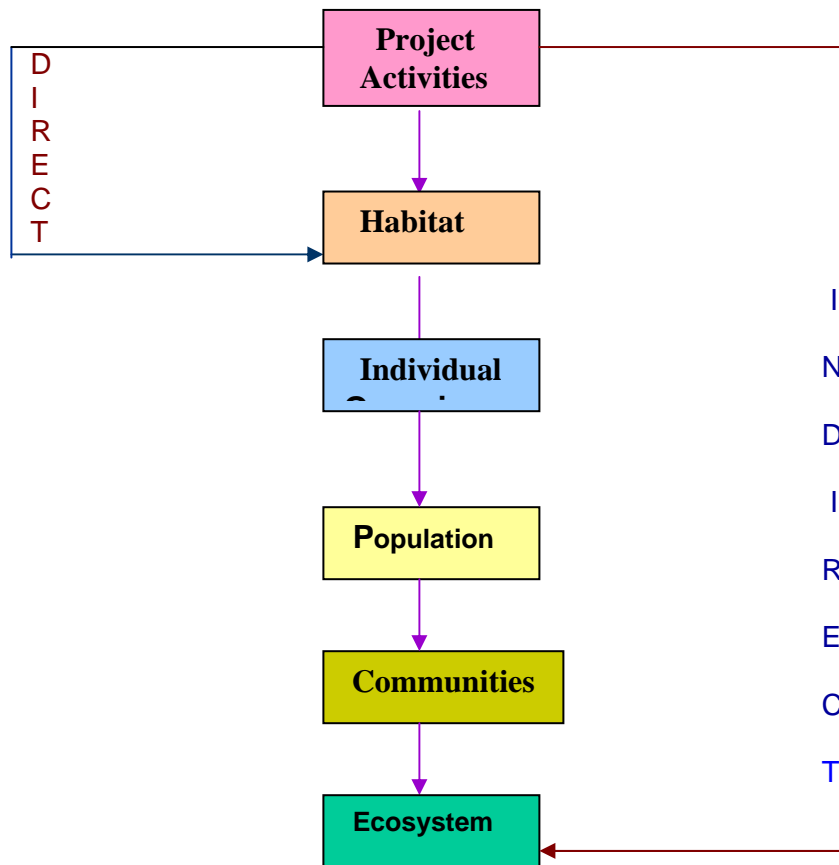




## CHAPTER 4 IMPACT OF PROJECT ACTIVITIES ON BIODIVERSITY

### 4.1 INTRODUCTION

Natural flora and fauna are the two important component of terrestrial ecosystem. They are organized into community on constantly interact with their physical environment as well as among themselves. They show various responses to outside influences. Environment impacts on biotic communities vary in directness, intensity and duration depending upon both nature of project activities and type of biotic communities. The response of biotic communities to project mediated changes in surrounding environment varies with ecological hierarchy i.e. from individual organism to ecosystem level as indicated in following flow chart (Manzel 1979).



Flow Diagram 4.1: Chain of Impacts and Structural Relationship of Terrestrial Biota



The project activity may directly affect organism by removal from habitat or indirectly through bringing out physico-chemical changes / alterations in their habitat. Long-term effect may be at population, communities and ecosystem level.

Impacts on terrestrial biodiversity has been considered at various levels such as project-affected area, project immediate influenced area and project influenced area (7 Km surrounding project site). Based on baseline terrestrial biodiversity status and various project activities during construction & operation phase of project impacts are predicted. Impacts are categorized as direct, indirect, cumulative and induced impacts. The mitigation measures for each impact is detailed out in **Table 4.7** hence, are not discussed along with impacts. The details of impacts are discussed below.

## 4.2 IMPACTS ON FLORA

Impacts of various project activities are directly related to project affected area. The baseline terrestrial biodiversity status of the project affected area revealed that, two forests types i.e. Himalayan Subtropical Scrub and Subtropical Euphorbia Scrub, dominated by various shrub species, represent natural flora and few tree species.

The flora of the project affected area is dominated by succulent shrubs such as *Agave americana* (Rambans), *Euphorbia royleana* (Shuru), and *Opuntia monacantha* (Nagphani) followed by thorny species such as *Carissa spinarum* (Karonda), *Zizyphus nummularia* (Beri), *Rubus ellipticus* (Hinsar), *Solanum surrattense* (Kateli) etc. The dominant weeds recorded were *Colebrookia oppositifolia* (Bambher), *Calotropis gigantea* (Aak), *Lantana camera* (Lantana); *Girardinia heterophylla* (Bichhu grass), *Ricinus communis* (Arandi), *Rumex hastatus* (Bhilmora) etc. Common tree species observed during the survey were *Eucalyptus globosus* (Safeda); *Dalbergia sissoo* (Shisham), *Acacia leucophloea* (Subabul), *Ficus palmata* (Fedu); *Bombax ceiba* (Semal), *Mallotus philippinensis* (Kamela), *Morus alba* (Tut) etc. Impacts of various project activities on flora of project area are discussed below:

### 4.2.1 Direct Impacts

Direct impacts of project activities on flora of the project-affected area are due to acquisition of forests land, tree felling and clearing of land for providing various project units. Details are discussed below

#### (I) Acquisition of Forests Land

Potential negative direct impact of hydroelectric project is considered to be loss of flora/ forests due to construction of dam/ reservoir. The proposed Rampur Hydroelectric Project neither involved construction of dam nor submergence of forest. Hence, any adverse impacts on existing forest in terms of reduction of either forest cover or loss of forest flora.



