

**H.P. Forest Department**  
**Himachal Pradesh**



**Management Plan**  
**TUNDAH WILDLIFE SANCTUARY**  
**(2022-23 to 2031-32)**  
**Divisional Forest Officer**  
**Wildlife Division Chamba (H.P.)**



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**OFFICE ORDER**

Office Order No/2022-23/ 295 Dated Shimla-1, the/ 27/01/24

The Management Plan of Tundah Wildlife Sanctuary for the period from 2022-23 to 2031-32 as submitted by the author Divisional Forest Officer (Wildlife), Sh. Rajeev Kumar HPFS, Chamba Wildlife Division is hereby approved for the management of the protected area for the next 10 years.

Endst. No. WLM /Management Plan/ 3754-56 Dated/ 27/01/24

Copy forwarded to :-

1. Additional Principal Chief Conservator of Forests (Wildlife), O/o Pr.CCF (Wildlife) Shimla for information and necessary action.
2. Chief Conservator of Forests (Wildlife) (S) Dharamshala w.r.t. his office memo No. 245 dated 12.04.2023 for information and necessary action.
- ✓ 3. Divisional Forest Officer (Wildlife) Chamba for information and necessary action.
4. Office Order File.



Misc  
Branch

9/02/2024  
Pr. Chief Conservator of Forests (WL)  
and Chief Wildlife Warden H. P. Shimla-1.

## PREFACE

Tundah Wildlife Sanctuary located in the South – East of Chamba District sharing its boundary with Lahaul & Spiti and Kangra district is an important range for the wildlife, prominent of which are Snow Leopard, Ibex, Musk Deer, Himalayan Brown Bear, Asiatic Black Bear, Himalayan Tahr, Goral etc. among the mammals and Cheer, Monal, Koklas, Snow cock etc. among the birds and also threatened floral species. The control of this area was with the Wildlife Division, Chamba from 1987 to 1997. During 1997 the administrative control of sanctuary was transferred to Bharmour Forest Division (T). First management plan for this sanctuary was prepared by Sh. T.D. Sharma, IFS, the then D.F.O. Wildlife, Chamba for a period of 10 years w.e.f. 1994-95 to 2003-04. Most of the works prescribed in the above management plan could not be executed for want of sufficient funds. The present management plan has been compiled following the manual for planning wildlife management in protected areas and managed forests by Wildlife Institute of India.

The present plan has been prepared to improve the habitat of wild animals in the sanctuary and to provide better protection to the wildlife in the area. At the same time, participation of the local habitants will be ensured for the better management of wildlife. It has also been emphasized to increase the awareness for wildlife conservation values among lakhs of pilgrims / tourists who visit Mani Mahesh lake/ Dal (which is situated at an altitude of 4200 Mtrs in the Northern fringe outside the Tundah Wildlife Sanctuary) and Kailang Wazeer Temple ( which is on the way to Tundah pass) every year. In this way, Eco-Tourism as well as conservation and protection of wildlife will be popularized among the visitors. This will also enhance the income of the local people living around the sanctuary area.

In addition to this, the emphasis is also on Eco-development activities, monitoring protocol, Eco system services and landscape approach to wildlife management. The Plan has been prepared to provide better habitat for conservation of wild animals and prescribing different operations for improvement of existing habitats which can be modified/ improved in the coming years depending upon the results obtained from monitoring and evaluation processes in the field on year to year basis. The period of this plan would be for 10 years i.e. from 2022-23 to 2031-32.

I would like to express my sincere thanks to Sh. Rajeev Kumar IFS, PCCF (HOFF) and PCCF, Wildlife-cum-Chief Wildlife Warden H.P, Sh. Anil Thakur IFS, Additional Principal Chief Conservator of Forests, Smt. Upasana Patial IFS, Additional Principal Chief Conservator of Forests, CPD (KFW Project), Dharamshala, Sh E.Vikram, IFS, Chief Conservator of Forests, Wildlife Circle (North), Dharamshala, Sh. Amit Sharma HPFS, Sh. Sanjeev Singh HPFS, DFO (HQ), Dr. Kuldeep Singh Jamwal HPFS, (DFO Wildlife Chamba, now), frontline staff of Tundah Wildlife Sanctuary and other seniors as well as field functionaries for their practical and valuable guidance in completion of this plan.

Rajeev Kumar, HPFS  
**Divisional Forest Officer,  
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## CHAPTER – I

### INTRODUCTION TO THE AREA



Himachal Pradesh with its varied terrain and topography exhibits a perfect cross section of floral and animal heritage distributed from Shivalik to Alpine regions. Similarly, the socio-economic fabric of the state is not only multi-dimensional but also closely linked to its forests and wildlife. The Tundah Wildlife Sanctuary is an externally important area for wildlife in Himachal Pradesh and indeed in the Western Himalaya. Being remote, Tundah Wildlife Sanctuary is relatively free of human disturbance and therefore management of wildlife is apparently much easier here. Its proximity to the Himalayas and the resulting proximity to high altitude give the region a fairly good representation of elements of the alpine and high Himalayan fauna. The sanctuary has Biological, ecological, hydrological, cultural and natural values and it is well buffered by the surrounding territorial forests.

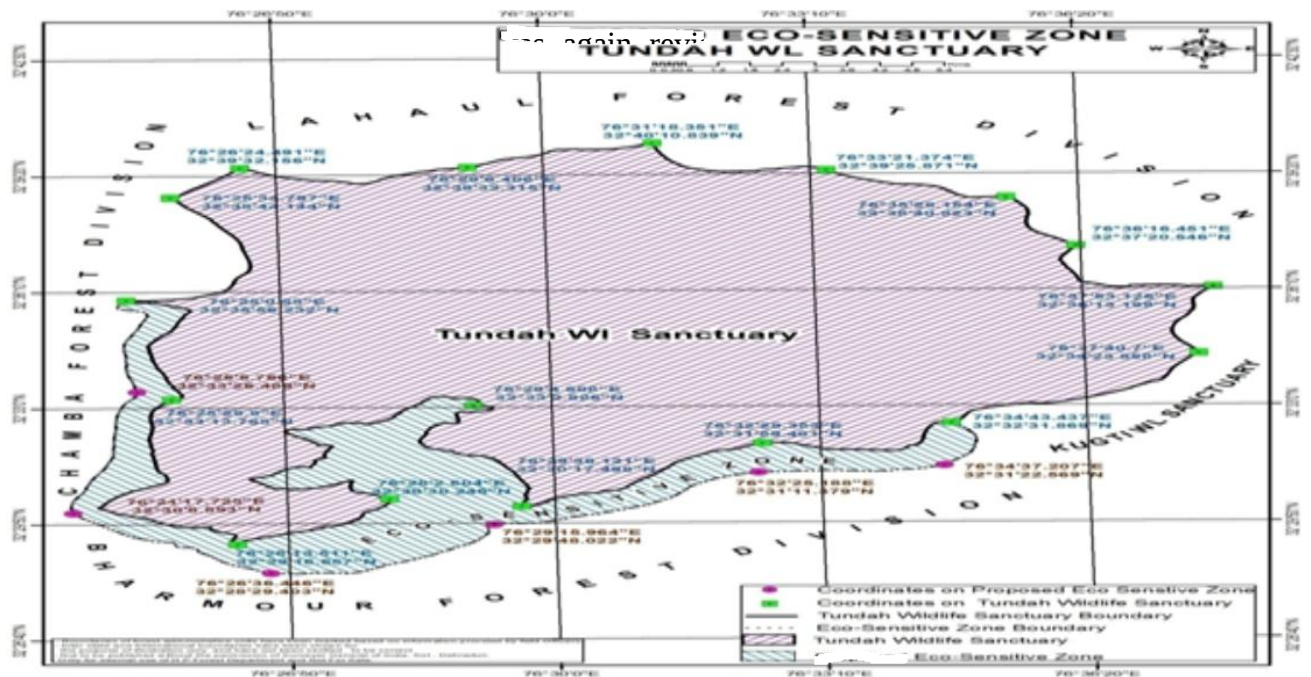
#### 1.1. NAME:

Tundah Wildlife Sanctuary is named after the Tundah village which falls in Bharmour Sub- Division. The sanctuary is situated within the Geo-coordinates:

**North** latitude  $32^{\circ}-40'-10''$  N and longitude  $76^{\circ}-31'-17''$  E,  
**East** latitude  $32^{\circ}-36'-15''$  N and longitude  $76^{\circ}-37'-52''$  E,  
**South** latitude  $32^{\circ}-29'-15''$  N and longitude  $76^{\circ}-26'-14''$  E,

**West** latitude  $32^{\circ}-30'-18''$  N and longitude  $76^{\circ}-24'-40''$  E.

The Sanctuary was notified during 1962 and as per this Notification the total area of this sanctuary



**MAP OF TUNDAH WILDLIFE SANCTUARY ALONG WITH ECO SENSITIVE ZONE**

## 1.2 LOCATION:

Tundah wildlife sanctuary is named after the Tundah village which falls in Bharmour Sub Division. It is located at a distance of 13 Km. from Dhakog, a place on Chamba- Bharmour main road. It is also approached from Bharmour via Sirdi and the distance is 26 Km from Bharmour up to Badgram from the where sanctuary starts.



| Sr. No    | Classification of Land       | Area in (Ha.)  | Land Use                                             |
|-----------|------------------------------|----------------|------------------------------------------------------|
| <b>A.</b> | <b>Govt. land.</b>           |                |                                                      |
| 1.        | Reserved Forests.            | 791.16         | Forest Area.                                         |
| 2.        | Demarcated Protected Forests | 2425.65        | Forest area                                          |
| 3.        | Dhars ( NDPFs)               | 3183.19        | Alpine pastures including permanent snow bound area. |
|           | <b>Total</b>                 | <b>6400.00</b> | -                                                    |

The forest wise detail of the area existing in the sanctuary is given in **Annexure-II**.

#### 1.4 APPROACH AND ACCESS:

The sanctuary can be approached from two sides. The main motorable road which takes to the sanctuary is Chamba-Bharmour road. One approach starts from Dhakog which falls on the Chamba Bharmour road at a distance of 43 Kms. from Chamba towards Bharmour. At this point there is a Bridge by which one can cross over Ravi River and after crossing there is a steep climb of 13 Kms up to Tundah. One Forest Rest House is also located here.

The second approach is to go by Chamba – Bharmour motorable road up to Dadma which is about 57 Kms from Chamba. From this point a kachha jeep able road takes off. This road after reaching the Budhil River crosses over to other side and then again a steady gradient takes it to Badgram village, there is one rest house at Bhadram. Then after the inspection path and bridal path further lead to the interior of the sanctuary. Thus the approaches can be identified as under:-

| Place From         | To      | Nature of approach | Length  |
|--------------------|---------|--------------------|---------|
| <b>Approach-I</b>  |         |                    |         |
| (i) Chamba         | Dakog   | Motorable road     | 43 Kms. |
| (ii) Dakog         | Tundah  | Motorable road     | 13 Kms  |
| (iii) Tundah       | Banni   | Motorable road     | 8 Kms.  |
| (iv) Banni         | Bhadra  | Bridal Path.       | 6 Kms.  |
| (v) Banni          | Thanala | Inspection Path.   | 8 Kms   |
| <b>Approach-II</b> |         |                    |         |
| (i) Chamba         | Dadma   | Motorable road.    | 57 Kms. |
| (ii) Dadma         | Badgram | Motorable road.    | 25 Kms. |
| (iii) Badgram      | Bhadra  | Inspection Path    | 6 Kms   |
| (iv) Bhadra        | Kathla  | Inspection Path    | 5 Kms.  |

The sanctuary remains accessible during the summer where as during winter the roads and bridal path get damaged / blocked due to heavy snow fall/ Landsliding thereby interrupting the access. The most suitable season to visit sanctuary is from May to June and August to October.



