	-	25000	1/4	25000	1/4	25000	1/4	25000	1/4	25000	1/4	25000	1/4	25000	1/4	25000	1/4	25000	1/4	25000	1/4	25000	200000

For Roura Non Conventional Energy P.A. Ltd.  
 Authorized Signatory

Divisional Forest Officer,  
 Kinnair Forest Division,  
 Al Rindong Pen, (H.P.)

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Year Wise Phasing for execution of CAT Plan for Roura II (20 MW) H.E.P, Konnar Forest Division.

Id	Name of component	Zero Year		1st Year		2nd Year		3rd Year		4th Year		5th Year		6th Year		7th Year		8th Year		9th Year		10th Year		Total
		Qty- ha/ann/ no	For-Rs ha/ann/ no	Qty- ha/ann/ no	For-Rs ha/ann/ no	Qty- ha/ann/ no	For-Rs ha/ann/ no	Qty- ha/ann/ no	For-Rs ha/ann/ no	Qty- ha/ann/ no	For-Rs ha/ann/ no	Qty- ha/ann/ no	For-Rs ha/ann/ no	Qty- ha/ann/ no	For-Rs ha/ann/ no	Qty- ha/ann/ no	For-Rs ha/ann/ no	Qty- ha/ann/ no	For-Rs ha/ann/ no	Qty- ha/ann/ no	For-Rs ha/ann/ no	Qty- ha/ann/ no	For-Rs ha/ann/ no	
(4)	Extension of Seakam Freezery at Gopalpur	-	-	-	-	-	-	U/S	100000	U/S	200000	U/S	150000	U/S	150000	-	-	U/S	150000	U/S	150000	U/S	150000	1200000
	TOTAL (b)	-	-	9400	-	283000	-	365000	-	259000	-	233000	-	200400	-	-	233000	-	203100	-	215000	-	208900	2009400
	Monitoring and Evaluation	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	2009400
	Site specific work plan	-	300000	-	300000	-	400000	-	500000	-	400000	-	300000	-	200000	-	100000	-	100000	-	90000	-	49400	2009400
	Contingencies	-	20000	-	100000	-	400000	-	500000	-	300000	-	200000	-	150000	-	100000	-	100000	-	90000	-	49400	2009400
	TOTAL COST OF CAT PLAN	-	520000	-	4100750	-	8050250	-	9298250	-	5970000	-	3734500	-	2534600	-	1847900	-	1598175	-	1819425	-	133850	40187000

For Roura Non Conventional Energy Pvt. Ltd.  
Authorized Signatory

Conservator of Forests  
Rampur Forest Circle M. P.

Divisional Forest Officer,  
Konnar Forest Division,  
At Rudrapur Post, (M.P.)

## ANNEXURE-I

## Detail of Work Schedule for Zero year

Sr. No.	Name of Component	Name of area	Phys. Targets	Rate	Amount (in Rs.)
1	Afforestation Measures				
(a)	Nursery Development				
	Extension and maintenance of existing Nurseries	Urni & Runang	2 No	L/s	200000
	<b>Sub-Total (1)</b>				<b>200000</b>
8	Site Specific Work Plan			L/s	300000
9	Contingencies			L/s	20000
	<b>G Total</b>				<b>520000</b>



## ANNEXURE-8

## Detail of Work Schedule for First year

Sr. No.	Name of Component	Name of area	Unit	Phys. Targets	Rate	Amount (in Rs.)
1	Afforestation Measures					
(a)	Nursery Development					
	Extension and maintenance of existing Nurseries	Urni & Runang	No	2	L/s	150000
	<b>Sub-Total (1)</b>					<b>150000</b>
(b)	Enrichment planting					
	New					
	Maintenance					
(c)	Energy Plantation					
	New					
	<b>Total 1</b>					
2	Soil and Water Conservation measures including				L/s	
(i)	Stabilization of land slides/Slips	Rangdul-I	Ha	5	L/s	1495250
(ii)	Stabilization of Nallas	Chhesido	Km	2	L/s	565000
(iii)	Soil and water harvesting structure-Construction of	-	-	-	-	
	<b>Total (2)</b>					<b>2061250</b>
						<b>558100</b>
3	Payments for Environmental Services					
4	Research, Training and Capacity Build-Up					500000
5	Infrastructure Build-Up and Forest Protection					
	Maintenance of Buildings					
(i)	Maintenance of Inspection Hut Runang	Inspection Hut Runang	No	1	L/s	150000
(ii)	Maintenance of Path	Yulla to Miru	KM		L/s	100000
(iii)	Establishment Cost	Contractual Staff			L/s	100000
	Office Equipment				L/s	0
	Office Expenses				L/s	20000
	Motor Vehical				L/s	15000
	<b>Total 5A</b>					<b>385000</b>
	Protection of Forests					
(a)	Energy saving devices		No	10	L/s	20000
(i)	Distribution of LPG Cylinders					
(b)	Construction and repair of existing boundary pillars/chak pillars					0
(c)	Sign & Slogan Boards			2		16000
(d)	Reward/Incentive to informers				L/s	5000
	<b>Total 5B</b>					<b>41000</b>
	<b>Total 5(A+B)</b>					<b>426000</b>
6	Management of Wildlife Measures in outside Protected					
(a)	Improvement and Development of Wildlife					
(i)	Engagement of Anti-Poacher					0
(ii)	Vaccination of domestic cattle					0
(iii)	Field equipment and medicine for management of Wildlife					0
(b)	Mitigation of Human Wildlife Conflict					
(i)	Publicity awareness through Kala Jatha (Nukar Natak)					5400
(ii)	Carrying out of wildlife census outside PA					0
(iii)	Compensation against wildlife damages					0
(c)	Extension of Sarahan Pheasanry at Dopalpur					0
	<b>Total (6)</b>					<b>5400</b>
7	Monitoring and Evaluation					300000
8	Support for preparing site specific Work Plans					100000
9	Contingencies					4100753
	<b>Total Cost of CAT Plan</b>					<b>4100753</b>

