CATCHMENT AREA TREATMENT PLAN

FOR

Selti-Masrang Hydro Electric Power Project (24 MW)

Village-Kafnoo, Tehsil-Nichar, Distt-Kinnaur (H.P.)

Divisional Forest officer
Wildlife Division, Sarahan BSR
Distt- Shimla (H.P)

PROMOTER:
M/S RAMESH HYDRO POWER PVT LTD.

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UNDERTAKING

I, V.Suresh, authorized signatory of M/S Ramesh Hydro Power Private Limited having its registered office Plot No.107, Prashanthi Nagar, Near I.E.Kukatpally, Hyderabad-500 072 here by confirm that CAT Plan of Selti-Masrang HEP (24.00MW) at Kafnoo village in Kinnaur Distt. with an outlay of Rs.3.86 crore has been prepared on the basis of the Total Project Cost Rs. 154.27crore as per GoHP Notification No-NES-F-(2)-22/2006 dated 11.8.2009 (copy enclosed). I hereby also confirm that in case the Project cost is increased then the CAT Plan outlay shall be enhanced accordingly through revision of the CAT Plan and differential amount of the CAT Plan outlay will be paid by the used agency.

M/s. Ramesh Hydro Power (P) Ltd.,

FOR RAMESH HYDROPOWER PVT. LTD.

Authorized Signatory
(V.SURESH)

Government of Himachal Pradesh.
Department of MPP & Power

No. NES-F(2)-22/2006 Dated, Shimla-2 11-8-, 2009

NOTIFICATION

In pursuance of Section 29 of the Electricity (Supply) Act , 1948, read with Section 8, 2 (a) of the Electricity Act, 2003, it is hereby notified that M/s Ramesh Hydro Power Private Limited with its Head Office at Plot No. 107, Prashanti Nagar, Kukatpalli, Hyderabed-500072 propose to implement the following Hydro Power Scheme :-

Name of the Project Selti Masrang (24 MW) Hydroelectric Project. In District Kinnaur, Himachal Pradesh.

Project Cost Rs.184.27 Crores.

(I) Brief description of the main Project Components

The Project namely Selti Masrang HEP is a run of river (ROR) scheme on Bhaba Khad, which is a tributary of Satluj river and is located in Bhaba valley in tehsil Nichar in District Kinnaur of Himachal Pradesh. The Project comprises of the following components :-

1. Diversion Weir : Raised crested type weir at EL+2880 m and 30 m long with two sluices.
2. Desilting Arrangement: Surface, Central silt gutter type, two chambers of size 48 mX8 m X6.11 m each with inlet and outlet transitions, designed to exclude all particles down to 0.2 mm size.
3. Water Conductor System: 3 m Dia, D-shaped, 2459 m long tunnel on right bank of Bhaba khad to carry design discharge of 12.36 cumecs.

2

4.	Surge Shaft & Penstock:	An underground surge tank, 7 m diameter, 45 meter high with maximum surge level of 2892 m and surface type cirucular steel penstock 1900 mm dia, 386 m length is proposed with trifurcation at lower end into 1200 mm dia each.
5.	Power House	: An underground power house of size 603 mX11 m and 12.80 m in height on right bank at El 2640.5 m with max. Tail Water Level of 2642.60 m, comprising of three units with Francis Turbines of 8.00 MW each.
6.	Tail Race Channel	Tail race channel has been proposed as Rectangular Section , size 3 mX3m and 75 m length.
7.	Generator set up	3 nos. with rated output of 8.00 MW each at 6.6 kV, 10.22 MVA, 6.6/66 KV step up transformer shall be provided for stepping up of voltage upto 66 kV level.
8.	Transmission Line	It is proposed to evacuate the power from Selti Masrang SHEP through about 15 km long, 66 kV line to the existing HPSEB sub-station at Nathpa.

ii) Notice is hereby given that any Licensee or any other person interested may raiseany objection and / or make any representation on the above scheme within two (2) months of the publication of this Notice as thereafter no objection and/or representation will be entertained and the scheme shall be commissioned with or without further notification as approved by the Government of Himachal Pradesh.

III) Necessary plans showing the Project site layout may be inspected on any working day at the following offices :-

i. Director,
M/s Ramesh Hydro Power Private Limited,
Plot No. 107, Prashanti Nagar, Kukatpalli,
Hyderabad-500072
or
B-33, Main Road, Sector-I, New Shimla-171009.

ii. Chief Engineer (Projects),
HP State Electricity Board,
Shimla-171004.

iii. Principal Secretary (MPP & Power) to the
Government of Himachal Pradesh.
Shimla-171002.

By Order

Principal Secretary (Power) to the
Government of Himachal Pradesh.

Endst. No. As above Dated, Shimla-2 11-8-2009

Copy is forwarded to the following :-

1. The Special Officer, HP State Electricity Board, Shimla-171004 for information please.
2. The Chief Engineer (PSP), HP State Electricity Board, Shimla-171004 for information & necessary action.
3. The Controller , Printing & Stationery Department, Shimla for printing the Notification in the Gazette.
4. The Ramesh Hydro Power Private Ltd., Plot No. 107, Prashanti Nagar,Kukatpally, Hyderabad-500072. He is directed to publish the Notification in the leading Newspapers (at least three local dailies) at his cost. He is further directed to supply the published notification cuttings to the undersigned as well as to the Chief Engineer (PSP), HPSEB, Shimla-171004 immediately.
5. Guard file.

Special Secretary (Power) to the
Government of Himachal Pradesh.

Whether the plant is Commissioned after release of water.

4

Executive Summary

The CAT plan for Selti-Masrang HEP has been prepared on the basis of field survey in active association of the officers/staff of the Forest Department and keeping in view the general requirement of the catchment area to stabilize the area and to reduce the silt load. The areas to be treated have been selected as advised by them.

However, detailed site specific planning/micro planning is required before actual execution of the works in consultation with local people/committees to ensure mutually agreed type of work and its scheduling.

Moreover, Master Catchment Area Treatment Plan of Satluj river is under preparation by the H.P. Forest Department with the help of experts/consultant. The prescription of CAT plans of this area will have to be necessarily revised to fit in the prescription of the Master CAT Plan.

For the revision/site specific micro planning, as per actual requirement at the time of execution, a provision of Rs 19.31 lac has been kept.

Changes in this CAT Plan (inter component or across the plan) can be made with approval of PCCF, H.P. within over all ceiling of the amount, for which this CAT Plan has been prepared.

Total Catchment area is 245.49 km^2, 90 % of which falls in PA. The balance catchment area (10%) is outside PA but within jurisdiction of Wild Life Division Sarahan. It is also important to add here that out of total catchment area, 35 % is under permanent snow and another 35 % area is totally barren and rocky, which can not sustain any vegetative growth. In addition, about 22 % area is under

pasture/meadow, thus, leaving a balance of only 8 % area , where treatment can be done. This comes to about 19.5 sq km. (1950 ha). The area proposed for treatment/area benefitted by treatment is 300 ha. 15.4 % of 1950 ha.

The total out lay of the CAT Plan is Rs 3.86 crore.

CHAPTER – 1

General Description of the Tract and Project

1.1 INTRODUCTION:

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 21000MW identified hydroelectric potential, out of which 6370MW potential had been harnessed so far. During the 10th five year plan, 2241MW potential was harnessed and 5744MW would be added during the 11th five year Plan.

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 9,227MW of electricity. 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 down stream. Soil erosion occurs due to number of abiotic and biotic factor like, topography of the catchment, soil characteristics, meteorological conditions such as precipitation and its intensity in the form of rainfall and snowfall and the extent of vegetation cover and its types. It is therefore imperative to

control one or more of the most crucial contributes of the factors triggering soil erosion, which will enhance the life of the reservoir.

A large portion of catchment is under snow. A portion is covered with dense forests and major portion is steep mountainous region with rocky outcrops and contains many glaciers, which provide the streams with perennial water flow.

The area is rich in bio diversity and around 90% of the catchment area above the diversion site falls in the Rupi-Bhaba wild life sanctuary. Therefore, while making the CAT plan for the area special attention is required to be paid towards improvement of habitat and protection of Wild Life. A well-designed Catchment Area Treatment (CAT) Plan is essential to ameliorate the biotic pressure, adverse process of soil erosion and maintenance of ecological balance including atmospheric equilibrium, which is vital for sustenance of all life forms- humans, animal and plants in and outside the protected area. Proper soil and moisture conservation treatment, bio-engineering works, habitat improvement for management of Wild Life Sanctuary is of utmost importance.

1.2 HYDRO-POWER POTENTIAL OF HIMACHAL PRADESH

Himachal Pradesh is situated in the northern part of the country and lies between latitudes 30° 22' to 33° 12' N and longitudes 75° 47' to 79° 04' E. It shares its boundary with Uttaranchal on the eastern side, Jammu and Kashmir in the north-western side, China on the north-east side and Punjab and Haryana in the southern side. The State has a geographical

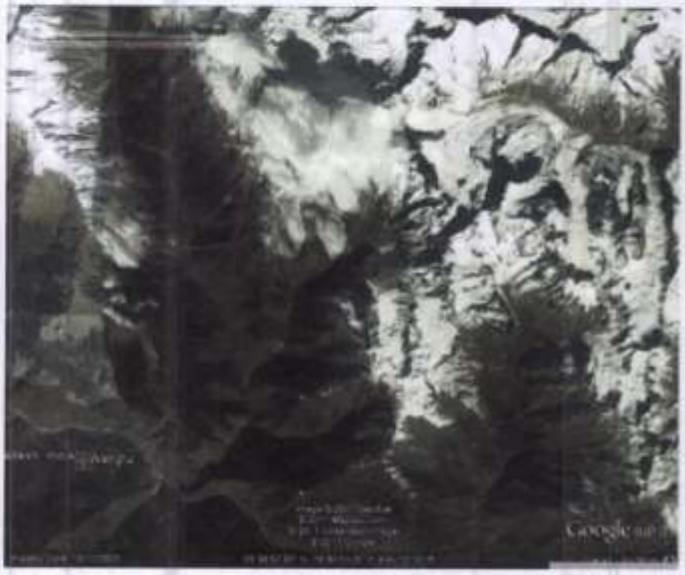
area of 55,673 sq. km. and population of 60,77,248 as per 2001 census records. The State has a population density of about 109 persons per sq. km.

The State is blessed with significant hydropower potential. The total power potential of various river basins in the State is estimated as 20131.75 MW, which is available in five river basins. Details of basin wise hydropower potential are given in the following Table.

Hydro-power potential in various river basins of Himachal Pradesh

S. No.	Basin	Identified potential (MW)
1.	Satluj	9396.75
2.	Beas	4,293
3.	Ravi	2,181
4.	Chenab	3,301
5.	Yamuna	960

Figure: Rivers flowing through Northern India; Location of State of Himachal Pradesh



Satellite imagery of Bhaba catchment

The present installed capacity of Himachal Pradesh in medium and major hydro projects is 6344 MW (Source: HPSEB). With rising hydro power generation and improving efficiencies in distribution of electricity, Himachal Pradesh can offer energy at stable prices for eco-friendly industrial development. Thus, there is an urgent need to develop its huge untapped hydro power potential capacity with the purpose of harnessing hydro-power resources in the State for economic well being and growth of the people in the whole region.

1.3 NEED OF THE PROJECT

Our country is facing severe power crisis, which will aggravate further, even after considering the contribution of various projects in different stages of commissioning. Thus, it is imperative to harness the untapped power potential of various river basins.

Due to paucity of resources and the increasing gap between supply and demand of power, Govt. of India has sought participation of private sector in power generation. The Electricity Act 1910 and Electricity (Supply) Act 1948 have been amended to facilitate entry of the private sector in power generation. Various incentives have been offered to attract private investors, both domestic and overseas to enter in the field of power generation.

In line with the policy guidelines of the Govt of India, the Himachal Pradesh Govt has decided to allow development of selected hydro-electric power projects in the State by the private sector. Selti Masrang (24 MW) located in Kinnaur district has been allocated by Himachal Pradesh Govt to M/s Ramesh Hydro Power Pvt Ltd.

An Implementation Agreement (IA) has been signed between Ramesh Hydro Power Pvt Ltd. and Government of Himachal Pradesh for implementation of the project.

1.4 Project detail

Proposed Selti Masrang Hydroelectric Project (24 MW) is a run of the river type project on Bhaba khud, a tributary of Satluj river in Distt Kinnaur,

Himachal Pradesh. The scheme envisages diversion of Bhaba khud inflows by constructing a raised crested diversion weir at El 2880 m. The diverted inflow will be carried through conveyance box type channel to a surface desilting tank, which will be designed to exclude all silt particles down to 0.20 mm size. The silt free water will be carried through head race tunnel up to an underground surge shaft. The inflows will be led to surface power house through a surface penstock to feed 3 no Francis type turbine driven generating units of 8 MW capacity each. There is no other project upstream of this project so far.

Salient features of Selti Masrang Project:

Proposal	Weir site on Bhaba Khad at El 2880 m and powerhouse on right bank at El 2640 m near village Selti and Masrang
Geographical co ordinates	31^0 37' 07" N, 78^0 01' 16"E
SOI Topo sheet	53E/14
Design discharge	12.36 cumecs
Percentage availability of design discharge	36.88 cumecs
Design flood	659 cumecs
Intake carrying capacity	19.5 cumecs
Surge tank	Underground, 7 m dia, 45 m high
Penstock	Circular, surface steel, 386 m long, 1900 mm dia
Gross head	232 m
Net head	229 m

Tail race	Rectangular, dia- 3mx3m, length-75 m
Installed capacity	24 MW

1.5 Topography and Drainage:

The catchment area is generally rocky and mountainous, which may be classified under moderate to steep with precipitous slopes (35^0 to 85^0). The catchment area drains into Bhaba khud (Wanger Khud), which ultimately joins the Sutlej River on the right Bank above Wangtu town.

Fig- Drainage of Catchment area

1.6 Geology:

The known geological formations in the tract are followings:

1.	Pre Cambrian	Schist's, gneisses, granites, quartzite's (Vaikrita system)
2.	Late Pre Cambrian	Haimanta System-phyllites, quartzite conglomerates, shale's and slates.
3.	Silurian	Coral limestone, Quartzite's
4.	Carboniferous	Quartzites and limestones
5.	Triassic Rhaestic	Limestone, Shales, dolomites etc
6.	Recent sub-recent	Soils

The important rock formation in the forest areas are gneisses, schist, phyllites, granites and quartzites; metamorphosed schists occurring principally in the western portion of the Sutlej valley. In the Wanger (Bhaba) khad there is an outcrop of greenish quartzite which rapidly assumes a gneissic structure. Extensive outcrop of "Granitod gneiss" are seen beyond Wangtoo along the Hindustan Tibet Road. To this rock type the name "Wangtoo gneiss" is given. This parent rocky structure has given rise to clayey-loam and sandy-loam soils, which are shallow on the rocky outcrops and moderately deep to very deep at sheltered places and valleys. In many places the soil are prone to fast erosion due to rains and glacial activity. The different soil types and varied terrain have resulted in endowing the area with very rich bio-diversity- both flora and fauna.

Schists and soft-Banded gneiss, which decompose more rapidly, tend to produce deeper soils than the hard fine-grained gneiss and quartzite. The soils produced by the former vary from clay to clay-loam and are often heavy and retentive of moisture to a considerable degree, edaphic conditions favoured by Kail and silver Fir. Fine-grained gneiss produce well drained sandy loam when decomposition is slow, but coarse gritty sand when decomposition is rapid. The former is particularly preferred by finest Deodar growth.

Depth and fertility of soil are both dependent on the presence of sufficient humus. Under a Fir or broadleaved canopy, the quantity of humus produced is greater than that under a Deodar. Spruce canopy is sufficient to produce a fertile loam. The soil profiles are generally well developed in

higher locations under dense forest, but lower down they suffer from erosion and offer less scope for developing. Soils in most of the areas are formed in situ and are more or less loamy to clay-loam.

Photo: Rock type of the area

Generally speaking, the soil is shallow on ridges, spurs, and precipitous slopes. On the other hand, it is moderately deep on the cooler aspects and gentle slopes. On steep slopes, the soil is rapidly eroded by precipitation particularly where it lies just above sheet rock, unless it is adequately protected by woody vegetative growth. Owing to the very steep inclination of the terrain, soils are generally shallow. With steeply inclined rock strata and unstable surface soils, it is not uncommon to find boulder beds and detritus deposits at the base of the ridges in the catchment area. The chemical constitution of soils does not appear to have so important

bearing on the quality of tree growth as do their physical properties. Preservation of tree growth on hot aspects and steep slopes is strongly recommended as a means of preserving soil fertility and a guard against soil erosion in the area where natural forces often become calamitous

1.7 Climate:

The climate is predominantly temperate with a more subtropical environment along the lower reaches. However, with such a wide elevation range (2880-5560 m), inter-annual and intra-seasonal climatic variations are markedly higher in the region. The northern parts of the catchment, most of which are above 4000m altitude, are under permanent snow with tundra-like climate.

Photo: View of Catchment area

There are four clearly defined seasons that mark the region's local climate: spring, summer or monsoon, autumn, and winter. The spring

extends from mid March to mid June and is characterized by a sunny weather in the forenoon and moderate to heavy showers in the afternoons. The summer season, from mid June to mid September, is the hottest period when both day temperature and relative humidity are highest. Intense heat is generally experienced along the main Sutlej Valley because of large bare rocky mountains that overlook the river Bank. Interior valleys however are relatively cooler in summer owing to dense moist temperate vegetation on slopes. By the end of June, south west monsoon breaks bringing in copious rainfall along the outer Himalayas, but less so in the interior valleys. The autumn season that immediately follows the monsoon between mid September and mid November is probably the driest period when there is very little rain or snow and diurnal range of temperature is quite marked. Areas above 2000 m altitude experience frost during this period. The winter lasts from mid-December up to mid-March and even till April in alpine localities in the north. It is characterized by heavy frost in the lower areas and fairly heavy snowfall at higher elevations. Snow may descend down to Sutlej valley (1500m) during severe spells, but does not usually stay longer below 2000 m. Similarly, the accumulation of snow is often high in the forest belt but quickly melts away on south-facing slopes. By the end of April, all but high-lying forests and deep interior valleys on the northern aspects are clear of snow.

1.8 Temperature and Rainfall:

Specific data in respect of temperature & humidity of the Catchment is not available as there is no temperature recording station in the area. However, the temperature varies from (-) 10^0 to 25^0

The temperature varies according to the elevation. Temperature begins to rise rapidly from April onwards till June, which is the warmest month. It remains more or less high between June and September after which it starts to drop. Then the temperature becomes very low with the onset of winter, and January is the coldest month. In association with the passage of western disturbances in the cold season, the area experiences severe cold spells when the temperature often goes down below the freezing point. Frost is also very common between October and May.

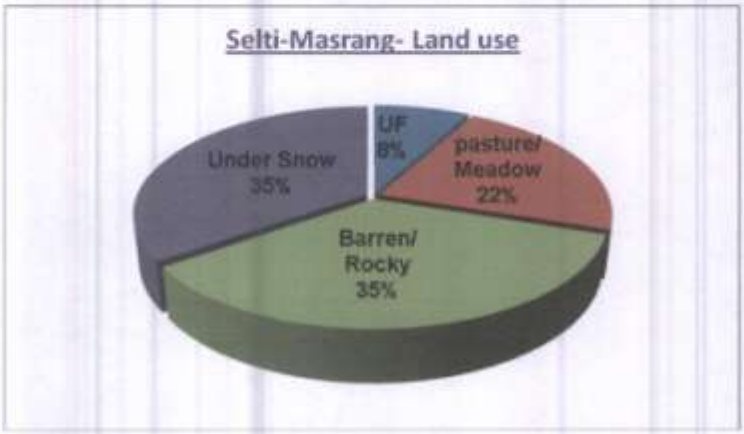
Rainfall in the area is in the range of 700-750 mm.

1.9 Land Use Pattern:

The land use pattern of the catchment area is summarized in the Table:

S. No.	Category	Total Area in ha.
1	UF	1,950
2	Pasture land	5,465
3	Rocky/barren land	8,595
4	Area under permanent snow	8,539
	Total	**24,549**

Source: Revenue Department & Forest Department.