The total land requirement of the project is 86.5 ha of which 69.37 ha is forestland. The forestland is represented by degraded forest based on forest types i.e. Subtropical Euphorbia Scrub and Himalayan Subtropical Scrub. Hence, direct impact due to loss of forestland i.e. 48.9 ha on existing forest cover will be insignificant. Moreover, the total forest cover area of Rampur forest division is 53,826 ha, as compared to forestland required for project i.e. 69.37 ha is just 0.90% of total forest cover. Hence, forest loss is insignificant as compared to availability of forestland in Rampur division.

## (ii) Tree Felling

The direct impact on flora is attributed to loss of trees, which are required to be cleared for establishment of various project units. A total number of 1075 trees are to be felled/ cleared. The details of tree are given below.

**TABLE 4.1**  
**List of Trees to be felled for clearing the Site**

Sl.No.	Scientific Name	Common Name	Number
1	<i>Eucalyptus globulus</i>	Safeda	996
2	<i>Dalbergia sissoo</i>	Shisham	37
3	<i>Melia azadirach</i>	Dreak	21
4	<i>Grewia oppositifolia</i>	Biul	9
5	<i>Toona ciliata</i>	Tun	4
6	<i>Pinus roxburghii</i>	Chir	3
7	<i>Morus alba</i>	Mulberry	2
8	<i>Acacia leucophloea</i>	Subabul	1
9	<i>Salix sp</i>	Willow	1
10	<i>Ficus palmata</i>	Fedu	1
	<b>Total</b>		<b>1075</b>

Source: Tree Cutting Report Rampur Forest Division

Tree cutting report revealed that, of 92.6 % of trees to be felled is contributed by Eucalyptus. The Eucalyptus is exotic species to the natural forests of the region, and is planted by forests department under degraded forest area development scheme.



Other species reported are commonly distributed throughout the project immediate influence area and project influence area.

None of endangered, rare, threatened or endemic tree is loosed due to felling in project-affected area. Owing to their common distribution and not having significant ecological status loss, of these species will not significantly affect existing biodiversity status of the either project influence area, Satluj Basin in general or Himachal Pradesh in totality. It will also not affect the structure composition, of existing forest types, forest cover or distribution characteristics of flora. Therefore, adverse impacts on terrestrial biodiversity due to proposed tree felling is not at all expected.

### (I) Clearing of Project Land

Direct impact on flora is also attributed to loss of flora due to clearing for forests land for providing various facilities such as provision of approach road, job facilities, construction of adits, power house, excavation for quarry and dumping areas etc. The detailed site specific investigation has been carried out to establish terrestrial biodiversity status it revealed that, dominant shrubs were *Adhatoda vasica* (Vasik), *Colebrookia oppositifolia* (Bambher), *Calotrolois gigantea* (Akh), *Carissa spinarum* (Karonda), *Cannabis sativa* (Bhang), *Agave americana* (Rambans), *Euphorbia royleana* (Shuru), *Dodonea vasicosa* (Mehandi), *Opuntia monacantha* (Nagpani), *Rubus ellipticus* (Hinsar), *Zizyphus numularia* (Beri) *Lantana camara* (Lantara), *Rumex hastatus* (Bhilmora) etc. The common tree species observed were *Eucalyptus globosus* (Safeda), *Acacia leucophloea* (Subabul), *Malotus philippensis* (Kamela), *Mangifera India* (Aam), *Morus alba* (tut), *Grewia oppositifolia* (Biul) etc. These species are widely distributed throughout the project immediate influence area as well as project influence area and are neither endangered, rare nor threatened, endemic in nature.

The flora of the project area is very sparsely distributed showing low diversity index, which varied between 0.78 to 0.97 indicative of degraded forestland. Thus, it revealed that loss of flora due to clearing of trees for various project activities will not have any direct significant impacts on flora of the region in terms of total forest cover, loss of ecologically significant species, change in structure, composition and distribution pattern of flora and there by any adverse significant impacts on existing terrestrial biodiversity status of the forest of Rampur division, in particular and flora of Satluj Basin or Himachal Pradesh in general. As direct impacts of project activities are confirmed to project affected areas only hence, any direct impacts on project immediate influence area and project influence area are not at all expected.

In order to compensate the loss of forests land acquired for establishing various project units, loss due to tree felling as well as due to land clearing the approved **Compensatory Afforestation Plan** will be implemented by State Forest Department. The Compensatory Afforestation will be carried out on 139 ha as per the **Forests (Conservation) Act 1980** in Arsu and Nather ranges of Ani forest division. The Details of land for compensatory afforestation is given below.



**TABLE 4.2**  
**Proposed Sites for Compensatory Afforestation, Anni Forest Division**

S.No.	Name of Unprotected Forests	Forests Numbesr	Compartment
1	Bail		C - 09
2	Chebri		C - 83
3	Karnon		C - 11
4	Kindla		C - 38
5	Rallo		C - 14
6	Shalt		C - 06
7	Sisu		C - 10

Source: Proposal for Compensatory Afforestation Plan, Anni Div. Govt. H.P.