## 1.5 STATEMENT OF SIGNIFICANCE:

### 1.5.1 Conservation Values:

Situated in the Western Himalayan region which is considered as one of the biodiversity hotspots, the Tundah Wildlife Sanctuary is covered with well preserved tracts of Temperate forests, Alpine forest, meadows and grasslands. The Sanctuary is extremely rich in both floristic and faunal biodiversity harbouring endangered and endemic species. The sanctuary is important from the point of view that it exhibits a very good habitat for the animals like Ghoral, Himalyan Tahr, Brown bear, Muskdeer, Ibex and birds such as Monal, Snow Cock, Chir Pheasant, koklas etc. All the above listed species falls under schedule I, Part-I of Wildlife Protection Act, 1972. The Sanctuary is part of the catchment area of River Ravi, which is the life line for the down stream population. Consisting of dense temperate forests, alpine forest, grassland and meadows the Sanctuary is extremely important for maintenance of ecological balance and soil and moisture conservation. The area of Tundah Wildlife Sanctuary together with the areas Kugti Wildlife Sanctuary, Dhauladhar Wildlife Sanctuary, Nargu Wildlife Sanctuary and Khokhan Wildlife Sanctuary form a large contiguous area by a forest corridor which provides good shelter for many rare and endangered wildlife species.



### **1.5.2 Scientific, educational and recreational values:**

Since the Sanctuary is extremely rich in biodiversity it offers extensive opportunities for scientific study and research. It also offers considerable education value because of its richness in biodiversity and ecological processes. It offers great opportunities for trekkers, bird watchers and nature enthusiasts. Because of its proximity to the famous Banni temple, the Sanctuary has high potential for developing eco-tourism. The Sanctuary has Biological, ecological, hydrological, cultural and natural values and it is well buffered by the surrounding territorial forests.

### **1.5.3 Cultural and Religious Values:**

There is a famous temple named as Banni Mata which is located at Banni village 8 Kms from Tundah and 6 Kms from Badgram is visited by many pilgrims of H.P. and other states. It is not only a religious place for the locals but also is an attraction for the outsiders. This temple mythologically traces back its origin to a place known as Chharola where from the deity is believed to have come down to this village. So it has been a place of worship and great cultural and

religious significance. Apart from this, there are many small temples inside the sanctuary, it is also necessary to mention here that the local deities also help a lot in forest conservation.



**Banni Mata Temple**

## CHAPTER –II

### BACK GROUND INFORMATION AND ATTRIBUTES.

#### 2.1 BOUNDARIES:

The Tundah Wildlife Sanctuary is Situated between Geo- coordinates: **North** latitude 32°- 40'-10" N and longitude 76°-31'-17" E, **East** latitude 32°- 36'-15" N and longitude 76°-37'-52" E, **South** latitude 32°- 29'-15" N and longitude 76°-26'-14" E, **West** latitude 32°- 30'-18" N and longitude 76°-24'-40" E. The Tundah Wildlife Sanctuary falls under the administrative control of Wildlife Division Chamba. The limits of the Tundah Wildlife Sanctuary as per the latest Notification after rationalization is FFE-B-F(6) -11/2005-II/Tundah WLS dated 07.06.2013 under Section 26(A) of the Wildlife (Protection) Act,1972 is as under-

**NORTH:** From Ridge point 5495 mtr height to point 5507 mtr height up to Kalicho Pass at point 4999 mtrs height along the boundary of Lahul and Spiti District.

**EAST:** Form Kalicho pass at point 4999 mtr height to point 5688 mtr to 5783 mtr up to Badakanda at point 5857mtrs

**SOUTH:** From Badakanda at point 5857 mtrs to Chho nalla to point 2829 mtr to 2865 mtr up to Bhadra Nalla to point 2275 mtr 2637 mtrs along boundary of Silpari PF to point 3094 mtr then along the boundary of Tundah PF and Gowar Pf to thalla Nalla up to point 3719 mtrs.

**WEST:** From point 3719 mtrs to 3684 mtrs to 3978 mtrs to 4892 mtrs to 5355 mtrs up to point 5495 mtrs all along the ridge

**The Total Area of sanctuary is 64 Sq KM.**

##### 2.1.1 The Eco-sensitive Zone:

The Eco-sensitive Zone of Tundah Wildlife Sanctuary was notified by Ministry of Environment, Forests and Climate Change New Delhi vide Notification No. S.O. **394]** (E) dated: 1<sup>st</sup> February, 2022

(1) The Eco-sensitive Zone shall be to an extent of zero to one kilometres around the boundary of Tundah Wildlife Sanctuary and the area of the Eco-sensitive

zone is 46.74 square kilometres and the zero extent of Eco-sensitive Zone towards Northern and North Eastern side is due to presence of district boundary of Lahul and Spiti exhibiting snow bound mountains with glaciers and inaccessible terrains.

(2) The boundary description of the Tundah Wildlife Sanctuary and its Eco-sensitive Zone is appended as **Annexure-XVII**.

(3) The maps of the Tundah Wildlife Sanctuary demarcating Eco-sensitive Zone along with boundary details and latitudes and longitudes are appended as **Annexure-XVII**,

(4) Lists of geo-coordinates of the boundary of the Tundah Wildlife Sanctuary and Eco-sensitive Zone are given in **Annexure-XVII**

(5) The list of villages falling in the Eco-sensitive Zone along with their geo co-ordinates at prominent points is appended as **Annexure-XVII**

## **2.2 GEOLOGY ROCK AND SOIL:**

The hill ranges usually lie in the east west direction with some local variation. Schists are very common and occur in different forms such as Shale's, Slates, Gneisses, Argillaceous clay etc. Underlying rocks are Granite and Gneiss almost uniform in character. Rock system in general, is unstable and of friable nature. Sub soil in the Ravi Valley is fairly hard, generally Argillaceous Shale. Soil beads inverse proportion to the slope. On southern aspects soil tends to be shallow and dry with rock out crops.

## **2.3 TERRAIN:**

Sanctuary lying in the middle Himalayas has basically a difficult terrain with steeply rising rock precipices interspersed with some moderately steep and occasional plateau like alpine pasture. Physiography in the Park varies from gentle Riverine to Steep rocky. The lofty peaks with number of ridges, valleys, depression, saddle and spurs are the characteristic grandeur of the area.

## **2.4 CLIMATE:**

### **2.4.1. RAINFALL PATTERN AND DISTRIBUTION:**

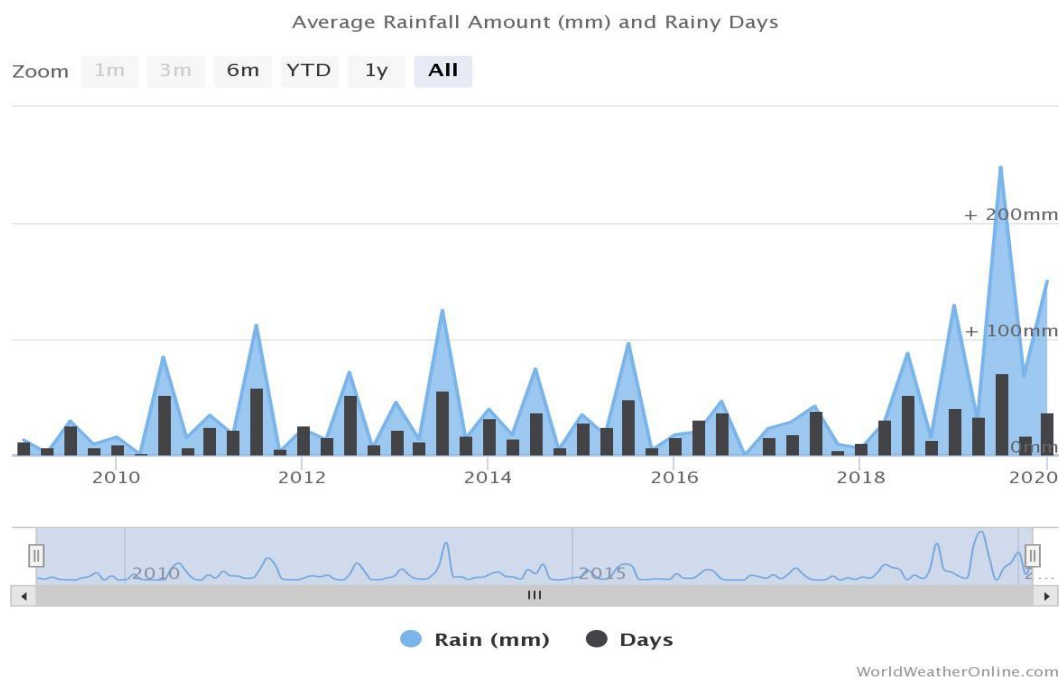
The area acquires greater proportion of precipitation in the form of rain / snow during the winter season. The monsoon rains also occur during July August also.

## 2.4.2 RAINFALL:

The sanctuary experiences greater proportion of precipitation in the form of rain/snow during the winter season. The monsoon rains do occur but the quantum of rain is very less. The data rainfall and snowfall collected from the nearest metrological stations from the Tundah Wildlife sanctuary is tabulated as under: -

**Name of Station: - Tundah.**

**Elevation:-**



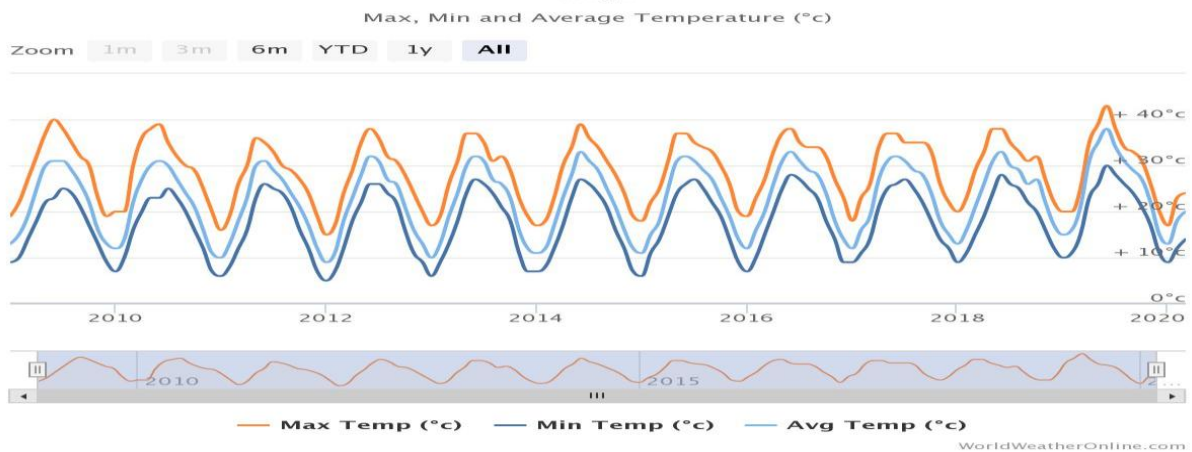
## SNOW FALL:

Thus the average annual rainfall and snowfall for last 7 years works out to be 320.02 mms and 168.95 Cms respectively. The bulk of precipitation falls in the form of snow and sheet in the months of November to February and rainfall occurs in the months of July to August.

## 2.4.3 TEMPERATURE:

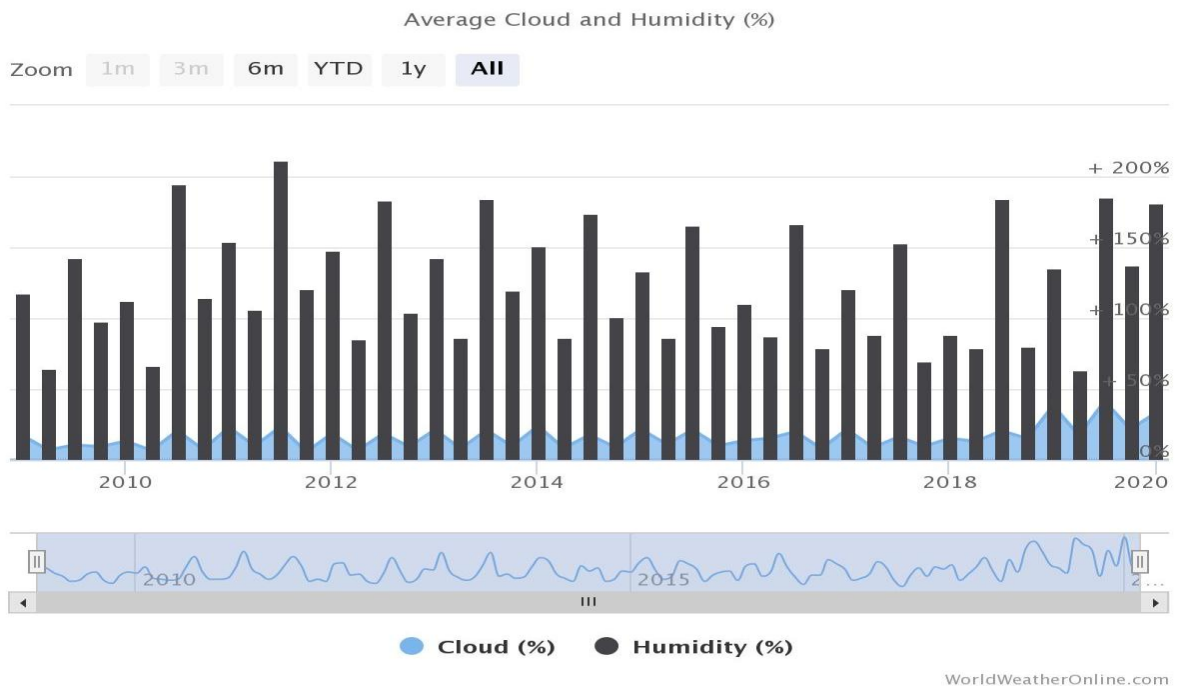
It is primarily the temperate conditions which prevail in this region. Temperature goes down considerably during winter. Sub zero conditions touching  $-10^{\circ}$  are not rare during the winter season. During summer months, however, the weather

normally remains clear with quite equable temperatures which may go up to 25<sup>0</sup>.