1.10 Human Population:

There is no village inside the catchment area. However, human population of nearby villages, which have biotic influence/pressure on the catchment area, is given under:

Tehsil	Panchayat	Village	No. of House Hold	Human Population
Nichar at Bhaba Nagar	Kafnooo	Kafnooo	145	738
		Homtey	29	162
	Yangpaa	Yangpaa-I	170	1195
		Yangpaa-II	148	828
		Huri	32	164
		Kasrim	22	214
	Katgoan	Katgoan	134	609
		Bai	31	187
		Shango	110	533
		Dutarang	25	124
		Kangrang	12	63
		Surchoo	16	97
		Karaba	50	287
		Total	**924**	**5,201**

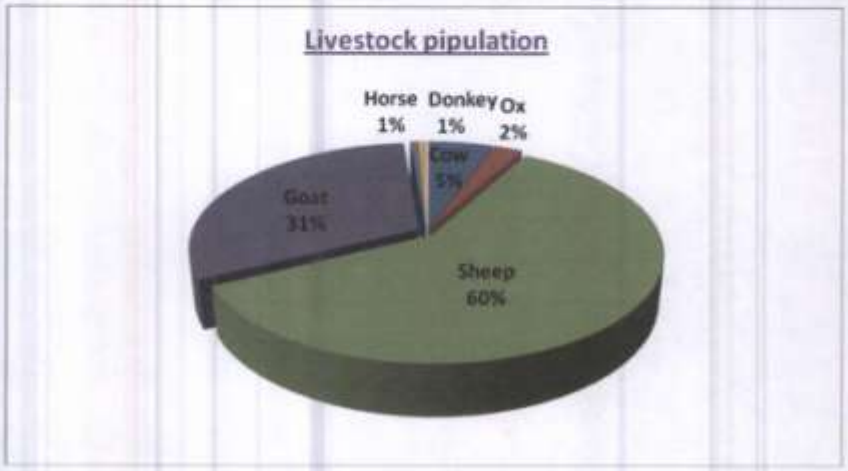
There are 28 villages in the buffer zone of the notified sanctuary area with a human population of 6,371 (1991 census) and cattle population of 14,257. The local communities are by and large agrarian (with a total cultivation area of 807 ha) and a few young generation members are currently working outside either in Government services or in unorganized sector. Though cultivation of wheat, rice, and potato is the traditional practice, local people have started to grow apple, walnut, pear, and other commercially viable crops. Animal husbandry (esp. rearing of sheep and goats) has been practiced by the local communities as a source of supplementary income

1.11 Livestock population:

Population of live stock in the villages, which are outside the catchment area but exert biotic pressure in the catchment area, is given below.

Panchayat	Village	Cow	Ox	Sheep	Goat	Horse	Donkey	Total
Kafnooo	Kafnooo	150	75	1020	600	15	21	1881
	Homtey	49	23	910	320	35	20	1357
Yangpaa	Yangpaa-I	410	130	4950	2300	45	29	7864
	Yangpaa-II	190	70	640	590	13	15	1518
	Huri	30	15	170	155	6	9	385
	Kasrim	15	10	420	110	5	6	566
Katgoan	Katgoan	124	49	620	310	0	7	1110
	Bai	39	18	940	475	5	8	1485
	Shango	15	45	520	220	0	12	812
	Dutarang	27	12	520	215	0	3	777
	Kangrang	15	10	370	290	0	12	697
	Surchoo	15	10	675	360	0	7	1067
	Karaba	40	32	545	465	0	8	1090
Total		1,119	499	12,300	6,410	124	157	20,609

Source: Revenue Department



The above table shows that number of milch cattle is only 1,119. Sheep and Goat constitute 91 % of the total cattle population, which have very adverse impact on regeneration of forests.

1.12 Flora:

The catchment area is endowed with rich flora of temperate species. The major species of the area include Deodar, Kail, Spruce, Betula utilis, Ban Oak, Mohru Oak, Kharsu Oak, Alders, Rhododendrons, Aesculus indica, Bird Cherry, Mapple, Juglans regia, Pyrus species, wild popular, Salix, Alnus nitida etc., The under growth is viola indigofera, Desmodium, Rubus spps.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 in the catchment.

1.13 Forest Types:

1.13 Forest Types:

Following 17 types of forest associations belonging to six vegetation classes (as per the classification by Champion and Seth, 1968) are found in the catchment area:

1. SUBTROPICAL PINE FORESTS

Type 9/C1. Himalayan subtropical pine forest

1b. Upper or Himalayan chir pine forest

Scattered trees of Chir pine (Pinus roxburghii), with undergrowth of Indigofera spp., Desmodium spp., and Rubus spp. Seen mostly as immature and irregular crop along Sutlej River at Neoul, Kachrang, Nathpa, and up to Wangtu.

2. HIMALAYAN MOIST TEMPERATE FORESTS

Type 12/C1. Lower Western Himalayan temperate forest

1a. Ban Oak forest

Dominated by Quercus incana (Ban Oak), mostly in association with a few trees of Blue Pine, Deodar, and Spruce. Mainly below 2400 m. Found in small patches near villages of Rupi and Salaring valleys. The village Rokcharang has a good patch of almost pure Ban Oak and the local deity (devta) is, in fact, named after this stand.

1b. Moru Oak forest

Dominated by Quercus dilatata (Mohru Oak) between 2400-2600 m. found In small degraded isolated patches in Rupi and Shorang valleys.

1c. Moist Deodar forest

Dense, moist forest of Deodar (Cedrus Deodara) with a few Pinus wallichiana between 2300-2600m. Very few patches in Rupi and Shorang valleys.

1d. Western mixed coniferous forest

The most predominant vegetation type in Rupi, Shorang, Salaring, and Lower Bhaba valleys, between 2400 and 3200 m. Association includes Picea smithiana (Himalayan Spruce), Abies pindrow (Silver Fir), Pinus wallichiana (Blue Pine), and a few Deodars either as pure stands (rare) or commonly in different combinations (depending on edaphic factors and aspects). Luxuriant undergrowth and herbaceous layer. Grazing is heavy and very prone to forest Fires during summer.

1e. Moist temperate deciduous forest

Includes temperate broadleaved trees like Acer spp. (maples), Aesculus indica (horse-chestnut), Juglans regia (walnut), Ulmus wallichiana (Himalayan elm), and Prunus cornuta (bird cherry). At 2200-2800 m commonly found in moist valleys and along stream-Banks. Mainly in Rupi valley and Lankapuri in Salaring valley.

1f. Low level Blue Pine forest

The Blue Pine or Kail (Pinus wallichiana) occurs in association with Deodar. Found at lower altitudes (up to 2300 m) throughout the sanctuary.

Type 12/C2.Upper Western Himalayan temperate forest

2a. Kharsu Oak forest

Dominated by Quercus semicarpifolia (Kharsu Oak). On southern aspects, Blue Pine runs right up to Kharsu Oak forests. 2600-3300 m. A dominant vegetation type in Shorang valley and Lankapuri and Phuphal Ghad valleys (of Salaring). Canopy is too dense even for its own seedlings to emerge. Patches of regeneration saplings frequently seen on ridges where Monals dig up soils for foraging or resting.

2b. West Himalayan upper Oak/Fir forest

An uncommon association of Abies pindrow (Silver Fir) and Quercus semecarpifolia (Kharsu Oak), between 2500-3100 m. Some stretches are found in Lankapuri and Phuphal Ghad valleys.

Seral type $_1S_1$. Alder forest

Nearly monospecific linear stretches of Alnus nitida (alder, locally known as kunees) along the riverbeds close to Banks mainly between 2100 and 2500 m. Quite a few patches are found along downstream of Lankapuri, Phuphal Gad, and Salaring rivers.

3. HIMALAYAN DRY TEMPERATE FORESTS

Type 13/C1. Dry broadleaved and coniferous forest

Mainly association of Pinus gerardiana (Chilgoza pine) and Quercus ilex with some Deodar trees, between 2100-2600 m. Found along high elevations in main Sutlej valley; Chilgoza pine cultivated in a few localities.

Type 13/C2. Dry temperate coniferous forest

2b. Dry Deodar forest

Nearly mono specific stand of open Deodar trees with some scattered Blue Pine, between 2100-2500 m a few patches occur between Chota Kamba and Yurang dhar (Shorang valley).

4. SUB-ALPINE FORESTS

Type 14/C1. West Himalayan sub-alpine Birch/Fir forest

1a. West Himalayan sub-alpine high level Fir forest

Predominantly Abies spectabilis. Chiefly above 3000 m, but below Birch scrub. Some patches are seen in Upper Listegarang valley and Bhaba valley.

1b. West Himalayan sub-alpine Birch/Fir forest

A high-altitude association of Abies spectabilis and Betula utilis (Birch) with some Rhododendron campanulatum shrubs, between 3000-3300 m. Some large patches are found around Mulling pastures in Upper Bhaba valley.

5. MOIST ALPINE SCRUB

Type 15/C1. Birch/Rhododendron scrub forest

Stunted growth of Betula utilis (Birch) with Rhododendron campanulatum shrubs, between 3200-3500 m. Upper Bhaba valley.

Type 15/C3. Alpine pastures

High-altitude alpine pastures, above tree line (3500 m and above). The slopes are usually gentle and bear a thick mat of alpine grasses sometimes with a heavy presence of rocky outcrops. Snowbound between November and April. Some of the common herbs include Primula spp., Anemone spp., Gentiana spp., Jurinea spp., and Aconitum heterophyllum. Common grasses are Andropogon munroi, Brachypodium sylvaticum, Blymus compressus, Poa spp., Dactylis glomerata, and Millium effusum. Some of the prominent alpine pastures in RBWLS include Yurang dhar in Shorang valley, Upper Phuphal valley, Kara, Mulling, and Deiya pastures in Upper Bhaba valley, and Pandoshwar pasture in Listegarang valley.

6. DRY ALPINE SCRUB

Type 16/C1. Dry alpine scrub

Dwarf alpine shrubs mainly composed of Juniperus macronoda, Artemisia maritima, Caragana spp., Lonicera spp., and Ephedra spp. Found in high-altitude cold and arid tracts in the north-eastern parts of Bhaba valley contiguous with Pin Valley National Park.

1.14 Animals (Fauna) in the area

Mammals

Rupi-Bhaba Sanctuary is home to about 65 species of mammals including some Himalayan charismatic species like Snow Leopard, Himalayan Tahr, Brown Bear, and Himalayan Weasel. However, mammal populations are generally low in density, barring a few species like Serow and Common Leopard. Heavy disturbance owing to movement of nomadic shepherds and mushroom collectors, habitat degradation due to grazing by livestock, and poaching (which was found till recently) are the primary causes.

Bats:

12 species of bats are expected to occur in Rupi Bhaba WLS. The fact that there are quite a few small to large rocky caves particularly in Upper Lankapuri and Phuphal Ghad valleys underscores the importance of these 'unique habitats' for bat populations. Rock-face shelters forming shallow caves (locally known as 'dwars') are often used for camping by shepherds and guchchi mushroom collectors, and these dwars sometimes hold small bat populations. Some of these dwars in the interior valleys may be surveyed intensively for a baseline assessment of bat populations.

Primates:

There are only two species of primates in Rupi-Bhaba WLS. Though Common Langurs (Semnopithecus entellus) are seen even at higher altitudes up to c. 200m (e.g., Listegarang Valley), they are

not widespread. Their patchy distribution is orth investigating. Langurs are an important prey for Common Leopards in Rupi-Bhaba as their wild preys are dwindling in numbers. We found in our survey a large localized population of Common Langurs foraging among the temperate forests high up the ridges of Upper Lankapuri Valley (2550-3200m); these langurs looked clearly different from their cousins in plains in that they had snow-white hairs on body (contra darkgrey) and tail. Moreover, their alarm calls were very different from the alarm calls of the peninsular populations; the alarm call was more like a clear single-noted deep exhalation that had a curious ringing tone. Though Common Langurs are known to exhibit great variations in their morphology and behavior, genetic studies need be conducted to examine the taxonomic significance of the Lankapuri population. The other primate Rhesus Macaque (Macaca mulatta) occurs in very small patches (e.g., one troupe near Chota Kamba and another in Lower Phuphal Ghad forests).

Carnivores:

Common Leopard (Panthera pardus) is the predominant predator in Rupi-Bhaba WLS, being present in all the valleys of the Sanctuary up to 3200 m in Listegarang and Bhaba valleys. Gauged from the relative frequency of signs and other indirect evidences, their numbers seem to be quite high in the Sanctuary. But the predator population is certainly not matched by their wild prey populations (that comprise mainly goral and langurs). This has led to

increasing number of human-wildlife conflicts as leopards often take cattle from mountain villages. This issue is particularly rampant in Rupi and Salaring valleys. Snow Leopard (Uncia uncia), the flagship species of high-altitude mountain ecosystem in the Himalayas, suffers from the same malaise that Common Leopard does: scarcity of wild prey populations. Though we did encounter quite a few signs of Snow Leopard in Upper Bhaba Valley (including a couple of cattle kills possibly by this species), there were no significant populations of prey species like Bharal or Himalayan Tahr owing to heavy presence of nomadic shepherd camps and possibly poaching. This has given rise to increased instances of livestock depredation by Snow Leopards in alpine pastures during summer. In winter, Snow Leopards are known to descend much lower in search of livestock. In these times, they are sometimes trapped and killed by locals; one mother and cub were apparently killed by local villagers near Katgaon two years ago. Among the small cats, Leopard Cat (Prionailurus bengalensis) seems to be quite abundant particularly in inner valleys of Shorang and Lankapuri. Local people in Chota Kamba and Bara Kamba villages frequently complain of small wild cats predating on their poultry; investigation of pugmarks led us to believe that they may be Leopard Cats. The distribution of Jungle Cat (Felis chaus) needs to be corroborated as the only evidence that we came across was in Rupi Valley. Yellow-throated Marten (Martes flavigula) is another key predator in Rupi-Bhaba WLS and occurs in

good numbers. We had several sight records of this species in Rupi, Shorang, Lankapuri, and Bhaba valleys. Himalayan Weasel (Mustela sibirica) is quite common particularly in high-altitude thatches as it prefers to inhabit stonewalls raised by the shepherds to protect their cattle camps. One Himalayan Weasel was seen foraging among rock-piles in Yurang Dhar (3800 m) near Shorang valley. Shepherds often claim that the young kids of sheep and goats are very vulnerable to predation by Stone Martens (Martes foina) in the upper alpine pastures.

Among the canids, Red Fox (Vulpes vulpes) is the commonest species in the higher altitudes (>3000m). Their scats and pugmarks were frequently seen in Upper Shorang Valley and Upper Bhaba Valley. Jackals (Canis aureus) were seen only around mountain villages of Sutlej Valley and near Katgaon; they are not encountered in the interior valleys. Both the species of Asiatic Black Bear (Ursus thibetanus) and Himalayan Brown Bears (Ursus arctos) occur in Rupi-Bhaba with the former between 2100 and 3000 m and the latter at above 3300m altitudes. The Black bear is feared by the locals as number of attacks by these bears on humans is quite high in this part of the Himalayas; in particular, the Rupi and Salaring Valleys are prone to human-bear conflicts. Local villagers in these valleys have been demanding protection measures from Forest Department and adequate compensation for victims. Though instances of attacks from

Brown bear are few and far between, they do take goats and sheep in alpine pasturelands during summer.

Ungulates:

A worrying feature of mammal populations in Rupi-Bhaba WLS pertains to the apparent scarcity of wild ungulates. Barring Serow (Naemorhedus thar), all the wild ungulates are found in extremely small numbers. Heavy poaching in the past seems to be the overriding cause though habitat degradation and disturBance by shepherd camps and livestock grazing also contribute to the population decline. Serow, probably owing to its close resemblance to cow, is generally spared by poachers. In our knowledge, Rupi-Bhaba is probably the only PA in the entire Western Himalayas that has a significant population of Serows (locally known as emmu). In view of the fact that Serow remains little studied in India, we strongly recommend Rupi-Bhaba as a potential site for intensive ecological research on biology and management of Serow. Locally known as mushknapha, the Musk Deer (Moschus chrysogaster) has been hunted extensively in the past for the commercially valuable musk-pod, an abdominal gland in the males. A solitary and secretive animal, it is found between 290 and 4000 m elevation range in Rupi Bhaba Sanctuary. Lankapuri Valley, Phupal Gad Valley, and Upper Bhaba Valley hold significant populations of Musk Deer in the sanctuary.

Though Gorals (Naemorhedus goral) are still found in hills and cliffs even outside the Sanctuary limits (e.g., Salaring FRH), their population is alarmingly low. Considering the fact that suitable habitats are still to be found throughout the inner valleys, it is a matter of grave concern that the gorals are slowly disappearing.

Unfortunately, this grim scenario also holds true for the mountain-ungulate populations in the high-altitude plateaus and ridges of Rupi-Bhaba WLS. Though Himalayan Tahr (Hemitragus jemlahicus) is still found in small numbers in Shorang, Lankapuri, and Listegarang Valleys, the current population is far from ideal. The status of Asiatic Ibex (Capra ibex), said to be residing in deep interior cliffs and gorges of Upper Bhaba Valley is not fully known, as a large part of its range is virtually inaccessible. The populations of Bharal (Pseudois nayaur), which the local shepherds claim that they were quite common till a decade ago in Upper Bhaba Valley, have become insignificant in recent times. It has been sighted reliably in the past from alpine meadows like Pandoswar, Palasnud, and wastich in Bhaba Valley and Kumrang in Shorang Valley. It is hoped that small populations may still hold out in some of the interior valleys along Wangsham Ghad (e.g., near Deiya Glacier).

Flying Squirrels:

Unlike other mammalian taxa, flying squirrels are fortunately quite common in Rupi-Bhaba WLS. Both the Red Giant Flying Squirrel (Petaurista petaurista) and Small Kashmir Flying Squirrel

(Hylopetes fimbriatus) at a higher altitude seem to be thriving well especially in Oak-dominant temperate forests of Rupi and Shorang valleys. A comprehensive survey is required to study the exact status, distribution, and ecology of these giant squirrels, and Rupi-Bhaba WLS is potential site for such studies. Indian Crested Porcupine (Hystrix indica) occurs close to villages and cultivation and they often cause enormous damage to potato crops.

Pikas

Often considered as 'keystone' species of high-altitude alpine pastures, Pikas play an important role as prey for several small carnivores. Both Royle's Pika Ochotona roylei) and possibly Large-eared Pika (Ochotona macrotis) are to be found in good numbers in rock-strewn high-altitude plateaus of Rupi-Bhaba WLS. In particular, Yurang dhar (3800m), Upper Bhaba valley (3400m), and Pandoshwar asturelands in Listegrang Valley (3300m) hold good populations. It is however not clear how livestock grazing affects these pika populations, as these sites suffer from nslaught of heavy cattle grazing during summer.

Avifauna

Though Rupi-Bhaba WLS has a wide elevational range from 2100 to 6000m and represented by both Great Himalayan and Trans-Himalayan ranges, its birdlife (with a little over 200 species) is not as exceptionally rich as either GHNP in the west or the Garhwal Himalayas in the east. The major factor is the predominance of dry

temperate coniferous forests which support very few bird species and patchy distribution of temperate broadleaved vegetation including Oak-rhododendron mixed forest which is known to harbour high species diversity of birds in the Western Himalayas. This also explains why some of the common birds of Western Himalays like hill-partridges, hawk-cuckoos, jays, laughin gthrushes, sibias, and sunbirds are either rare or locally absent in Rupi-Bhaba. However, the birdlife of the Sanctuary is rich in some avian taxa like pheasants, raptors, swifts, warblers, thrushes, flycatchers, chats, robins, and finches. Presence of habitat-specialists like Eurasian Woodcock, Wood Snipe, and Solitary Snipe which breed in high-altitude marshes and alpine meadows further underscores the importance of Rupi-Bhaba WLS for conservation of Himalayan avifauna. Further, one of the Indian Subcontinent's rarest birds, the Large-billed Reed Warbler (Acrocephalus orinus) was First described from one specimen collected from Sutlej Valley near Rampur in 1867 and it was never found again till its recent rediscovery in Thailand in 2006 after a gap of 139 years (Round et al., 2007).

Pheasants

Rupi-Bhaba WLS harbours very significant populations of at least nine speciesof Galliformes (pheasants & partridges) including Western Tragopan, a flagshipspecies for biodiversity conservation in the Western Himalayas. Western Tragopans are particularly common along Shorang valleys and inner valleys of Lankapuri. The fairly high

frequency of their encounters makes Rupi-Bhaba a potential destination for ecotourists and birdwatchers and a good alternative to GHNP in this regard. Rupi-Bhaba WLS also has a healthy population of Koklass pheasant and Himalayan Monal. The Kalij Pheasant, however, is quite scarce in Rupi-Bhaba, owing to higher altitudinal range of the Sanctuary and lower extent of broadleaved temperate forests. In the past, Cheer Pheasants were quite common in the dry scrub-covered ridges along downstream valleys of Rupi, Shorang, and Salaring, and they particularly favour early successional habitats. But their population has suffered a heavy decline in recent times as these scrubs have been largely converted to crop-fields. Chukar partridges are distributed patchily in Rupi-Bhaba WLS, across a very wide elevational range from 2100 m (Salaring) to 3800 m (Yurang dhar). They are also frequent along lower Listegarang Valley (2300 m). Among the high-altitude Galliformes, Himalayan Snowcocks were quite common in both Yurang dhar (3800m) and Upper Bhaba Valley (>3300m). Though swathes of suitable habitats occur in Upper Bhaba Valley, Snow Partridges are uncommon.

Raptors

Among raptors, Lammergeier and Himalayan Griffon Vulture are the most common species in Rupi-Bhaba WLS; while the former occurs at higher altitudes, imalayan Griffon is frequently met with up to 3000 m. Golden and Booted Eagles were also frequently seen throughout the Sanctuary. High-altitude raptors like Eurasian

Sparrowhawk and Himalayan Buzzard are common in Upper Bhaba valley. Among the falcons, Common Kestrel and Eurasian Hobby are widespread, while Peregrine Falcons could occur along the Sutlej Valley.

Doves & pigeons

Oriental Turtle-dove is present throughout the Sanctuary and up to 3300 m in Listegarang Valley. Speckled Wood-pigeons were found in small flocks particularly around Shorang Valley. Large flocks of Snow Pigeons were seen at higher altitudes closer to glaciers in Upper Bhaba Valley and Shorang Valley. Several pairs of Wedgetailed Green Pigeons were sighted at lower altitudes along Salaring and Sutlej valleys.