The direct impacts will be compensated by implementation of Compensatory Afforestation Plan not only this it will helpful to increase forest cover of the region.

#### 4.2.2 Indirect & Cumulative Impacts

Indirect impacts of project activities on flora is expected to be limited to project immediate influence area and to some extent to project influence area. Indirect impacts will be due to various construction activities such as generation of dust due to earthwork, excavation, transportation of construction materials( Sand, Soil, Cement etc), quarry, crusher & blasting operations, , air pollution due to movement of construction vehicles, equipments and machineries, influx of laborers population and pollution generated through provision of labors camps / huts established temporarily at construction sites etc. These impacts will be short term and limited to construction period only.

The existing terrestrial biodiversity status of the project immediate influence area revealed the, natural flora is representative of Euphorbia Scrub and Himalayan Subtropical Scrub, it is interrupted by human settlements and intensive agricultural & horticultural activities, heavy lopping & browsing activities, continuous traffic on existing NH-21 etc. The flora is dominated by trees due to avenue plantation / compensatory afforestation.

The dominant trees of avenue plantation along existing NH-21 are *Acacia leucophloea* (Subabul), *Bombax ceiba* (Semul), *Erithrina indica* (Pangara) *Eucalyptus globosus*( Safeda), *Ficus palmata* (Fedu), *Mallotus philippinensis*(Kamela), *Melia azedirecta* (batern), *Morus alba* (Malbery), *Pinus roxburji* (Chir), *Robnia pseudoacacia* (Pahari kikar) etc. Common shrubs were represented by *Adhatoda vasica* (Vasak), *Colobrookia oppositifolia* (Bambter);



*Calotropis gigantea* (Akh), *Carissa spinarum* (Karonda); *Dodonea viscosa* (Me handi), *Euphorbia royleana* (Shuru), *Rubus ellipticus* (Hinsar) *Cannabis sativa* (Bhang), *Debregeasia hypoteuca* (Sihanru), *Girardinia heterophylla* (Bichhu Ghas), *Ricinus communis* (Arandi) *Zizyphus numularia* (Beri), *Rumex hastatus* (Bhilmara) etc. The indirect impacts due to various project activities are discussed in details below.

### **(I) Generation of Dust**

The dust is primary air pollutant in the form of Suspended Particulate Matter generated due to various project activities such as earthworks, general transportation, loading/unloading/ transportation of construction material, blasting, crusher & quarry operation etc. Trees are well known for their remarkable scavenging abilities. Trees can filter out dust, soot and smoke. It is estimated that vegetation can filter out particulate matter of 120 ug/m<sup>2</sup> of leaf area over a distance of 200 mts. Evergreen species with simple leaves, having rough & hairy surface are more efficient dust collector than deciduous trees with compound leaves having smooth surface (Das T.M. 1990).

Long-term exposure of dust primarily affects vegetation by interfering the matter exchange between plants and atmosphere. The exchange of gaseous components is an important for various vital physiological processes such as photosynthesis, respiration & evapotranspiration etc leading to various morphological effects such as chlorosis, necrosis, discoloration and ultimately reduction in primary productivity.

As the avenue plantation along the existing NH-22 is well grown (which will be used for transportation) and will be helpful in filtering out dust and impact due to dust during transportation will minimize. The vegetation in project immediate influence area is a thorny shrub hence, impact will be insignificant. As indirect impact due to dust will be restricted during construction period only hence long terms impacts are not expected. However to mitigate adverse impact due to dust suggested mitigative measures (Table 4.7) should be strictly followed.

### **(II) Generation of Noise**

The noise will be generated due to various construction activities such as movement of construction vehicles machineries and equipments, working force as well as blasting. Blasting is a common practice of tunneling activity. It is short-lived phenomenon i.e. duration generally less than 0.5 seconds. There are no direct impacts of blasting activity on vegetation as vegetation attenuates sound by absorption. The blasting will be carried out by controlled blasting techniques hence any adverse impacts on vegetation are not expected.

### **(III) Temporary Laborers Camp**

The hydroelectric projects are labor intensive hence, large number of labors are expected to influx the area during construction phase. The aggregation of labor population estimated to be 11850 for various construction purposes. The important project activity-affecting flora



surrounding the project influence area is due to establishment of laborer camps. The major threat to surrounding flora is through collection of fuel wood by laborers for cooking purposes and thereby loss of trees. Hence, to mitigate this impact on flora necessary alternate arrangement should be done for fuel such as provision of LPG, Kerosene etc. It should be ascertained that no open fire should be allowed in labor camps as it may lead to fire to surrounding forest leading to loss of forest. The solid wastes generated in the form of garbage and effluent due to sewage should be properly collected and suitably disposed so as to avoid any impact on surrounding flora.