#### 2.4.4 HUMIDITY:

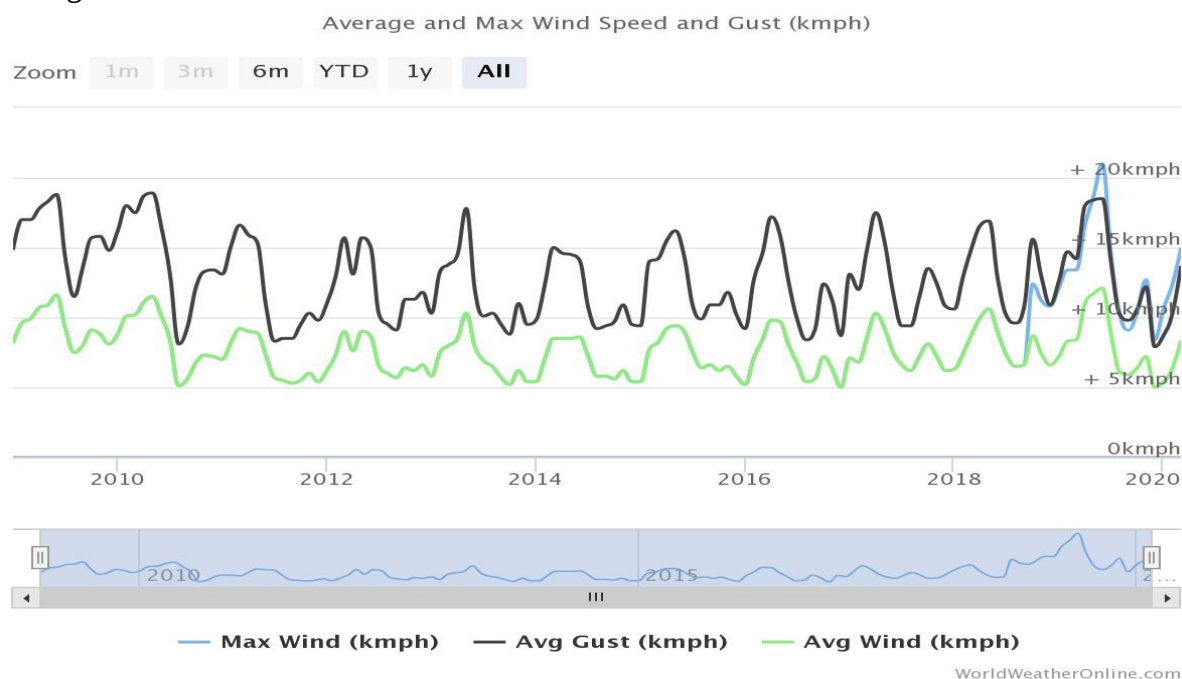
Atmospheric humidity increases during the winter season. Otherwise the humid conditions rarely prevail with very little turbidity in the atmosphere.



#### 2.4.5 WIND:

Light wind of 6-11 Km / hr velocity can be generally felt in the area. On rare occasions particularly during winter there may be some gentle to moderate winds ranging from 12-29 Km / hr. These chilly winds are generally experienced along Nallas

when glaciers come down with a disastrous affect.



#### 2.4.6 DROUGHT:

Droughts occur during April – May and early June and again during October – November. Normally such droughts come as routine weather conditions and do not have any noticeable influence on the vegetation or water supply. It is only during occasional prolonged droughts when the young regeneration gets adversely affected. The perennial streams and water bodies are not much affected. However, the cultivated crops suffer damage on this account.

#### 2.5 WATER SOURCES:

The area is endowed with perennial streams / nallas and small water bodies. These are mainly snow fed and receive large quantities of water from the melting of high level snow during the hot weather.

The main Nallas / streams in the sanctuary flowing down to Ravi river are as under:-

| Sr. No. | Name of Resource / Nalla |
|---------|--------------------------|
| 1       | Chhoo Nalla.             |
| 2       | Kuthari Nalla            |
| 3       | Raskund Nalla.           |
| 4       | Talnu Nalla              |
| 5       | Gaj Nalla                |
| 6       | Bhansar Nalla            |
| 7       | Charola Nalla            |
| 8       | Thanala Nalla            |

|    |                      |
|----|----------------------|
| 9  | Banni/Mahdedh Nalla. |
| 10 | Jaled Nalla          |
| 11 | Mandha Nalla.        |
| 12 | Kuthal Nalla         |
| 13 | Tundah Nalla.        |
| 14 | Diggu-Ki-Dalli       |

Besides these there are few prominent water bodies in the wildlife sanctuary (Enclosed **Annexure-III**). Some species of fishes are definitely available in these Khadds but the same have not been identified. The source of runoff water is snow; as such there are sufficient reasons for the rearing of Trout fish.

## **HABITAT ATTRIBUTES, RANGE OF WILD LIFE DISTRIBUTION AND STATUS:**

### **2.6 BIO-GEOGRAPHIC CLASSIFICATION:**

Biogeographically, the area falls into Trans Himalayan Zone.

### **2.7 HABITAT ATTRIBUTES, RANGE OF WILDLIFE DISTRIBUTION AND STATUS:**

The floral and faunal diversity with respect to altitudinal zone of the Sanctuary is as under-

| Altitudinal Range<br>(in meters) | Flora                                                                                                                                                                                                                                                                                                                                                                                              | Fauna                                                                                                                                                                                                                                                                                                 |
|----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 2000–2800<br><br>Temperate Zone  | <i>Abies pindrow</i> ,<br><i>Cedrus deodara</i> ,<br><i>Picea smithiana</i> ,<br><i>Taxus wallichiana</i> ,<br><i>Pinus wallichiana</i> , ,<br><i>Aesculus indica</i> ,<br><i>Corylus colurna</i> ,<br><i>Acer pictum</i> , ,<br><i>Juglans regia</i> ,<br><i>Prunus persica</i> ,<br><i>Prunus cornuta</i> , <i>Rhamnus virgatus</i><br><i>Berberis lyceum</i> ,<br><i>Desmodium gingeticum</i> , | ASIATIC BLACK BEAR<br><i>Ursus thibetanus</i><br>COMMON LEOPARD<br><i>panthera pardus</i><br>GORAL<br><i>Nemorhaedus goral</i><br>YELLOW THROATED MARTEN<br><i>Martes flavigula</i><br>COMMON LANGUOR<br><i>Presbytus entellus</i><br>HIMALAYAN GREY LANGUR<br><i>Semnopithecus ajax</i><br>PORCUPINE |

|                                     |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                           |
|-------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                     | <i>Indigofera</i> ,<br><i>Morchella esculent</i><br><i>Vivurnum erubescens</i> , <i>Fagopyrum</i><br><i>esculentum</i> , <i>Fragaria vesca</i> ,<br><i>Polygonum capitata</i> ,<br><i>Rumex nepalensis</i>                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | <i>Hystrix indica</i><br>MONAL<br><i>Lophophorous impejanus</i><br>KOKLAS<br><i>Pucrasia macrolopha</i><br>CHEER<br><i>Catreus wallichii</i>                                                                                                                                                                                                              |
| 2800–3300<br><br>Upper<br>Temperate | <i>Abies pindrow</i> ,<br><i>Cedrus deodara</i> ,<br><i>Picea smithiana</i> ,<br><i>Pinus wallichiana</i> , <i>Prunus persica</i> ,<br><i>Prunus cornuta</i> , <i>Rhamnus virgatus</i><br><i>Quercus semecarpifolia</i> ,<br><i>Betula utilis</i> ,<br><i>Rhododendron companulatum</i><br><i>Rubus</i> ,<br><i>Morchella esculent</i><br><i>Cotoneaster bacillaris</i> , <i>Indigofera</i><br><i>heterantha</i> , <i>Viburnum</i> , <i>erubescens</i> ,<br><i>Sarbococca</i> , <i>Rosa</i> ,<br><i>Juniperus recurva</i><br><i>Berberis</i> , <i>Lycium</i> ,<br><i>Artemisium</i> ,<br><i>Viola</i> ,<br><i>Valeriana</i> ,<br><i>Fragaria</i> ,<br><i>Rumax nepalensis</i> , etc. | GORAL<br><i>Nemorhaedus goral</i><br>HIMALAYAN BROWN BEAR<br><i>Ursus arctos</i><br>HIMALAYAN GREY LANGUR<br><i>Semnopithecus ajax</i><br>SIBERIAN WEASEL<br><i>Mustela sibirica</i><br>ROYLE’S PIKA<br><i>Ochotona roylei</i><br>KOKLAS<br><i>Pucrasia macrolopha</i><br><br>CHEER<br><i>Catreus wallichii</i><br>MONAL<br><i>Lophophorous impejanus</i> |
| 3300–3600<br><br>Subalpine<br>Zone  | <i>Rhododendron companulatum</i> ,<br><i>Betula utilis</i> ,<br><i>Juniperus communis</i> ,<br><i>Iris kemaonensis</i> and<br><i>Trifolium repens</i> etc.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           | HIMALAYAN BROWN BEAR<br><i>Ursus arctos</i><br>MUSKDEER<br><i>Moschus moschieferus</i><br>HIMALAYAN IBEX<br><i>Capra ibex</i> ,<br>HIMALAYAN THAR<br><i>Hemitragus jemlahicus</i><br>HIMALAYAN BLUE SHEEP<br><i>Pseudois nayaur</i><br>SNOW LEOPARD<br><i>panthera uncia</i> .<br>MONAL<br><i>Lophophorous impejanus</i>                                  |