Owls

Among owls, Collared Owlet and Mountain Scops-owl were heard throughout the Sanctuary. Asian Barred Owlet was seen and heard at lower altitudes in Rupi and Salaring valleys. One Himalayan Wood-owl was distinctly heard (double-noted deep resonant hoots, quite distinct from Tawny Wood-owl with which it was treated formerly as a subspecies) at Shamno dhar in Rupi valley (2995m). Though not seen in the survey, Upper Bhaba Valley, Phuphal Ghad valley and Yurang dhar had large tracts of rockfalls and rocky slopes that could hold Eurasian

Swifts

Rocky cliffs and ridges that typically characterize the mountain gorges and river valleys of Rupi-Bhaba WLS offer a great diversity of habitats for swifts in general. Himalayan Swiftlet is, by far, the most abundant species of swifts in the Sanctuary. White-throated Needletails were frequently encountered along Sutlej valley. Though not seen in the survey, other species like Alpine, Common, and Fork-tailed Swifts could very well occur in Rupi-Bhaba Sanctuary.

Woodpeckers

Himalayan Woodpecker is the most common species in the Sanctuary, though Scaly-bellied Woodpecker occurs in good numbers in lower Rupi and Salaring valleys. A couple of live nests of the latter were found in Rupi.

Passerines

Birds of dry temperate mixed coniferous forests were numerically the most predominant elements in the birdlife of Rupi-Bhaba WLS. Species like Spotted Nutcracker, Spot-winged Tit, Phylloscopus leaf warblers, White-cheeked Nuthatch, Bar-tailed Tree creeper, Mistle Thrush, and Black-and-yellow Grosbeak were the commonest birds that one would encounter throughout the Sanctuary. In particular, the leaf warblers of Phylloscopus genus were strikingly conspicuous. The fact that 10 species of Phylloscopus warblers occurs in the Sanctuary in good numbers makes it an ideal

destination for ornithologists and birdwatchers. This should get publicized well when ecotourism initiatives are to be taken up as suggested in the management plan. Specifically, occurrence of Large-billed Leaf Warbler along the riverine forests of the Sanctuary and breeding colony of Hume's Leaf Warblers in high-altitude Birch forests in Upper Bhaba Valley assumes significance, given the fact that these two species are not common elsewhere in the Western Himalayas. Among the Cettia warblers, Brownish-flanked Bush-warbler is the most abundant species, being found in scrub and shrubberies on the edge of forests and hill-cultivation; On the other hand, Grey-sided Bush-warbler is quite scarce being heard only at Gyare forest near Bhaba valley (3100m) and Khasyan base camp in Listegarang Valley (3050 m). Our record of White-browed Bush-robin in subalpine Birch forests of Bhaba Valley (near Mulling) is a significant range-extension as the species is currently known to occur only from Kumaon in Uttarakhand eastwards. Both Indian Blue Robin and Orange-flanked Bush-robin are quite frequent in the Sanctuary.

Another notable feature of the local avifauna is the high abundance of flycatchers. Breeding of Ultramarine Flycatcher in coniferous forests, Grey-headed Canary Flycatcher in damp ravines and streamside vegetation, Dark-sided Flycatcher in edges of temperate forests and Slaty-blue flycatcher in subalpine scrub are noteworthy in Rupi-Bhaba WLS. One can also see here two of the most uncommon birds of Western Himalayas, viz., White-throated Tit

and Long-billed Thrush. While the former occurs in Shorang Valley, the latter is found in dense moist temperate forests of Lankapuri Valley. Among finches, Fire-fronted Serin, Common Rosefinch, Pink-browed Rosefinch, European Goldfinch, Plain Mountain-Finch, Red-headed Bullfinch, and Black-and yellow Grosbeak are conspicuous among local avifauna. Rock Bunting is one of the commonest birds at mid-altitudes throughout the Sanctuary. Interestingly, Chestnut-eared Buntings which are quite uncommon in Western Himalayas were observed to breed along the Sutlej Valley hills.

1.15 Rights of the people:

i) Grazing:

In almost all the forests, rights for grazing exist. It is estimated 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 and no ceiling has been fixed on the number of cattle that might be grazed. A large number of cattle grazing in these forests lead to great damage 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 requires closure notification under the Indian Forest Act, 1927.

In Bhaba Valley, a large number of livestock enter the area each year in summer and monsoon months. A large number of these are from the 13 villages of the Bhaba valley itself, but a considerable number are also from other villages/areas. The livestock from the Bhaba valley villages primarily graze in the Mulling alpine pastures

en-route to Spiti, while other alpine pastures are used by herders from areas other than the Bhaba valley. Fodder is extracted both from within the forests and from the apple orchards (because the land beneath apple trees is fallow and yields considerable amounts of palatable grasses and herbs). With no major broadleaf forests in the Bhaba valley, the lopping of trees for fodder is not prevalent around villages but some fodder yielding tree species close to the tree-line are lopped in the autumn to provide winter forage.

ii) **Collection of fuel wood:**

People have the right to collect dry and fallen wood for their domestic use as per Forest Settlement Report, 1921. People entirely depend upon Fuel wood for their day to day use. Annual consumption of fuel wood per house hold has been assessed to be 6.0 tonnes. Mainly this requirement is fulfilled by Broadleaved species found near the adjoining forest and river banks.

iii) **Timber:**

People have the right to get timber at nominal rates for construction/repair/maintenance of their houses. The concessional rates were fixed at the time of forest settlement. No limit on the nos. of trees to be sanctioned was placed. However, now new TD rules have been framed by the Forest Department.

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

People have right to cut grass and lop trees for fodder purpose. Cutting of grasses is being done 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 Satluj valley Forest settlement report, 1921 by H.M. Glover. The system of issuance of permit has been made easier by delegating power on the Pradhan Gram Panchayat concerned. Local communities are dependent on the Sanctuary for a variety of forestry resources. Collection of medicinal herbs, particularly Dhup (Jurinea macrocephalla), karu (Gentiana kurroo), mohra or patish (Aconitum heterophyllum), and kuth (Saussurea lappa) is a major activity. Besides, Gucchi (Morchella esculenta, a commercially valuable fungus grown on forest floor during rainy season) is much sought after by locals.

The main non-timber forest products include medicinal plants, guchchi mushroom, and other minor products like honey and animal by-products. A majority of these medicinal and aromatic plants occur in alpine meadows and pastures above the tree line in the sanctuary; among them Jungli jeera (Carum corvi), Bankakri Podophyllum hexandrum), Tallish patra (Rhododendron anthopogon), Karu (Picrorhiza kurrooa), Dhoop (Jurinea macrocephala), Hath-panja (Dactylorhiza hatagirea), Chukhli (Rheum australe), Patish (Aconitum heterophyllum), and Saussurea obvallata, are the most sought-after plants by the locals. In particular, Dhoop is also being exported in

large quantities. The Guchchi mushroom which emerges in damp moist forest floor during monsoon is reportedly delicious and a highly priced product that may fetch Rs. 8,000 -10,000 per kg in retail markets. In particular, dense forests in deep interior valleys of Lankapuri and Phupal Gad Valleys are the major source for Guchchi mushroom, and hundreds of people throng these areas every monsoon in search of the mushroom.

1.16 General Condition of Flora and fauna:

The Rupi Bhaba Wildlife Sanctuary in the Great Himalayan Range of Himachal Pradesh is endowed with a great diversity of land forms from narrow and deep riverine gorges of the Sutlej to steep, precipitous mountains and alpine meadows at higher altitudes. Though this spectacular mountainous landscape is rich in floral and faunal biodiversity, it is one of the lesser-known PAs in the western Himalayas. The Sanctuary holds good populations of mammals like Himalayan Goral, Himalayan Tahr, Himalayan Serow, Musk Deer, Himalayan Black Bear, and Snow Leopard. The rich birdlife includes a greater diversity of avifauna including pheasants (Western Tragopan, Himalayan Monal, Koklass, and Kalij), raptors (Himalayan Griffon Vulture, Lammergeier, Golden Eagle, and Himalayan Buzzard), and other smaller birds like cuckoos, pigeons, woodpeckers, magpies, flycatchers, warblers, thrushes, babblers, sunbirds, and finches. With a wide elevational range from 2000m to 6000m, vegetation types also change dramatically with respect to

altitude, slope, and aspect. The main forest types include moist Deodar patches between 2300-2600m, Oak-pine forests between 24002600m, Fir-Spruce-Blue Pine dominant mixed coniferous forests between 2400-3200, maple-horse chestnut-bird cherry dominant moist temperate broadleaved forests between 2300-2800m, and sub-alpine Birch-Fir forests above 3000m and below tree line.

Rupi-Bhaba Wildlife Sanctuary is well known for its vast and extensive alpine pastures above 3500m, where thousands of livestock are taken for grazing every summer. In particular, Phuphal Ghad and alpine pastures of Upper Bhaba Valley that connect to Pin Valley in the north are notable camping sites for the nomadic shepherds. The forest-clad mountains with steeper slopes are a general feature of the Sanctuary, and several Nullahhs and streams cut through these gorges draining into four major rivers viz., Rupi, Shorang, Salaring, and Bhaba (Wangar), all tributaries of the Sutlej River. Each of these river valleys is distinct in its floristics and eco-climatic profile.

The upper part of the catchment is snow covered and devoid of vegetation. However the lower part is covered with good forest cover of Deodar, Fir, and Spruce etc. The regeneration status is good in Kail and Deodar, which has been supplemented with plantation in the area by the Forest Department.

1.17 Period of CAT Plan:

The Cat plan has been formulated for a period of eleven years. For the First two years of the plan not much of works have been prescribed and establishment of nurseries has been emphasized. However, from the second year onwards works will be done in full swing and will gradually taper off from the 6th year onwards and completed during the plan period.

1.18 Cost of the Plan:

The total outlay envisaged for the implementation of this CAT plan is Rs.3.86 crore including Contingencies, Eco-Tourism & Monitoring & Evaluation, Environmental Services etc.

CHAPTER-2

Problem analysis and Objectives

The study area taken for the catchment area treatment falls in sub catchment-9 having priority category-4 keeping in view the low intensity of soil erosion problem. It is covered with snow in upper reaches and by forests in middle and lower reaches. Bhaba khud originates at an elevation of 5315 and joins Satluj river on its right bank at an elevation of 1495 m just upstream of Wangtu town. Total catchment area is 248.83 sq km. Survey of India Topo sheets No- 52 1/1, 52 1/3, 52E/13 and 53E/14 (1:50,000 scale) cover the catchment area.

2.1 Soil Erosion:

Soil erosion may be defined as the removal of soil from its origin and deposition in a new area. Water is the major agent responsible for this erosion. The intensity of rain/snow melt, steepness of hill sides, nature of top soil, vegetation, human interference, grazing and many such factors combine to erode the surface soil and carry it away in the form of silt load. In this catchment area glaciers are the major source for soil erosion. In the catchment area of a hilly area like one being considered for the project, land slips/glaciers, water erosion is a common phenomenon and the same has been studied as a part of the Catchments Area Treatment (CAT) Plan.

Photo: Glacier in Sorganch Nullah

The catchment area comprises mainly of gneisses, which are by and large quite compact and do not pose problem of possible potential slides in general. The catchment in the upper reaches is not approachable. However, some of the areas are susceptible to incidence of landslides, slips/glaciers and water erosion. Bulk of soil erosion takes place due to scouring action of water running off the surface during melting of snow. The geology of the catchment area is such that major land slides or high soil erosion intensity locations are in the upper portion, but the lower portion is not susceptible to much soil erosion.

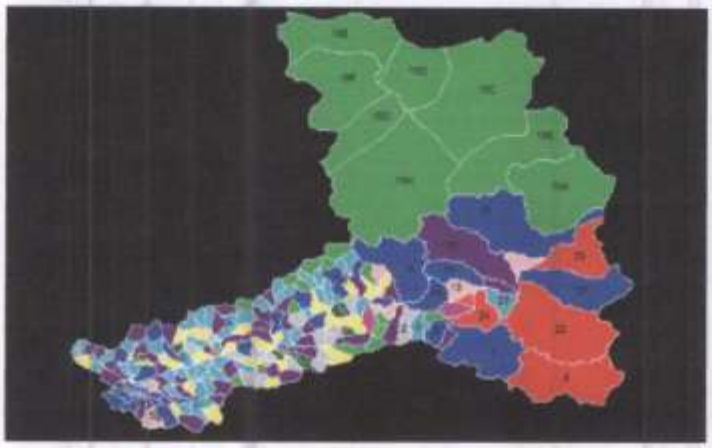
The sediment load in Bhaba (Wanger Khud) is very low even in rainy season as compared to the silt load in Satluj river. During winter season the water is quite and almost free from any kind of sediment/silt.

Photo: Bhaba khud joins Satluj river near Wangtu.

Photo: Bhaba meets Satluj

Photo: Clear water in Bhaba Khud in July 2011

Map showing Prioritization of Micro Watersheds:



MWS Prioritization Legend

- 1 Highest Priority
- 2
- 3
- 4
- 5
- 6
- 7
- 8
- 9
- 10 Lowest Priority

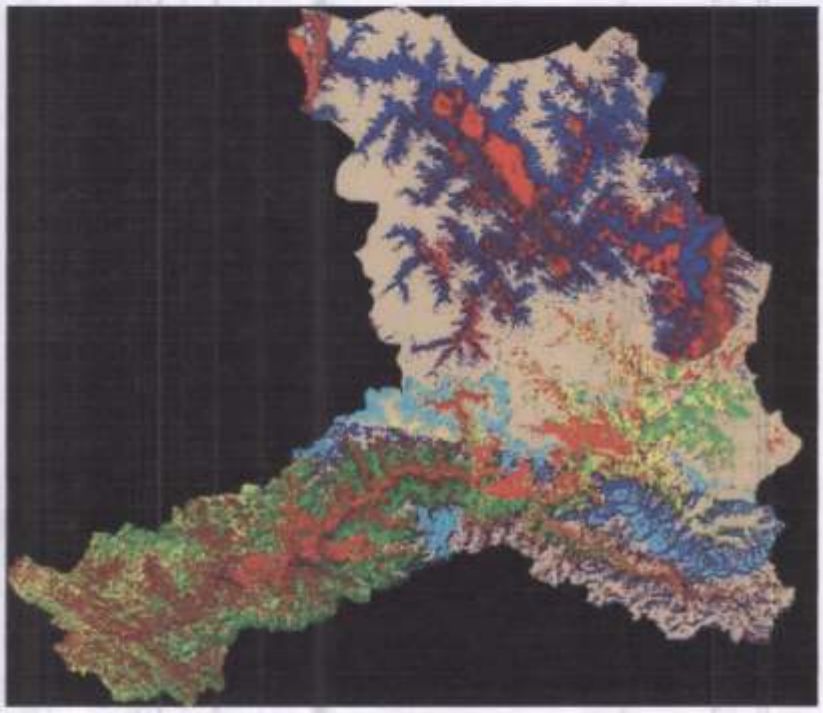
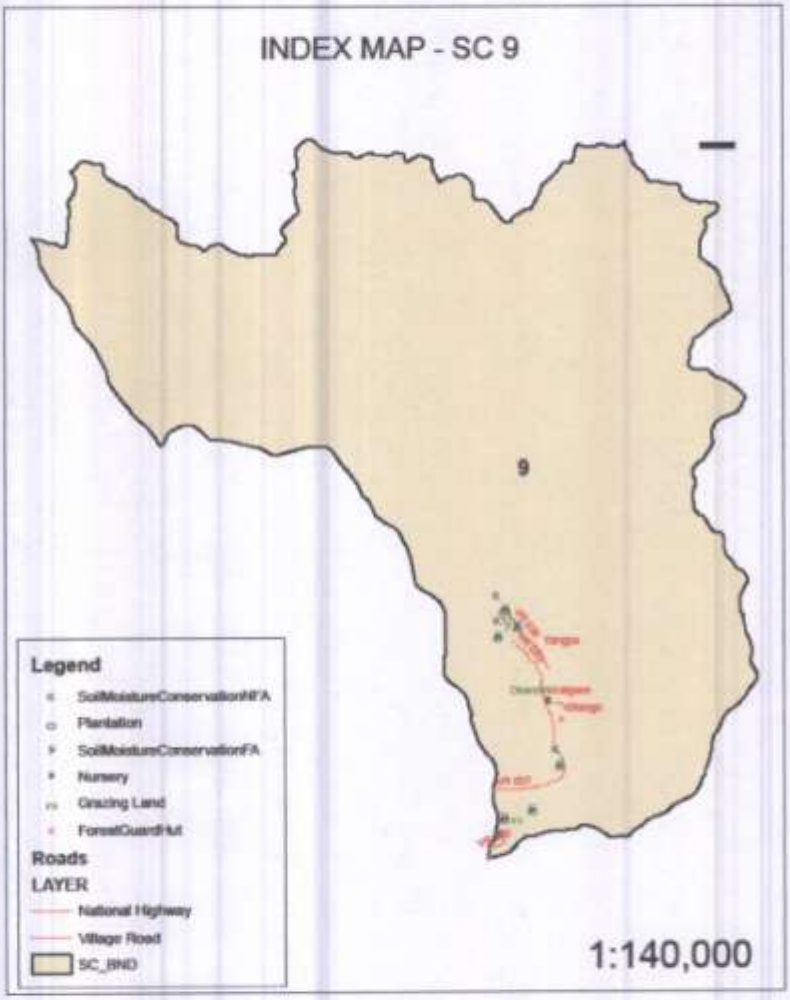


Photo: Satellite image- Land use and Land cover

	Dense Forests
	Moderate Dense Forests
	Open Forests
	Scrubs
	Private Land
	Barren Land
	Water Body
	Snow Cover



Area of sub catchment-9 is 405 km^2, out of which the catchment of Selti-Masrang is only 245 km^2.

Soil Erosion Leads to:

i) Loss in production in agriculture land due to removal of top soil.

ii) Reduction in infiltration rates due to soil removal.

iii) Reduction in water holding capacity.

iv) Loss of nutrients available to plants and trees.

v) Increase in tillage operation costs.

vi) Reduction in water availability due to heavy runoff

2.2 Information Collection & Compilation:

Ground maps, contour information, and problematic areas were collected/selected and studied to know the specific areas which require intervention. As mentioned earlier, the area falls in the low priority based on the problem of soil erosion problem. The strata are generally stable and rocky.

2.3 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 programme are to:

- Increase infiltration into soil.
- Control excessive runoff.

- Manage and utilize runoff for useful purposes.

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:

- Nursery Development.
- Afforestation.
- Enrichment planting.
- Energy Plantation.
- NTFP/Medicinal Plants Plantation.

b. Bio-engineering Measures

- Stabilization of landslides/slips
- Nullah stabilization

2.4 Pressure on Forest Resources:

2.4.1 Grazing:

Afforestation can not be successful if it is damaged soon. Grazing is the most destructive factor for the failure of plantation. Grazing includes eating of any

kind of standing vegetation by domestic livestock or wild animals. Young seedlings/sa[lings can hardly coexist with thousands of sheep, goats, and cattle left freely in the plantations and regeneration areas causing irreparable losses to the soil and vegetation cover. Nevertheless, role of livestock in the economy of local people is appreciable, But free and uncontrolled grazing causes tremendous losses to the forests.

The extent of pressure can be gauzed by the fact that the livestock population of the nearby villages is 4 times the human population

Effects of grazing on forests:

1. Grazing destroys tender seedlings of desirable species which are eaten away along with grass.
2. Seedlings of the desirable species get either trampled or damaged by the heavy hooves of the animals; roots get exposure and finally plants die out.
3. Grazing makes the soil compact, reduces its porosity and breaks down the soil aggregates. Heavily grazed lands are therefore, poorly-aerated, with poor percolation, increased run-off and evaporation whereby germination of seeds is reduced.
4. Soil particles are dislodged and destruction of protective cover leads to erosion.
5. With grazing by cattle highly nutritive palatable grasses and plants get replaced by less nutritive, unpalatable and coarse grasses leading to

dwindling of grazing resources. Change of composition of crop also takes place with inferior species.

6. Mechanical damage to seedlings and saplings by the passage of animals.

2.4.2 Fodder and Fuel wood:

Livestock population in the nearby villages is 20,609, out of which Sheep is 12,300 and Goat is 6,410. These animals put great pressure on the forests as most of them graze in the forests. 82 % of household is dependent on forest to meet the fodder requirement. 27 % of fuel wood requirement is met from their own farms and to cover the gap 80 % families depend on forests.

2.5 Man-Wildlife conflict:

Man-wild life conflict is the result of gradual degradation of natural resources and the most sufferers are poor, marginalized communities living in and around the forests of the Catchment area. The problems of animal damage in area, whether it is crop depredation, live stock depredation or human causalities, are not as alarming as it is in some other parts of the State or elsewhere in the country. However, the problem of livestock predation and killing by Leopard and Black Bear is gradually increasing. In particular, cattle lifting by Common Leopard and human attacks by Black Bear seem to be a burning issue in this part. The problem of encounters with Black Bear seems to be particularly high during winters and monsoons. The villagers also complain about extensive damage to potato fields by porcupines, both the freshly-sown and harvest-stage crops. Livestock owners and shepherds complain that their animals are routinely preyed on

by Common Leopards, Snow Leopards, and more occasionally by Brown Bears, in alpine pastures during summer. Common Leopards occasionally attack livestock within villages as well, but no loss of human life was reported. Himalayan Black Bears frequent the surrounds of the villages of the Bhaba valley, lured by the abundance of fruit and other crops in the fields. Interestingly, villages most affected by Bears typically have orchards along the upper fringes of agricultural land; areas that are usually the most distant from homes and most proximate to forests. Villages that are lower down in the valley, or surrounded by other villages face less damage from Bears.