#### (IV) Generation of Debris & Muck

Huge amount of construction spoils/ muck is expected to be generated from various constructions it may adversely affect the surrounding forest areas leading to loss of flora. Hence, necessary steps to be taken to mitigate impact by suitable disposal at identified dumping areas. A total 3.06 Mm<sup>3</sup> will be generated of which 0.3 Mm<sup>3</sup> will be reused and 2.76 Mm<sup>3</sup> will be disposed at four dumping areas. Details of proposed dumping area are given below.

**TABLE 4.3**  
**Details of Identified Dumping Areas**

S.N.	Dumping Area No.	Description of Area	Quantity Dump Mm <sup>3</sup>
1	Dumping area - I	Opposite Kaneri Hospital, Rampur	1.05
2	Dumping area - II	Opposite HERC workshop, Rampur	0.06
3	Dumping area - III	D/S Nirmund Bridge	0.38
4	Dumping area - IV	Vairi	1.32

It revealed that dumping areas are either devoid of vegetation or showed few weedy shrubs. Hence, any adverse impacts on flora are not expected as these shrubs are widely distributed in project immediate influence area as well as project influence area. To mitigate this loss of shrubs approved **Muck Disposal Plan** should be strictly implemented. As such no vegetation was recorded at proposed quarry site, however to avoid impacts due to quarry operations on surrounding quarry site necessary dust suppression measures should be implemented. After completion the quarry operation area should be reclaimed.

#### (V) Soil Erosion

The soil erosion due to natural and anthropogenic activities cause major threat to survival of vegetation. The Saltuj River flows in narrow deep channels with steep hills rising on either side in the project area. The hills are very steep with poor or no vegetation cover. Due to



poor vegetation cover the rate of soil erosion is high. Different forms of erosion such as sheet erosion, gully erosion, riverbank erosion are quite prevalent throughout the project affected/immediate influence and project influence area. Common anthropogenic factors leading to erosion are over grazing, collection of trees for fuel, fodder, timber and unscientific farming practices.

The project activities accelerating soil erosion will be quite significant during construction phase such excavation work, tunneling/blasting, construction of temporary and permanent road in project area to move vehicle/machinery/equipments and working force (Laborers) . The forestland acquired for the project had to be cleared to make way for various project components clearing of vegetation accelerates erosion process in addition to above-mentioned activities.

The excavated material is generally loose, unstable and keeps rolling down and thereby affecting natural drainage channels of the river deteriorate water quality as well as accelerate sedimentation & soil erosion. As three of four dumping area are located closed to river Satluj and chances of rolling down of muck/ loose material leading to blockage in river flow or contamination of water due to silting are more. In order to avoid this the retaining wall varying from of 2 – 7 mts height is proposed along the bank of the river at all Muck Disposal Areas. In order to control the soil erosion the approved **Catchments Area Treatment Plan** should be strictly implemented. Other measures of soil erosion control during construction activities are enlisted in Table.

#### 4.2.3. Induced Impacts

The induced impacts largely concentrated on project influence area owing to dependency of local people on forests. These impacts are discussed specially in light of various human activities affecting forest such as Traditional timber rights, new migrant labors, associated development, and induced commercial developments

The baseline terrestrial biodiversity status of the project influence area (7 Km) reveled that; eight different forests types represent the flora. The altitudinal variation leads to various forest types. The dominant forest type in project influence area are Himalayan Subtropical Scrub forests, Euphorbia Scrub forests, Northern mixed decidus forest, Himalayan Subtropical Pine forests, DSI Oak Scrub etc. The dominant tree species of these groups are *Pinus roxburghii* (*Chir*) and its common associates such as *Quercus incana* (*Ban Oak*), *Rhododendron arboreum* (*Brass*), *Lyonia ovalifolia* (*Anyar*), *Albizia procera* (*Siris*), *Mallotus philippinensis* (*Kamela*), *Cadrela toona* (*Toon*), *Bauhinia variegata* (*Kachnar*), *Albizia lebbek* (*Siris*), *Bombax ceiba* (*Semul*), *Pinus wallichiana* (*Kail*) and *Lennea grandis* (*Jhingan*) while at higher elevations 1800 to 2400m *Cedrus deodara* (*Deodar*) is reported. The dominant shrubs reported to be *Adhatoda vasica*, (*Vasak*), *Colebrookia oppositifolia* (*Bambher*); *Euphorbia royleana* (*Shuru*), *Rubus ellipticus* (*Hinsar*), *Girardiana heterophylla* (*Bichnu ghas*), *Woodfordia floribunda* (*Dhau*) *Cannabis sativa* (*Bhang*), *Zizyphus nummularia* (*Ber*), *Donoea vasica* (*Mehandji*) etc.

The forests of the influence area are interrupted with various forest settlements along with agricultural, horticultural, animal husbandry practices. Local villagers are fully dependent on



forests for their day-to-day requirements including fodder, fuel, timber grazing etc. All these activities adversely affect the forests and it is under pressure due to increasing human population and their activities. Besides this, lopping of trees for fodder manure and bed preparation for cattle sheds, heavy grazing and forest fire have thinned out the forest to varying degree, destroy all undergrowth and reduced shrubby ground cover. The other human activities contributing to forest reduction are unscientific horticultural practices, torch wood extraction, debarking etc. The induced impacts are discussed below in details.