## Detail of Work Schedule for Second year

Sr. No.	Name of Component	Name of area	Unit	Phys. Targets	Rate	Amount (in Rs.)
1	<b>Afforestation Measures</b>					
	(a) Nursery Development					
	Extension and maintenance of existing Nurseries	Umi & Runang	No	2	L/s	150000
	Sub-Total (1)					150000
	(b) Enrichment planting					
	New					
	Maintenance					
	(c) Energy Plantation					
	New					
	Total 1					
2	<b>Soil and Water Conservation measures including</b>					150000
	(i) Stabilization of land slides/Slopes	Rangdai-II	Ha	5	L/s	
	(ii) Stabilization of Nallas	Rattan Budha	Km	3	L/s	1496250
		Resuro (Part)	Km	1	L/s	
		Total Nallas	Km	4	L/s	1140000
	(iii) Soil and water harvesting structure-		No	1	L/s	700000
	Total (2)					
3	Payments for Environmental Services					3336250
4	Research, Training and Capacity Build-Up					800000
						600000
5	<b>(A) Infrastructure Build-Up and Forest Protection</b>					
	Maintenance of Buildings					
	(i) Maintenance of FG Hut Umi	FG Hut Umi	No	1	L/s	100000
	Maintenance of FG Hut Runang	FG Hut Runang	No	1	L/s	100000
	Maintenance of BO Qrts Umi	BO Qrts Umi	No	1	L/s	100000
	(ii) Maintenance of Path	Miru To Gorme	KM		L/s	100000
	(iii) Establishment Cost	Contractual Staff			L/s	1500000
	Office Equipment				L/s	50000
	Office Expenses				L/s	40000
	Motor Vehicle				L/s	15000
	Amenities to staff & labour					30000
	Total 5A					2035000
	(B) Protection of Forests					
	Energy saving devices					
	(i) Distribution of LPG Cylinders		No	10	L/s	20000
	(b) Construction and repair of existing boundary pillars/chak pillars					
	(c) Sign & Slogan Boards					25000
	(d) Reward/Incentive to informers			2		18000
	Total 5B				L/s	5000
	Total 5(A+B)					66000
6	<b>Management of Wildlife Measures in outside Protected</b>					2101000
	(a) Improvement and Development of Wildlife					
	(i) Engagement of Anti-Poacher					
	(ii) Vaccination of domestic cattle					18000
	(iii) Field equipment and medicine for management of Wildlife					10000
	(b) Mitigation of Human Wildlife Conflict					100000
	(i) Publicity awareness through Kala Jetha (Nukar Natak)					
	(ii) Carrying out of wildlife census outside PA					10000
	(iii) Compensation against wildlife damages					0
	(c) Extension of Sarahan Pheasantry at Gopalpur					25000
	Total (6)					100000
7	<b>Monitoring and Evaluation</b>					263000
8	Support for preparing site specific Work Plans					0
9	Contingencies					400000
	Total Cost of CAT Plan					8050250