In the past, poaching of wildlife was apparently common, as hunting was a prime pastime of the locals. In particular, Musk Deer was poached extensively for the commercially valuable musk-pod (an abdominal gland in male animals), which would then be sold in markets of Rampur Bushahr, Shimla, Amritsar, and Ambala. Barking Deer was heavily killed for its meat and even today the Barking Deer populations in the Sanctuary is very low. Himalayan Tahr and Goral were other animals which were hunted in a large scale for meat. Himalayan Monals were trapped and killed for their crest feathers which the villagers used to wear on their caps as a status symbol. Fortunately, poaching became much reduced since the enactment of the Wild Life (Protection) Act, 1972 and the re-notification of the Sanctuary status in 2001. Moreover, establishment of several hydel projects along Sutlej and its tributaries in recent years has opened up employment

opportunities among the locals and this has, to a certain extent, weaned away the locals from poaching practices.

Appropriate compensation is needed and also environmental awareness programmes for glaziers need to be created. Concerted efforts, education, awareness, research, monitoring, habitat restoration and development is essentially needed to tackle the complex issue of man animal conflict

2.6 Improvement in Scientific Information:

Although some inventory of the flora and fauna of the catchment has been prepared, The complete status of important habitat types and that of the threatened flora and fauna is yet to be studied. Sufficient information is not available 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. Further study will help in managing the catchment area in a better way.

2.7 Employment and Income generation Activities:

In general, people in Bhaba valley are relatively well off as a result of recent commercialization of the valley in response to establishment of hydel projects which were followed by huge infrastructural development like roads, buildings, electricity, telecommunication, and residential colonies. This has provided ample opportunity for employment and income generation. Apple

orchards are also owned by the villagers nearby the catchment area. However, people are interested in Khadi, Fishery, Poultry, Bee keeping etc.

2.8 Eco-Tourism Potential:

The area is very interior and picturesque. The Bhaba Valley is having a good potential of Eco-Tourism but is still not fully 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, proper 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-å-vis wildlife conservation. It can become one of the most important alternative income generation activities.

Rupi Bhaba Wildlife Sanctuary has a large number of trekking routes and mountain trails, most of which are quite challenging and the high mountain-passes connect the Sanctuary to neighbouring parts of Great Himalayan National Park and Pin Valley National Park.

2.9 Demarcation of Boundaries and Construction of boundary Pillars:

The boundaries of Rupi-Bhaba Sanctuary has finally been notified under Section 26A of the Wildlife (P) Act, 1972 by the H.P. Government Notification dated 07.09.2001. However, these boundaries are yet to be marked on the ground for the better management and to protect their boundaries from the encroachments.

Construction of the B/Pillars and chak pillars will not only prevent illegal activities in the Sanctuary but also benefit the local people to know the boundaries of their cultivated land in PA.

2.10 Buildings, Paths, Bridges and Communication network:

The existing buildings are inadequate and the I/Paths and B/Paths/Foot bridges are in bad condition, which require immediate repair and some new buildings are also required. To manage the forest resources and to implement the CAT Plan, better infrastructure is necessary for the front line field staff. The paths and bridges are also required to be maintained for the local people and the staff for patrolling.

2.11 Lack of latest professional training for the staff/officers:

The front line staff as well as officers need to be regularly trained in latest professional skills and management techniques. In order to equip them with recent technology and scientific knowledge to add to their long gained experience, training needs to be arranged in wildlife management, soil conservation etc.

2.12 Lack of concern about conservation by the local people:

The local people are not much concerned about the forest wealth due to various reasons. They are more concerned about their livelihood opportunities. Proper understanding, co-operation and awareness is required to have better results.

2.13 Monitoring and Evaluation:

Monitoring is an important and integral component of effective conservation and management as it provides ways to track the status of various components of biological diversity and forest eco system over time. The regular feed back through monitoring and evaluation allows better understanding, midway corrections and adoption of appropriate strategies.

CHAPTER-3

Joint Forest Management (JFM)

3.1 Joint forest Management (JFM) in the CAT Plan:

The term Joint Forest Management (JFM) is used for describing a process in which the local communities are involved in planning, establishing, Protecting, managing and using the forests through collective action, with the forest department playing the role facilitator.

The key issues in the participatory approach involving JFM are:

a) Giving the local communities a stake in the well being of a forest right from the planning stage to management and protection.

b) Even though most communities use fuel wood, fodder and small timber from the forest, giving them a substantial share of the forest produce, including timber and medicinal plants.

c) Developing and supporting local level institutions for the participatory practices and managing their share of responsibilities for cost and benefit sharing.

d) Enlisting the help of existing community based organizations, schools, panchayats and non-governmental organizations in participatory forest management.

3.2 Role of community participation:

People's participation in forestry programmes may be brought about and sustained in the following manners:

a) The stakeholders become agents of change and partners in the development of forests.

b) The Forest Department assumes the role of a facilitator, helping the local communities in developing, protecting and managing their forest resources.

c) Building institutions at the grass roots level for sustained development and linkages with panchayats.

d) The local institutions function as an operational mechanism for providing an opportunity to the local communities in participation in forestry.

In India Joint Forest Management (JFM) has emerged as an important intervention in management of forest resources. In many parts of India, small village groups have started to protect and reclaim degraded forest lands through collective action. The Joint Forest Management Programme seeks to develop partnerships between local community institutions and State Forest Departments for sustainable management and joint benefit sharing. The primary objective of JFM is to ensure sustainable use of forests to meet local needs equitably while ensuring environmental sustainability. The central premise is that local women and men who are dependent on forests have the greatest stake in sustainable forest management.

3.3 JOINT FOREST MANAGEMENT IN HIMACHAL PRADESH

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 19th 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 protect in mid 1980s as also with the adoption of the National Forest Policy 1988, which brought the people to the centre stage.

This brought about a paradigm shift in the objectives and management practices for forestry in the State through participatory management modes.

Social Forestry (Umbrella) Project was launched in late eighties with the concept of people's participation. Sanjhi Van Yojna (SVY) Scheme, was started in 2001 for sustainable management of forest resources in the State in collaboration with the local communities. This was followed by Parisharam Hamara Van Hamara Scheme, Apna Van Apna Dhan Scheme, Ja Jan Sanjeevani Van etc. Mid Himalya Watershed Development project is being implemented successfully in 10 districts of Himachal Pradesh

In many locations people's voluntary groups were engaged in protection of forests. Subsequently, based on the experience, the process of institutionalizing people's participation in forest protection and regeneration began. This type of collective endeavour in protection and management of

forests through people's involvement was later termed as Joint Forest Management.

3.4 IMPLEMENTATION STRATEGIES OF JOINT FOREST MANAGEMENT (MICRO-PLAN PREPARATION)

For the long-term success and the sustainability of the village level institutions, it is important that proper and adequate methods of community organisation and management are followed. Thus, normally in the First year major emphasis should be on the systematic and sequential formation of JFMCs, training of local communities, CBOs and community members. Towards the end of the First year, a well documented but simple and understandable micro-plan needs to be ready for implementation.

The micro plan should be prepared by the Forest Officers and Joint Forest Management Committees after detailed PRA exercise and should reflect the livelihood needs of the local communities as well as provisions for meeting the same sustainably. It should utilize locally available knowledge as well as aim to strengthen the local institutions. It should also take into account marketing linkages for better return of NTFPs to the gatherers and should also reflect the needs of local industries/ markets. This should be done with due regard to the environmental functions and productive potentials of the forests and their carrying capacity as also their conservation and biodiversity values.

The micro plan should also take into consideration and provide suitable advice for areas planted/ to be planted on community lands and other Government lands.

Responding to the 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 holder's 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 Organizations, community based Organizations 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 in 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.

3.5 Date of Issue of Govt. Orders on JFM and its Modification Dates:

GOI resolution-1990

HP introduced JFM-1992

Date of issuance of 1st JFM orders/rules-12.05.1993

Date of amendment/new orders/rules-23.08.2001

3.6 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%.

3.7 JFM and Selti-Masrang HEP CAT Plan:

Of the 13 villages in the Bhaba valley, presently only few have committees that address issues related to natural resource management. The village of Bai, has for several years, devised and implemented a forest-protection plan for a Deodar forest in the proximity of the village. With the reduction in the availability of Deodar in the region, Bai's Deodar forests were under severe pressure for timber. The village community evolved a plan to protect the forest with the assistance of the Forest Department. The only significant surviving Deodar forest near Bai stands as testimony to local efforts in forest conservation. In Katgaon, there is a newly formed forest committee that intends to take up plantation activities and encourage the community to protect forests. A fenced patch of regenerating Deodar on the right Bank of the khud above Katgaon was planted by villagers about two decades ago. Villagers assert that because they planted these trees from their own initiative, they have sincerely protected them over the years. This patch is surrounded by apple orchards.

To effectively implement conservation and convince people to respect the sanctity of the Sanctuary, the Forest Department needs to urgently take several steps like:

- Tree plantation ought to be a priority to replenish fast depleting forests. However, the Department must realize that for a plantation to be successful, the active participation of local communities is

essential. Villagers must, therefore, be consulted and involved at all stages of plantation. Local people must be provided opportunities to work as labour in such works.

- There must be an interface between the Forest Department and local communities through the formation of Forest Committees. The Department has a role in educating people about the consequence of forest loss, and about the ecological and economic services and functions of forests in the proximity of villages.
- The works specified under the CAT Plan except engineering/ Technical works should be executed based on the model of JFM.
- The various activities planned are in consonance with the JFM. Provisions have been kept for plantations in the degraded forest land, NTFP Plantation and Bamboo/shrubs plantations. JFMCs should be formed for implementation of various works of CATP. Considering the immense potential and genuine need for women's participation in JFM programmes, it is important that the women folk are involved in the above activities. At least 50% members of the JFM general body should be women. For the general body meeting, the presence of at least 50% women members should be a prerequisite for holding the general body meeting. Local people and committees should be engaged for the CAT Plan works such as plantation and maintenance etc. instead of hiring the labour from outside. The wages will be met out from the provision incorporated in the norms etc.

CHAPTER-4

Objective and Project Proposal

4.1 Project Objectives:

Catchment area treatment basically involves:

- Understanding erosion characteristics and
- Suggesting remedial measures to reduce the erosion rate/silt load

The objectives of the CAT Plan are summarized as under:

- To achieve sustainable management of Forests, Bio-Diversity Conservation and also ecological rehabilitation in the area leading to an all round eco-development activities on sustainable basis.
- To initiate measure to rehabilitate the degraded habitat through afforestation of native species.
- To reduce soil erosion and land degradation through soil conservation measures to ensure longevity of Selti-Masrang Hydel Project.
- To increase the potential/production of the bio-mass in the area and to ensure longevity of Selti-Masrang Hydel Project.
- To improve the infrastructure facilities in the area.
- To reduce burden on forests through Energy Saving Devices and other measures.

- To provide employment to the local people by engaging them in afforestation, anti poaching, rural infrastructure and other works.
- To upgrade the skills and build capacity of the PA's staff in Wildlife management skills by providing training to meet the challenges.
- To plant wild fruit bearing species suitable for wild life and create water resources for wild life.
- To strengthen the extension activities for forestry development and wild life protection.
- To conduct research studies relevant for management of flora and fauna.
- To seek people's participation in planning, implementation and monitoring.

In the present plan thrust has been given for sustainable development of the catchment area as well as to protect and conserve the local environment with the active involvement of 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.

Various mechanical and biological measures have been suggested to treat the catchment area to meet the objectives of the CAT Plan.

4.2 Project Period:

The Project period would be for 11 years.

4.3 Project Components:

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 catchment through afforestation in blank/ degraded areas, and bio engineering works in soil eroded areas including Nullahs. It also envisages an active participation of local community as it will ensure better success of the works and 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, coupled with bio engineering works will be undertaken in the catchments area. The important activities in this regard to be undertaken during the project period have been described.

a. A map depicting the administrative and forest boundaries, Beats, Block, Range , Road network, drainage of the catchment etc. has been prepared.

b. A map showing the forest infrastructure present like buildings, nurseries, plantations & soil & water conservation works for existing and proposed works has been prepared. Few works have been proposed to be treated outside of the catchment area in the interest of environment & rehabilitation of the adjoining area.

c. The prescriptions of the CAT Plan have been made based on the analysis of the current situation of the catchment after extensive field reconnaissance.

d. 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.

e. A provision to offset the cost escalation in the CAT Plan has also been made. As the Hydel project implementation cost increases, the outlay of the CAT Plan will be revised proportionately after review to be done every two years.

f. The basis for calculating the financial outlay for the all the activities mentioned in the CAT Plan are based on the prevailing schedule of rates of H.P. Forest Department for 2011-12.

g. The locations of the proposed activities are based on GPS Coordinates which will subsequently form the basis of monitoring .

h. The activities proposed in the CAT Plan have been spread over 11 years and annual phasing of the works has also been kept as per guiding principles.

4.4 Biological Measures—Improvement of tree cover

(a) Nursery development:

Extension and maintenance of existing Nursery.

(b) Afforestation.

(c) Enrichment plantation.

(d) Energy Plantation.

(e) N.T.F.P/Medicinal plants Plantation

4.5 Soil Conservation Works- Engineering and Bio-Engineering measures:

- ❖ Stabilization of land slides/slips.
- ❖ Stablization of Nullahs

4.6 Payment of Environmental Services (PES)

This is a new concept and detailed modalities are yet to be worked out.

4.7 Research, Training, studies and Capacity Build up

Different research/studies have been proposed in the CAT Plan along with training of Forest officers/ front line staff to enhance their capacity for wild life management.

4.8 Forest Infrastructure Development, Operational Support &Forest Protection

4.8.1 Infrastructure development

- ✓ Repair of forest path/bridle Paths/foot bridges.
- ✓ Maintenance of existing buildings
- ✓ Revival of Bunker.

4.8.2 Operational support

- Establishment cost
- Mobility
- Equipments

4.8.3 Forest Protection

(a) Energy saving devices.

- ➢ Distribution of LPG Cylinders.
- ➢ Distribution of Solar lights.

- Construction of crematoria and store for fuel wood.
- Distribution of induction heaters/cookers/ Energy efficient chulhas.

(b) Construction and repair of existing boundary pillars.

Although the boundaries of sanctuary have been notified, boundary pillars are yet to be fixed.

(c) Sign and slogan boards

Sign and slogan board will help in educating/ sensitizing local people as well as visitors about the Wild Life.

4.9 Management of Wildlife in and outside the protected area

Rupi Bhaba Sanctuary, being located in the Great Himalaya, is characterized by a steep, precipitous terrain with harsh weather and poor access to deep interior valleys.

This Sanctuary is among those mountain protected areas in the state where there is lot of scope for further studies, strategic monitoring mechanism needs to be improved to understand the responses shown by the wildlife. The key problems that plague the Sanctuary are as follows

- The staff requires latest and adequate equipments and education materials relevant for wildlife management.
- Dependency of local communities on the area is substantial similar to many other mountain protected areas. With improvement in the road network leading to increased agriculture/horticulture opportunities, conflicts also increase due to crop depredation and killing of livestock by wild animals.

- Managing livestock grazing is a challenging task, and in the absence of any credible information on the livestock-habitat interaction, it is difficult to gauge the consequences of livestock grazing or non-grazing here.
- Information on biodiversity components is grossly lacking, and that the management objectives are constrained by this lack of knowledge. Research has not found a place in the Sanctuary, except for some short surveys, and therefore, there is no targeted activity. Monitoring is adhoc, and there is a clear need for scientifically sound monitoring protocol.
- Unique Wildlife Habitats: The area seems to have a lot of Unique wildlife habitats such as gorgers and hidden valleys which are home to many such species which may be new to the science (such as amphibians like salamanders, etc). There is a need to identify such unique habitats and protect them from blasting, degradation, etc. Same is true for nesting sites of vultures (cliffs, ledges, etc), galliforms, etc. The mapping of such critical and unique area needs to be done.

Opportunity for ecotourism is unbounded and this would not only create revenue for Sanctuary management, but would simultaneously harness popular support for the welfare of the area. Research and monitoring, if undertaken on the target groups/activities suggested in this plan, would put the management on right course similar to already established mountain PAs in the state.

4.9.1 Management Prescriptions

- The frontline staff of the sanctuary should be regularly given hands-on training on the field on different aspects of wildlife management including

survey methods for large mammals and pheasants, reading and interpretation of signs and evidences of wildlife, assessment of the state of wildlife habitats, and evaluation of wildlife health.

- A good network of intelligence is essential to the sanctuary management, and as such, the frontline staff should be encouraged to liaison with the local people and gather crucial opinions and information.
- Capacity-building workshops and training sessions should be regularly conducted in the field for the lower and middle level staff in various aspects of wildlife management and conservation. Professional organizations like Wildlife Institute of India, Forest Survey of India, and Institute of Himalayan Bioresource Technology (Palampur), can be approached for imparting these trainings.
- The sanctuary management, in general, should now adopt new-age spatial tools and techniques like use of GIS and remote sensing for mapping the sanctuary, resource mapping, distribution of wildlife populations, fire-incidence, etc. A dedicated GIS lab should be commissioned at the head-quarters along with a team of trained personnel and required tools and software.

4.9.2 Eco-tourism Initiatives

Though Rupi Bhaba Sanctuary has enormous potential for wildlife and adventure tourism on account of it being the stronghold of some of the spectacular wildlife species of western Himalaya like Western Tragopan,

Serow, and Himalayan Tahr, and being a mountain landscape with precipitous hills and deep narrow gorges, there are hardly any signs of such activities in the sanctuary barring a few recent initiatives by private tourism firms in Bhaba Valley.

Photo: Scenic view of the area-tourist's attraction.

In particular, the spectacular diversity of birds like the nine species of pheasants, three species of rare snipes that occur only in high-altitude bogs of montane forests, and ten species of leaf-warblers would make Rupi Bhaba Sanctuary a birding hotspot. This would also attract the foreign birders and wildlife enthusiasts who throng GHNP and Pin Valley in great numbers every year to Rupi Bhaba. Eco-tourism, while it can generate

opportunities to raise income for local communities and sanctuary management, can also be a bane if not regulated. We provide here some possible outlines for taking up responsible eco-tourism initiatives in the sanctuary.

4.9.3 Income Generation Opportunities and Mechanisms

It is imperative to wean away the local communities from forest-based livelihood for effective conservation of wildlife populations and their habitats. It can be done only by creating new genre of employment and income-generating opportunities, equitably across all strata of the society. This is evident from Rupi Bhaba Sanctuary, where pressure on forests is perceptibly low in Bhaba Valley in comparison to the Rupi Range. The establishment of hydel projects and subsequent infrastructure developmental works created new employment opportunities in Bhaba Valley, and recent shift in their cropping pattern to more lucrative apple orchards has generated a lot of agricultural income. These two factors have contributed to the growing clout of non-forest economy in Bhaba valley. Opening up of Bhaba Valley for mountain and adventure tourism has again created a new avenue of income generation for the local people. On the contrary, people in Rupi and Shorang Valley continue to be wholly dependent on forestry resources for their sustenance, exerting huge pressure on forests and wildlife populations in the core of the sanctuary. With agriculture largely confined to sustenance farming and lack of opportunities for raising non-forest income, villages in Rupi Valley are dependent on forests for their livelihood and their use and extraction of forestry resources are often well beyond sustainable limits.

Though Mahila Mandals (women's self-help organizations) are actively present in nearly every village of the buffer zone, they are currently not sufficiently innovative to find revenue-creating opportunities from non-forestry sector. Lack of counsel and leadership, traditional absence of social entrepreneurship in these communities, and a misplaced perception of forests as limitless resources of income are some of the factors why these Mahila Mandals are not very successful vehicles of local level economic change.

4.10 Mitigation of Human-Wildlife Conflict

(i) Compensation against wildlife damages.

(II) Publicity and awareness.

4.11 Extension of Sarahan Peasantry at Gopalpur

Brief description of each component is given as under:

1. Biological Measures-Improvement of tree cover:

a. Nursery Development:

To raise successful plantation it is necessary to have a good & adequate planting stock. It is proposed to extend and improve the existing nurseries at Darchi. The nursery shall be raised in the 1st year of the project period and will be further maintained till the completion of this CAT Plan.

Name of Nursery	Amount-Rs	Longitude	Latittude
Extension and maintenance of Nursery at Darchi, UF-27	7,30,000	78°00'10"	31°37'05"

of time. Divisional Forest Officer may make any changes as per requirement of field during the course of execution of the works.

Photo: Areas selected for plantation

Plantation will be maintained for subsequent three years. A total of 20 hac. Has been identified as available for planting under the scheme. The detail of the areas identified to be planted is given below:

Sr.N.	Name of Area/Forest	Area in Ha	Longitude	Latitude
1	UF-27	5	77°55'12"	31°40'15"
2	UF-29	5	78°40'12"	31°41'10"
3	UF-29-	10	78°06'18"	31°40'10"
	Total	**20**		

The afforestation norms have been worked out as per norms of HP Forest Department for tribal areas for the year 2011-12. Looking at the high incidence of grazing during summer, all the plantation areas will be fenced with B/Wire in 3-4 strands.

b. Afforestation.

