



CHAPTER 1 INTRODUCTION

1.1 BACKGROUND

Satluj Jal Vidyut Nigam Limited (SJVN Limited) has been assigned to construct 412 MW Rampur Hydro Electric Project (RHEP) near Rampur town in Kullu District, Himachal Pradesh (H.P.). The project RHEP has been conceived as a tailrace development from the 1500 MW Nathpa Jhakri Hydroelectric Project (NJHEP) to tap the hydropower potential of river Satluj between Jhakri and Bayel village. The surface powerhouse will be constructed on the right bank of the river Satluj at village Bayel, which is about 15 km downstream of Rampur town.



Rampur Hydro Structure Intake Point

The intake of the project is located at the outfall of Nathpa Jhakri Project at Jhakri. The project area falls under the Tehsil Nirmand covering villages Tunan, Poshana, Gadej, Bahri, Kushwa, Kharga and Bahawa situated on the right bank of river Satluj and Duttanagar situated on the left bank of river Satluj. Project site is about 130 km away from Shimla on NH-22.

1.2 PROJECT SETTING

The salient feature of the proposed hydroelectric project is given in the table below:

Table: 1.1
Salient Features of Rampur Hydro-electric Project

1.	LOCATION	
	State	Himachal Pradesh
	District	Shimla / Kullu
	River	Satluj
	Vicinity	Intake work at Jhakri in District Shimla. The tail water of Nathpa Jhakri Hydro-electric Project will be utilized. The Power House is located on right bank of river Satluj near village Bayal in District Kullu about 15 km d/s of Rampur.
2.	HYDROLOGY	
	Catchment area at Rampur (G & D Side)	50880 km ²
	Design Flood at Rampur(as per SJVN Limited)	
	100 Years	4104 m ³ /sec



	1000Years	5572 m ³ /sec
	10,000 Years	7151 m ³ /sec
	Average Annual runoff in 50% average year	10181.22 M m ³
	Average Annual runoff in 90% average year	8195.35 M m ³
3.	INTAKE STRUCTURE	
	Normal Pond Level	1005.00m
	Minimum water level(MWL)	1002m
	Design Discharge	383.88 cumecs
	Top elevation of wall structure	1026.5m (corresponding to design flood of 5660 cumecs with freeboard of 1.8m)
	Number of Intake gates	2(6m wide x 7m)
4.	INTAKE TUNNEL	
	Type	Circular, Concrete lined
	Size	10.15m/ 10.50m dia
	Length	484m
	Design Discharge	383.88 cumecs
5.	INTAKE CONDUIT (CUT & COVER)	
	Type	Circular
	Length	43.2m
	Design Discharge	383.88 cumecs
6.	HEAD RACE TUNNEL	
	Type	Circular Concrete lined
	Size	10.50 m finished diameter
	Length	15.08m
	Design Discharge	383.88 cumecs
	Bed Slopes	1 in 90 & 1 in 431
	Velocity	4.43m/sec
7.	ADITS	
	Length of Adit at RD 14625 m(upstream of surge shaft)	590m
	Length of Goshai Khad Adit at RD 11720m	1116m
	Length of Kunni Khad Adit at RD 5854m	604m
	Length of Kazo Khad Adit RD 2712	760m
	Length of Adit cum spill tunnel at left bank	342.5
	Type	7.5m D shaped
8.	SURGE SHAFT	
	Numbers	1
	Diameter	Restricted Orifice
	Depth	38m
	Orifice diameter	4.45m
	Elevation of centre line of head race tunnel	949.54m
	Elevation of invert of surge shaft	944.29m
	Max. up surge	1049.38m
	Minimum down surge	978.05m
9.	BUTTERFLY VALVE CHAMBER	



	Type	Surface Type
	Size of Chamber	69m long, 10.5m wide & 23m high
	No. of butterfly valves	3 nos.
	Size of valves	5.40m internal dia.
10.	PENSTOCK	
	Number	Three numbers
	Size	5.40m circular steel lined
	Type	Partially underground
	Length	Approx. 5000 m each
	Velocity in 3.8m dia. portion	5.64 m/sec
	Type and thickness of steel liner	ASTM-537 (20mm to 16mm -main pipe), (12mm- branch pipe)
11.	POWER HOUSE COMPLEX	
	Type	Surface
	Installed Capacity	412MW
	Size	Approximately 136 m long, 23.5m wide and 50m high
	Type of turbine	Francis vertical axis
	Speed of Turbine	214.3 RPM
	Generating unit	6 x 68.67 MW
	Gross head	138.7 M
	Net head	119.10M
	Generators	6 x68.67MW, 0.9 pf, generation voltage 11KV
	Step up unit Transformer	6 Nos, 84 MVA 3 phase 11/400KV OFWF type
12.	SWITCH YARD	
	Size and Type	Surface – 400 KV Switch gear
13.	TAIL RACE CHANNEL	
	Type	Horse shoe concrete lined / Trapezoidal
	Length	72 m + open channel
	Size	10.5 m dia
	Max. Tail water level for Power generation (Q=383.88 cumecs)	EL 866.70m
	Minimum Tail water Level (Q=32 cumecs)	EL 862.90m
14.	POWER GENERATION	
	Peaking capacity during lean period	412 MW
	Annual energy generation in	
	a) 90% dependable year	2021.980 MU
15.	TRANSMISSION OF POWER	
	It is Proposed to evacuate the Power generated at Rampur Hydro Electric Project by LILO of 400KV Jhakri Nalagarh D/C line	