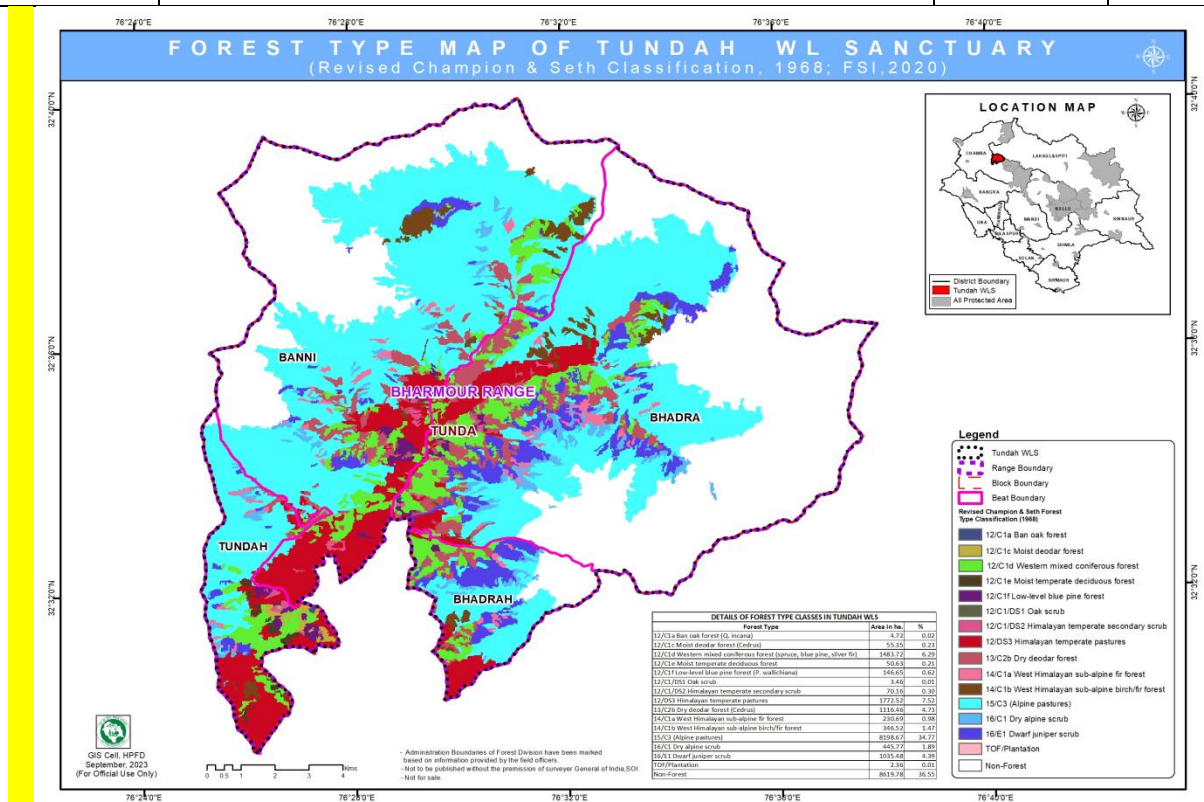
|                          |                                                                                                                                                                                                                                      |                                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                          |                                                                                                                                                                                                                                      | CHUKAR<br><i>Alectoris chukar</i><br>SNOW COCK<br><i>Tetraogallus himalayensis</i><br>SNOW PARTRIDGE<br><i>Lerwa lerwa</i>                                                                                                                                                                                                                                                                                  |
| >3600<br><br>Alpine Zone | <i>Jurinea macrocephala</i> (Dhoop),<br><i>Aconitum heteroplyllum</i> (Patis),<br><i>Picrorhiza Kurrooa</i> (Kaur),<br><i>Sassurea lappa</i> (Kuth),<br><i>Viola odorata</i> (Banafsha),<br><i>Valeriana – wallichii</i> (Muskwala). | HIMALAYAN BROWN BEAR<br><i>Ursus arctos</i><br>MUSKDEER<br><i>Moschus moschieferus</i><br>HIMALAYAN IBEX<br><i>Capra ibex</i> ,<br>HIMALAYAN THAR<br><i>Hemitragus jemlahicus</i><br>HIMALAYAN BLUE SHEEP<br><i>Pseudois nayaur</i><br>SNOW LEOPARD<br><i>panthera uncial</i><br>CHUKAR<br><i>Alectoris chukar</i><br>SNOW COCK<br><i>Tetraogallus himalayensis</i><br>SNOW PARTRIDGE<br><i>Lerwa lerwa</i> |

## 2.8 FOREST TYPES:

According to the classification of Revised Champion & Seth, the forests of the Sanctuary are categorized into the following forest types: -

| Sr. No. | Forest type                                                            | Area    | Percentage |
|---------|------------------------------------------------------------------------|---------|------------|
| 1       | TOF/Plantation                                                         | 2.36    | 0.01       |
| 2       | 12/C1d Western mixed coniferous forest (Spruce, blue pine, silver fir) | 1483.72 | 6.29       |
| 3       | 13/ C2b dry deodar forest(Cedrus)                                      | 1116.46 | 4.73       |
| 4       | 16/E1Dwarf Juniper scrub                                               | 1035.48 | 4.39       |
| 5       | 14/C1b west Himalayan sub- alpine birch/fir forest                     | 346.52  | 1.47       |
| 6       | 12/C1e Moist temperate deciduous forest                                | 50.63   | 0.21       |
| 7       | 14/c 1a west Himalayan sub- alpine fir forest                          | 230.69  | 0.98       |
| 8       | 12/C1f Low level blue pine forest                                      | 146.65  | 0.62       |

|    |                                              |         |       |
|----|----------------------------------------------|---------|-------|
| 9  | 12/C/DS2 Himalayan temperate secondary scrub | 70.16   | 0.30  |
| 10 | 12/C1c Moist deodar forest                   | 55.35   | 0.23  |
| 11 | 12/DS3 Himalayan temperate pastures          | 1772.52 | 7.52  |
| 12 | 12/C1/DS1 Oak scrub                          | 3.46    | 0.01  |
| 13 | 12/C1a Ban oak forest (Q.leucotricophora)    | 4.72    | 0.02  |
| 14 | 15/C3 (Alpine pastures)                      | 8198.67 | 34.77 |
| 15 | 16/C1 Dry alpine scrub                       | 445.77  | 1.89  |
| 16 | Non forest                                   | 8619.78 | 36.55 |

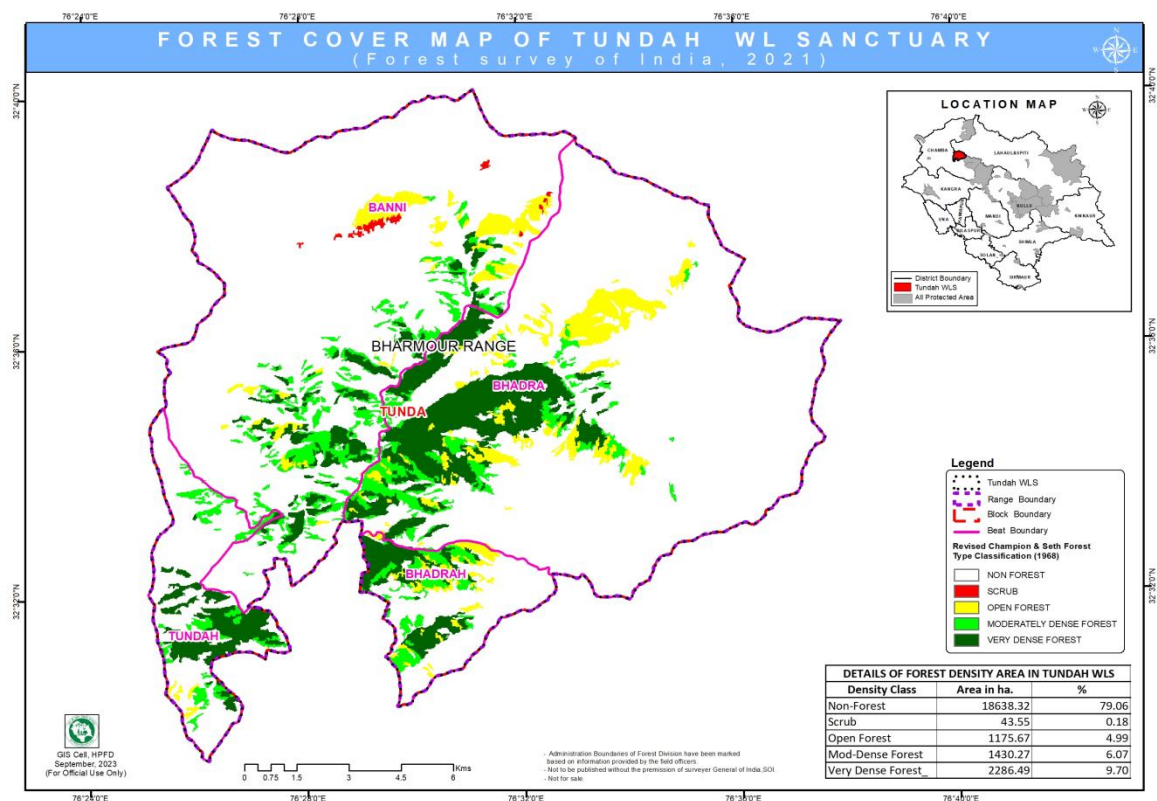


## 2.9. COVER:

The sanctuary has fairly close forest canopy of mixed coniferous species in the lower elevation where as the higher altitudes as described under forests type are mainly alpine pastures. There is a good interface of the blanks and the forested area. This provides ideal shelter to different animals and bird species.

| Sr. No. | Classification          | Area (In Ha) | %    |
|---------|-------------------------|--------------|------|
| 1       | Very Dense Forest       | 2286.49      | 9.70 |
| 2       | Moderately Dense forest | 1430.27      | 6.07 |

|   |             |          |       |
|---|-------------|----------|-------|
| 3 | Open Forest | 1175.67  | 4.99  |
| 4 | Scrub       | 43.55    | 0.18  |
| 5 | Non Forest  | 18638.32 | 79.06 |



## 2.10 FOOD FOR WILD ANIMALS:

The vegetation of varied nature offers plenty of food for the wild animal. Some fruit bearing tree species like *Juglans regia*, *Aesculus indica*, *Prunus persica*, *Prunus padus*, *Pyrus pashia*, *Quercus spp.*, *Berberis aristata*, Wild Cherry, *Cotoneaster* etc. are the staple diet of the Wild animals. Some animals like Himalayan Brown Bear and Asiatic Black Bear prefer the fruits of *Prunus persica*, *Prunus cornuta*, *Rhamnus virgatus*, *Berberis aristata* and *Viburnum cotinifolium* as their food. Other plants or their parts consumed by them are *Rumex nepalensis*, *Fagopyrum esculentum*, *Morchella esculent* and, *Fragaria nubicola*, which are found in good number in this sanctuary. Herbivorous consume many varieties of grasses, herbs and fodder plants and mainly venture into the vast expanse of pasture. The prey and predator relationship exists in the different species of wild animals.

## **CHAPTER- III**

### **HISTORY OF MANAGEMENT AND PRESENT PRACTICES**

#### **3.1 GENERAL:**

The general history of the forests prior to the annexation of Punjab by the British Government in the year 1849 of which present day Tundah Wildlife Sanctuary of Chamba District was a part, is practically unknown. It is presumed that no large scale fellings for export purpose had been carried out and only petty felling by the adjoining villagers might have taken place to meet the bonafide requirements. Subsequently, in the year 1851, an agreement between Raja of Chamba and Britishers was entered upon for delivering 10,000 logs annually to British Agent at Shahpur for the construction of barracks and other public utility works. This arrangement failed in the year 1854 due to obstruction in the Ravi River. Further, the Raja of Chamba made an arrangement in 1861 to sell standing trees direct to the British Govt. but it also lasted up to 1864. In May, 1864 the forests were again leased to the British Govt. for a period of 99 years subject to renewal of the rules every after 20 years.

This lease was re-drafted in 1872 when a code of forest rules was added to it as a schedule. Under these rules, some of the forests were to be demarcated and declared as reserved forests. The demarcation of the forests was done at the option of Raja of Chamba and the British Govt assumed the exclusive control of Reserve Forests whereas the other forests were managed by the Chamba State for the benefit of the Ruler and for the supply of privileges to local people, as they were entitled to subject to the condition that no trees were exported for sale from these forests. The demarcation and settlement work of the present day Reserve Forests of Bakloh, Dalhousie, Upper Chamba, Bharmour and Trehta Ranges was completed in 1879-82. The lease of the Reserve Forests was revised in 1886 and 1905. On 1<sup>st</sup> April, 1908, the British Government restored the management of these forests to His Highness, the Raja of Chamba on experiment basis for a period of five years in the first instance on certain conditions. All the Reserve Forests were finally handed over back to Raja of Chamba in the year 1913 and the lease was cancelled. The Reserve Forests were placed under the control of Conservator of Forests and the State's Revenue Forests remained under the control of Superintendent of Forests. The two units functioned independently except that the Conservator of Forests acted as an advisor to the Superintendent of Revenue Forests.

After independence in 1947, Chamba State was merged in Civil District of Chamba as a part of Himachal Pradesh under Govt of India. The forests of Chamba District were divided into two forest divisions i.e. Churah and Chamba.

The first working plan for the Reserve Forests of Upper Ravi valley was prepared by D' Arcy in 1885 which came into operation w.e.f. 1886-87. This plan was revised by Mc. Intire. Trevor's Plan remained operative during the period 1911 to 1924. This Plan was followed by Khosla's Plan which became operational in 1928 and expired in 1952. Mr.