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, degraded forests and old failure plantation areas shall be undertaken for plantations, while the choice of species will be mainly governed by the site/location, effort will be made to raise a mixture of conifers, broad leaved species and fruit bearing species etc. The plant life provides congenial home to wildlife and bio diversity therefore the habitat of wildlife is to be improved by supplementing the Bamboo/shrubs/fruit bearing species and supported by Bio-engineering works. The Nirgal/shrubs in the under story is very important for pheasant in the catchments area. The main species to be raised under this scheme are Deodar, Kail,Fir/Spruce, Nirgal, Maple, Ban, Oak, Aesculus indica, Prunus persica, Prunus cornuta, Prunus pashia, chestnut, Juglans regia, pyrus spps and other fruit bearing spps etc. Plantation must use local and indigenous species since exotic species have long term negative impacts on the forest eco-system. The preference of local communities as the regards the choice of species will be ascertained and given due weight age as per the requirement of site, 1500 plants per hectare will be planted under this scheme. Sometimes all afforestation works should be supported by anti erosion measures such as small check dams and gully plugging etc. before starting the afforestation works bush cutting should be done and area will be cleared of obnoxious vegetation. Hoeing, mulching, weeding shall be attended regularly. These details are only indicative and open for amendment as per site needs with the passage

S.N.	Component	Amount-Rs
1	Fencing cost-wages	6971.64
2	Planting cost-wages	14014.13
3	**Sub total wages**	**20,985.77**
4	Barbed wire cost	3,500.00
5	Other material cost	1,100.00
6	**Sub total material cost**	**4,600.00**
7	Cost of plants Rs 4.35x1100	4,785.00
8	**Total**	**30,370.77**
9	**Norm**	**Rs 30,400 per ha**

Sr.No	Expenditure Detail	Amount-Rs.
1	Afforestation cost with conifers/Broad Leaved over 20 ha. @ 30,400	6,08,000
2	Maintenance cost of 3 years	
a	1st Year Maintenance cost for 20 ha. @ 5,040	1,0,800
b	2nd Year Maintenance cost for 20 ha. @ 3,120	62,400
c	3rd Year Maintenance cost for 20 ha. @ 1,740	34,800
	G.Total (New + Maintenance)	**8,06,000**

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 55 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	Area in Ha	Longitude	Latitude
1	UF-27	5	77°55'12"	31°42'15"
2	UF-28	5	78°40'12"	31°41'10"
3	UF-29	10	78°06'18"	31°40'10"
	Total	**20**		

Per Ha Cost Norms for Enrichment Plantation (800 plants per ha) Works has been calculated on the Prevailing Schedule of rates applicable in H.P. Forest Department for the year 2011-12.

S.N.	Component	Amount-Rs
1	Fencing cost-wages	6971.64
2	Planting cost-wages	10,985.02
3	**Sub total wages**	**17,956.66**
4	Barbed wire cost	3,500.00
5	Other material cost	800.00
6	**Sub total material cost**	**4,300.00**
7	Cost of plants Rs4.35x800	3,480
8	**Total**	**25,736.66**
9	**Norm**	**Rs 25,700 per ha**

Sr. No	Expenditure Detail	Amount-Rs.
1	Afforestation cost over 20 ha. @ 25,700	5,14,000

c	3rd Year Maintenance cost for 20 ha. @ 1218	24,360
	Total (New + Maintenance)	**6,66760**

d. Energy plantation

Nearer to habitations in small patches, energy plantation/ high density plantation is proposed, in which Five Strands barbed wire fencing of 3 strand and 2 cross wise; with creosoted wooden fence posts & two layers

2	Maintenance cost of 3 years	
a	1st Year Maintenance cost for 20 ha. @ 3,996	79,920
b	2nd Year Maintenance cost for 20 ha. @ 2,424	48,480
c	3rd Year Maintenance cost for 20 ha. @ 1218	24,360
	Total (New + Maintenance)	**6,66760**

d. Energy plantation

Nearer to habitations in small patches, energy plantation/ high density plantation is proposed, in which Five Strands barbed wire fencing of 3 strand and 2 cross wise; with creosoted wooden fence posts & two layers of live-hedge to reinforce fencing will be done and , 5000 tall plants per ha (spacing 2mx 1m) of fuel and fodder value will be planted to provide quick availability of fodder and fuel wood. No maintenance will be done. Total 10 hac area has been identified for this treatment under this component as per detail is given below:

Name of Area/Forest	Area in Hac.	Longitude	Latitude
UF-28	10 hac	78°40'12"	31°41'10"
Total	**15 hac**		

Per Ha Cost Norms for Energy Plantation:

S.N.	Component	Rs
1	Fencing cost	10,000
	Planting cost	37,500
2	Sub-Total Wages	47,500
3	Material cost	9200

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	Cost of plants raised (Rs.4.35/Plant x5000)	21,750
4	Total	78,450
5	**Norms per ha**	**Rs. 78,500**

Expenditure Detail	Amount
Energy plantation over 10 ha. @ 78,500	**7,85,000**

e. N.T.F.P/Medicinal Plants Plantation:

A number of valuable medicinal plants have become endangered due to over exploitation and unscientific extraction and collection from their natural habitat without adequate replacement by way of artificial regeneration. Local people have a right to collect/extraction of Minor Forest Produce in and around the forest and Sanctuary area under provision of Forest Settlement Report, 1921 for domestic use and their livelihood, there by threatening the very existence of rare and endangered species of medicinal herbs. Therefore, it is essential to address the livelihood issue by encouraging forest based enterprises for development of NTFPs on sustainable basis as it provides alternative income generation activities. Under this scheme medicinal herbs like Dhoop, Karu, Kuth, Salam Panja (Hat Panja), Ban kakri, Chora, Patish and Discorea deltoidea etc. will be raised. About 2200 plants shall be planted in 1 ha. Area depending upon the site.

The plants can also be raised as intercrop in the other plantation areas to be taken up for tree planting. The plantation areas will be fenced

with B/wire fence in four strands on wooden fence posts. Total 35 hac. area has been identified for planting under this component. The details of the area identified are as under:

Sr.N.	Name of Area/Forest	Area in Ha.	Longitude	Latitude
1	UF-27	10	77°55'12"	31°42'15"
2	UF-29	10	78°06'18"	31°40'10"
	Total	**20**		

Expenditure Detail:

Sr.No	Expenditure Detail	Amount-Rs
1	Afforestation cost over 20ha. @ 37500	7,50,000
2	Maintenance cost of 3 years	
a	1st Year Maintenance cost for 20 ha. @ 6350	1,27,000
b	2nd Year Maintenance cost for 20 ha. @ 4300	86,000
c	3rd Year Maintenance cost for 20 ha. @ 2250	45,000
	Total (New + Maintenance)	10,08,000

2. Soil Conservation works-Engineering and Bio-Engineering measures:

Soil bio-engineering stabilizes or protects eroded soils and reduces further 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. The approach must allow the involvement of the local population in the management and

Photo: Land Slide at Homti

maintenance aspects. 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 cuttings.

Photo: Areas requiring soil conservation measures.

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% for raising nursery plants.
  - 50% 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
- Large bamboo 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

a) **Land Slide Stabilizations:**

Land slides are caused by the down hills measurements of weathered rock mass, boulders, soil etc.

There are various factors natural and manmade, which contribute directly or indirectly in producing land slide.

Photo: Land slide requiring treatment

The identified areas in the CAT Plan area are to be stabilized through various controlled measures 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:

a) Construction of check wall/protection/retaining wall with crate wire to control land slips and toe cutting with brushwood check dams.

b) 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 the Location/Area	Ha	Area benefitted-ha	Longitude	Latitude
1	Chhaltee Slip	1	10	78°00'12"	31°37'10"
2	Ayarang Slip	2	20	77°55'12"	31°42'15"
3	Chamuling Slip	2	20	77°59'30"	31°41'10"
4	Darchi / Slip	2	20	78°01'02"	31°38'10"
	Total	**7**	**70**		

The Expenditure of Land slide and slips stabilization:

Sr.No	Name of Work	Amount-Rs
1	Lland slip/Stabilization over 7 ha @7,91,666.6	**29,00,000**

The actual extent of treatment and expenses will vary as per the site condition and requirement at the time of execution.

b) Nullah Stabilization:

5 Nullahs with a length of about 14 Kms. are required to be treated in the catchment area.

Photo: Thingri Nullah

Photo: Masrang Nullah

Photo: Homti Nullah

Photo: Ayarang Nullah

These will be done through various measures which will depend upon the site, extent and location of the points. Some of the activities suggested are:

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

b) The eroded and effected Nullah will be channelized and protected by the crate wire of check wall and check dams.

c) Live hedge vegetative spurs along the nullah and land slips shall be put up after one or two years, when the nullah will be filled by the silt. Local species which are good soil binders like Salix, Alnus nitida, Alianthus, Agave, Nirgal, Kashmal, Bhekhal, Seabuckthorn, Rosa spp. & Rubas spp. etc. will be planted.

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

S.N.	Name of the Nullah	Length -Kms	Area benefitted-ha	Lattitude	Longitude
1	Sorganch Nullah	1	20	31°40'10"	78°01'00"
2	Mooling Nullah	1	20	31°42'40"	78°01'00"
3	Darchi Nullah	1	20	31°47'86"	78°04'16"
4	Ayarang Nullah	1	20	31°41'156"	78°01'10"
5	Wanger Khad	10	40	31°43'14"	78°02'02"
	Total	14	**140**		

Detail of works at some of the locations are given below:

S.N.	Name of place	Longitude	Latitude	Prescription	Quantity
1	Baltepa	31°40'05"	78°01'12"	➢ Trenching	560
				➢ Brushwood	50 RM
				➢ Check Dam	45
				➢ Live hedge	40 RM
2	Bura	31°39'35"	78°01'32"	➢ Trenching	700
				➢ Check Dam	48
				➢ Live hedge	50 RM
3	Darchi	31°38'16"	78°02'15"	➢ Trenching	460
				➢ Brushwood	60 RM
				➢ Check Dam	60
				➢ Live hedge	400 RM

Balance work will be as per site specific micro planning for which sufficient provision has been made.

Financial Implications:

Sr.No	Name of Work	Amount-Rs
1	Nullah Stabilization over 14 Kms	41,40,000

3. Payment of Environmental Services (PES):

It is a new concept as a reward for good conservation behaviour by the community living around the catchments area of the project having bearing on the catchment area. 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 and around the catchments area reducing pressure on forest.

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

Village support activities/Eco development activities:

In order to reduce the pressure from forests of Sanctuary, it is essential to develop village support The component wise detail is given below:

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 Bawries.
- Incentivisation for rotational grazing in pastures.
- B/L (fodder) plantation around villages to reduce pressure of grazing in forests.

Eco tourism activities:

The area is also known for its scenic beauty. The area has a very high potential for development of Eco-Tourism but poor infrastructure, low publicity, trained manpower and inadequate financial resources have been the main constraints in the proper development of eco-tourism. There is priority need to promote and develop eco-tourism, wilderness travel and adventure travel in the landscape. The eco-tourism society and they need training and awareness/importance of the conservation of wildlife along with eco-tourism. 1% of the cost of CAT plan has been kept reserved for eco-tourism activities. Sign and Slogan boards to encourage all interested persons, both domestic and foreign tourist with a view to acquaint them and create awareness of this unique eco-system.

The activities which can be undertaken under this component have been identified as under:

- Development of camping sites and public utility services.
- Training of local youths for Eco-Tourism activities.
- Maintenance/repair of path/trekking routes.
- Purchase of camping equipments.

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.

Income Generation Activities.

One of the major factors impacting on the effective bio-diversity conservation is the dependence of local people on the natural resources of the area for their livelihood. Local people have right to collect/extract NTFP in and around the Sanctuary area under the provision of Forest Settlement

Report, 1921. Extraction in unregulated/controlled manner may threaten the very existing of the rare and endangered species of medicinal herbs.

Therefore, there is a need to address the livelihood issues of local people by encouraging alternative livelihood activities like bee keeping, vermi composting and organic farming. This will provides alternative income generation activities. Agriculture and Horticulture are the main occupation of the people in the project area. The productivity of such land is mostly poor as only traditional methods are adopted. It is thus imperative that appropriate technological interventions are made in Agriculture and Horticulture to have a harmonious effect on the environment. Use of toxic chemicals such as pesticides/weedicides must be restricted or avoided. This will help in maintaining quality of Bio-diversity, water, soil and atmosphere as a whole. Mitigative works should be carried out with the consent of the local people and with the help of. line Departments.

Under this component, suggested activities are given below:

- Vermi compost & organic farming
- Apiculture (Bee keeping)
- Animal husbandry support and Dairy development
- Agriculture and Horticulture support

4. Research, Capacity building and Publicity:

The 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 grasslands 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 important that a base line information about the floral diversity, ecological studies and composition is generated to guide future conservation action. Priority will be given to undertake research studies on the following subject:

(a) Collection of base line data for future monitoring.

(b) Environmental impact Assessment of biotic pressure in higher alpine zone.

(c) Identification of habitat for pheasants.

(d) Survey of Vultures and their nesting sites.

For capacity building, following activities are proposed:

a. Training and workshops.

To make aware about the latest technologies and for skill up gradation study tours in India shall be arranged for forest officials/officers who are implementing the plan. The objective

of this training component would be to provide the staff and officers working in the project area to augments their existing skill, and professional knowledge with latest specialized skills to build better capacity for wild life and other activities.

Training of Eco guides.

Local guides should be enlisted as official tour and trek guides and income generated can be disbursed through co-operative venture. These co-operatives should be managed by the local communities themselves

5. Infrastructure Build up & Forest Protection:

a. Maintenance of Buildings.

For the optimum management of Forest resources of the tract, it is essential that the field infrastructure of the Forest Department adequately maintained. The forest path/bridal paths 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 buildings are proposed to be maintained:

S.N	Name of Building	Amount
1	FG Hut, Katgaon	2,00,000
2	FG Hut Yangpa	2,00,000
3	FG Hut Shango	2,00,000
4	Type-I qtr, Katgaon	2,00,000
5	Revival of Bunkar at Ramsackle	3,00,000
	Total	11,00,000

b. Maintenance of paths and bridges.

Following roads/paths/foot bridge are proposed to be repaired/ constructed:

S.N.	Name of Path/Bridge	Amount
1	Maint-Bridal path Kafnu to Kara-16 km	2,00,000
2	Maint-Bridal path Kafnu to Nigul-24 km	2.00,000
3	Maint-Bridal path Katgaon to Pandoswar-4 km	2,00,000
4	Maint-Bridal path Kafnu to Mulling-18 km	6,00,000
5	Repair of wooden bridge Muling	1,00,000
	Total	13,00,000

c. Office 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.

S. N.	Description of items	Qty	Amount-Rs
1	Establishment Cost (Reimbursement of Salary & remuneration to Contractual Staff)	L/s	5,00,000
2	Provision of vehicle		8,00,000
3	(a) Office Equipments -Computer along with accessories-2, (b) GPS	2 8	3,50,000
4.	O.E.	L/S	1,00,000

5.	Maintenance of Motor Vehicle	L/S	1,00,000
6.	Amenities to staff & labour	L/S	50,000
	Total		**19,00,0,00**

d. 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 village. The component wise detail is given below:

1. Distribution of LPG cylinders 120
2. Distribution of Solar lights 20 Nos.
3. Construction of Crematoria 5 No
4. Distribution of Induction heaters/cookers/Energy efficient chulhas- 100 No

An amount of Rs 21.2 lac has been provided for this.

This has to be done in consultation with the JFMCs.

e. 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. 1 lac is proposed to be incurred during the plan period.

f. 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. 30,000 has been proposed for this purpose during the plan period.

6. Management of Wild Life

a. Improvement and Development of Wild Life:

i. Anti Poaching/patrolling activities:

The sanctuary area as well as area outside the Sanctuary 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/chokiest 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 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.2 lac. has been kept to meet this purpose during the plan period.

ii. Wild Life awareness and vaccination of domestic cattle

The local people have grazing rights in and around the Sanctuary area. It is therefore, necessary to immunize the domestic cattle against contagious disease like foot and mount etc. It will prevent disease from spreading from domestic cattle to Wild animals and vice-versa.

Iii. Field equipments for staff/officers and Office support

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 sanctuary is surrounded by private land or other man-modified habitats where the presence of several wild animals, particularly predators i.e. Leopard and Black Beer is intolerable. These species venture into human settlements and cultivated areas in search of food and cause loss or injuries, livestock predation or

extensive damage to the Horticulture/Agriculture crops and other private properties. 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 animal repellants, deterrents, snares, traps, capture devices nets and accessories and 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.

In addition to that it is necessary to purchase a medicine also for management of Wildlife-because in the past it has been frequently responded to call from a different Sanctuary to deal with human-Wildlife conflict. Therefore, an amount of Rs.11.10 Lac has been kept for following items:

1) Physical capture cages, traps, immobilizing gun, darts, drugs.
2) Animal rescue, translocation/transportation devices.
3) Animal Capture devices.
4) Field equipmentst- altimeter, pedometer, Compass, Handy cam, Tape Recorder, Census equipments etc.
5) Binoculars and spotting scope etc.
6) Medicines

7) Protection Guns.

8) Other equipments.

iv. Habitat improvement

Following activities are proposed under Habitat improvement:

a. Plantation of herbs/shrubs for creation of refuge sites for wild life.

b. Development of hiding sites for animals.

c. Pheasant's habitat development activities.

d. Improvement of forest cover and under storey cover along nullahs.

v. Signage

Proper and adequate signage is very helpful in creating awareness among the local people and visitors/ tourists. Therefore, a provision of Rs 1.40 lac has been provided for this purpose.

vi. Support to Gopalpur Peasantry (Sarahan):

The idea of establishing the alternate site of breeding western Tragopan was put forward by the chief wildlife warden, HP during the year 2008. Then a budget was provided under NJPC CAT plan to create Security Fencing around 6.033a (Approx.) area. The area was fenced at the cost of 28Lac during the year 2009-10. Then the matter was taken up to Central Zoo Authority for its site approval and for preparation of management plan. In order to make funds for this purpose, a sum of Rs. 13Lac has been earmarked for its conservation breeding.

This pheasantry will serve an alternate breeding centre for Western Tragopan. This was created mainly for the following reasons.

- To save birds in case of any epidemic/disease in Sarahan Pleasantry.
- To try its success of breading in two different locations.
- To increase its population stock
- To release in its natural habitat after its sufficient population in Captive Breeding.
- To save this rare Spp from Extinction.

(b) Mitigation of Human-Wild Life conflict

(i) Publicity for awareness through Kala Jatha (Nukkar Natak) etc.

A provision for formation of a street theatre of the local community may be very effective for the protection of wildlife and forests. Several bands of ten to twelve village youth each may go performing about wildlife and forest conservation (with local nature based songs and natti) from village to village. Other methods like posters, pamphlets will also be used.

(ii) Compensation against Wildlife damages.

Wildlife depredation on cattle 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. A provision for Rs.4.10 Lacs has been made during the plan period for this purpose.

7. **Monitoring and evaluation**

In addition to 3rd party monitoring, regular in house quarterly monitoring will be done. The Monitoring Committee would be constituted as below:

1. Conservator of Forests Wild Life, Shimla-Chairman.
2. A.C.F. Wild Life Div, Sarahan- Member
3. Representative of PRI- Member
4. Representative of user agency- Member
5. Range Officer Katgaon- Member
6. D.F.O. Wild Life, Sarahan- Member Secretary

The committee would need to ensure the implementation and monitoring of the catchment 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 by D.C. Shimla. In addition to inhouse monitoring, third party monitoring will also be done.. 5% of the cost of CAT Plan has been kept

reserved for this purpose. Therefore an outlay of Rs. 19,31,000 is proposed to be incurred under the scheme during the plan period.

8. Site specific / Micro Planning:

In the proposed CAT Plan, activities are given component wise and area specific. Further Micro Planning will be required at the time of execution of CAT Plan with the consultation of JFMCs especially in afforestation and Soil Conservation activities. Moreover, if certain new techniques/ innovative idea come in due course of time, these can be taken up as per requirement of site and particular location. Therefore, an outlay Rs. 19,31,000 is proposed for this purpose during the plan period.

9. Contingencies:

Outlay in the CAT Plan for various components has been worked out as per H.P. Forest Department schedule rate for the year 2011-12. Lump sum provision has been made in the plan for engineering works & for soil and moisture conservation works. These works are to be undertaken after preparation of detail estimates and as per actual works depending upon the sites/location required to be worked. The model/ design prescribed in the proposed plan is only suggestive although efforts have been made to restrict the expenditure but excess and deficit may occur as per the allocation of funds and escalation of wage rate and cost of material etc. since the CAT Plan is to be implemented over a period of seven years, there may be some un foreseen activities to be undertaken. For this, 5 % of the CAT Plan outlay has been kept under contingency.

CHAPTER-5

Organization structure and Implementation

This CAT Plan will be implemented by the H.P. Forest Department through DFO Wild Life Sarahan, Conservator of Forests wildlife, (South, Shimla)/Society meant for implementation of CAT Plan. At the field level the actual implementation will be done by D.F.O wildlife Sarahan having territorial jurisdiction over the areas covered under this Plan. The DFO wildlife Sarahan 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.