## ANNEXURE-IV

## Detail of Work Schedule for Third year

Sl. No.	Name of Component	Name of area	Unit	Phys. Targets	Rate	Amount (in Rs.)
1	<b>A Reforestation Measures</b>					
	(a) Nursery Development					
	Extension and maintenance of existing Nurseries	Uma & Runeng	No	2	L/s	100000
	<b>Sub-Total (1)</b>					100000
	(b) Enrichment planting					
	<b>New</b>					
		UP Yulla	Hec.	15		
		C-252	Hec.	10		
		Shikamo	Hec.	10		
		Tharu(1st)	Hec.	5		
		<b>Total</b>	Hec.	40	30100	1204000
	<b>Maintenance</b>					
	<b>Energy Plantation</b>					
	<b>New</b>					
	<b>Total 1</b>					1304000
2	<b>Soil and Water Conservation measures including</b>					
	(i) Stabilization of land slides/Slope	Yulla (Part)	Ha	5	L/s	1490250
	(ii) Stabilization of Nallas	Supurcho	Km	2	L/s	
		Resuro (Part)	Km	2	L/s	
		<b>Total Nallas</b>	Km	4	L/s	1140000
	(iii) Soil and water harvesting structure-		No	0	L/s	0
	<b>Total (2)</b>					2636250
3	Payments for Environmental Services					650000
4	Research, Training and Capacity Build-Up					500000
5	<b>(A) Infrastructure Build-Up and Forest Protection</b>					
	Maintenance of Buildings					
	(ii) Maintenance of Path	Minu to Kashri	KM		L/s	100000
	(iii) Establishment Cost	Contractual Staff			L/s	1748000
	Mobility for Protection-Vehicle				L/s	800000
	Office Equipment				L/s	50000
	Office Expenses				L/s	25000
	Motor Vehicle				L/s	10000
	Amenities to staff & labour					30000
	<b>Total 5A</b>					2563000
	<b>(B) Protection of Forests</b>					
	Energy saving devices					
	(i) Distribution of LPG Cylinders		No	10	L/s	20000
	(b) Construction and repair of existing boundary pillars/Chak pillars				L/s	25000
	(c) Sign & Slogan Boards					0
	(d) Reward/Incentive to informers				L/s	5000
	<b>Total 5B</b>					50000
	<b>Total 5(A+B)</b>					2913000
6	<b>Management of Wildlife Measures in outside Protected</b>					
	(a) Improvement and Development of Wildlife					
	(i) Engagement of Anti-Poacher					18000
	(ii) Vaccination of domestic cattle					10000
	Field equipment and medicine for management of Wildlife					100000
	(b) Mitigation of Human Wildlife Conflict					
	(i) Publicity awareness through Kala Jatha (Nukar Natak)					12000
	(ii) Carrying out of wildlife census outside PA					20000
	(iii) Compensation against wildlife damages					25000
	(c) Extension of Sarahan Pheasantry at Gopalpur					200000
	<b>Total (6)</b>					385000
7	<b>Monitoring and Evaluation</b>					0
8	Support for preparing site specific Work Plans					500000
9	Contingencies					500000
	<b>Total Cost of CAT Plan</b>					9298250



## ANNEXURE-V

## Detail of Work Schedule for Fourth year

Sr. No.	Name of Component	Name of area	Unit	Phys. Target	Rate	Amount (in Rs.)
1	<b>Afforestation Measures</b>					
(a)	Nursery Development					
	Extension and maintenance of existing Nurseries	Umi & Runang	No	0	L/s	0
	<b>Sub-Total (1)</b>					0
(b)	<b>Enrichment planting</b>					
	<b>New</b>					
		Bragdo	Hac	10		
		C-252	Hac	10		
		C-253	Hac	10		
		C-253	Hac	10		
		Thanu(2nd)	Hac	5		
		<b>Total</b>	<b>Hac</b>	<b>45</b>	<b>30100</b>	<b>1354500</b>
	<b>Maintenance (1st Year)</b>					
		UF Yulla	Hac	15		
		C-252	Hac	10		
		Shikamo	Hac	10		
		Thanu(1st)	Hac	5		
		<b>Total</b>	<b>Hac</b>	<b>40</b>	<b>5850</b>	<b>238000</b>
(c)	<b>Energy Plantation</b>					
	<b>New</b>					
	<b>Total 1</b>					<b>1592500</b>
2	<b>Soil and Water Conservation measures including</b>				L/s	
(i)	Stabilization of land slides/Slips	Yulla (Part)	Ha	1		
		Rangle	Ha	3		
		<b>Total Slips</b>		<b>4</b>	<b>L/s</b>	<b>1195000</b>
(ii)	Stabilization of Nallas	Yulla Khad (Part)	Km	2	L/s	585000
		<b>Total Nallas</b>	<b>Km</b>	<b>2</b>		<b>585000</b>
(iii)	Soil and water harvesting structure-		No	0	L/s	0
	<b>Total (2)</b>					<b>1760000</b>
3	Payments for Environmental Services					000000
4	Research, Training and Capacity Build-Up					409400
5	<b>(A) Infrastructure Build-Up and Forest Protection</b>					
	Maintenance of Buildings					0
(ii)	Maintenance of Path	Yulla to Roura Kanda	KM		L/s	150000
(iii)	Establishment Cost	Contractual Staff			L/s	100000
	Mobility for Protection-Vehicle				L/s	0
	Office Equipment				L/s	0
	Office Expenses				L/s	15000
	Motor Vehicle				L/s	10000
	Amenities to staff & labour					30000
	<b>Total 5A</b>					<b>305000</b>
(B)	<b>Protection of Forests</b>					
	Energy saving devices					
(i)	Distribution of LPG Cylinders		No	10	L/s	20000
(ii)	Distribution of Solar lights		No	1	L/s	10000
(iii)	Distribution of induction heater/cooker		No	5	L/s	10000
(b)	Construction and repair of existing boundary					0
(c)	Sign & Slogan Boards					0
(d)	Reward/Incentive to informers				L/s	5000
	<b>Total 5B</b>					<b>45000</b>
	<b>Total 5(A+B)</b>					<b>350000</b>
6	<b>Management of Wildlife Measures in outside Protected</b>					
(a)	Improvement and Development of Wildlife					
(i)	Engagement of Anti-Poacher					18000
(ii)	Vaccination of domestic cattle					10000
(iii)	Field equipment and medicine for management of Wildlife					50000