Gaur compiled working plan for the period 1954-55 to 1968-69. This was followed by R.C. Sharma's working plan for the period 1969-70 to 1983-84. Sharma's working plan covered present Dalhousie Forest Division, Bharmour Forest Division, Chhatrari Range of Chamba Forest Division and area transferred to Wildlife Division Chamba including Tundah Wildlife Sanctuary.

Bharmour Forest Division was created in 1984 and there was no working plan for the forests of this division for the period 1984-85 to 2003-04. However, the forests were being managed under the expired working plan of Shri R.C.Sharma. Shri Avtar Singh, IFS, prepared the working plan of Bharmour Forest Division for the period 2004-05 to 2019-20 which was approved during the year 2003-04. This plan excludes the forests falling in two sanctuaries of Bharmour Forest Division i.e. Tundah and Kugti. In working plans mentioned above there was no specific activity adopted for the management of wildlife except general protection provided to the wildlife under Wildlife (Protection) Act, 1972.

However, plantations have been raised under various center and state schemes and soil conservation measures carried out in different years did help in the improvement of habitat for wild animals in the sanctuary.

## **T.D. SHARMA'S MANAGEMENT PLAN**

This was the first ever effort to manage the wildlife in Tundah Wildlife Sanctuary scientifically for the period 1994-95 to 2003-04. Special emphasis was laid on habitat management, protection; pasture improvement, eco- development, eco- tourism and research and monitoring. As mentioned above, the control of the sanctuary remained with D.F.O. Wildlife Chamba up to February, 1997 and thereafter the sanctuary was again put under the control of Bharmour Forest Division (T) up to 31-03-2008. During this phase sanctuary was not managed scientifically or as per the prescriptions of management plan. From 1.4.2008 the administrative control of Tundah Wildlife Sanctuary was transferred to DFO wildlife Chamba and since then it is functioning under the control of DFO Wildlife Chamba.

### **3.2 TIMBER OPERATIONS:**

#### **3.2.1 EXPLOITATION OF FORESTS:**

The exploitation of forests for export purpose started during 1850 onwards. A considerable number of trees mostly deodar were removed up to 1860. 14443 nos. of trees are estimated to be felled between 1861 to 1864. Thereafter felling of moderate intensity took place up to 1885. The forests were further exploited under the provisions of various working plans which remained under operations from time to time. Further, a complete ban on commercial green felling was imposed in the state of H.P. Since 1983. However, dry, dead, diseased trees were being removed in salvage marking in the various forests of sanctuary. The

trees were also granted to the right holders for house construction in TD rights upto the 2003-04. The timber exploitation activity over the years has affected the wildlife due to loss of habitat and occasional poaching by laborers. With the pronouncement of judgment in a court case in IA No. 548 dated 12.02.2000, all activities of timber exploitation has been stopped.

### **3.3 MINOR FOREST PRODUCE COLLECTION:**

The collection and removal of minor forest produce was regulated under the Chamba Minor Forest Produce Exploitation and Export Act, 2003 and under section 41 and 42 of Indian Forest Act, 1927 and rules made there under from time to time. The extraction, purchase and export permits of the minor forest produce were issued after realizing prescribed fee/ royalty under the above rules by the competent forest officers. The minor forest produce was exported from the sanctuary during 1994-95 to 2003-04. Extraction and export of minor forest produce has now been stopped since 2004-05 with orders of Hon'ble Supreme Court of India.

### **3.4 LEASES:**

As there is no green felling or Salvage removal from the sanctuary area hence, no leases at present exist in the sanctuary.

### **3.5 OTHER PROGRAMMES AND ACTIVITIES:**

#### **3.5.1 HABITAT MANAGEMENT:**

The afforestation and pasture improvement activities by artificial sowing and planting of species beneficial to wildlife and suitable to the temperate climate have been carrying out. The detail of plantations raised upto 2021-22 with number of plants and species planted in the plantation areas is given as Annexure- IV

#### **3.5.2 PROVISION OF SALT LICKS:**

The provision of salt licks was also made on the suitable sites. The details of which is annexed as **Annexure –V**

#### **3.5.3 TREKKING ROUTES:**

There are already some trekking paths in the area, however, for a better study of flora, fauna and for better protection network, some more routes are required to be constructed. Detail of trekking routes is enclosed as **Annexure-VI**

### **3.5.4 CONSTRUCTION OF BUNKERS AND WATCH TOWERS:**

Bunkers help the staff in the adverse climate and for lodging during the night to keep watch against the poachers when they cannot come back to their headquarters. The wild animals also take shelter in the bunkers in the severe winter. Such shelters will provide commanding position in controlling the poaching of wild animals during adverse climatic condition / snow fall and will save the valuable wild life present in the area. Watch towers are essential components in detecting fires and control of poaching and Sighting of wild animals and latest status of their health, as well as keeping watch on the moments of suspicious elements. Attached as **Annexure-VII**

### **3.6 FOREST PROTECTION:**

#### **3.6.1 LEGAL STATUS:**

As the complete area 64 Sq. Km. has been declared as Wildlife Sanctuary. The complete area is also legally protected area as per Wildlife (Protection) Act, 1972. The legal status of forests is as under:

#### **RESERVE FORESTS :**

The Reserve Forests were constituted after demarcation during 1879-1882 and forest settlement was carried out simultaneously. Further Chamba State forests were declared as reserve forests. These forests were again revalidated as Reserve forests under The Indian Forest Act, 1927. The Reserve Forests constitute 791.16 hac. of area in the sanctuary. The forest wise detail is enclosed as **Annexure – II**

#### **DEMARCATED PROTECTED FORESTS:**

The old DPFs were demarcated and settled in 1912-15. Subsequently, these were declared as DPFs under section 29 of Indian Forest Act, 1927. Consequent upon the merger of states and formation of H.P. all the proprietary rights over forest area have been inherited by H.P. Subsequently, H.P. Govt. ordered that these forests stands demarcated, surveyed and rights determined and now these forests stand declared as Demarcated Protected Forests. The Demarcated Protected Forests and Dhars constitute an area of 5608.84 hac. The forest wise detail is given in **Annexure – II**.

#### **3.6.2 HUNTING:**

A complete ban on hunting of wild animals has been imposed under the Wildlife (Protection) Act, 1972 and further amendments of the above Act and rules framed

there under from time to time except as provided under special circumstances provided in the Act/rules.

### **3.6.3 POACHING AND OTHER ILLEGAL ACTIVITIES:**

#### **3.6.3.1 POACHING:**

Although no case of poaching in the sanctuary has been reported since last so many years, but this threat to the wild animals cannot be ruled out. As the sanctuary is located in remote area and during winter season when most of the families of Tundah village migrate towards Kangra and other areas and also the mobility of field staff is hampered due to excessive snowfall, possibility of occurring poaching cases is always there. The wild animals can become easy targets of poachers. It has been noticed that the villagers never inform the forest officers nor come forward to witness the poaching or other forest offences and become ignorant even if they know the commission of any offence. Besides providing effective patrolling mechanism during this period, the local people be educated regarding the importance of wildlife conservation.

#### **3.6.3.2 ILLEGAL FELLING OF TREES:**

No case of illicit felling on the record/reported since 2004-05 onwards.

#### **3.6.3.3 ILLICIT REMOVAL OF MINOR FOREST PRODUCE:**

There had been a systematic exploitation of minor forest produce under the Chamba Minor Produce Exploitation and Export Act 2003, and transit rules under section 41 & 42 of IFA, 1927. As local habitants are tribals and have liberal rights for exploitation of minor forest produce that time. Thereafter, the extraction of Minor Forest Produce has been banned now with the orders of Hon'ble Supreme Court of India. Whenever any case of illegal extraction of minor forest produce comes in the notice of field staff, action as per law is taken.

#### **3.6.3.3 ENCROACHMENT:**

No case of encroachment in the sanctuary has been reported since last seven years.

#### **3.6.3.4 OTHER ILLEGAL ACTIVITIES:**

Other illegal activities which are taken place are illegal grazing by the domestic and nomadic goats, sheep and cattle in the plantations and closed areas. A few instances of illegal lopping, removal of fuel wood in the forests have also been detected but by and large these offences are petty and action has been taken by the staff as per rules.

#### **3.6.4 LIVESTOCK GRAZING:**

The right to graze in all types of forests, except Reserve Forests is more or less unlimited and was being exercised for more than 125 years. In reserve forests, the number of cattle allowed to be grazed had been fixed but this regulation has seldom been enforced in the field. In the days of Rajas, people who used to herd cattle in excess of prescribed number had to pay fees in the shape of Ghareri to the State. This was an effective check on the tendency of rearing cattle over and above the maximum domestic requirement of a family. Since the abolition of this tax by H.P. Govt, the pressure on forests has increased considerably resulting in soil erosion particularly adjoining to the villages and also in the pasture areas. The hereditary, migratory and nomadic graziers had enjoyed grazing rights in the forests of sanctuary as per settlement rights and concession granted to them by the rulers of Chamba State. The number of sheep and goats allowed to graze in particular Dhars and forests was freezed to the enumeration carried out during the year, 1971-72. The number was further revised and freezed to the actual enumeration carried out during 1987-88. Thereafter, the Grazing Advisory Committee has allowed the number of sheep and goats and other cattle to graze as per actual enumeration. The dhars are more or less free from rights. The gaddies and gujjars were allowed to graze their cattle on payment of prescribed fee. With the pronouncement of judgment in a court case in IA No. 548 dated 12.02.2000, all activities including grazing have been prohibited in the sanctuary area without the prior approval of Apex Court. Despite of this ban nomadic graziers with their flock have been using their traditional route through sanctuary area to reach Lahaul and other areas. This is a serious issue as about one lakh sheep and goats cross sanctuary area twice in a year i.e. just after winter season and before onset of winter season. There is no alternate route available for them to reach Lahaul as Tundah wildlife sanctuary along with Tundah, Dhauladhar, Nargu and Khokhan wildlife sanctuaries form a contiguous patch of forests. Therefore, this issue needs to be addressed on higher priority and the matter be taken up with the government of Himachal Pradesh or any other appropriate forum.

#### **3.6.5 WILD FIRES:**

The chances of occurring forest fires are more in the winters before snowfall. During this period people from adjacent villages burn their grazing lands (Ghasnis) to have more grass in the coming season. Fire incidences also take place when nomadic graziers cross sanctuary area, although such incidences are rare. Regular patrolling along with deployment of fire watchers are carried out during both the summer and winter seasons. Construction of water bodies, cleaning of bridle paths, inspection paths are also done during the season. Besides this regular fire awareness campaigns/ workshops are also conducted to make people aware about the loss during forest fires. These activities help in combating with fire incidence. The list of fire prone areas is given as **Annexure-VIII**

### **3.6.6 INSECT ATTACK AND PATHOLOGICAL PROBLEM:**

No study in this regard has been carried out in the past. However from the field experience of the staff, it has been reported that no insect attack has taken place on the vegetation in the past. This is perhaps due to the existence of the sanctuary in the high mountains. However, the interaction between domestic cattle and wild animals cannot be ruled out, which may result into some contagious diseases. But this aspect has not been ascertained yet. Remains of salt given to the domestic live stock in the pastures may act as a carrier of some pathogenic disease to the wild animals if they lick that salt.

### **3.7 TOURISM:**

Due to lack of publicity about the area, this area is practically untouched from tourism point of view. Although a number of pilgrims visit Chadola mata temple every year and they use the trek which is inside the sanctuary area. Efforts are being made to develop eco tourism in this area. Eco-tourism society/ committee are also being formed to involve local people in eco tourism activities.

### **3.8 RESEARCH MONITORING AND TRAINING:**

#### **3.8.1 RESEARCH AND MONITORING:**

Although some research works have been published by research scholars/ institutes, but that is not suffice in itself for the management of the sanctuary. Neither research on the issues required for better management of sanctuary nor regular training have been done so far in this sanctuary area. However, in house trainings for field staff have been undertaken. The works executed in the sanctuary are regularly being monitored by different level of forest officers as per protocol. Until and unless there is sufficient research data and information regarding the schemes to be implemented is available, the success cannot be achieved. The very basics of the subject matter viz a viz topography, climatic condition, flagship wildlife species, associates, migratory origin wildlife, predators, preys, all types of invertebrates and vertebrates including reptiles, birds, amphibians, insects, various types of flora of the area and the choice of species for different wild animals species, carrying capacity of the area, eco system services provided by the area, adaptability of the habitat to the wild animals, infrastructure available for the managerial staff in the sanctuary area and their effectiveness as well as professional skills / excellence etc. are some of the basics for research monitoring and subsequent training.