5.1 Implementation Staff:

The existing staff of wildlife Division Sarahan Bushahr will implement the CAT Plan works in addition to their own duties, DFO will be authorized to engage staff on contract basis with the approval of Society/Project Director-cum-C.F (Wildlife) Shimla as and when required.

5.2 Cost Escalation:

The present cost projections are based on the wage rates of 2011-12. The outlay of the CAT Plan is based on the HEP cost as mentioned in the TEC. As the project cost increases, CAT Plan outlay will proportionately be revised and the Project proponent will pay the differential amount. It will be reviewed every 2 years.

CHAPTER-6

Cost Estimate

6.1 Total Project Cost:

Cost of the various component have been worked out on schedule rate for the year 2011-12 of H.P. Forest Department.. Total project cost for 11 years will be as under:

Year	Amount- Rs lac
Zero Year	5.20
Ist Year	33.70
2nd Year	57.33
Third Year	65.73
Fourth Year	62.55
Fifth Year	45.37
Sixth Year	24.37
Seventh Year	27.22
Eighth Year	24.20
Nineth Year	22.84
Tenth Year	**17.71**
Total	**386.22**

Annexure -1

Year wise Planning for execution of Selti-Masrang CAT Plan

S. 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	
		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
1	**Bio-logical Measures-Improvement of tree cover**																							0	0
	(a) Nursery Development																							0	0
	(i) Extension and Maintenance of Dantshi Nursery	1	100000		100000		200000		100000		80000		70000		50000		30000		0		0		0	1	730000
	(b) Afforestation																							0	0
	New -UF-27, 29, 30- 20 ha	0	0	0	0		0	10	304000	10	304000		0		0		0		0		0		0	20	608000
	Maintenance																							0	0
	1st year maintenance	0	0	0	0	0	0	0	0	10	50400	10	50400	0	0		0		0		0		0	20	100800
	2nd year maintenance	0	0	0	0	0	0	0	0	0	0	10	31200	10	31200	0	0	0	0	0	0	0	0	20	62400
	3rd year maintenance	0	0	0	0	0	0	0	0	0	0	0	0	10	17400	10	17400	0	0	0	0	0	0	20	34800
	© Enrichment planting																								
	New -UF 27,28,29- 20 ha	0	0	0	0	0	0	10	257000	10	257000	0	0	0	0	0	0	0	0	0	0	0	0	20	514000
	Maintenance														0	0	0	0	0	0	0	0	0	0	0
	1st year maintenance	0	0	0	0	0		0	0	10	39960	10	39960	0	0		0	0	0	0	0	0	0	20	79920
	2nd year maintenance	0	0	0		0	0	0	0	0	0	10	24240	0	0	0	0	0	0	0	0	0	0	20	48480
	3rd year maintenance	0	0	0	0	0	0	0	0	0	0	0	0	10	12180	10	12180		0	0	0		0	20	24360
	(c) Energy Plantation-UF-28- 10 ha																								
	New	0	0	0	0	5	392500	5	392500	0	0	0	0		0	0	0	0	0	0	0	0	0	10	785000
	(c) NTFP/Medicinal Plants Plantation-UF-27,29 20 ha																							0	0
	New	0	0	0	0	0	0	10	375000	10	375000	0	0	0	0	0	0	0	0	0	0	0	0	20	750000
	Maintenance																		0	0	0	0	0	0	0
	1st year maintenance	0	0		0		0	0	0	10	63500	10	63500	0	0	0	0	0	0	0	0	0	0	20	127000
	2nd year maintenance	0	0		0		0	0	0	0	0	10	43000	10	43000	0	0	0	0	0	0	0	0	20	86000
	3rd year maintenance	0	0		0		0	0	0	0	0	10	0	10	22500	10	22500	0	0		0		0	30	45000
	Total (1)	1	100000	0	100000	5	592500	35	1428500	60	1169860	70	222300	50	200620	10	82080	0	0	0	0	0	0	261	3995760

2	Soil Conservation works-Engineering and Bio-																									
	(i)	Stabilization of land slides/Slips				300000		400000		400000		400000		400000	0	0		300000		300000		300000		100000	0	2900000
	(ii)	Stabilization of Nalla				300000		400000		600000		700000		600000	0	0		500000		490000		350000		200000	0	4140000
	Total (2)		0	0	0	600000	0	800000	0	1000000	0	1100000	0	1000000	0	0	0	800000	0	790000	0	650000	0	300000	0	7540000
3	Payment of Eco-Services					400000		600000		700000		800000		800000				700000		700000		693000		600000	0	5993000
4	Research, Capacity building, Publicity					200000		300000		300000		300000		200000				200000		150000		150000		130000	0	1930000
5		Infrastructure Build up & Forest Protection:																								
A	(i)	Maintenance of FG Hut, Katgaon		0		0		100000		100000		0		0		0		0		0		0		0		200000
	(ii)	Maintenance of FG Hut Yangpa		0		0		100000		100000		0		0		0		0		0		0		0		200000
	(iii)	Maintenance of FG Hut Shango		0		0		0		100000		100000		0		0		0		0		0		0		200000
	(iv)	Maint of Type-I Qtr, Katgaon		0		0		100000		100000		0		0		0		0		0		0		0		200000
	(v)	Maint-Bridal path Kafnu to Kara		0		0		0		0		100000		100000		0		0		0		0		0		200000
	(vi)	Maint-Bridal path Kafnu to Nigul		0		0		0		100000		100000		0		0		0		0		0		0		200000
	(vii)	Maint-Bridal path Katgaon to Pandoswar-4 km		0		0		0		0		100000		100000		0		0		0		0		0		200000
	(viii)	Repair of Foot bridge Muling		0		0		100000		0		0		0		0		0		0		0		0		100000
	(ix)	Maint-Bridal path Kafnu to Muling-18 km		0		0		100000		100000		200000		100000		0		100000		0		0		0		600000
	(x)	Revival of Bunker at Ram shackle		0		0		100000		400000		200000		300000		0		0		0		0		0		1000000
	(xi)	Establishment Cost (Reimbursement of Salary & Contractual amount to Contractual Staff)		0		50000		50000		50000		50000		50000		50000		50000		50000		50000		50000		500000
	(xii)	Mobility for protection-vehicle		0		0		800000		0		0		0		0		0	0	0	0	0	0	0	0	800000
	(xiii)	Office Equipments (Computer- 2 with accessories, GPS – 8		0		100000		100000		100000		150000		0		0		0		0		0		0		450000
	(xiv)	O.E		0		15000		15000		10000		10000		10000				10000		10000		10000		10000		100000
	(xv)	Maintenance of Motor Vehicle		0		5000		5000		5000		5000		5000		5000		5000		5000		5000		5000		50000
	(xvi)	Amenities to staff & labour				5000		5000		5000		5000		5000		5000		5000		5000		5000		5000		50000
	Total 5A		0	0	0	175000	0	1575000	0	1170000	0	1020000	0	870000	0	80000	0	170000	0	75000	0	70000	0	70000	0	5050000
B	Protection of Forests																									
	a	Energy Saving devices																								
		(i) Distribution of LPG Cylinders -120	0	0	10	20000	10	20000	15	30000	15	30000	10	20000	10	20000	10	20000	10	20000	10	20000	10	20000	110	220000
		(ii) Distribution of Solar lights -20	0	0	4	40000	4	40000	4	40000	4	40000	4	40000		0		0		0		0		0	20	200000
		(iii) Distribution of Induction Heater/ Cooker/Energy efficent chulhas-100	0	0	10	20000	10	20000	10	20000	10	20000	10	20000	10	20000	10	20000	10	20000	10	20000	10	20000	100	200000
		(iv) Construction of crematorium-5	0	0	1	300000	1	300000	1	300000	1	300000	1	300000	0	0		0		0		0		0		1500000
	b	Construction and repair of existing boundary pillars/chak pillars	0	0	0	20000		20000		20000		20000		20000	0	0		0	0	0		0	0	0	0	100000
	c	Sign & Slogan Boards	0	0		5000		5000		5000		5000		5000	0	5000		0	0	0		0	0	0	0	30000
	Total 5 B		0	0	25	405000	25	405000	30	415000	30	415000	25	405000	20	45000	20	40000	20	40000	20	40000	20	40000	230	2250000
	Total 5 (A+B)		0	0	25	580000	25	1980000	30	1585000	30	1435000	25	1075000	20	105000	20	210000	20	110000	20	110000	20	110000	230	7300000

6	Management of Wildlife in and outside the Protected																													
	(a)	Improvement and Development of wildlife																												
		(i)	Anti-Poaching/patroling activities	L/s	20000	L/s	20000	L/s	20000	L/s	20000	L/s	20000	L/s	20000	0	0	L/s	20000	L/s	20000	L/s	20000	L/s	20000	L/s	20000	0	200000
		(ii)	Vaccination of domestic cattle	L/s	20000	L/s	20000	L/s	20000	L/s	20000	L/s	20000	L/s	20000	0	0	L/s	10000	L/s	10000	L/s	10000	L/s	10000	L/s	10000	0	160000
		(iii)	Field equipments for staff and officers and	0	0	L/s	200000	L/s	200000	L/s	300000	L/s	200000	0	0	0	0	L/s	60000	L/s	50000	L/s	50000	L/s	50000	L/s	50000	0	1110000
		(iv)	Habitat improvement	0	0	L/s	400000	L/s	400000	L/s	400000	L/s	400000	L/s	400000	0	0	L/s	200000	L/s	200000	L/s	200000	L/s	200000	L/s	200000	0	2800000
		(v)	Signage	0	0	L/s	20000	L/s	20000	L/s	20000	L/s	20000	L/s	20000	0	0	L/s	10000	L/s	10000	L/s	10000	L/s	10000	L/s	10000	0	140000
		(vi)	Support to Western Tragopan pheasantry at Gopalpur (Sarahan)	0	0	L/s	200000	L/s	200000	L/s	200000	L/s	200000	L/s	200000	0	0	L/s	100000	L/s	100000	L/s	100000	L/s	100000	L/s	100000	0	1400000
	(b)	Mitigation of Human Wildlife Conflict																												
		(i)	Compensation against wildlife damages	0	0		50000		50000		50000		50000		50000		0	0	50000		50000		30000		30000		410000		
		(ii)	Publicity & awareness through Kala Jatha (Nukar Natak) etc.	L/s	30000	L/s	30000	L/s	50000	L/s	50000	L/s	40000	L/s	30000		0	L/s	30000	L/s	30000	L/s	30000	L/s	30000		350000		
		Total (6):			70000		340000	0	560000	0	1060000	0	950000	0	740000	0	0	0	490000	0	470000	0	450000	0	450000	0	5570000		
	G. Total (1 to6)			1	170000	25	2820000	30	5232500	65	6073500	90	5754860	95	4137300	80	305520	50	2472080	20	2220000	20	2053000	20	1590000	491	32828760		
7	Monitoring & Evalution																1931000									0	1931000		
8	Site Specific Plan/ estimate				300000		400000		500000		200000		300000		200000		50000		50000		0		31000		0	0	1931000		
9	Contingencies				50000		150000		200000		200000		200000		200000		150000		200000		200000		200000		181000	0	1931000		
	Total Cost of CAT Plan			1	520000	25	3370000	30	5732500	65	6573500	90	6254860	95	4537300	80	2436520	50	2722080	20	2420000	20	2284000	20	1771000	491	38621760		

6.2 Annual Phasing:

Annual phasing of works to be carried out in Selti-Masrang HEP is given as Annexures-I to XII.

Annexure-II

S. No.	Name of Component			Zero Year	
				Phy-ha/ Km/ No	Fin- Rs
1	**Bio-logical Measures-Improvement of tree cover**				
	(a)	**Nursery Development**			
		(i)	Extension and Maintenance of Darchi Nursery	1	100000
	(b)	**Afforestation**			
		New -UF-27, 29, 30- 20 ha		0	0
		Maintenance			
			1st year maintenance	0	0
			2nd year maintenance	0	0
			3rd year maintenance	0	0
	©	**Enrichment planting**			
		New -UF 27,28,29- 20 ha		0	0
		Maintenance			
			1st year maintenance	0	0
			2nd year maintenance	0	0
			3rd year maintenance	0	0
	(d)	**Energy Plantaion-UF-28- 10 ha**			
		New		0	0
	(e)	**NTFP/Medicinal Plants Plantation-UF-27,29 - 20 ha**			
		New		0	0
		Maintenance			
			1st year maintenance	0	0
			2nd year maintenance	0	0
			3rd year maintenance	0	0
	Total (1)			**1**	**100000**
2	**Soil Conservation works-Engineering and Bio-Engineering measures**				
	(i)	Stabilization of land slides/Slips			
	(ii)	Stabilization of Nalla			
	Total (2)			**0**	**0**
3	**Payment of Eco-Services**				
4	**Research, Capacity building, Publicity**				
5	**Infrastructure Build up & Forest Protection:**				
A	(i)	Maintenance of FG Hut, Katgaon			0
	(ii)	Maintenance of FG Hut Yangpa			0
	(iii)	Maintenance of FG Hut Shango			0
	(iv)	Maint of Type-I Qtr, Katgaon			0
	(v)	Maint-Bridal path Kafnu to Kara-24 km			0
	(vi)	Maint-Bridal path Kafnu to Nigul			0
	(vii)	Maint-Bridal path Katgaon to Pandoswar-4 km			0
	(viii)	Repair of Foot bridge Muling			0
	(ix)	Maint-Bridal path Kafnu to Mulling-18 km			0
	(x)	Revival of Bunker at Ram shackle			0

	(x)	Establishment Cost (Reimbursement of Salary & Contractual amount to Contractual Staff)			0
	(xii)	Mobility for protection-vehicle			0
	(xiii)	Office Equipments (Computer- 2 with accessories,, GPS – 8			0
	(xiv)	O.E.			0
	(xv)	Maintenance of Motor Vehicle			0
	(xvi)	Amenities to staff & labour			
	Total 5A			**0**	**0**
B	**Protection of Forests**				
	a	**Energy Saving devices**			
		(i) Distribution of LPG Cylinders -120		0	0
		(ii) Distribution of Solar lights -20		0	0
		(iii) Distribution of Induction Heater/ Cooker/Energy efficient Chulhas-100		0	0
		(iv) Construction of crematorium-5		0	0
	b	Construction and repair of existing boundary pillars/chak pillars		0	0
	c	Sign & Slogan Boards		0	0
	Total 5 B			**0**	**0**
	Total 5 (A+B)			**0**	**0**
6	**Management of Wildlife in and outside the Protected Area**				
	(a)	**Improvement and Development of wildlife**			
		(i)	Anti-Poaching/patrolling activities	L/s	20000
		(ii)	Vaccination of domestic cattle	L/s	20000
		(iii)	Field equipments for staff and officers and office support	0	0
		(iv)	Habitat improvement	0	0
		(v)	Signage	0	0
		(vi)	Support to Western Tragopan pheasantry at Gopalpur (Sarahan)	0	0
	(b)	**Mitigation of Human Wildlife Conflict**			
		(i)	Compensation against wildlife damages	0	0
		(ii)	Publicity & awareness through Kala Jatha (Nukar Natak) etc.	L/s	30000
		Total (6)			**70000**
	G. Total (1 to6)			**1**	**170000**
7	**Monitoring & Evalution**				
8	**Site Specific Plan/ estimate**				**300000**
9	**Contingencies**				**50000**
	Total Cost of CAT Plan			**1**	**520000**

Annexure-III

S. No.	Name of Component			1st Year	
				Phy-ha/ Km/ No	Fin- Rs
1	**Bio-logical Measures-Improvement of tree cover**				
	(a)	**Nursery Development**			
		(i)	Extension and Maintenance of Darchi Nursery		100000
	(b)	**Afforestation**			
		New -UF-27, 29, 30- 20 ha		0	0
		Maintenance			
			1st year maintenance	0	0
			2nd year maintenance	0	0
			3rd year maintenance	0	0
	©	**Enrichment planting**			
		New -UF 27,28,29- 20 ha		0	0
		Maintenance			
			1st year maintenance	0	0
			2nd year maintenance	0	
			3rd year maintenance	0	0
	(d)	**Energy Plantaion-UF-28- 10 ha**			
		New		0	0
	(e)	**NTFP/Medicinal Plants Plantation-UF-27,29- 20 ha**			
		New		0	0
		Maintenance			
			1st year maintenance		0
			2nd year maintenance		0
			3rd year maintenance		0
	Total (1)			**0**	**100000**
2	**Soil Conservation works-Engineering and Bio-Engineering measures**				
	(i)	Stabilization of land slides/Slips			300000
	(ii)	Stabilization of Nalla			300000
	Total (2)			**0**	**600000**
3	**Payment of Eco-Services**				**400000**
4	**Research, Capacity building, Publicity**				**200000**
5	**Infrastructure Build up & Forest Protection:**				
A	(i)	Maintenance of FG Hut, Katgaon			0
	(ii)	Maintenance of FG Hut Yangpa			0
	(iii)	Maintenance of FG Hut Shango			0
	(iv)	Maint of Type-I Qtr, Katgaon			0
	(v)	Maint-Bridal path Kafnu to Kara-24 lm			0
	(vi)	Maint-Bridal path Kafnu to Nigul			0
	(vii)	Maint-Bridal path Katgaon to Pandoswar-4 km			0
	(viii)	Repair of Foot bridge Muling			0
	(ix)	Maint-Bridal path Kafnu to Mulling-18 km			0
	(x)	Revival of Bunker at Ram shackle			0

	(x)	Establishment Cost (Reimbursement of Salary & Contractual amount to Contractual Staff)			50000
	(xii)	Mobility for protection-vehicle			0
	(xiii)	Office Equipments (Computer- 2 with accessories,, GPS – 8			100000
	(xiv)	O.E.			15000
	(xv)	Maintenance of Motor Vehicle			5000
	(xvi)	Amenities to staff & labour			5000
	Total 5A			**0**	**175000**
B	**Protection of Forests**				
	a	**Energy Saving devices**			
		(i) Distribution of LPG Cylinders -120		10	20000
		(ii) Distribution of Solar lights -20		4	40000
		(iii) Distribution of Induction Heater/ Cooker/Energy efficient Chulhas-100		10	20000
		(iv) Construction of crematorium-5		1	300000
	b	Construction and repair of existing boundary pillars/chak pillars		0	20000
	c	Sign & Slogan Boards			5000
	Total 5 B			**25**	**405000**
	Total 5 (A+B)			**25**	**580000**
6	**Management of Wildlife in and outside the Protected Area**				
	(a)	**Improvement and Development of wildlife**			
		(i)	Anti-Poaching/patrolling activities	L/s	20000
		(ii)	Vaccination of domestic cattle	L/s	20000
		(iii)	Field equipments for staff and officers and office support	L/s	200000
		(iv)	Habitat improvement	L/s	400000
		(v)	Signage	L/s	20000
		(vi)	Support to Western Tragopan pheasantry at Gopalpur (Sarahan)	L/s	200000
	(b)	**Mitigation of Human Wildlife Conflict**			
		(i)	Compensation against wildlife damages		50000
		(ii)	Publicity & awareness through Kala Jatha (Nukar Natak) etc.	L/s	30000
		Total (6)			**940000**
	G. Total (1 to6)			**25**	**2820000**
7	**Monitoring & Evalution**				
8	**Site Specific Plan/ estimate**				**400000**
9	**Contingencies**				**150000**
	Total Cost of CAT Plan			**25**	**3370000**

Annexure-IV

S. No.	Name of Compcnent			2nd Year	
				Phy-ha/ Km/ No	Fin- Rs
1	**Bio-logical Measures-Improvement of tree cover**				
	(a)	**Nursery Development**			
		(i)	Extension and Maintenance of Darchi Nursery		200000
	(b)	**Afforestation**			
		New -UF-27, 29, 30- 20 ha			0
		Maintenance			
			1st year maintenance	0	0
			2nd year maintenance	0	0
			3rd year maintenance	0	0
	©	**Enrichment planting**			
		New -UF 27,28,29- 20 ha		0	0
		Maintenance			
			1st year maintenance	0	
			2nd year maintenance	0	0
			3rd year maintenance	0	0
	(c)	**Energy Plantaion-UF-28- 10 ha**			
		New		5	392500
	(c)	**NTFP/Medicinal Plants Plantation-UF-27,29 - 20 ha**			
		New		0	0
		Maintenance			
			1st year maintenance		0
			2nd year maintenance		0
			3rd year maintenance		0
	Total (1)			**5**	**592500**
2	**Soil Conservation works-Engineering and Bio-Engineering measures**				
	(i)	Stabilization of land slides/Slips			400000
	(ii)	Stabilization of Nalla			400000
	Total (2)			**0**	**800000**
3	**Payment of Eco-Services**				**600000**
4	**Research, Capacity building, Publicity**				**300000**
5	**Infrastructure Build up & Forest Protection:**				
A	(i)	Maintenance of FG Hut, Katgaon			100000
	(ii)	Maintenance of FG Hut Yangpa			100000
	(iii)	Maintenance of FG Hut Shango			0
	(iv)	Maint of Type-I Qtr, Katgaon			100000
	(v)	Maint-Bridal path Kafnu to Kara			0
	(vi)	Maint-Bridal path Kafnu to Nigul			0
	(vii)	Maint-Bridal path Katgaon to Pandoswar-4 km			0
	(viii)	Repair of Foot bridge Muling			100000
	(ix)	Maint-Bridal path Kafnu to Mulling-18 km			100000
	(x)	Revival of Bunker at Ram shackle			100000