Sr. No.	Name of Component	Name of area	Unit	Phys. Target	Rate	Amount (in Rs.)
(b)	Mitigation of Human Wildlife Conflict					
	Publicity awareness through Kala Jatha (Nukar Natak)					6000
(i)						0
(ii)	Carrying out of wildlife census outside PA					25000
(iii)	Compensation against wildlife damages					
	Extension of Sarahan Pheasantry at Gopalpur					150000
(c)						239000
	Total (b)					0
7	Monitoring and Evaluation					400000
8	Support for preparing site specific Work Plans					300000
9	Contingencies					6970900
	<b>Total Cost of CAT Plan</b>					

## ANNEXURE-VI

## Detail of Work Schedule for Fifth year

Sr No.	Name of Component	Name of area	Unit	Phys. Target	Rate	Amount (in Rs.)
1	<b>Afforestation Measures</b>					
(a)	Nursery Development					
	Extension and maintenance of existing Nurseries	Umi & Runang	No	0	L/s	0
	<b>Sub-Total (1)</b>					0
(b)	<b>Enrichment planting</b>					
	<b>New</b>					
		NC-27 (Chigoza)	Hac.	10		
		<b>Total</b>	Hac.	10	37120	371200
	<b>Maintenance (1st Year)</b>					
		Bragdo	Hac.	10		
		C-252	Hac.	10		
		C-253	Hac.	10		
		C-255	Hac.	10		
		Tharu(210)	Hac.	5		
		<b>Total</b>	Hac.	45	5950	267750
	<b>(2nd Year)</b>					
		UF Yula	Hac.	15		
		C-252	Hac.	10		
		Shikamo	Hac.	10		
		Tharu(1st)	Hac.	5		
		<b>Total</b>	Hac.	40	3950	158400
	<b>Energy Plantation</b>					
	<b>New</b>					
	<b>Total 1</b>					797350
2	<b>Soil and Water Conservation measures including</b>					
(i)	Stabilization of land slides/Slips	Bjarmang	Ha	3		
		<b>Total Slips</b>		3	L/s	893750
(ii)	Stabilization of Nallas	Yula Khad (Part)	Km	2	L/s	665800
		<b>Total Nallas</b>	Km	2		665800
(iii)	Soil and water harvesting structure-		No	0	L/s	0
	<b>Total (2)</b>					1459550
3	Payments for Environmental Services					750000
4	Research, Training and Capacity Build-Up					0
5	<b>(A) Infrastructure Build-Up and Forest Protection</b>					
	Maintenance of Buildings					0
(ii)	Maintenance of Path	Yula to Roura Kanda	KM		L/s	0
(iii)	Establishment Cost	Contractual Staff			L/s	100000
	Mobility for Protection-Vehicle				L/s	0
	Office Equipment				L/s	0
	Office Expenses				L/s	20000
	Motor Vehicle				L/s	10000
	Amenities to staff & labour					0
	<b>Total 5A</b>					130000
(B)	<b>Protection of Forests</b>					
	Energy saving devices					
(i)	Distribution of LPG Cylinders		No	10	L/s	20000
(ii)	Distribution of Solar lights		No	1	L/s	10000
(iii)	Distribution of induction heater/cooker		No	5	L/s	10000
(b)	Construction and repair of existing boundary pillars/chak pillars					0
(c)	Sign & Slogan Boards					0
(d)	Reward/Incentive to informers				L/s	5000
	<b>Total 5B</b>					45000
	<b>Total 5(A+B)</b>					175000
6	<b>Management of Wildlife Measures in outside Protected</b>					
(a)	<b>Improvement and Development of Wildlife</b>					
(i)	Engagement of Anti-Poacher					18000
(ii)	Vaccination of domestic cattle					10000
(iii)	Field equipment and medicine for management of Wildlife					0
(b)	Mitigation of Human Wildlife Conflict					



	(i)	Publicity awareness through Kala Jaha (Nukar Natak)				0
	(ii)	Carrying out of wildlife census outside PA				30000
	(iii)	Compensation against wildlife damages				25000
	(c)	Extension of Sarahan Pheasantry at Gopalpur				150000
		Total (b)				233000
7		Monitoring and Evaluation				0
8		Support for preparing site specific Work Plans				109400
9		Contingencies				200000
		Total Cost of CAT Plan				3724000