1.3 SCOPE OF WORK

The scope of Terrestrial Bio-diversity Study include detailed survey of flora and fauna of the Project Affected Area (The forest land acquired for various project units) and Project Immediate Influence area (500mt on either side of constructions



sites of HRT, Surge shaft, Penstock, Powerhouse, etc) and Project Influence Area (7 Km Surrounding Project Sites). Scope of Biodiversity assessment is as below:

- To conduct Botanical survey of flora with reference to. taxonomy and physiological approach
- The survey of flora was conducted following Standard Quadrat Method and Random Sampling approach was followed. The number of Quadrat studied so as to cover 8-10% of total land parcel under the study
- The flora survey also include information on forest type, cover structure of forest, major and minor associations
- Composition & structure of forest with reference to Abundance, Distribution, Phenology, & Ethno-botanical approach for major forest species
- To identify ecological Status of flora & fauna species with reference to endangered, rare, threatened or endemic.. Also categorization of species as Native or exotic species, commercially important species, weed or parasite species
- To identify major uses of tree species in terms of timber, fodder, food, medicinal etc base on available literature as well as through consultation with local institute / people
- Calculation of density and diversity flora
- Preparation of Study area map as well as forest maps
- To identify major and minor habitats of fauna
- To identify major threats to existing biodiversity
- To review compensatory afforestation plan/ Catchments Area Treatment Plan and re-devolvement plan for Muck Area Disposal of RHP and recommend vegetative measures in light of previous experience of NJHP
- To formulate bio-diversity management plan for protection of flora and fauna

1.4 POLICY AND LEGAL ASPECTS OF BIODIVERSITY CONSERVATION

Biogeographically, India is situated at the tri-junction of three realms, namely Afro-tropical, Indo-Malyan, and Paleo-Arctic realms and therefore, has characteristic elements from each of them. As a result, India has a rich biological heritage that qualifies it as one of 12 mega diversity nations of the world. (Gadgil 1992)

In order to project existing biodiversity resources of the country. Government Of India (GOI) is actively involved in various conservation measures such as establishment of National Parks & Sanctuaries, Biosphere Reserve Program, World Heritage Sites, Specific Animal Targeted Project (Project Tiger 1973, Project Elephant 1991-92, Rhinoceros i.e. Sanctuary / National Park in North East and North West India), etc. Besides this GOI is actively co-operating with



other nations with reference to biodiversity conservation. These are many international treaties/regional treaties concentrate specifically on conservation and use of global biodiversity. Following are some of the international treaties relevant to biodiversity

- Convention Relative to the Preservation of Fauna and Flora in their Natural State. 8th Nov. 1993, London
- International Plant Protection Convention. 6th Dec. 1951, Rome
- Plant Protection Agreement for South East Asia and Pacific Region 27th Feb. 1956, Rome
- Convention on Wetlands of International Importance Especially as Waterfowl Habitat 2nd Feb 1971, Ramsar
- Convention on the conservation of Migratory Species of Wild Animals, 23rd June 1979, Bonn
- Convention on International Trade in Endangered Species of Wild Fauna and Flora, 3rd March 1973, Washington
- International Tropical Timber Agreement 19th Nov. 1983, Geneva

The rich biodiversity of the country has been deservedly acknowledged as playing a significant role in livelihoods and cultural sustenance of the country over the years. Ministry of Environment and Forests, Government of India, to formulate a National Biodiversity Strategy and Action Plan (NBSAP), is a firm step towards addressing the various issues related to the use, status and conservation needs of biodiversity in the country. Under this initiative, it has been envisaged to produce a series of planning documents dealing with various facets related to the conservation of biodiversity.

The NBSAP process includes widespread consultation process across the country involving all the major stakeholders. It is against this background that the present State Biodiversity and Action Plan (SBSAP) for Himachal Pradesh has been prepared.