### (I) Traditional Timber Rights

Himachal Pradesh has the highest percentage of rural population (90.21%) in the country residing more than 20000 villages across the state. The predominantly rural population is primarily dependent on agriculture base economy for livelihood. The natural forest in the area provides wood for building of houses, bridges, furniture, and agricultural implements, in addition to providing much needed fuel wood. People are also dependent upon the native land races of livestock for agricultural purposes and their daily needs of milk, meat, wool and hide. A large proportion of this livestock feeds on grasses and leaves obtained from forest. Overall the dependency of local people on naturally available resources of forest is very high.

The forest of Himachal Pradesh have an estimated growing stock of 10.26 crore m<sup>3</sup> and more than 4.5 lakh m<sup>3</sup> of timber is harvested every year in the form of salvage and to meet the demand of right holders. As per one estimate timber worth Rs. 60 crore is allocated to the right holders at nominal cost every year (HPFSR, 2000). The forests also contribute an estimated annual income of Rs. 25 crore to the rural communities in the form of minor forest produce.

The right to the timber is admitted under section 28 of Indian Forest Act (1927). People have a right to get timber at nominal rates for construction/repair of houses/dwellings. The right holders must be bonafied native agriculturist, holding land in settlements in forest areas. A right to the timber is for building & repair of households, construction of temple arch, cremation of dead bodies etc.

As regards the timber rights of project influence area total forest cover of Rampur division is 40372 ha and there are 250 villages under 48 panchayats as right holders. The local villagers have rights to get timber for construction of house/ cattle sheds. It is estimated that nearly 800 trees are cut/felled to fulfill the demand of local people. The data on timber rights has been collected from Rampur Div. For five years i.e. 1987-92. It revealed that, total 8695 trees were felled/ cut to meet timber demand. Important timber trees are *Pinus roxburghii*(Chir), *Pinus wallichiana* (Kail), *Cedrus deodara* and *Picea smithiana*(Rai). The maximum number of 5743 trees of Kail was felled followed by 2018 of Deodar, 717 of Rai and 217 of Chir. The year wise details of species felled along with number & volume of trees is given below

**TABLE 4.4**

**Timber Rights Marketed to Right Holders from 1987-88 to 91-92 in Rampur Forest Division**



S.N.	Year	Deodar		Kail		Rai		Chir	
		No	Vol	No	Vol	No	Vol	No	Vol
1	1987 – 88	533	1646.71	1058	4291.62	277	941.68	58	35.70
2	1988– 89	408	1085.58	955	2597.34	53	786.79	70	99.36
3	1989 – 90	109	543.04	655	2397.98	236	1118.43	23	26.99
4	1990 – 91	344	1773.625	1414	378.85	86	363.99	25	58.63
5	1991 – 92	624	2448.14	1661	6694.68	65	996.29	41	116.45

Source :

### Working Plan for Rampur Forest Div

The right holders have rights to remove all Chir & Kail trees uprooted by natural process such as rain, wind & snow. Deodar trees normally granted for door & windows only, but it is seen that, right holders manage to get Deodar for whole of the building. Besides this, right holders get timber at very nominal rate which are decided at the time of settlement i.e. Zamindari rate. The Zamindari rate or consessional rates at which a right holder get timber is given below

**TABLE 4.5**  
**Rate of Timber for Right Holders (Rs)**

S.N.	Gith Size	Class	Deodar	Kail	Far	Chir
1	90 – 120	ID	5.0	1.0	0.25	0.50
2		IC	4.0	1.0	0.25	0.50
3		IB	4.0	1.0	0.25	0.50
4		IA	3.0	1.0	0.25	0.50
5	60 – 90	IIB	2.0	0.75	0.19	0.37
6		IIA	1.5	0.50	0.19	0.28
7	30- 60	III	0.75	0.25	0.12	0.12
8	> 30	IV	0.19	0.12	0.06	0.06

Source : Working Plan , Outer Seraj Kullu Dist

It revealed that, the rates for high quality timber Deodar is sold at the rate of 0.19 to 5.0Rs depending on class of timber followed by Kail 0.12 to 1 Rs, Fir 0.06-0.25 Rs and Chir 0.06-0.50 Rs. This concession has resulted in considerable depletion of forest near habitats/settlements as demand of timber is growing day by day. The prices for nonright holder are decided by Himachal Pradesh Forest Corporation (1978). The average sale price/cubic centimeter timber in the depots of Forest Corporation is given below.

**TABLE 4.6**  
**Timber Rates for Non-right Holders**

S.N.	Name of Species	Size(cms)	Grade		Rate
			I	II	



1	Deodar	305x25x13	20,744	18,372	14,048
	Kail	- do -	14,978	12,226	10,262
	Fir	- do -	7,288	6,455	5,381
	Chir	- do -	6,876	6,089	4,690
2	Deodar	240x21x10	14,112	12,497	11,874
	Kail	- do -	13,401	11,869	9,183
	Fir	- do -	6,728	5,960	4,968
	Chir	- do -	5,991	5,305	4,087
3	Deodar	240x16x16	14,112	12,497	9,557
	Kail	- do -	10,765	9,537	7,378
	Fir	- do -	6,294	5,574	4,647
	Chir	- do -	5,821	5,156	3,971

Source: Working Plan , Outer Seraj Kullu Dist

The rate of best quality swan timber is Rs 1,421, for Deodar, 900 Rs for Kail, Rs 798 for & 743 m<sup>3</sup>. It seems that rates of timber allotted to right holders are 1000 time less than prevailing market rate. Leading to increase of timber demand by local people.