## ANNEXURE-VII

## Detail of Work Schedule for Sixth year

Sr. No.	Name of Component	Name of area	Unit	Phys. Targets	Rate	Amount (in Rs.)
1	<b>Afforestation Measures</b>					
(a)	Nursery Development					
	Extension and maintenance of existing Nurseries	Urmi & Rurang	No	0	L/s	0
	<b>Sub-Total (1)</b>					0
(b)	<b>Enrichment planting</b>					
	<b>New</b>					
				0		0
	<b>Maintenance</b>					
	<b>(1st Year)</b>	NC-27 (Chilgoza)	Hac	10		
		Total	Hac	10	7660	76600
	<b>(2nd Year)</b>	Bragdo	Hac	10		
		C-252	Hac	10		
		C-253	Hac	10		
		C-253	Hac	10		
		Tharu(2nd)	Hac	5		
		Total	Hac	45	3960	178200
	<b>(3rd Year)</b>	UF Yulla	Hac	15		
		C-252	Hac	10		
		Shikamo	Hac	10		
		Tharu(1st)	Hac	5		
		Total	Hac	40	3010	120400
	<b>Energy Plantation</b>					
	<b>New</b>					
	<b>Total 1</b>					375200
2	<b>Soil and Water Conservation measures including</b>					
(i)	Stabilization of land slides/Slips					0
(ii)	Stabilization of Nallas					0
(iii)	Soil and water harvesting structure-					0
	<b>Total (2)</b>					0
3	Payments for Environmental Services					0
4	Research, Training and Capacity Build-Up					0
5	<b>(A) Infrastructure Build-Up and Forest Protection</b>					
	Maintenance of Buildings					0
(i)	Maintenance of Path	Yulla to Roura Kanda	KM		L/s	0
(ii)	Establishment Cost	Contractual Staff			L/s	0
	Mobility for Protection-Vehicle				L/s	0
	Office Equipment				L/s	0
	Office Expenses				L/s	0
	Motor Vehicle				L/s	0
	Amenities to staff & labour					0
	<b>Total 5A</b>					0
(B)	<b>Protection of Forests</b>					
	Energy saving devices					
(i)	Distribution of LPG Cylinders					0
(ii)	Distribution of Solar lights		No		L/s	0
(iii)	Distribution of induction heater/cooker					0
(b)	Construction and repair of existing boundary pillars/chak pillars					0
(C)	Sign & Slogan Boards					0
(d)	Reward/Incentive to informers				L/s	0
	<b>Total 5B</b>					0
	<b>Total 5(A+B)</b>					0

6	Management of Wildlife Measures in outside Protected					
	(a)	Improvement and Development of Wildlife				
		(i) Engagement of Anti-Poacher				0
		(ii) Vaccination of domestic cattle				0
		Field equipment and medicine for management of Wildlife				0
	(b)	Mitigation of Human Wildlife Conflict				
		Publicity awareness through Kala Jatha (Nukar Natak)				0
		Carrying out of wildlife census outside PA				0
		Compensation against wildlife damages				0
	(c)	Extension of Saraha Pheasanty at Gopalpur				0
		Total (6)				0
7	Monitoring and Evaluation					2009400
8	Support for preparing site specific Work Plans					0
9	Contingencies					150000
		<b>Total Cost of CAT Plan</b>				<b>2534600</b>



**Detail of Work Schedule for Seventh year**

Sr. No.	Name of Component	Name of area	Unit	Phys. Targets	Rate	Amount (in Rs.)
1	<b>Afforestation Measures</b>					
(a)	Nursery Development					0
	Extension and maintenance of existing Nurseries	Umi & Runang	No	0	L/s	0
	<b>Sub-Total (1)</b>					0
(b)	<b>Enrichment planting</b>					
	<b>New</b>					0
				0		0
	<b>Maintenance (2nd Year)</b>	NC-27 (Chilgoza)	Hac	10		
		<b>Total</b>	Hac.	10	5105	51050
	<b>(3rd Year)</b>	Bragdo	Hac	10		
		C-252	Hac	10		
		C-253	Hac	10		
		C-253	Hac	10		
		Tharu(2nd)	Hac	5		
		<b>Total</b>	Hac.	45	3010	135450
	<b>(4th Year)</b>	UF Yolla	Hac	15		
		C-252	Hac	10		
		Shkamo	Hac	10		
		Tharu(1st)	Hac	5		
		<b>Total</b>	Hac.	40	1935	77400
(c)	<b>Energy Plantation</b>					
	<b>New</b>	NC-27	Hac.	5	66200	331000
	<b>Total 1</b>					594000
2	<b>Soil and Water Conservation measures including</b>					0
(i)	Stabilization of land slides/Slips					0
(ii)	Stabilization of Nallas					0
(iii)	Soil and water harvesting structures-					0
	<b>Total (2)</b>					0
3	Payments for Environmental Services					750000
4	Research, Training and Capacity Build-Up					0
5	<b>(A) Infrastructure Build-Up and Forest Protection</b>					0
	Maintenance of Buildings					0
(ii)	Maintenance of Path	Yulla to Roura Kanda	KM		L/s	0
(iii)	Establishment Cost	Contractual Staff			L/s	100000
	Mobility for Protection-Vehicle				L/s	0
	Office Equipment				L/s	0
	Office Expenses				L/s	15000
	Motor Vehicle				L/s	10000
	Amenities to staff & labour					0
	<b>Total 5A</b>					125000
(B)	<b>Protection of Forests</b>					
	Energy saving devices					20000
(i)	Distribution of LPG Cylinders		No	10	L/s	10000
(ii)	Distribution of Solar lights		No	1	L/s	10000
(iii)	Distribution of induction heater/cooker		No	5	L/s	10000
(b)	Construction and repair of existing boundary pillars/chak pillars					0
(c)	Sign & Slogan Boards				L/s	5000
(d)	Reward/Incentive to informers					45000
	<b>Total 5B</b>					170000
	<b>Total 5(A+B)</b>					170000
6	<b>Management of Wildlife Measures in outside Protected</b>					
(a)	Improvement and Development of Wildlife					18000
(i)	Engagement of Anti-Poacher					