The present SBSAP has been prepared with a view to achieve the following objectives:

- 1- to document the total range of biodiversity of the State and its social and cultural significance for various communities in the State
- 2- to assess the existing status of biodiversity of Himachal Pradesh and identify various factors causing its depletion and deterioration
- 3- to identify and address biodiversity related needs of local communities
- 4- to work out a strategy and put in place an action plan for conservation and sustainable use of the biological resources of the State
- 5- to generate awareness about biodiversity conservation imperatives amongst various stake holders and target groups
- 6- to secure participation of all stakeholders including various government agencies, public bodies, local communities including women, NGOs, private entrepreneurs, and the general public in the State in the conservation and sustainable use of biodiversity
- 7- to empower the local people in taking biodiversity related decisions and to ensure benefits to them as creators and holders of indigenous knowledge systems and
- 8- to ensure incorporation of principles of restoration, conservation and sustainable use of biodiversity in cross-sectoral policies and programs



- 9- to realize the consumptive and non-consumptive values of biodiversity through necessary investment in research and development
- 10- to identify legal and financial institutions to achieve these objectives
- 11- to promote regional, inter-state, national and international co-operation

1.4.1 Legal Framework

In order to conserve biodiversity of the Nation, GOI, has established policy framework that foster the sustainable use of biological resources and the maintenance of biodiversity. The economic policies and legal frameworks established by GOI create the incentives and obstacles that influence decision about how to utilize and manage biological resources. Following are some of the legal & policy framework, which relates specifically to biological diversity

- The Forest Act 1927
- The Wildlife (Protection) Act 1972
- The Forest (Conservation) Act 1980
- Environment (Protection) Act 1986
- National Conservation Strategy 1992
- National Forest Policy, amended in 1988
- National Wildlife Action Plan 1973

1.4.2 Protected Area management in Satluj Basin and Himachal Pradesh

Himachal Pradesh endowed with a vast canvas of dense forest and colorful wildlife. It encompasses three bio geographic zones representing great attitude and climate variations, sub tropical to cold desert supporting a vast variety of floral and faunal biodiversity. The protected areas are the vital tools for conserving biodiversity. The 32 Wildlife Sanctuaries together with 2 National Parks consisting the state's Protected Area Network (PAN) occupy 13.6% of state's geographical area as compared to national average of 4.70%. 25.78% area of States area' fall under forests which is higher than the average national forest area of 20.64% the Protected Area Network for wildlife & biodiversity management. The status of forest of the India, Himachal Pradesh and the two districts are given below:

Table: 1.2
Status of Forest

Place	Geographical Area km ²	Dense Forest km ²	Moderately Dense Forest km ²	Open Forest km ²
India	3287263	51285	339279	287769
Himachal Pradesh	55673	1093	7883	5377
Kullu District	5503	117	1295	521
Shimla District	5131	194	1587	602

Source: State of Forest Report 2003, Forest Survey of India, Dehradun



The first National Park under Wildlife (Protection) Act 1972 was established in 1987 in Pin Valley in Spiti extending over 675 sq. Km consisting 2.59% of geographical area of 55,673 sq. Km and 3.89% of the legal forest area of 37,033 sq. Km of the state (Enchanting Himachal, 2004).

The state's Protected Area Network is extremely rich in wildlife. Rare mammals include Musk Deer, Black Bear, and Snow Leopard & Leopard. The avifauna includes rare pheasants such as Western Tragopan and Cheer Pheasants. The state bird Monal is still found extensively in many higher protected areas. The status of protected area is given below in **Table 1.3**