	(x)	Establishment Cost (Reimbursement of Salary & Contractual amount to Contractual Staff)			50000
	(xii)	Mobility for protection-vehicle			800000
	(xiii)	Office Equipments (Computer- 2 with accessories,, GPS – 8			100000
	(xiv)	O.E.			15000
	(xv)	Maintenance of Motor Vehicle			5000
	(xvi)	Amenities to staff & labour			5000
	Total 5A			**0**	**1575000**
B	**Protection of Forests**				
	a	**Energy Saving devices**			
		(i) Distribution of LPG Cylinders -120		10	20000
		(ii) Distribution of Solar lights -20		4	40000
		(iii) Distribution of Induction Heater/ Cooker/Energy efficient Chulhas-100		10	20000
		(iv) Construction of crematorium-5		1	300000
	b	Construction and repair of existing boundary pillars/chak pillars			20000
	c	Sign & Slogan Boards			5000
	Total 5 B			**25**	**405000**
	Total 5 (A+B)			**25**	**1980000**
6	**Management of Wildlife in and outside the Protected Area**				
	(a)	**Improvement and Development of wildlife**			
		(i)	Anti-Poaching/patrolling activities	L/s	20000
		(ii)	Vaccination of domestic cattle	L/s	20000
		(iii)	Field equipments for staff and officers and office support	L/s	200000
		(iv)	Habitat improvement	L/s	400000
		(v)	Signage	L/s	20000
		(vi)	Support to Western Tragopan pheasantry at Gopalpur (Sarahan)	L/s	200000
	(b)	**Mitigation of Human Wildlife Conflict**			
		(i)	Compensation against wildlife damages		50000
		(ii)	Publicity & awareness through Kala Jatha (Nukar Natak) etc.	L/s	50000
		Total (6)		**0**	**960000**
	G. Total (1 to6)			**30**	**5232500**
7	**Monitoring & Evalution**				
8	**Site Specific Plan/ estimate**				**300000**
9	**Contingencies**				**200000**
	Total Cost of CAT Plan			**30**	**5732500**

Annexure-V

S. No.	Name of Component				3rd Year	
					Phy-ha/ Km/ No	Fin- Rs
1	**Bio-logical Measures-Improvement of tree cover**					
	(a)	**Nursery Development**				
		(i)	Extension and Maintenance of Darchi Nursery			100000
	(b)	**Afforestation**				
		New -UF-27, 29, 30- 20 ha			10	304000
		Maintenance				
			1st year maintenance		0	0
			2nd year maintenance		0	0
			3rd year maintenance		0	0
	©	**Enrichment planting**				
		New -UF 27,28,29- 20 ha			10	257000
		Maintenance				
			1st year maintenance		0	0
			2nd year maintenance		0	0
			3rd year maintenance		0	0
	(c)	**Energy Plantaion-UF-28- 10 ha**				
		New			5	392500
	(c)	**NTFP/Medicinal Plants Plantation-UF-27,29- 20 ha**				
		New			10	375000
		Maintenance				
			1st year maintenance		0	0
			2nd year maintenance		0	0
			3rd year maintenance		0	0
	Total (1)				**35**	**1428500**
2	**Soil Conservation works-Engineering and Bio-Engineering measures**					
	(i)	Stabilization of land slides/Slips				400000
	(ii)	Stabilization of Nalla				600000
	Total (2)				**0**	**1000000**
3	**Payment of Eco-Services**					**700000**
4	**Research, Capacity building, Publicity**					**300000**
5	**Infrastructure Build up & Forest Protection:**					
A	(i)	Maintenance of FG Hut, Katgaon				100000
	(ii)	Maintenance of FG Hut Yangpa				100000
	(iii)	Maintenance of FG Hut Shango				100000
	(iv)	Maint of Type-I Qtr, Katgaon				100000
	(v)	Maint-Bridal path Kafnu to Kara				0
	(vi)	Maint-Bridal path Kafnu to Nigul				100000
	(vii)	Maint-Bridal path Katgaon to Pandoswar-4 km				0
	(viii)	Repair of Foot bridge Muling				0
	(ix)	Maint-Bridal path Kafnu to Mulling-18 km				100000
	(x)	Revival of Bunker at Ram shackle				400000

	(x)	Establishment Cost (Reimbursement of Salary & Contractual amount to Contractual Staff)			50000
	(xii)	Mobility for protection-vehicle			0
	(xiii)	Office Equipments (Computer- 2 with accessories,, GPS – 8			100000
	(xiv)	O.E.			10000
	(xv)	Maintenance of Motor Vehicle			5000
	(xvi)	Amenities to staff & labour			5000
	Total 5A			**0**	**1170000**
B	**Protection of Forests**				
	a	**Energy Saving devices**			
		(i) Distribution of LPG Cylinders -120	15		30000
		(ii) Distribution of Solar lights -20	4		40000
		(iii) Distribution of Induction Heater/ Cooker/Energy efficient Chulhas-100	10		20000
		(iv) Construction of crematorium-5	1		300000
	b	Construction and repair of existing boundary pillars/chak pillars			20000
	c	Sign & Slogan Boards			5000
	Total 5 B		**30**		**415000**
	Total 5 (A+B)		**30**		**1585000**
6	**Management of Wildlife in and outside the Protected Area**				
	(a)	**Improvement and Development of wildlife**			
		(i) Anti-Poaching/patrolling activities	L/s		20000
		(ii) Vaccination of domestic cattle	L/s		20000
		(iii) Field equipments for staff and officers and office support	L/s		300000
		(iv) Habitat improvement	L/s		400000
		(v) Signage	L/s		20000
		(vi) Support to Western Tragopan pheasantry at Gopalpur (Sarahan)	L/s		200000
	(b)	**Mitigation of Human Wildlife Conflict**			
		(i) Compensation against wildlife damages			50000
		(ii) Publicity & awareness through Kala Jatha (Nukar Natak) etc.	L/s		50000
	Total (6)		**0**		**1060000**
	G. Total (1 to6)		**65**		**6073500**
7	**Monitoring & Evalution**				
8	**Site Specific Plan/ estimate**				**300000**
9	**Contingencies**				**200000**
	Total Cost of CAT Plan		**65**		**6573500**

Annexure-VI

S. No.	Name of Component				4th Year	
					Phy-ha/ Km/ No	Fin- Rs
1	**Bio-logical Measures-Improvement of tree cover**					
	(a)	**Nursery Development**				
		(i)	Extension and Maintenance of Darchi Nursery			80000
	(b)	**Afforestation**				
		New -UF-27, 29, 30- 20 ha			10	304000
		Maintenance				
			1st year maintenance		10	50400
			2nd year maintenance		0	0
			3rd year maintenance		0	0
	©	**Enrichment planting**				
		New -UF 27,28,29- 20 ha			10	257000
		Maintenance				
			1st year maintenance		10	39960
			2nd year maintenance		0	0
			3rd year maintenance		0	0
	(c)	**Energy Plantaion-UF-28- 10 ha**				
		New			0	0
	(c)	**NTFP/Medicinal Plants Plantation-UF-27,29 20**				
		New			10	375000
		Maintenance				
			1st year maintenance		10	63500
			2nd year maintenance		0	0
			3rd year maintenance		0	0
	Total (1)				**60**	**1169860**
2	**Soil Conservation works-Engineering and Bio-Engineering measures**					
	(i)	Stabilization of land slides/Slips				400000
	(ii)	Stabilization of Nalla				700000
	Total (2)				**0**	**1100000**
3	**Payment of Eco-Services**					**800000**
4	**Research, Capacity building, Publicity**					**300000**
5	**Infrastructure Build up & Forest Protection:**					
A	(i)	Maintenance of FG Hut, Katgaon				0
	(ii)	Maintenance of FG Hut Yangpa				0
	(iii)	Maintenance of FG Hut Shango				100000
	(iv)	Maint of Type-I Qtr, Katgaon				0
	(v)	Maint-Bridal path Kafnu to Kara				100000
	(vi)	Maint-Bridal path Kafnu to Nigul-24 KM				100000
	(vii)	Maint-Bridal path Katgaon to Pandoswar-4 km				100000
	(viii)	Repair of Foot bridge Muling				0
	(ix)	Maint-Bridal path Kafnu to Mulling-18 km				200000
	(x)	Revival of Bunker at Ram shackle				200000

	(x)	Establishment Cost (Reimbursement of Salary & Contractual amount to Contractual Staff)			50000
	(xii)	Mobility for protection-vehicle			0
	(xiii)	Office Equipments (Computer- 2 with accessories,, GPS – 8			150000
	(xiv)	O.E.			10000
	(xv)	Maintenance of Motor Vehicle			5000
	(xvi)	Amenities to staff & labour			5000
	Total 5A			**0**	**1020000**
B	**Protection of Forests**				
	a	**Energy Saving devices**			
		(i) Distribution of LPG Cylinders -120		15	30000
		(ii) Distribution of Solar lights -20		4	40000
		(iii) Distribution of Induction Heater/ Cooker/Energy efficient Chulhas-100		10	20000
		(iv) Construction of crematorium-5		1	300000
	b	Construction and repair of existing boundary pillars/chak pillars			20000
	c	Sign & Slogan Boards			5000
	Total 5 B			**30**	**415000**
	Total 5 (A+B)			**30**	**1435000**
6	**Management of Wildlife in and outside the Protected Area**				
	(a)	**Improvement and Development of wildlife**			
		(i)	Anti-Poaching/patrolling activities	L/s	20000
		(ii)	Vaccination of domestic cattle	L/s	20000
		(iii)	Field equipments for staff and officers and office support	L/s	200000
		(iv)	Habitat improvement	L/s	400000
		(v)	Signage	L/s	20000
		(vi)	Support to Western Tragopan pheasantry at Gopalpur (Sarahan)	L/s	200000
	(b)	**Mitigation of Human Wildlife Conflict**			
		(i)	Compensation against wildlife damages		50000
		(ii)	Publicity & awareness through Kala Jatha (Nukar Natak) etc.	L/s	40000
		Total (6)		**0**	**950000**
	G. Total (1 to6)			**90**	**5754860**
7	**Monitoring & Evalution**				
8	**Site Specific Plan/ estimate**				**300000**
9	**Contingencies**				**200000**
	Total Cost of CAT Plan			**90**	**6254860**

Annexure-VII

S. No.	Name of Component			5th Year	
				Phy-ha/ Km/ No	Fin- Rs
1	**Bio-logical Measures-Improvement of tree cover**				
	(a)	**Nursery Development**			
		(i) Extension and Maintenance of Darchi			70000
	(b)	**Afforestation**			
		New -UF-27, 29, 30- 20 ha			0
		Maintenance			
			1st year maintenance	10	50400
			2nd year maintenance	10	31200
			3rd year maintenance	0	0
	©	**Enrichment planting**			
		New -UF 27,28,29- 20 ha		0	0
		Maintenance			
			1st year maintenance	10	39960
			2nd year maintenance	10	24240
			3rd year maintenance	0	0
	(c)	**Energy Plantaion-UF-28- 10 ha**			
		New		0	0
	(c)	**NTFP/Medicinal Plants Plantation-UF-27,29 -20 ha**			
		New		0	0
		Maintenance			
			1st year maintenance	10	63500
			2nd year maintenance	10	43000
			3rd year maintenance	10	0
	Total (1)			**70**	**322300**
2	**Soil Conservation works-Engineering and Bio-Engineering measures**				
	(i)	Stabilization of land slides/Slips			400000
	(ii)	Stabilization of Nalla			600000
	Total (2)			**0**	**1000000**
3	**Payment of Eco-Services**				800000
4	**Research, Capacity building, Publicity**				200000
5	**Infrastructure Build up & Forest Protection:**				
A	(i)	Maintenance of FG Hut, Katgaon			0
	(ii)	Maintenance of FG Hut Yangpa			0
	(iii)	Maintenance of FG Hut Shango			0
	(iv)	Maint of Type-I Qtr, Katgaon			0
	(v)	Maint-Bridal path Kafnu to Kara-24 KM			100000
	(vi)	Maint-Bridal path Kafnu to Nigul			0
	(vii)	Maint-Bridal path Katgaon to Pandoswar-4 km			100000
	(viii)	Repair of Foot bridge Muling			0
	(ix)	Maint-Bridal path Kafnu to Mulling-18 km			100000
	(x)	Revival of Bunker at Ram shackle			300000

	(x)	Establishment Cost (Reimbursement of Salary & Contractual amount to Contractual Staff)			50000
	(xii)	Mobility for protection-vehicle			0
	(xiii)	Office Equipments (Computer- 2 with accessories., GPS – 8			0
	(xiv)	O.E			10000
	(xv)	Maintenance of Motor Vehicle			5000
	(xvi)	Amenities to staff & labour			5000
	Total 5A			**0**	**670000**
B	**Protection of Forests**				
	a	**Energy Saving devices**			
		(i) Distribution of LPG Cylinders -120		10	20000
		(ii) Distribution of Solar lights -20		4	40000
		(iii) Distribution of Induction Heater/ Cooker/Energy efficient Chulhas-100		10	20000
		(iv) Construction of crematorium-5		1	300000
	b	Construction and repair of existing boundary pillars/chak pillars			20000
	c	Sign & Slogan Boards			5000
	Total 5 B			**25**	**405000**
	Total 5 (A+B)			**25**	**1075000**
6	**Management of Wildlife in and outside the Protected Area**				
	(a)	**Improvement and Development of wildlife**			
		(i)	Anti-Poaching/patrolling activities	L/s	20000
		(ii)	Vaccination of domestic cattle	L/s	20000
		(iii)	Field equipments for staff and officers and office support	0	0
		(iv)	Habitat improvement	L/s	400000
		(v)	Signage	L/s	20000
		(vi)	Support to Western Tragopan pheasantry at Gopalpur (Sarahan)	L/s	200000
	(b)	**Mitigation of Human Wildlife Conflict**			
		(i)	Compensation against wildlife damages		50000
		(ii)	Publicity & awareness through Kala Jatha (Nukar Natak) etc.	L/s	30000
		Total (6)		**0**	**740000**
	G. Total (1 to6)			**95**	**4137300**
7	**Monitoring & Evalution**				
8	**Site Specific Plan/ estimate**				**200000**
9	**Contingencies**				**200000**
	Total Cost of CAT Plan			**95**	**4537300**

Annexure-VIII

S. No.	Name of Component			6th Year	
				Phy-ha/ Km/ No	Fin- Rs
1	**Bio-logical Measures-Improvement of tree cover**				
	(a)	**Nursery Development**			
		(i)	Extension and Maintenance of Darchi Nursery		50000
	(b)	**Afforestation**			
		New -UF-27, 29, 30- 20 ha			0
		Maintenance			
			1st year maintenance	0	0
			2nd year maintenance	10	31200
			3rd year maintenance	10	17400
	©	**Enrichment planting**			
		New -UF 27,28,29- 20 ha		0	0
		Maintenance			0
			1st year maintenance	0	0
			2nd year maintenance	10	24240
			3rd year maintenance	10	12180
	(c)	**Energy Plantaion-UF-28- 10 ha**			
		New			0
	(c)	**NTFP/Medicinal Plants Plantation-UF-27,29 20**			
		New		0	0
		Maintenance			
			1st year maintenance	0	0
			2nd year maintenance	10	43000
			3rd year maintenance	10	22500
	Total (1)			**60**	**200520**
2	**Soil Conservation works-Engineering and Bio-Engineering measures**				
	(i)	Stabilization of land slides/Slips		0	0
	(ii)	Stabilization of Nalla		0	0
	Total (2)			**0**	**0**
3	**Payment of Eco-Services**				
4	**Research, Capacity building, Publicity**				
5	**Infrastructure Build up & Forest Protection:**				
A	(i)	Maintenance of FG Hut, Katgaon			0
	(ii)	Maintenance of FG Hut Yangpa			0
	(iii)	Maintenance of FG Hut Shango			0
	(iv)	Maint of Type-I Qtr, Katgaon			0
	(v)	Maint-Bridal path Kafnu to Kara			0
	(vi)	Maint-Bridal path Kafnu to Nigul			0
	(vii)	Maint-Bridal path Katgaon to Pandoswar-4 km			0
	(viii)	Repair of Foot bridge Muling			0
	(ix)	Maint-Bridal path Kafnu to Mulling-18 km			0
	(x)	Revival of Bunker at Ram shackle			0

	(x)	Establishment Cost (Reimbursement of Salary & Contractual amount to Contractual Staff)			50000
	(xii)	Mobility for protection-vehicle			0
	(xiii)	Office Equipments (Computer- 2 with accessories,, GPS – 8			0
	(xiv)	O.E.			0
	(xv)	Maintenance of Motor Vehicle			5000
	(xvi)	Amenities to staff & labour			5000
	Total 5A			**0**	**60000**
B	**Protection of Forests**				
	a	**Energy Saving devices**			
		(i) Distribution of LPG Cylinders -120		10	20000
		(ii) Distribution of Solar lights -20			0
		(iii) Distribution of Induction Heater/ Cooker/Energy efficient Chulhas-100		10	20000
		(iv) Construction of crematorium-5		0	0
	b	Construction and repair of existing boundary pillars/chak pillars		0	0
	c	Sign & Slogan Boards		0	5000
	Total 5 B			**20**	**45000**
	Total 5 (A+B)			**20**	**105000**
6	**Management of Wildlife in and outside the Protected**				
	(a)	**Improvement and Development of wildlife**			
		(i)	Anti-Poaching/patrolling activities	0	0
		(ii)	Vaccination of domestic cattle	0	0
		(iii)	Field equipments for staff and officers and office support	0	0
		(iv)	Habitat improvement	0	0
		(v)	Signage	0	0
		(vi)			
		(vi)	Support to Western Tragopan pheasantry at Gopalpur (Sarahan)	0	0
	(b)	**Mitigation of Human Wildlife Conflict**			
		(i)	Compensation against wildlife damages		0
		(ii)	Publicity & awareness through Kala Jatha (Nukar Natak) etc.		0
	Total (6)			**0**	**0**
	G. Total (1 to6)			**80**	**305520**
7	**Monitoring & Evalution**				**1931000**
8	**Site Specific Plan/ estimate**				**50000**
9	**Contingencies**				**150000**
	Total Cost of CAT Plan			**80**	**2436520**

Annexure-IX

S. No.	Name of Component			7th Year	
				Phy-ha/ Km/ No	Fin- Rs
1	**Bio-logical Measures-Improvement of tree cover**				
	(a)	**Nursery Development**			
		(i) Extension and Maintenance of Darchi			30000
	(b)	**Afforestation**			
		New -UF-27, 29, 30- 20 ha			0
		Maintenance			
			1st year maintenance		0
			2nd year maintenance	0	0
			3rd year maintenance	10	17400
	©	**Enrichment planting**			
		New -UF 27,28,29- 20 ha		0	0
		Maintenance		0	0
			1st year maintenance		0
			2nd year maintenance	0	0
			3rd year maintenance	10	12180
	(c)	**Energy Plantaion-UF-28- 10 ha**			
		New		0	0
	(c)	**NTFP/Medicinal Plants Plantation-UF-27,29 20**			
		New		0	0
		Maintenance			
			1st year maintenance	0	0
			2nd year maintenance	0	0
			3rd year maintenance	10	22500
	Total (1)			**30**	**82080**
2	**Soil Conservation works-Engineering and Bio-Engineering measures**				
	(i)	Stabilization of land slides/Slips			300000
	(ii)	Stabilization of Nalla			500000
	Total (2)			**0**	**800000**
3	**Payment of Eco-Services**				**700000**
4	**Research, Capacity building, Publicity**				**200000**
5	**Infrastructure Build up & Forest Protection:**				
A	(i)	Maintenance of FG Hut, Katgaon			0
	(ii)	Maintenance of FG Hut Yangpa			0
	(iii)	Maintenance of FG Hut Shango			0
	(iv)	Maint of Type-I Qtr, Katgaon			0
	(v)	Maint-Bridal path Kafnu to Kara			0
	(vi)	Maint-Bridal path Kafnu to Nigul			0
	(vii)	Maint-Bridal path Katgaon to Pandoswar-4 km			0
	(viii)	Repair of Foot bridge Muling			0
	(ix)	Maint-Bridal path Kafnu to Mulling-18 km			100000
	(x)	Revival of Bunker at Ram shackle			0