	(v)	Vaccination of domestic cattle				10000
	(vi)	Field equipment and medicine for management of Wildlife				0
	(b)	Mitigation of Human Wildlife Conflict				
	(i)	Publicity awareness through Kala Jaha (Nukar Natak)				0
	(j)	Carrying out of wildlife census outside PA				30000
	(k)	Compensation against wildlife damages				25000
	(c)	Extension of Sarahan Pheasantry at Gopalpur				150000
		Total (b)				233000
7		Monitoring and Evaluation				0
8		Support for preparing site specific Work Plans				0
9		Contingencies				100000
		Total Cost of GAT Plan				1847900

## ANNEXURE-IX

## Detail of Work Schedule for Eighth year

Sr. No.	Name of Component	Name of area	Unit	Phys. Targets	Rate	Amount (in Rs.)
1	<b>Afforestation Measures</b>					
(a)	Nursery Development					
	Extension and maintenance of existing Nurseries	Uma & Runang	No	0	L/s	0
	<b>Sub-Total (1)</b>					0
(b)	Enrichment planting					
	New					
				0		0
	Maintenance					
	(3rd Year)	NC-27 (Chilgoza)	Hac.	10		
	(4th Year)	Bragdo	Hac.	10	3670	36700
		C-252	Hac.	10		
		C-253	Hac.	10		
		C-253	Hac.	10		
		Tharu(2nd)	Hac.	5		
		<b>Total</b>	<b>Hac.</b>	<b>45</b>	<b>1935</b>	<b>87075</b>
	(5th Year)	UF Yulla	Hac.	15		
		C-252	Hac.	10		
		Shikamo	Hac.	10		
		Tharu(1st)	Hac.	5		
		<b>Total</b>	<b>Hac.</b>	<b>40</b>	<b>1935</b>	<b>77400</b>
	<b>Energy Plantation</b>					
	New	UF Uma	Hac.	10	66200	662000
	<b>Total 1</b>					<b>665175</b>
2	<b>Soil and Water Conservation measures including</b>					
(i)	Stabilization of land slides/Slips					0
(ii)	Stabilization of Nalfas					0
(iii)	Soil and water harvesting structure-					0
	<b>Total (2)</b>					0
3	Payments for Environmental Services					750000
4	Research, Training and Capacity Build-Up					0
5	<b>(A) Infrastructure Build-Up and Forest Protection</b>					
	Maintenance of Buildings					0
(ii)	Maintenance of Path	Yulla to Roura Kanda	KM		L/s	0
(iii)	Establishment Cost	Contractual Staff			L/s	0
	Mobility for Protection-Vehicle				L/s	0
	Office Equipment				L/s	0
	Office Expenses				L/s	15000
	Motor Vehicle				L/s	10000
	Amenities to staff & labour					0
	<b>Total 5A</b>					<b>25000</b>
(B)	Protection of Forests					
	Energy saving devices					
(i)	Distribution of LPG Cylinders		No	10	L/s	20000
(ii)	Distribution of Solar lights		No	1	L/s	10000
(iii)	Distribution of induction heater/cooker		No	5	L/s	10000
(b)	Construction and repair of existing boundary pillars/chak pillars					0
(C)	Sign & Slogan Boards					0
(d)	Reward/Incentive to informers				L/s	5000
	<b>Total 5B</b>					<b>45000</b>
	<b>Total 5(A+B)</b>					<b>70000</b>
6	<b>Management of Wildlife Measures in outside Protected</b>					
(a)	Improvement and Development of Wildlife					
(i)	Engagement of Anti-Poacher					18000
(ii)	Vaccination of domestic cattle					10000



	(a)	Field equipment and medicine for management of Wildlife					0
	(b)	Mitigation of Human Wildlife Conflict					
		Publicity awareness through Kala Jatha (Nukar Natak)					0
	(i)	Carrying out of wildlife census outside FA					0
	(ii)	Compensation against wildlife damages					25000
	(c)	Extension of Sarahan Pheasanry at Gopalpur					150000
		Total (b)					203000
7		Monitoring and Evaluation					0
8		Support for preparing site specific Work Plans					0
9		Contingencies					100000
		Total Cost of CAT Plan					1988175