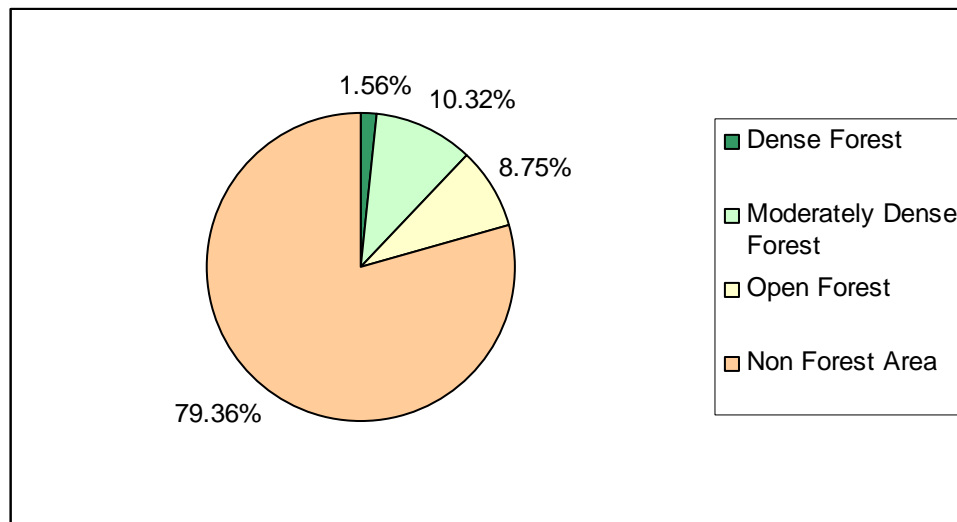


Fig. 1.1 Status of Forest Cover in India

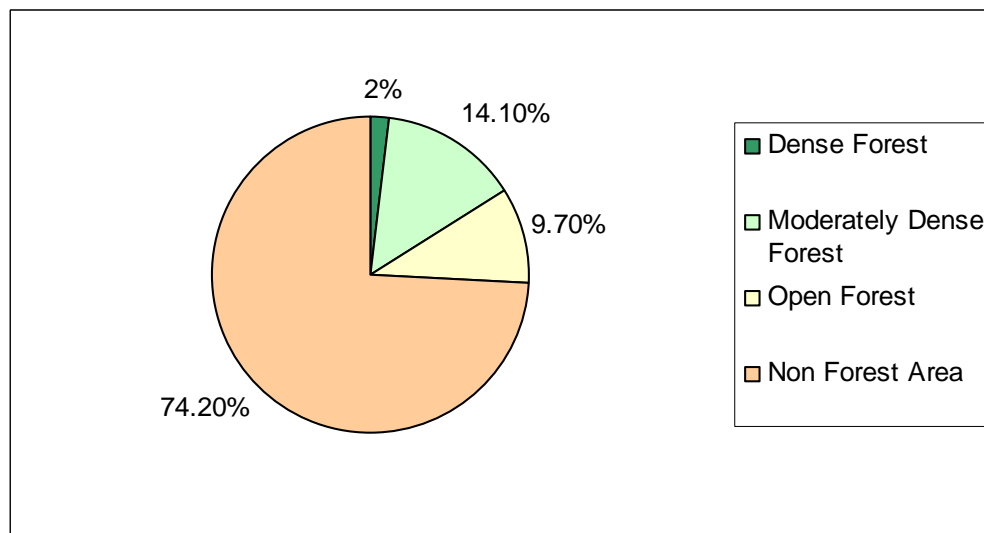


Fig 1.2 Status of Forest Cover in Himachal Pradesh

Table: 1.3
Status of Protected Area



Location	No. of Sanctuaries	No. of National Parks
India	490	88
Himachal Pradesh	32	2
Satluj basin	10	0
Project area	0	0

Source: Wildlife wing, Himachal Pradesh Forest Department, Shimla

Table 1.4
Wildlife Sanctuaries in Satluj Basin

S. No.	NAME	AREA (Sq. Km)
1.	Bandli (Mandi)	41
2.	Daranghati (Shimla)	167
3.	Darlaghat (Solan)	6
4.	Gobind Sagar	100
5.	Kibber (Llauhail & Spiti)	1400
6.	Lippa Assrang (Kinnaur)	349
7.	Majathal (Solan)	57.55
8.	Rakchham Chitkul (Kinnaur)	304
9.	Rupi Bhabha (Kinnaur)	738
10.	Shikari Devi (Mandi)	72

Source: Wildlife Wing Forest Department Himachal Pradesh

1.5 TRADITIONAL TIMBER RIGHTS FOLLOWED IN H.P.

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 m³ and more than 4.5 lakh m³ 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). All green commercial harvesting of timber from the State's forests has been suspended since 1984. 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 following purpose: -

- i. For construction and repair of dwelling houses, cattle and grass sheds and other agriculture buildings.
- ii. For construction & repair of temple and buildings attached to temple.
- iii. For ask of deotas and other such purposes.
- iv. For grain boxes, irrigation channels, agricultural & domestic implements.

1.5.1 Procedure for Obtaining Timber

The timber tree allotted to bonafied right holder on application to D.F.O. through Gram Pradhan and Patwani of settlement. The trees are cut and remove whether dry or green stating as fallen for building purpose only. The deputy commissioner is empowered to arrange with right holders in forest. The quantity of timber per annum to be granted (Thumb rule: 800 trees/year) is fixed and quantity is distributed among right holders.

1.5.2 Timber Trees

A total number of 20 timber species are recommended by forest department. The some important timber species are Deodar (*Cedrus deodara*); Chir (*Pinus roxburghii*); Kail (*Pinus wallichiana*); Rai (*Picea smithiana*); Tosh (*Abies pindrow*); Shisham (*Dalbergia sissoo*); Poplar (*Populus deltoides*) etc.

Trees to be cut are marked by Forest Officer strictly according to the silvicultural availability. Deodar trees are given only for irrigation channels for the construction & repair of temple buildings and for doors and windows of dwelling houses. Green deodar trees are not cut within 10 years of any temple or any building connected with any temple. While dry deodar trees standing within abovementioned places may be cut and remove only for repair of the temple building. There are 250 villages belonging to 48 Panchayat in Rampur forest division.