	(x)	Establishment Cost (Reimbursement of Salary & Contractual amount to Contractual Staff)			50000
	(xii)	Mobility for protection-vehicle			0
	(xiii)	Office Equipments (Computer- 2 with accessories,, GPS – 8			0
	(xiv)	O.E.			10000
	(xv)	Maintenance of Motor Vehicle			5000
	(xvi)	Amenities to staff & labour			5000
	Total 5A			**0**	**170000**
B	**Protection of Forests**				
	a	**Energy Saving devices**			
		(i) Distribution of LPG Cylinders -120	10		20000
		(ii) Distribution of Solar lights -20			0
		(iii) Distribution of Induction Heater/ Cooker/Energy efficient Chulhas-100	10		20000
		(iv) Construction of crematorium-5			0
	b	Construction and repair of existing boundary pillars/chak pillars			0
	c	Sign & Slogan Boards			0
	Total 5 B		**20**		**40000**
	Total 5 (A+B)		**20**		**210000**
6	**Management of Wildlife in and outside the Protected**				
	(a)	**Improvement and Development of wildlife**			
			0		0
		(i) Anti-Poaching/patrolling activities	L/s		20000
		(ii) Vaccination of domestic cattle	L/s		10000
		(iii) Field equipments for staff and officers and office support	L/s		60000
		(iv) Habitat improvement	L/s		200000
		(v) Signage	L/s		10000
		(vi)	L/s		
		(vi) Support to Western Tragopan pheasantry at Gopalpur (Sarahan)	L/s		100000
	(b)	**Mitigation of Human Wildlife Conflict**			
		(i) Compensation against wildlife damages	0		50000
		(ii) Publicity & awareness through Kala Jatha (Nukar Natak) etc.	L/s		30000
	Total (6)		**0**		**480000**
	G. Total (1 to6)		**50**		**2472080**
7	**Monitoring & Evalution**				
8	**Site Specific Plan/ estimate**				**50000**
9	**Contingencies**				**200000**
	Total Cost of CAT Plan		**50**		**2722080**

Annexure-X

S. No.	Name of Component			8th Year	
				Phy-ha/ Km/ No	Fin- Rs
1	**Bio-logical Measures-Improvement of tree cover**				
	(a)	**Nursery Development**			
		(i) Extension and Maintenance of Darchi			0
	(b)	**Afforestation**			
		New -UF-27, 29, 30- 20 ha			0
		Maintenance			
			1st year maintenance		0
			2nd year maintenance	0	0
			3rd year maintenance	0	0
	©	**Enrichment planting**			
		New -UF 27,28,29- 20 ha		0	0
		Maintenance		0	0
			1st year maintenance	0	0
			2nd year maintenance	0	0
			3rd year maintenance		0
	(c)	**Energy Plantaion-UF-28- 10 ha**			
		New		0	0
	(c)	**NTFP/Medicinal Plants Plantation-UF-27,29 20**			
		New		0	0
		Maintenance			0
			1st year maintenance	0	0
			2nd year maintenance	0	0
			3rd year maintenance	0	
	Total (1)			**0**	**0**
2	**Soil Conservation works-Engineering and Bio-Engineering measures**				
	(i)	Stabilization of land slides/Slips			300000
	(ii)	Stabilization of Nalla			490000
	Total (2)			**0**	**790000**
3	**Payment of Eco-Services**				**700000**
4	**Research, Capacity building, Publicity**				**150000**
5	**Infrastructure Build up & Forest Protection:**				
A	(i)	Maintenance of FG Hut, Katgaon			0
	(ii)	Maintenance of FG Hut Yangpa			0
	(iii)	Maintenance of FG Hut Shango			0
	(iv)	Maint of Type-I Qtr, Katgaon			0
	(v)	Maint-Bridal path Kafnu to Kara			0
	(vi)	Maint-Bridal path Kafnu to Nigul			0
	(vii)	Maint-Bridal path Katgaon to Pandoswar-4 km			0
	(viii)	Repair of Foot bridge Muling			0
	(ix)	Maint-Bridal path Kafnu to Mulling-18 km			0
	(x)	Revival of Bunker at Ram shackle			0

	(x)	Establishment Cost (Reimbursement of Salary & Contractual amount to Contractual Staff)			50000
	(xii)	Mobility for protection-vehicle		0	0
	(xiii)	Office Equipments (Computer- 2 with accessories,, GPS – 8			0
	(xiv)	O.E.			10000
	(xv)	Maintenance of Motor Vehicle			5000
	(xvi)	Amenities to staff & labour			5000
	Total 5A			**0**	**70000**
B	**Protection of Forests**				
	a	**Energy Saving devices**			
		(i) Distribution of LPG Cylinders -120		10	20000
		(ii) Distribution of Solar lights -20			0
		(iii) Distribution of Induction Heater/ Cooker/Energy efficient Chulhas-100		10	20000
		(iv) Construction of crematorium-5			0
	b	Construction and repair of existing boundary pillars/chak pillars		0	0
	c	Sign & Slogan Boards		0	0
	Total 5 B			**20**	**40000**
	Total 5 (A+B)			**20**	**110000**
6	**Management of Wildlife in and outside the Protected**				
	(a)	**Improvement and Development of wildlife**			
		(i)	Anti-Poaching/patrolling activities	L/s	20000
		(ii)	Vaccination of domestic cattle	L/s	10000
		(iii)	Field equipments for staff and officers and office support	L/s	50000
		(iv)	Habitat improvement	L/s	200000
		(v)	Signage	L/s	10000
		(vi)	Support to Western Tragopan pheasantry at Gopalpur (Sarahan)	L/s	100000
	(b)	**Mitigation of Human Wildlife Conflict**			
		(i)	Compensation against wildlife damages		50000
		(ii)	Publicity & awareness through Kala Jatha (Nukar Natak) etc.	L/s	30000
		Total (6)		**0**	**470000**
	G. Total (1 to6)			**20**	**2220000**
7	**Monitoring & Evalution**				**0**
8	**Site Specific Plan/ estimate**				**0**
9	**Contingencies**				**200000**
	Total Cost of CAT Plan			**20**	**2420000**

Annexure-XI

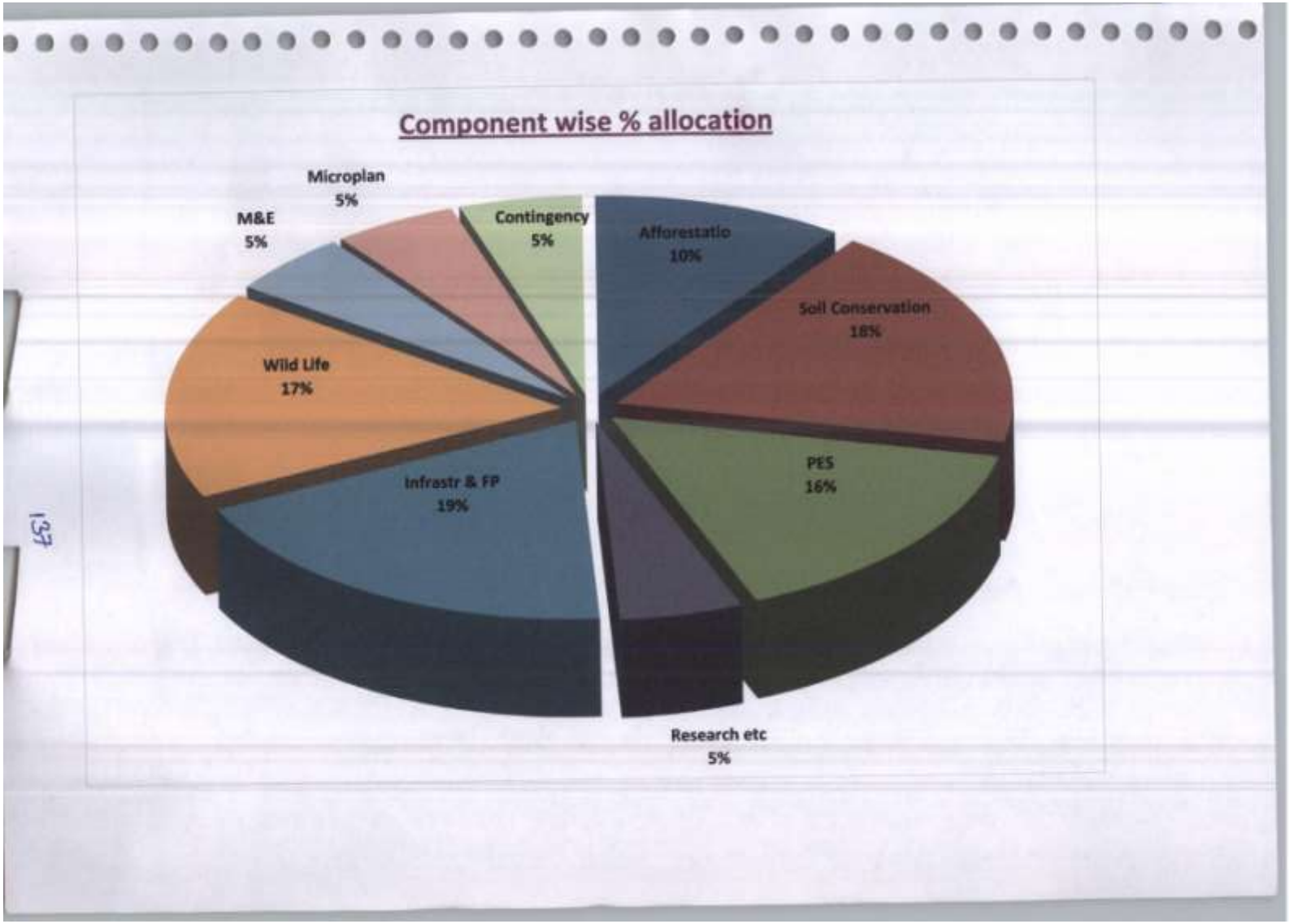
S. No.	Name of Component			9th Year	
				Phy-ha/ Km/ No	Fin- Rs
1	**Bio-logical Measures-Improvement of tree cover**				
	(a)	**Nursery Development**			
		(i)	Extension and Maintenance of Darchi Nursery		0
	(b)	**Afforestation**			
		New -UF-27, 29, 30- 20 ha			0
		Maintenance			
			1st year maintenance		0
			2nd year maintenance	0	0
			3rd year maintenance	0	0
	©	**Enrichment planting**			
		New -UF 27,28,29- 20 ha		0	0
		Maintenance		0	0
			1st year maintenance	0	0
			2nd year maintenance	0	0
			3rd year maintenance	0	
	(c)	**Energy Plantaion-UF-28- 10 ha**			
		New		0	0
	(c)	**NTFP/Medicinal Plants Plantation-UF-27,29 - 20 ha**			
		New		0	0
		Maintenance		0	0
			1st year maintenance	0	0
			2nd year maintenance	0	0
			3rd year maintenance	0	
	Total (1)			**0**	**0**
2	**Soil Conservation works-Engineering and Bio-Engineering measures**				
	(i)	Stabilization of land slides/Slips			300000
	(ii)	Stabilization of Nalla			350000
	Total (2)			**0**	**650000**
3	**Payment of Eco-Services**				**693000**
4	**Research, Capacity building, Publicity**				**150000**
5	**Infrastructure Build up & Forest Protection:**				
A	(i)	Maintenance of FG Hut, Katgaon			0
	(ii)	Maintenance of FG Hut Yangpa			0
	(iii)	Maintenance of FG Hut Shango			0
	(iv)	Maint of Type-I Qtr, Katgaon			0
	(v)	Maint-Bridal path Kafnu to Kara			0
	(vi)	Maint-Bridal path Kafnu to Nigul			0
	(vii)	Maint-Bridal path Katgaon to Pandoswar-4 km			0
	(viii)	Repair of Foot bridge Muling			0
	(ix)	Maint-Bridal path Kafnu to Mulling-18 km			0
	(x)	Revival of Bunker at Ram shackle			0

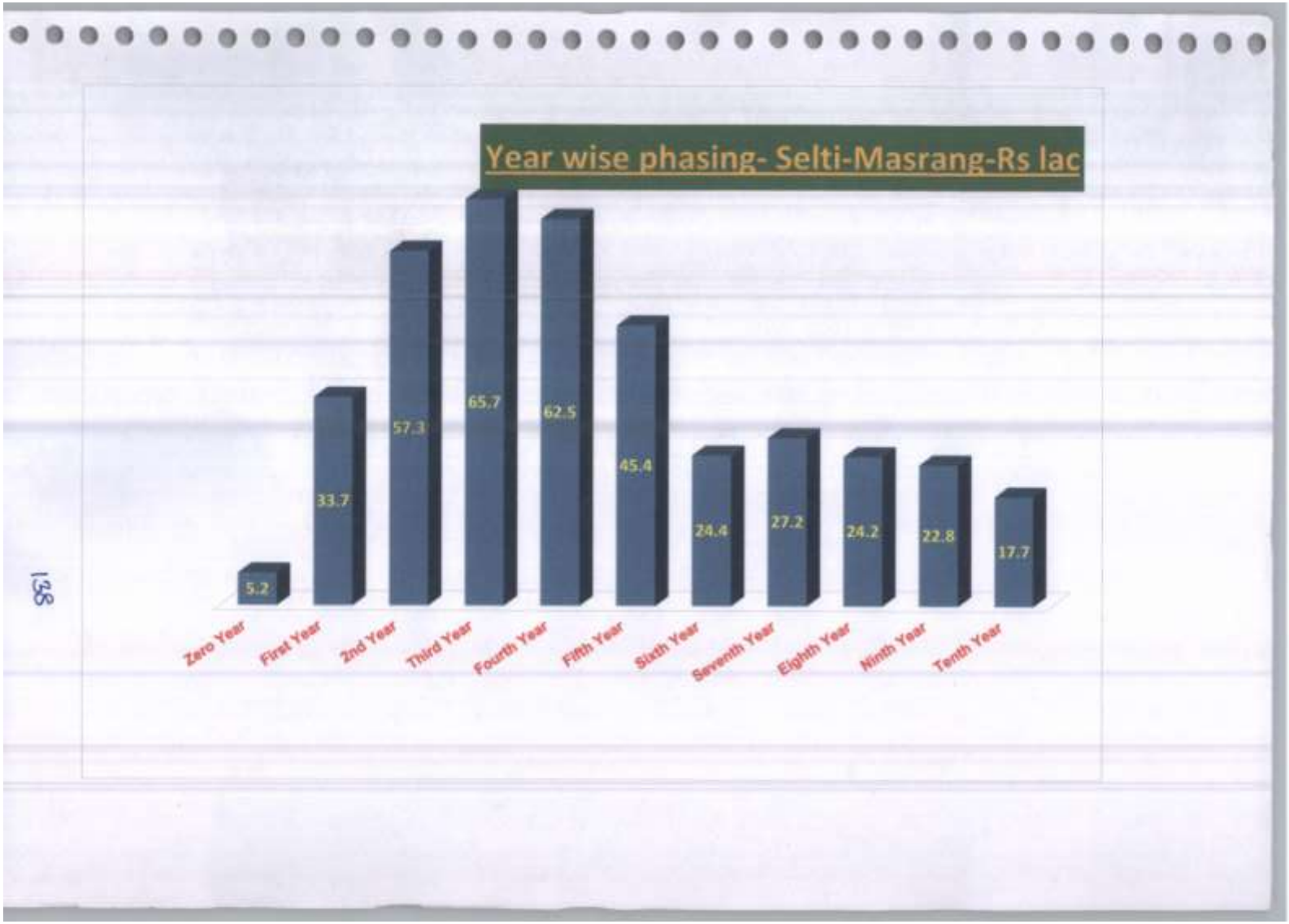
	(x)	Establishment Cost (Reimbursement of Salary & Contractual amount to Contractual Staff)			50000
	(xii)	Mobility for protection-vehicle		0	0
	(xiii)	Office Equipments (Computer- 2 with accessories,, GPS – 8			0
	(xiv)	O.E.			10000
	(xv)	Maintenance of Motor Vehicle			5000
	(xvi)	Amenities to staff & labour			5000
	Total 5A			**0**	**70000**
B	**Protection of Forests**				
	a	**Energy Saving devices**			
		(i) Distribution of LPG Cylinders -120		10	20000
		(ii) Distribution of Solar lights -20			0
		(iii) Distribution of Induction Heater/ Cooker/Energy efficient Chulhas-100		10	20000
		(iv) Construction of crematorium-5			0
	b	Construction and repair of existing boundary pillars/chak pillars			0
	c	Sign & Slogan Boards			0
	Total 5 B			**20**	**40000**
	Total 5 (A+B)			**20**	**110000**
6	**Management of Wildlife in and outside the Protected**				
	(a)	**Improvement and Development of wildlife**			
		(i)	Anti-Poaching/patrolling activities	L/s	20000
		(ii)	Vaccination of domestic cattle	L/s	10000
		(iii)	Field equipments for staff and officers and office support	L/s	50000
		(iv)	Habitat improvement	L/s	200000
		(v)	Signage	L/s	10000
		(vi)	Support to Western Tragopan pheasantry at Gopalpur (Sarahan)	L/s	100000
	(b)	**Mitigation of Human Wildlife Conflict**			
		(i)	Compensation against wildlife damages		30000
		(ii)	Publicity & awareness through Kala Jatha (Nukar Natak) etc.	L/s	30000
		Total (6)		**0**	**450000**
	G. Total (1 to6)			**20**	**2053000**
7	**Monitoring & Evalution**				
8	**Site Specific Plan/ estimate**				**31000**
9	**Contingencies**				**200000**
	Total Cost of CAT Plan			**20**	**2284000**

Annexure-XII

S. No.	Name of Component			10th Year	
				Phy-ha/ Km/ No	Fin- Rs
1	**Bio-logical Measures-Improvement of tree cover**				
	(a)	**Nursery Development**			
		(i)	Extension and Maintenance of Darchi Nursery		0
	(b)	**Afforestation**			
		New -UF-27, 29, 30- 20 ha			0
		Maintenance			
			1st year maintenance		0
			2nd year maintenance	0	0
			3rd year maintenance	0	0
	©	**Enrichment planting**			
		New -UF 27,28,29- 20 ha		0	0
		Maintenance		0	0
			1st year maintenance	0	0
			2nd year maintenance	0	0
			3rd year maintenance	0	
	(c)	**Energy Plantaion-UF-28- 10 ha**			
		New		0	0
	(c)	**NTFP/Medicinal Plants Plantation-UF-27,29 20**			
		New		0	0
		Maintenance		0	0
			1st year maintenance	0	0
			2nd year maintenance	0	0
			3rd year maintenance		
	Total (1)			**0**	**0**
2	**Soil Conservation works-Engineering and Bio-Engineering measures**				
	(i)	Stabilization of land slides/Slips			100000
	(ii)	Stabilization of Nalla			200000
	Total (2)			**0**	**300000**
3	**Payment of Eco-Services**				**600000**
4	**Research, Capacity building, Publicity**				**130000**
5	**Infrastructure Build up & Forest Protection:**				
A	(i)	Maintenance of FG Hut, Katgaon			0
	(ii)	Maintenance of FG Hut Yangpa			0
	(iii)	Maintenance of FG Hut Shango			0
	(iv)	Maint of Type-I Qtr, Katgaon			0
	(v)	Maint-Bridal path Kafnu to Kara			0
	(vi)	Maint-Bridal path Kafnu to Nigul			0
	(vii)	Maint-Bridal path Katgaon to Pandoswar-4 km			0
	(viii)	Repair of Foot bridge Muling			0
	(ix)	Maint-Bridal path Kafnu to Mulling-18 km			0
	(x)	Revival of Bunker at Ram shackle			0

	(x)	Establishment Cost (Reimbursement of Salary & Contractual amount to Contractual Staff)			50000
	(xii)	Mobility for protection-vehicle		0	0
	(xiii)	Office Equipments (Computer- 2 with accessories,, GPS – 8			0
	(xiv)	O.E.			10000
	(xv)	Maintenance of Motor Vehicle			5000
	(xvi)	Amenities to staff & labour			5000
	Total 5A			**0**	**70000**
B	**Protection of Forests**				
	a	**Energy Saving devices**			
		(i) Distribution of LPG Cylinders -120		10	20000
		(ii) Distribution of Solar lights -20			0
		(iii) Distribution of Induction Heater/ Cooker/Energy efficient Chulhas-100		10	20000
		(iv) Construction of crematorium-5			0
	b	Construction and repair of existing boundary pillars/chak pillars		0	0
	c	Sign & Slogan Boards		0	0
	Total 5 B			**20**	**40000**
	Total 5 (A+B)			**20**	**110000**
6	**Management of Wildlife in and outside the Protected**				
	(a)	**Improvement and Development of wildlife**			
		(i)	Anti-Poaching/patrolling activities	L/s	20000
		(ii)	Vaccination of domestic cattle	L/s	10000
		(iii)	Field equipments for staff and officers and office support	L/s	50000
		(iv)	Habitat improvement	L/s	200000
		(v)	Signage	L/s	10000
		(vi)	Support to Western Tragopan pheasantry at Gopalpur (Sarahan)	L/s	100000
	(b)	**Mitigation of Human Wildlife Conflict**			
		(i)	Compensation against wildlife damages		30000
		(ii)	Publicity & awareness through Kala Jatha (Nukar Natak) etc.	L/s	30000
	Total (6)			**0**	**450000**
	G. Total (1 to6)			**20**	**1590000**
7	**Monitoring & Evalution**				
8	**Site Specific Plan/ estimate**				**0**
9	**Contingencies**				**181000**
	Total Cost of CAT Plan			**20**	**1771000**


Component wise % allocation
Microplan 5%
M&E 5%
Contingency 5%
Afforestatio 10%
Soil Conservation 18%
Wild Life 17%
PES 16%
Infrastr & FP 19%
Research etc 5%


Year wise phasing- Selti-Masrang-Rs lac
5.2
33.7
57.3
65.7
62.5
45.4
24.4
27.2
24.2
22.8
17.7
Zero Year
First Year
2nd Year
Third Year
Fourth Year
Fifth Year
Sixth Year
Seventh Year
Eighth Year
Ninth Year
Tenth Year