Increase in timber demand attributed to increase in population of right holders, as well as partition in the family, all round development of the people in their financial position & good return of horticultural crops/activities and most importantly the low rates (two to four rupees/tree) at which trees are granted to right holders as compare to the prevailing market rate. It is also observed that, local right holders misuse rights by selling timber obtained in concessional rates to non-right holders & city dwellers of nearby town. The concession with reference to Rights to the timber have been reduced due to non-availability of trees in Rampur Forest Division.

Thus it revealed that, major impact on project influence area is due to various rights given to villagers residing in forests

## (II) New migrant Labors

The induced impact associated with new migrant labor are due loss of vegetation/flora for provision of facilities such as accommodation, provision of road for transportation, provision of waste disposal such as solid waste/garbage and effluents generated through sewage, provision of commercial complexes to meet their day to day requirements and provision of parking facilities etc. As the land acquired for above-mentioned purposes is not forestland hence loss of flora associated with these activities are not expected. Moreover large scale migration of labors/ employees during operation phase is not at all expected as working staff will be limited to skill workers & trained officials of SJVNL Therefore loss of forest land, loss of flora, pollutions generated via sewage & garbage & thereby adverse impacts on surrounding flora is not at all envisaged.

## (III) Associated Developments



Development of Rampur Hydro-electric project will bring associated development in several sectors such as transportation, automobile, commercial sectors such as daily needs, agriculture related developments such as vegetable, fruit, grain, fertilizer, pesticides, irrigation, electric appliances, which will provide employment opportunities for local people and help to increase their social & economic status. All these development need space/land, which is clear of flora/vegetation. The land is to be cleared before establishment of any facility. As such all above mentioned facilities are well developed at Rampur as well as Duttanagar town hence no new development is expected in project area. Hence, loss of flora attributed to clearing of land for development & thereby any adverse impacts are not envisaged..

#### **(IV) Induced Commercial Development**

As such the project area is located in interior areas away from the township in hilly area hence, large-scale commercial development is not expected. All commercial facilities are available at Rampur and Duttanagar village that are very near from proposed powerhouse and settlement town ship therefore additional commercial development is also not envisaged. Hence any adverse impacts on flora of the either project influence area or project immediate influence area due to induced commercial development is not expected.

Thus it revealed that., timber right to local villagers is the main threat for depletion of forests in the project influence area and not due to the project induced changes. Hence, necessary steps should be taken by forest department to control timber demand & minimize pressure on forest.

### **4.3 IMPACTS ON FAUNA**

The presence of fauna in any area is largely depends on type and nature of flora. It provides major habitat, food, fodder, resting, hiding as well as breeding sites to all types of animals. The major factor affecting the distribution of animals in entire area is found to be forest types, altitudinal variation, interference of human activities and forest cover. The data has been collected on fauna based on extensive field survey, direct and indirect methods ,secondary data collected from respective Forests Dept., Animal Husbandry dept. Wildlife Board etc.. Impacts on fauna are categorized as direct, indirect, cumulative and induced impacts and are discussed in details below.

#### **4.3.1 Direct Impacts**

Direct impacts of project activities are restricted to project influence area. The presence of fauna is directly related to type of flora present. Himalayan Subtropical Scrub and Subtropical Euphorbia Scrub, which are sparsely distributed along hill slopes, foothills and Satluj river valley, represent Flora of project-affected area. The forest patches present in the project-affected area is mostly Eucalyptus Plantation carried out by state forest department under degraded forest area development programmed. Most of the hill slopes are very steep and almost without any vegetation or with thin vegetation dominated by shrubs, which is already discussed in details on vegetation impacts.



The baseline faunal biodiversity status of project affected area revealed that, fauna is very thinly distributed. Reptiles, birds and mammals represent the fauna. The common representation of reptiles was *Calotes versicolor* (Common Lizard), and *Hemidactylus brooki* (Common Gecko). The common birds recorded were *Acridotheres tristis* (Indian Myna), *Columba livia* (Blue Rock Pigeon), *Corvus macrorhynchos* (Jungle Crow), *Dandroatta vagabunda* (Treepie), *Lanius excubitor* (Grey Shrike), *Milvus migrans* (Pariah Kite), *Nectarinia minima* (Purplerumped Sunbird), *PicnonotuMammals leucogenys* (White Cheeked Bulbul), *Orthotomus sutorius* (Tailor Bird), *Turdoides caudatus* (Common babbler), *Sexicoloides fulicata* (Indian Robin), *Turdus merula* (Blackbird) etc. showing typical agrarian bird community as area is marked by intensive agricultural & horticultural activities.

The mammals were represented by domestic animals. As the agricultural & horticultural activities dominated the project area the domestic animals of local importance were mainly observed such as cow, Buffalo, Oxes of agricultural importance, Horses, Moles and Donkeys used for carrying loads in hilly areas and common pet animal such as Dogs & Cats. None of the wildlife was either observed during survey of the area or has been reported by forest department. These area no records of any endangered, rare, threatened or endemic species from the project area.