## ANNEXURE-X

## Detail of Work Schedule for Ninth year

Sr. No.	Name of Component	Name of area	Unit	Phys. Targets	Rate	Amount (in Rs.)
1	<b>Afforestation Measures</b>					
(a)	Nursery Development					
	Extension and maintenance of existing Nurseries	Umi & Runang	No	0	L/s	0
	<b>Sub-Total (1)</b>					0
(b)	<b>Enrichment planting</b>					
	<b>New</b>					
				0		0
	<b>Maintenance</b>					
	<b>(4th Year)</b>	NC-27 (Chilgoza)	Hac.	10		
		<b>Total</b>	<b>Hac.</b>	<b>10</b>	<b>2635</b>	<b>26360</b>
	<b>(5th Year)</b>	Bragdo	Hac.	10		
		C-252	Hac.	10		
		C-253	Hac.	10		
		C-253	Hac.	10		
		Tharu(2nd)	Hac.	5		
		<b>Total</b>	<b>Hac.</b>	<b>45</b>	<b>1935</b>	<b>87075</b>
⊙	<b>Energy Plantation</b>					
	<b>New</b>	Rangdul	Hac.	10	66200	662000
	<b>Total 1</b>					775425
2	<b>Soil and Water Conservation measures including</b>					
(i)	Stabilization of land slides/Slips					0
(ii)	Stabilization of Nallas					0
(iii)	Soil and water harvesting structure-					0
	<b>Total (2)</b>					0
3	Payments for Environmental Services					670000
4	Research, Training and Capacity Build-Up					0
5	<b>(A) Infrastructure Build-Up and Forest Protection</b>					
	Maintenance of Buildings					0
(ii)	Maintenance of Path	Yulla to Roura Kanda	KM		L/s	0
(iii)	Establishment Cost	Contractual Staff			L/s	0
	Mobility for Protection-Vehicle				L/s	0
	Office Equipment				L/s	0
	Office Expenses				L/s	14000
	Motor Vehicle				L/s	10000
	Amenities to staff & labour					0
	<b>Total 5A</b>					<b>24000</b>
(B)	<b>Protection of Forests</b>					
	Energy saving devices					
(i)	Distribution of LPG Cylinders		No	10	L/s	20000
(ii)	Distribution of Solar lights		No	1	L/s	10000
(iii)	Distribution of induction heater/cooker		No	5	L/s	10000
(b)	Construction and repair of existing boundary pillars/chak pillars					0
(C)	Sign & Slogan Boards					0
(d)	Reward/incentive to informers				L/s	5000
	<b>Total 5B</b>					<b>45000</b>
	<b>Total 5(A+B)</b>					<b>69000</b>
6	<b>Management of Wildlife Measures in outside Protected</b>					
(a)	Improvement and Development of Wildlife					
(i)	Engagement of Anti-Poacher					18000
(ii)	Vaccination of domestic cattle					10000

	(ii)	Field equipment and medicine for management of Wildlife					0
	(b)	Mitigation of Human Wildlife Conflict					
	(i)	Publicity awareness through Kala Jetha (Nukar Natak)					12000
	(ii)	Carrying out of wildlife census outside PA					0
	(iii)	Compensation against wildlife damages					25000
	(c)	Extension of Sarahan Pheasantry at Gopalpur					150000
		Total (c)					215000
7		<b>Monitoring and Evaluation</b>					0
8		<b>Support for preparing site specific Work Plans</b>					0
9		<b>Contingencies</b>					90000
		<b>Total Cost of CAT Plan</b>					<b>1819425</b>




## ANNEXURE-XI

## Detail of Work Schedule for Tenth year

Sr. No.	Name of Component	Name of area	Unit	Phys. Targets	Rate	Amount (in Rs.)
1	<b>Afforestation Measures</b>					
(a)	Nursery Development					
	Extension and maintenance of existing nurseries	Umi & Runang	No	0	L/s	0
	<b>Sub-Total (1)</b>					0
(b)	Enrichment planting					
	New					
	Maintenance			0		0
	(5th Year)	NC-27 (Chilgoza)	Hac.	10		
	<b>Total</b>		Hac.	10	2635	26350
(c)	Energy Plantation					
	New					0
	<b>Total 1</b>					26350
2	<b>Soil and Water Conservation measures including</b>					
(i)	Stabilization of land slides/slips					0
(ii)	Stabilization of Nafies					0
(iii)	Soil and water harvesting structure-					0
	<b>Total (2)</b>					0
3	Payments for Environmental Services					0
4	Research, Training and Capacity Build-Up					0
5	<b>(A) Infrastructure Build-Up and Forest Protection</b>					
	Maintenance of Buildings					0
(ii)	Maintenance of Path	Yulia to Roura Kanda	KM		L/s	0
(iii)	Establishment Cost	Contractual Staff			L/s	0
	Mobility for Protection-Vehicle				L/s	0
	Office Equipment				L/s	0
	Office Expenses				L/s	9100
	Motor Vehicle				L/s	10000
	Amenities to staff & labour					0
	<b>Total 5A</b>					19100
(B)	<b>Protection of Forests</b>					
	Energy saving devices					
(i)	Distribution of LPG Cylinders		No	5	L/s	10000
(ii)	Distribution of Solar lights		No	1	L/s	10000
(iii)	Distribution of induction heater/cooker		No	5	L/s	10000
(b)	Construction and repair of existing boundary pillars/chalk pillars					0
(c)	Sign & Slogan Boards					0
(d)	Reward/Incentive to informers				L/s	5000
	<b>Total 5B</b>					38000
	<b>Total 5(A+B)</b>					54100
6	<b>Management of Wildlife Measures in outside Protected</b>					
(a)	Improvement and Development of Wildlife					
(i)	Engagement of Anti-Poacher					18000
(ii)	Vaccination of domestic cattle					10000
(iii)	Field equipment and medicine for management of Wildlife					0
(b)	Mitigation of Human Wildlife Conflict					
(i)	Publicity awareness through Kala Jatha (Nukar Natak)					0
(ii)	Carrying out of wildlife census outside PA					0
(iii)	Compensation against wildlife damages					25000
(c)	Extension of Sarahan Pheasantry at Gopalpur					150000
	<b>Total (6)</b>					203000
7	Monitoring and Evaluation					0
8	Support for preparing site specific Work Plans					0
9	Contingencies					49400
	<b>Total Cost of CAT Plan</b>					332950