### **3.8.2 TRAINING:**

#### **ON JOB TRAINING:**

To manage ecosystem with the basic purpose of wildlife management is a highly technical subject. Wildlife is a dynamic component of the ecosystem, which requires a well-trained forester to comprehend, appreciate and manage. It is highly imperative that short trainings, in house trainings, refresher courses, exposure visits etc. for the field staff are made a regular feature, so that they keep abreast with the latest developments regarding different management techniques.

#### **FORMAL TRAINING COURSES:**

Regular training courses being conducted at Wildlife Institute impart a useful technical knowhow. The officers/officials dealing with the wildlife management will be trained. Besides this, to acquaint with the latest management techniques adopted in different states/ countries, short training will be arranged for the officers and field staff.

### **3.9 WILDLIFE CONSERVATION STRATEGIES AND THEIR EVALUATION:**

#### **3.9.1 AWARENESS PROGRAMME:**

The approach with respect to conservation of wildlife is mainly by way of ensuring effective protection against poaching. A special campaign for educating the people through nature awareness programmes, guided tours and telling them the significance of wildlife conservation is required to be taken up every year. The field staff of the sanctuary has been carrying out awareness campaign among mass but more emphasis is needed to make people understand about the basic values of eco system services, wildlife conservation and other benefits, which they are getting from the area.

#### **3.9.2 PASTURE IMPROVEMENT:**

The sanctuary has a vast area under alpine pastures, which is visited by the migratory as well as hereditary graziers during the summer every year. Although the Hon'ble Supreme Court of India prohibited many activities including grazing in the sanctuary, yet the problem of grazing is yet to be settled, as the rights of migratory graziers have not been settled. It will take some time to sort out the problem. The pasture improvement activities had been taken up in the past in a limited way and it need to be extended further with removal of unpalatable grasses and bushes selectively for the protection and dissemination of indigenous grasses scientifically and execution of soil conservation measures in the slips and nallahs.

### **3.9.3 CATTLE TREATMENT & VACCINATION:**

Inoculation against possible cattle diseases is required for the domestic cattle, sheep and goats passing through the sanctuary during the migratory period. The inoculation is carried out by the Animal Husbandry department as per norms. However, it needs to be ensured that the inoculation has been carried out from time to time at the main entrance points in the sanctuary and provision is required to be made and kept at the disposal of the Animal Husbandry Department so that the infection does not spread to the wild animals.

Tundah Wildlife Sanctuary has a number of alpine pastures which are the grazing grounds of migratory graziers during the summer season. These grounds are grazing grounds for numerous domestic animals like cow, sheep and goat. While during their stay, these animals become easy prey for carnivorous animals and their excreta gets mingled with grass, water etc. which is ultimately consumed by wild animals. In this way diseased animals can spread diseases in the wild population.

All migratory animals are inoculated against common diseases to ensure that they are disease free. Adequate funds need to be provided to the animal Husbandry Department well in time for inoculating such animals before they enter the sanctuary.

### **3.9.4 CONSTRUCTION OF BRIDLE PATHS AND BUNKERS:**

The larger portion of the sanctuary is inaccessible and located in high mountainous altitudes. Moreover, it is very far from field staff headquarters and they cannot come back to their residences in the evening. For proper monitoring and vigilance of wildlife, it is necessary to have paths and shelters at appropriate places during patrolling in the sanctuary. The natural sites like caves and overhangs can be improvised in the shape of bunkers where the staff can halt for the night. The paths and bunkers need to be maintained every year as these are damaged and blocked with debris due to the heavy snowfall during the winter season. **Enclosed as Annexure -15**

### **3.9.5 ENGAGEMENT OF WILDLIFE WATCHERS/ INFORMERS :**

The field staff has been carrying out the protection and management duty of the sanctuary. However, during the summer season, the graziers pass through the sanctuary to their grazing runs. More vigil is required for the protection of wildlife. Moreover, the Forest Guard of the beat cannot go to the forest in the high alpine pastures alone during emergency. He has to have at least two /three persons with him to go on raid or otherwise for patrolling and other duty in the remote and inaccessible areas. The persons from the adjoining villages with a view of wildlife conservation attitude can be engaged as watchers in the sanctuary. Their services can also be utilized for launching awareness campaign regarding wildlife conservation and its importance. This will also generate employment potential to the villagers.

### **3.9.6 PROHIBITION OF WEAPONS:**

There is a complete ban on carrying of weapons inside the sanctuary area. The necessary sign boards of prohibited activities are already in place. However further awareness shall be taken up regularly

### **3.9.7 CENSUS:**

The census of the rare and endangered species especially and other important wild animals and birds in general is a must to monitor their population in the wild. Census techniques are not available for all the species. However, the Wildlife Institute of India, Dehradun can be requested to evolve the census methodology and provide training to the field staff so that the process can be completed at least once in year after the melting of snow. The regular survey and census will help in maintaining or amending the management practices. It must be ensured that a time schedule for census and its methodology be prepared and the census be conducted as per census schedule each year.

### **3.10 ADMINISTRATIVE SET UP:**

The sanctuary is being managed by Divisional Forest Officer, Wildlife Division Chamba. There is one Range Forest Office (Wildlife) posted at Bharmour, who supervises two Wildlife Sanctuaries viz Tundah & Tundah both in the tribal area. The Tundah Wildlife Sanctuary has been divided into one block and Four beats. The Deputy Ranger at Tundah is the incharge of forest block (whole sanctuary area) and Four Forest guards (incharge of each beat) posted at Tundah, Banni, Bhadra and Badgram Beats. The administrative set up of the sanctuary is given as under:-

| <b>Designation of the Forest Officer</b> | <b>No.</b> | <b>Headquarter</b>                      |
|------------------------------------------|------------|-----------------------------------------|
| D.F.O.                                   | 1          | Chamba.                                 |
| A.C.F.                                   | 1          | Chamba                                  |
| Range Forest Officer                     | 1          | Bharmour.                               |
| Block Officer                            | 1          | Tundah                                  |
| Forest Guards                            | 4          | Tundah, Banni, Bhadra and Badgram Beats |
| Forest Guard                             | 1          | Special duty in Range office            |
| Peon/ Chowkidar                          | 2          | FRH Tundah and Tripna                   |

### **3.11 COMMUNICATION:**

For better management and strengthening the Wildlife protection measures, it is imperative to have an efficient communication system. Tundah Wildlife Sanctuary is connected to road upto Tundah village. For patrolling and to supervise other development

works, one has to go on foot, as there is no road connectivity in the sanctuary. As far as the telephone and other mobile communication are concerned, there is no telephone connectivity except manual delivering of message. The whole sanctuary gets disconnected with rest of the world due to heavy snowfall during the winters. This is the period when wild animals migrate from higher reaches to lower elevation for search of food and water. Poachers become active during this time. Besides this, a good communication network among field staff by means of providing them satellite phones/ walkie talkie/ GPS or any other latest means of communication will give effective protection and of course will be of tremendous help in better management and protection of wildlife in the coming time.

### **3.12 SUMMARY OF THREATS TO WILDLIFE:**

#### **3.12.1 GRAZING:**

Grazing by migratory and hereditary graziers not only poses serious threat to the habitat but also there are chances that the infection of contagious diseases may spread among the wild animals from the domestic livestock. No disease or mortality was noticed in the past but the fact needs to be studied / established and prevention on this score must be taken by way of inoculation of domestic livestock and better animal husbandry practices. As mentioned earlier, the grazing has been prohibited by the orders of Hon'ble Supreme Court of India but the rights of migratory graziers have not been settled yet and the scenario in the field is entirely different. As discussed above, this is a serious threat to the wildlife and needs to be addressed on high priority

#### **3.12.2 PASTURE STATUS:**

Due to excessive grazing beyond the carrying capacity, the pastures have got degraded in many areas causing soil erosion and invasion of unpalatable grasses and bushes. This has resulted in the reduction of pasture area which is an issue to be addressed in the current plan. However, the area of reduction has not been quantified after due assessment of such areas. Since the framing of rules for grazing is a policy matter, however, keeping in view the orders of Hon'ble Supreme Court of India, the matter can be taken up with the government. Simultaneously the efforts must be carried out by wildlife managers to tackle such pastures for immediate treatment by mobilizing resources for this purpose.

#### **3.12.3 DISEASES TRANSMITTED THROUGH DOMESTIC CATTLE/ COMMUNICABLE DISEASES:**

Wildlife disease is a major protection issue. In Tundah Wildlife Sanctuary the chances of infection from the cattle of adjoining villages/ migratory graziers cannot be ruled out. The areas where the wild animals as well as domestic animals feed /graze frequently are more sensitive. Therefore, these area need to be sanitized, so that the disease from domestic animals

does not get transmitted to the wild animals in the vicinity and vice versa. Further, the sites nearer to habitats or Goths (where the migratory graziers camp during nights) and entrance points to the sanctuary, it is necessary to vaccinate the herds of sheep and goat regularly to avoid the transmission of possible diseases.

#### **3.12.4 HUMAN WILDLIFE CONFLICT:**

Crop depredation by wild animals, grazing of cattle and collection of NTFP by Nomadic graziers and fringe villagers increase the chances of human wildlife conflict, as a result of which local people are not supportive to conservation of wildlife. Forest department (especially frontline staff) are not getting proper support from local communities, therefore management of human wildlife conflict should be the priority for management of any PA.

#### **3.12.5 FOREST FIRES:**

During the process of rationalization, all villages were taken out from the boundary of sanctuary. As a result of this the chances of occurring fire reduced in itself. It has been noticed that no fire incident took place since last so many years. Even then the possibility of occurring forest fire cannot be ruled out. The forests adjoining to private ghasnis( pasture lands) are vulnerable to forest fire. People burn their ghasnis during winter season to have more grass in the coming season.

#### **3.12.6 POACHING:**

Poaching can be a threat to the existing wildlife. Of course, due to its remoteness this does not have any significant impact upon the Wildlife. Only in the event of heavy snow fall during winter, the Wild animals are compelled to climb down to lower areas and habitations in search of food when the local people do some damage to it. Besides this, people during collection of herbs and medicinal plants may indulge into poaching. This practice can be minimized through strong line of communication system and effective patrolling in the protected area through wildlife watchers and evolving effective information system amongst the local people of the area. The wildlife watchers are engaged in the sanctuary particularly in the winter season and this activity is of immense help in the protection of wildlife against poachers. However, there are no reported incidences of poaching from the sanctuary area.

## CHAPTER-IV

### 4. PROTECTED AREA & THE EXISTING LAND USE SITUATION:

#### 4.1 EXISTING SITUATION IN THE ZONE OF INFLUENCE:

The sanctuary has high mountainous peaks towards the northern, eastern and southern direction. As one goes in the western direction, the elevation goes on decreasing and the lowest point exists at the junction of Ravi River & Tundah Nalla near Khadamukh. 18 villages exist inside the sanctuary. Few shops exist at Tundah, Banni & Badgran which caters the needs of tired migratory tribals and tourists on the way to their destination. Residents of Tundah sanctuary are also migratory in their habit. A few persons live there and the others migrate to Bharmour, Chamba / Kangra and Pathankot area of Gurdaspur district during the severe winters. However, with the pace of development and good connectivity by roads in the area, there is considerable amount of decrease in the age old migration to lesser harder area down below in the planes under compelled circumstances of hardships and non availability of medical and other live saving facilities in the area. The professional poachers from outside the areas hardly ventures during the ordis winter season in the sanctuary area. Thus the villagers don't pose much of the problems in the wildlife sanctuary.