The project activities affecting directly to animals project present in the project area is not envisaged in terms of direct loss of any animal due to any proposed project activity.

#### 4.3.2 Indirect & Cumulative Impacts

Indirect and cumulative impacts are associated with various construction activities such as clearing of vegetation for establishment of various project units, movement of vehicles, construction equipments & machineries etc, interferences due to influx of laborers as well as temporary establishment of labor camps, blasting operations etc.

The major direct impact of and hydro -electric project is primarily through construction of reservoir and submergence of forest leading to loss of habitat for wildlife. The proposed project does not involve construction of dam hence any adverse impact due to loss of habitat is totally ruled out.

The loss of 48-9 ha land for various project unit will also not adversity affect the fauna as similar habitat is present throughout the project immediate influenced area as well as project influence are. Therefore impact due to loss of habitat for birds, reptiles and mammals of the project area is not expected.

The blasting activity is short term activity and impact is lest up to 0.5 sec. Due to noise generated during blasting may lead to short time driving way of birds & animals in surrounding areas. As the controlled blasting technique will be followed hence any long-term adverse impacts are not engaged.

Impacts on surrounding fauna due to movement of vehicles, machinery, equipments and work force may slightly interfere in animal movements. As most of the domestic animals are guided & controlled by cowboy's egg. Cow, Buffalo, goats sheep's, donkey & horses and



hence any causality in terms of killing or accident are not expected. However proper maintenance of vehicle and controlling speed during driving may avoid impact totally. As no wildlife is reported from project-affected areas any adverse impacts on wildlife are totally ruled out.

### 4.3.3 Induced Impacts

The induced impacts are considered to be due to establishment of propose hydroelectric project, migration of laborers/employees, induced commercial developmental activities on surrounding fauna. As project affected area and project immediate are is mainly represented by common domestic animals, which are protected by their owners, hence any adverse impacts are not envisaged. However the project influence are 7 Km surrounding the proposed project varies forest types as well as wildlife is reported hence induced impacts are discussed with reference to forests & wild life reported from project influence area.

The variation in altitude leads to variation in forest types and associated changes in wildlife. Important wild animals are reported at higher altitude such as Himalayan Black bear (*Selenarctor thibetenus*) reported at 1800 to 2500mt altitude, Musk deer (*Moschus moschiferus*) is reported from 2900-4000 meters. Rhus Macaque (*Macaca mulata*) from 1200-2400m while Languor (*Presbytes entellus*) from 1800-2800 meters. Hence, any adverse impacts due to induced developmental activities on wildlife are not expected. However, in order to improve forest cover & wild habitat suggested recommendations to be strictly implemented as per approved **Compensatory Afforestation Plan** and **Catchment Area Treatment Plan**.

### Conclusion

The terrestrial biodiversity of project affected area and project immediate influence area is represented by low floral & faunal diversity. The forests of the area are represented by degraded forests type such as Euphorbia Scrub and Himalayan Subtropical Scrub. Weedy shrubs with some common tree species dominate the area. Direct impacts of project activity on flora are considered to be due to acquisition of forestland for establishment of various project units, loss of trees due to felling and clearing. As acquire forestland is just 0.9% of the total forestland available in Rampur division therefore it will not significantly affect existing forest cover.

The impact due to tree felling will be insignificant, as 92.6 % of the total trees to be felled are comprised of Eucalyptus trees, which is exotic species to the natural forest. Other tree species are commonly available thought project immediate influence area and project influence area. As a result there will no change in community composition and structure of forest due to tree felling.

The loss due to clearing is also not expected as weedy shrubs, which are widely distributed, dominate project area. None of the endangered, rare, threatened or endemic species was observed throughout the project area hence, adverse impacts on Terrestrial Biodiversity due to loss of species are not at all expected. The loss of forestland and trees felled will be compensated by implementation of approved **Compensation Afforestation Plan** not only



this but it will also increase forest cover area of the surrounding region. Thus, it revealed that no significant adverse impacts on terrestrial biodiversity due to proposed Rampur Hydro-electric project is envisaged.

**TABLE 4.7**  
**ASSESSMENT OF IMPACTS AND MITIGATION MEASURES**

<b>S N</b>	<b>Project Phase</b>	<b>Activities</b>	<b>Impacts</b>	<b>Mitigation Measures</b>
1.	<b>Constructi on Phase</b>	(i) Acquisition of Forests Land  (II) Felling of Trees  (iii) Clearing of Project sites for construction activity	<p>The proposed project does not involve either construction of dam/reservoir hence major loss to the existing forest is not at all envisaged.</p> <p>Loss of Forests land i.e. 48.9 ha which is just 0.9 % of the total forests land available in Rampur Forest div. Hence impact will be insignificant</p> <p>The clearing of project sites for construction requires felling of trees, a total number of 1077 trees are be felled. Out of total 92.6 % of trees are Eucalyptus Plantation , the exotic the natural forests and rest are commonly distributed throughout the project immediate influence as well as project influence area hence, the impact will be insignificant .</p> <p>The project site is dominated by weedy shrubs which are commonly distributed throughout and none of rare, endangered or threatened or endemic species was observed during survey /reported in the project sites. Therefore no impact on biodiversity is envisaged.</p>	Strict implementation of approved Compensatory Afforestation Plan in accordance with Forest (conservation) Act 1980 and Himachal Pradesh Forest Policy (1980). The compensatory Afforestation will carried under the Degraded Forest Area Development scheme hence there will be increase the
<b>S N.</b>	<b>Project Phase</b>	<b>Activities</b>	<b>Impacts</b>	<b>Mitigation Measures</b>
2		(i) Generation of dust by	This may cause increase in SPM and RPM level in the area. Dust is also likely to	* All vehicles delivering materials to the site shall be covered to avoid