<b>Activity-wise percentage of total outlay of Roura HEP CAT Plan</b>				
Sr. No.	Name of Component		Total Outlay	% age
1	<b>Afforestation Measures</b>			
	(a)	Nursery Development	600000	1.49
	(b)	Afforestation		
		Enrichment planting	4575900	11.39
		Energy Plantation	1655000	4.12
		<b>Total:-</b>	<b>6830900</b>	<b>17.00</b>
2	<b>Soil and Water Conservation measures including Bio-Engineering measures</b>			
	(i)	Stabilization of land slides/Slips	6577500	16.37
	(ii)	Stabilization of Nallas	3975800	9.89
	(iii)	Soil and water harvesting structure-Construction of Van Sarovar	700000	1.74
		<b>Total:-</b>	<b>11253300</b>	<b>28.00</b>
3	Payments for Environmental Services		6028100	15.00
4	Research, Training and Capacity Build-Up		2009400	5.00
5	A	Infrastructure Build-Up and Forest Protection	5611100	13.96
	B	Protection of Forests	417000	1.04
		<b>Total:-</b>	<b>6028100</b>	<b>15.00</b>
6	Management of Wildlife Measures in outside Protected Areas		2009400	5.00
7	Monitoring and Evaluation		2009400	5.00
8	Support for preparing site specific Work Plans		2009400	5.00
9	Contingencies		2009400	5.00
	<b>Total Cost of CAT Plan</b>		<b>40187400</b>	<b>100.00</b>

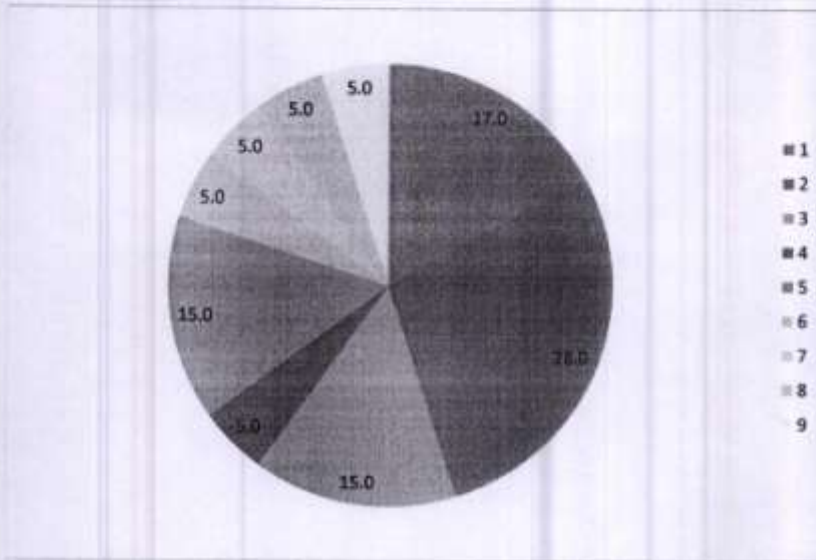
For H.P. Non Conventional Energy Pvt. Ltd.  
  
 Authorized Signatory

  
 Divisional Forest Officer,  
 Kinnur Forest Division,  
 At Racking Poo, (H.P.)

**Activity-wise percentage of total outlay of Roura HEP CAT Plan**

S.No	Name of Component	Total Outlay	% age
1	Afforestation Measures	6830900	17.0
2	Soil and Water Conservation measures including Bio-Engineering measures	11253300	28.0
3	Payments for Environmental Services	6028100	15.0
4	Research, Training and Capacity Build-Up	2009400	5.0
5	Infrastructure build up and forest protection	6028100	15.0
6	Management of Wildlife Measures in outside Protected Areas	2009400	5.0
7	Monitoring and Evaluation	2009400	5.0
8	Support for preparing site specific Work Plans	2009400	5.0
9	Contingencies	2009400	5.0
	<b>Total Cost of CAT Plan</b>	<b>40187400</b>	<b>100.0</b>

**Component wise percentage outlay**



For the *Hydro Power Corporation Pvt. Ltd.*  
*[Signature]* authorized signatory

*[Signature]*  
 Divisional Forest Officer,  
 Kinnaur Forest Division,  
 At Reckong Poo, (H.P.)