#### 4.2 VILLAGE ADJACENT TO THE SANCTUARY:

After rationalizing of the boundaries of the sanctuary, the details with the population of the villages present within the ESZ of the sanctuary are given as under:-

| Sr. No. | Name of village. | Population            |
|---------|------------------|-----------------------|
| 1.      | 2.               | 3.                    |
| 1.      | Bhadra           | 293                   |
| 2.      | Banni            | 250                   |
| 3.      | Mandha           | 275                   |
| 4.      | Kumharkadi       | 120                   |
| 5.      | Silpari          | 108                   |
| 6.      | Badgran          | 760                   |
| 7.      | Khanbug          | 180                   |
| 8.      | Kuthal           | 207                   |
| 9.      | Lahdogi          | 74                    |
| 10.     | Morthu           | Temporary Settlements |
| 11.     | Chular           | Temporary Settlements |
| 12.     | Tundah           | 300                   |
| 13.     | Gowar            | 409                   |
| 4.      | Sulo             | Temporary Settlements |
| 15.     | Banar            | Temporary Settlements |

|     |         |     |
|-----|---------|-----|
| 16. | Palani  | 280 |
| 17. | Sarotha | 290 |
| 18  | Kuthar  | 668 |

The whole of the population formally living inside the sanctuary was tribal. Now these all the eighteen villages have been included into the Eco-Zone all around the sanctuary. The villagers have small land holdings. They grow maize, wheat, phullan, barley, potato and pulses in their small land holdings. They rear sheep, goats and cattle for the agriculture needs. Apart from agriculture and marginal horticulture, a few of them run small shops of daily needs. Some of them are Govt. employees serving in the lower areas. In general, the villagers are very simple and tough. Their standard of living is increasing day by day and they have an education facility up to GSSS School at Mandha. Primary Health Center is also there at Silpari. The infrastructure existing in the sanctuary and the Govt. employees living there could be used to have a direct bearing with the existence of wildlife in the sanctuary and they can be mobilized usefully and can exert their influence on the locals and the tourists in the wildlife conservation activities.

#### **4.5                   IMPLICATION OF LAND USE:**

The cattle's rearing is the chief profession of the majority of the population and it is impossible to delink the dependency of the people on the forest resources. The quantity and quality of the livestock has to be determined on the carrying capacity of the forests and the available fodder on the private holdings. Private land can be tilled in a better way so that the nutrient loss is less sheet erosion of top soil is arrested. The grazing land around the village have lot of biotic pressure where plantations of species fit for fuel and fodder can be raised to reduce the pressure on the main protected area. The pasture land along the corridor of migratory graziers leading to Lahoul and Spiti can be improved by rotational closure and planting of improved palatable grasses. But with the banning of all activities in the wildlife sanctuaries by the order dated 4.02.2000 of Hon'ble Supreme Court of India, the whole scenario has changed. With the above order, the rights of the villages have to be settled by following due process of settlement which will create another situation and different implication with respect to land use.

#### **4.3                   ETHNIC IDENTITIES:**

The villagers living in the proposed Eco-zone area are known as Gaddies and they have a pastoral base of economy. Most of them migrate to Bharmour, Chamba and plains of Kangra district and Pathankot area of Gurdaspur district during the winters along with sheep, goats and cattle and few of them stay back. Their migration pattern has undergone change with economy over the years. They have a rich cultural identity and their attire give them particular identity. However, with rise in the standard of living due to sale of pulses, potatoes and marginal horticulture and increased education their general life style is changing

and they wear their traditional dress on specific occasion on marriages, deaths and other ceremonies. They worship local gods and deities in traditional attires.

#### **4.4 ECONOMY AND OCCUPATION OF VILLAGERS LIVING IN THE PROPOSED ECO-ZONE AREA:**

Economically the people are not well of but there had been an increase in their income with improved marginal agriculture and horticulture practices. They meet their annual requirement of food by practicing agriculture and horticulture on the small land holdings. The approximate average production of food grains and fruit is given as under:-

| <b>Sr. No.</b> | <b>Crop</b> | <b>Production in Kgs/Bigha.</b> |
|----------------|-------------|---------------------------------|
| 1.             | Maize.      | 150 Kgs/Bigha.                  |
| 2.             | Wheat.      | 25 Kgs/Bigha.                   |
| 3.             | Phullan.    | 20 Kgs/Bigha.                   |
| 5.             | Barley.     | 35 Kgs/Bigha.                   |
| 7.             | Potato.     | 200 Kgs/Bigha.                  |
| 8              | Pulses.     | 50 Kgs/Bigha.                   |
| 9.             | Apple.      | 8 Qtl./Bigha.                   |

The phototropic period of the crop is quite long due the severe temperate conditions prevailing in the area. Whatsoever crops are grown are harvested in the months of June- July and September-October. They had been living with nature in complete harmony along with their livestock, sheep and goats. They migrate to Kangra district, Chamba, Bharmour and to the lower hills during the month of September and October with the onset of winter season and again start their back journey from the plains / lower hills to the summer pastures in the month of April and May. A few of them practice bee keeping for their domestic consumption and not on commercial scale. Collection of NTFP activity has been stopped due the order of Hon'ble Supreme Court of India dated 4.02.2000. Whereas they sell pulses, apples, wool and woollen blankets, sheep and goats and make purchase of oil, grocery, cloth, utensils and other things from Bharmour and Chamba. The sale amount is just sufficient to provide them basic needs of livelihood and meet the requirement of education of their children. There are number of government schemes for their upliftment such as free medicines, free books and uniforms to students, housing subsidy, family and old age pension etc amongst many.

#### **4.6 PORTECTED AREA MANAGEMENT AND ITS IMPLICATIONS:**

The forest department will rehabilitate the degraded forest land and help the natural regeneration by artificial sowing and planting. However, the details and extent of such forest lands requiring immediate attention is readily available which will be carried out subsequently. The inspection/ census paths will be constructed and the old one will be

repaired annually to have better monitoring of wildlife and different habitat management works in the sanctuary. By developing trekking facility in the form of paths, inspection huts, bunkers, the necessary thrust for development of tourism can be provided. All the above activities will generate employment to the local people and research on wild animals can also be carried out for better management. At present no non-government agency is working in the area. Whereas one SHG Tundah is functional, this has been registered by Wildlife Division, Chamba. The Forest department is under taking different livelihood activities aimed at increasing the alternative livelihood income of the people living inside the sanctuary.

#### **4.7 GPS ENABLED DEVICES FOR FOREST GUARDS:**

Necessary global positioning systems (GPS) devices will be provided to all the field staff i.e. beat in charge Forest guards, Block Officers and Range Forest Officers. This will consolidate the field working system and staff will know the exact positions of nesting places, caves/ crevices where mammals have given birth to their new borns. The latitude and longitude as well as the exact height of the place including the map of the route followed can be drawn with the help of GPS devices.

#### **4.8 TRAINING:**

Training of the field staff will be the most important part of field working in the sanctuary. Necessary refresher courses for various levels of functionaries of the wild life sanctuary will be imparted at various institutions to make them more skillful and professional in management in the wild life sanctuary. Experts from various wild life institutes as well as NGOs will be requested to organize such camps within the sanctuary itself. The modern techniques for the census of various wild life species will be ensured frequently.

#### **4.9 THE DEVELOPMENT PROGRAMMES AND CONSERVATION ISSUE:**

##### **4.9.1 GOVT. AND NON GOVT. PROGRAMMES AND THEIR IMPLICATIONS FOR THE PROTECTED AREA AND ZONE OF INFLUENCE:**

At present, there is no Non-Govt. agency working in the area. The Forest Department is undertaking different activities aimed at improving the forests habitat conditions, making efforts to educate the masses regarding Wildlife Conservation and to promote Eco Tourism. For the involvement of non government agencies, local bodies like Panchayats and other institutions like schools, Yuvak Mandals, Mahila Mandals etc. are being persuaded to take part in wildlife conservation activities. To ensure more participation some eco developmental works are also being taken up in the surrounding villages.

#### **4.9.2 ECONOMY:**

As already mentioned, people are financially self-sufficient to some extent. The level of investment in rural development programmes has remained comparatively low. One of the reasons for this is the low density of population and difficulty in executing works in these areas because of tough terrain and inaccessibility of areas. The production of cash crops in the area and other development schemes of the Govt. are helping the local people to improve their monetary status to some extent.

#### **4.9.3 PROBLEMS FACED BY PEOPLE AND EFFECT ON THE MANAGEMENT OF PA AND ZONE OF INFLUENCE:**

So far as the management of Wildlife is concerned, it does not have any implication for the local public. People however, show resentment when there is man- animal conflict or some damage to the live stock or crops by the wild animals. Particularly leopard, Black Bear, Brown bear and Monkey constitute man-animal conflicts for which people are quite apprehensive. Local people as well as migratory graziers also show resentment when they are restricted to graze their cattle in the sanctuary area especially during summer season. However, scientific management as well as awareness programmes can help in managing conflicts between the public and wildlife.

## CHAPTER-V

### VISION, OBJECTIVES AND PROBLEMS

#### 5.1 THE VISION:

*“To be a well protected sanctuary in the Trans Himalayas free from any adverse biotic pressures, with an undisturbed; well protected ecosystem that is a home to a variety of flora and fauna and to develop as a centre for wildlife tourism providing a rich and hassle-free experience to eco tourists”.*

#### 5.2 OBJECTIVES OF MANAGEMENT:

The objectives of management of Tundah Wildlife Sanctuary are enumerated as under: -

1. To develop a harmonious relationship between wildlife and people for peaceful co-existence.
2. Improvement of Habitat for different wildlife species.
3. Protection against threats to wildlife.
4. Conservation of biodiversity.
5. Ecological Development for livelihood.
6. Eco-tourism.
7. To enhance capacity for front line staff and local community through training and nature education programmes.

#### 5.3 PROBLEMS/ CONSTRAINTS IN ACHIEVING THE OBJECTIVES:

Since the sanctuary is located in the remote area of Chamba District of Himachal Pradesh, it is very difficult to implement the management practices in very harsh temperate climate. The working season is very limited and ranges from June to October. The skilled workers have to be imported from Bharmour/Chamba, which is quite far and makes the implementation of different operations expensive. The remoteness, harsh weather conditions and non- existence of shelters inside the sanctuary area make regular monitoring of work difficult.

| Sr. No. | Objective                                                                         | Problems/Constraints                                                                                                                                                             |
|---------|-----------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1       | To develop a harmonious relationship between wildlife and people for peaceful co- | <ul style="list-style-type: none"><li>• Location of villages: These are surrounded by sanctuary area from almost all sides.</li><li>• No alternate route available for</li></ul> |

|   |                                                                                  |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
|---|----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|   | existence                                                                        | <p>the movement of migratory graziers outside sanctuary area.</p> <ul style="list-style-type: none"> <li>• Lack of knowledge about wildlife conservation values among local people</li> <li>• Lack of community participation in the management of sanctuary</li> </ul>                                                                                                                                                                                                                         |
| 2 | To observe habitat for any significant changes (Long Term Ecological Monitoring) | <ul style="list-style-type: none"> <li>• Insufficient scientific data</li> <li>• Limited working season</li> </ul>                                                                                                                                                                                                                                                                                                                                                                              |
| 3 | Protection against threats to wildlife                                           | <ul style="list-style-type: none"> <li>• No communication facility (phone network) inside the sanctuary area.</li> <li>• Sanctuary remains inaccessible during December to March due to heavy snow fall</li> <li>• Insufficient nos. of patrolling huts/watch towers/anti poaching huts inside sanctuary area.</li> <li>• Patrolling and monitoring system is not appropriate and needs improvement</li> <li>• Unregulated religious tourism</li> <li>• Insufficient human resources</li> </ul> |
| 4 | Conservation of Biodiversity                                                     | <ul style="list-style-type: none"> <li>• Insufficient scientific data</li> <li>• Frontline staff posted in the sanctuary does not have required trainings for wildlife management</li> </ul>                                                                                                                                                                                                                                                                                                    |
| 5 | Ecological Development for livelihood                                            | <ul style="list-style-type: none"> <li>• Lack of awareness and sense of belongingness among local community.</li> </ul>                                                                                                                                                                                                                                                                                                                                                                         |
| 6 | Eco-tourism.                                                                     | <ul style="list-style-type: none"> <li>• Lack of publicity about Tundah wildlife sanctuary and its significance.</li> <li>• Lack of knowledge about wildlife conservation values among local people</li> <li>• Unregulated religious tourism</li> <li>• Insufficient infrastructure</li> </ul>                                                                                                                                                                                                  |

|   |                                                                                                                                                   |                                                                                                                                                                                                                                  |
|---|---------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 7 | To reduce Man-Animal Conflict                                                                                                                     | <ul style="list-style-type: none"> <li>• Lack of awareness about wild life.</li> <li>• Habitat fragmentation due to unregulated developmental activities.</li> <li>• Dependence of local people on natural resources.</li> </ul> |
| 8 | To Enhance Capacity of front line staff and local community for better management of wild life and to build a dialogue between all stake holders. | <ul style="list-style-type: none"> <li>• Shortage of specialized resource persons for knowledge exchange and guidance</li> <li>• Lack of awareness and sense of belongingness among local community.</li> </ul>                  |

#### 5.4 MAJOR CHALLENGES FOR THE MANAGEMENT:

Since the sanctuary is located in the remotest area of Bharmour Tribal Civil Sub –Division, it is very difficult to implement the management practices in the very harsh temperate climate. The working season is very limited and varies from April to November. The skilled manpower has to be imported from Chamba which is quite far and makes the implementation of different operation expensive. The only land communication is the fair-weather road existing up to Badgram & Tundah where the boundary of the sanctuary starts. The remoteness, lack of sufficient bridle/ inspection/ census paths and non- existence of shelters in the far off during the night in the inaccessible areas make regular monitoring of work difficult. This sanctuary is a corridor of migratory graziers who pass through the sanctuary with more than 0.30 lakh sheep and goats twice a year to their summer grazing runs in Lahaul & Spiti district and it becomes very difficult to protect the habitat management works as they sometime graze the closed pasture and other plantation during the night. Further, no studies/ research have been conducted in the sanctuary in the past which could suggest better management practice. Due to lack of awareness about wildlife conservation, public participation is almost nil in the management of PA. There is a lack of long-term vision in PA management and people participation is purely opportunistic depending upon availability of funds. There is need to formulate a mechanism so as to link the communities for better protection and management effectiveness of the sanctuary.