		<p>movement of vehicles and construction work, crusher operation</p> <p>(ii) Generation of Noise</p>	<p>settle on the surrounding flora.</p> <p>The impact shall be temporary, localised and reversible.</p> <p>No significant impact on Project Influence Area and Satluj Basin.</p> <p>The noise level of the construction site is likely to increase due to various activities, which may cause disturbance to the fauna in the area. However this impact would be insignificant as the increase in noise shall be intermittent and temporary</p> <p>No significant impact on fauna of Project Influence Area and Satluj Basin</p>	<p>spillage of materials.</p> <ul style="list-style-type: none"> <li>* All exiting approach road used by vehicles shall be kept clean and clear of dust</li> <li>* The roads surfaces shall be host or watered using necessary equipments.</li> <li>* Plants, machinery and equipment shall be handled so as to minimize generation of dust.</li> <li>* All earth work shall be protected to minimize dust generation.</li> <li>* All crusher used in construction shall confirm to relative dust emission devises</li> <li>* The machineries, vehicles and equipments use in construction shall strictly confirmed to CPCB standard.</li> <li>* All vehicles equipment machinery used in construction shall be fitted by exhaust silencers.</li> <li>* Equipments should be maintained regularly and soundproof gadgets should be used.</li> <li>* Blasting shall be carried out as per the statutory laws, regulation and rules pertaining to acquisition, transport, storage, handling and used of explosives</li> </ul>
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S N.	Project Phase	Activities	Impacts	Mitigation Measures
				* Blasting should be carried out during fixed hours preferably during midday.
		(iv) Movement of Labour force and Technical Staff	The labour force and technical staff may poach on occasionally invaded wildlife in the area. No endangered, rare and threatened wildlife is reported in the project area hence no significant impact is anticipated on fauna.	* The contractor should arrange alternate source of energy such as Kerosene or LPG  * The Wildlife conservation Act should be strictly adhered.
		(v) Borrow and Quarry activities	No significant impact on Project Influence Area and Satluj Basin  Extraction of rocks soil and sand shall be done for the construction work. Borrow and quarry sites require felling of trees.  No significant impact on Project Influence Area and Satluj Basin.	Environmental awareness training should be provided to the Contractor and workers.  * The extraction of material should be done from the identified borrow and quarry site only.  * If new borrow & quarry sites are required then prior permission has to be taken from the owner.  The quarry and borrow area should be reclaimed back. The pits formed should be backfilled by construction waste and site should be stabilized.  * The topsoil(150mm) from all areas should be preserved in stockpiles.  * Such a stockpile shall be utilize for redevelopment of borrow / quarry areas.
		(vi) Control of Soil Erosion	The construction of activities may lead to the erosion of soil in catchments area of Satluj	* Grasses and shrub species should be planted.



		(vii) Muck Disposal	Basin. The muck produced by the construction work shall be disposed at the dumping sites.	Strict implementation of approved Catchment Area Treatment Plan for control of soil erosion.  * The muck should be disposed at the identified sites only.
S N.	Project Phase	Activities	Impacts	Mitigation Measures
3.		(i) Traditional Timber Rights  (II) Influx of laborers  (III) Induced commercial	The disposal of muck shall destroy the flora at the sites. However the sites identified for muck disposal has low diversity for trees and shrubs and ranges from 0.59 to 0.97 which is very low.  Loss of flora due to logging of timber trees which are Climax species of natural forests  Requirement of living places, hotels, filling stations, service stations and extra workers will arise. This will provide job opportunity to the local skilled and unskilled population.	* Before disposal of muck retention wall should be constructed at the base to retain the muck as the sites are just above the river Satluj.  The increased in timber prices for right holders as per the prevailing market rate  Reduction in permitting timber demand by right holders Provision of alternate building material to timber such as provision of breaks/concrete blocks for building houses, tin/asbestos/ plastic sheets as roof material at concession rates to right holders  Cutting of trees should be strictly prohibited in the area for other construction



		development	Development in Rampur town and nearby places is likely to take place and land price may increase.	work.  Forest clearance should be obtained if there is any requirement for cutting trees.  Any new colonies developed in area should have provision for plantation in the colony.  As, the Rampur & Duttanagar are well equipped with the commercial development which are very near from proposed sites hence any
<b>S.N.</b>	<b>Project Phase</b>	<b>Activities</b>	<b>Impacts</b>	<b>Mitigation Measures</b>