#### 5.5 SWOT ANALYSIS

##### Strength-

1. Wildlife heaven
2. Religious places nearby
3. Natural & Cultural richness
4. Traditional hospitality

5. Pollution free environment

#### **Weaknesses-**

1. Dependency of local people on natural resources of the sanctuary
2. Harsh weather conditions
3. Tough terrain
4. Lack of proper awareness among the community

#### **Opportunities-**

1. To Provide better opportunities to the visitors to enjoy its natural beauty
2. To develop an ideal destination for nature lovers
3. To promote as an adventurous destination
4. To conduct awareness camps.
5. To provide opportunities of studies for research scholars/ educational institutes/ universities etc.

#### **Threats-**

1. Grazing
2. Pasture status
3. Poaching
4. Shrinking habitat
5. Absence of baseline information about wild life flagship species of the sanctuary.

## **CHAPTER- VI**

### **THE STRATEGIES**

#### **6.1 STRATEGY FOR ACHIEVING THE BROAD OBJECTIVE:**

Tundah Wildlife Sanctuary is a unique assemblage of high altitude flora and fauna. The sanctuary bears Temperate and Alpine forest types housing Broadleaved, Coniferous and Alpine vegetation. Keeping this in mind, the proposed strategies are focused on securing the ecological integrity of this area with its connectivity in the large landscape. This will require building better understanding about the ecosystem and putting in place a mechanism which could provide intensive management, long-term monitoring of the area and generate support of the local communities for the management of wildlife sanctuary. Major strategies for future management of the area are as under:

#### **6.2 ZONATION:**

Based upon the specific management interventions required on account of its objectives, it is proposed to create following zones in the area:

##### **Wilderness Zone:**

In this zone the area is more or less secure. The area is ideally free from human disturbances and external influence. In the zone, natural ecological process shall be allowed to continue and in this minimal management interventions will be introduced. The area supports alpine pastures, dense forests of different conifers and some broad leaved species. This area is proposed to be managed in its pristine status by intensive protection and Long-Term Ecological Monitoring.



## **Restoration / conservation Zone:**

- (i) **Rehabilitation zone:** This zone consists of areas where the degradation level is comparatively higher due to anthropogenic pressure. Degradation of natural ecosystem is principal cause for losses of biodiversity and ecosystem functions. This zone is facing tremendous pressure from migratory graziers. Local people are also putting extra pressure on these areas by cattle grazing and collection of non timber forest produce. The objective of this zone will be to restore these areas which would mitigate the negative effects of degradation.
- (ii) **Species specific conservation zone:** This zone consists of the conservation plan of two flagship species (i.e. Himalayan Brown Bear & Musk Deer) of Tundah Wildlife Sanctuary. Based on their relative abundances and distribution, as these are habitat specialist species, two species (Himalayan Brown Bear & Musk Deer) have been identified as flagship species for Tundah wildlife sanctuary.

## **Eco-Tourism zone/ tracts**

This zone can be defined as that part of the sanctuary where tourism is allowed to a certain extent without disturbing the natural integrity of the ecosystem. This area will be used for eco-tourism activities. The objective of this zone will be to enhance the eco-tourism and to regulate the inflow of eco-tourists to the sanctuary by involving local people, thereby generating direct and indirect livelihood options for them and generate support for long-term conservation of the area. There are identified trekking routes which can be highly attractive and challenging to the hard core trekkers and nature lovers. In this zone/tracts various activities which involved nature trails, sight seeing, adventure trekking, biodiversity nature trails, glaciers tours, bird watching, religious trails, photography, conservation awareness programmes etc. will be taken up.



## Human Wildlife interface management Zone:

Human wildlife conflict refers to the negative interactions between human and wild animals, with undesirable consequences both for people and their resources, on the one hand, and wildlife and their habitats on the other hand. Human wildlife conflict is caused by competition for natural resources between human and wildlife. In many regions, the number of these conflicts has increased in recent decades as a result of human population growth and the transformation of land use. In these zone different management aspects to minimize/dealwith the human wildlife conflict situation will be discussed.



### 6.3 THEME PLANS:

The theme plan which would be implemented in consonance with the plan objectives are as under:-

- ✓ **Protection Plan:** In this segment of theme plan, various challenges, possible threats and strategies to mitigate these constraints have been discussed.
- ✓ **Habitat enrichment Plan:** In this plan various interventions like plantation, soil& moisture conservation works keeping in view the breeding, foraging and hiding of two flagship species requirement in space and time etc. have been discussed.
- ✓ **Infrastructure development plan:** In this plan, the existing scenario of infrastructure has been identified and required infrastructure has been proposed.
- ✓ **Eco development plan:** It talks about different villages that are present around the sanctuary and various measures to involve these villages in the management of the wildlife sanctuary.
- ✓ **Research and monitoring:** In this plan various monitoring techniques have been elaborated.
- ✓ **Wildlife health management plan:** In this plan, various preventive measures against wildlife diseases have been discussed.

## **6.4 ZONE PLANS:**

Zones identify where various strategies for management and use will best accomplish management objectives to achieve the desired future of the Protected Area. Within each zone, the management prescriptions should be reasonably uniform but may differ in type or intensity from those in the other zones in order to accommodate multiple objectives.

### **6.4.1 WILDERNESS ZONE PLAN:**

This zone needs complete protection and just a minimum of restorative management intervention to secure its objectives. The forests/areas in this zone should be managed as to retain these in their pristine status and there will be no interference for development in this zone. The managerial interference here would only be protection oriented and the habitat should be regularly monitored.

#### **6.4.1.1 OBJECTIVES:**

1. To give top priority to protection, conservation and preservation of species in their natural habitat.
2. To allow minimal external influences and undertake such habitat management interventions that are absolutely essential.
3. To undertake need based habitat restoration activities such as soil and moisture conservation activities in the areas prone to degradation.

#### **6.4.1.2 PRESENT STATUS:**

The area supports alpine pastures, dense forests of different conifers and some broad leaved species. This zone possess intact undisturbed vegetation and perfect habitat for wildlife.

#### **6.4.1.3 RECOMMENDED STRATEGIES:**

**Protection** – Effective protection to the wild animals against poaching, grazing, fire and other natural hazards shall be provided. This shall be achieved through establishment of adequate number of anti-poaching camps, increased patrolling, enhanced communication facilities, and monitoring.. Further details are given in Protection Plan (para 6.5.1).

**Habitat monitoring** - This zone will primarily act as biodiversity conservation zone and needs complete protection with a minimum restorative management intervention to secure its objectives but with extreme caution so as to keep the area as pristine as possible. The zone will be kept for Long Term Ecological Monitoring to observe any significant changes in the habitat and its influence on the species.

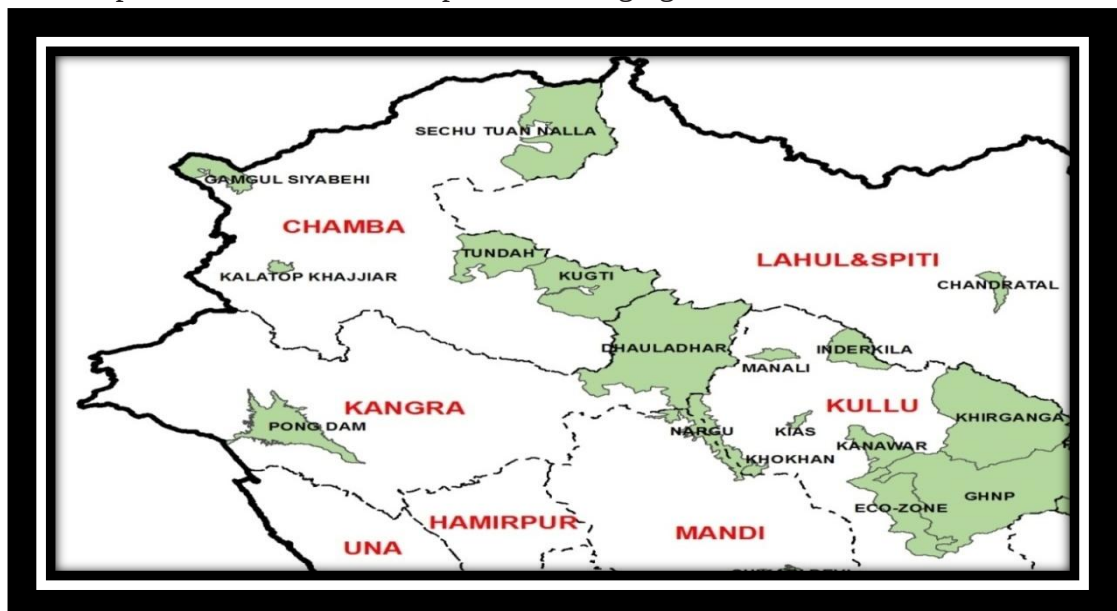
- ✓ A complete survey in this zone should be conducted in order to identify the gaps and possible augmentation activities.
- ✓ Similar survey should also be taken to identify potential soil conservation and water regime development areas.
- ✓ Further details related to these activities are given in habitat enrichment plan

#### **Landscape approach to wildlife management:**

All animals move across the landscape to varying extents in order to acquire the resources necessary for survival: food, water, protective cover and mates. Man made barriers can affect each of these movement pattern and may pose a threat to the long term persistence of wildlife population. Disruption of habitat connectivity is a major impact of human activities on plant and animal populations and one of the leading causes of the biodiversity crisis.

The best solution to addressing the issues of habitat loss and fragmentation is to prevent it from occurring by preserving existing blocks of un- fragmented habitat. Creating corridors or linkage provides the means for animals to move between blocks of habitat while supporting natural levels of:

- ✓ Individual movement for needed resources (food and water etc.)
- ✓ Movements to breeding, birthing, summer and winter habitats
- ✓ Dispersal and colonization of vacant habitat
- ✓ Gene flow
- ✓ Seasonal migration
- ✓ Population movement in response to changing climate



In the past, some biodiversity conservation efforts have tended to focus on individual, local environmental challenges on smaller land areas, specific sites, or specific populations, often taking an opportunistic approach and without an eye to the broader landscape. Landscape management is an evolving concept in the conservation of biological diversity, in which conservation means much more than simply protecting a species or an ecosystem within a confined area.

Tundah wildlife sanctuary together with the areas to its north side LahulSpiti area and on the other side Kugti, Dhaluadhar, Nagru and KhokhanWildlfie sanctuaryform a single landscape through a forest corridor which provides good shelter for many rare and endangered wildlife species. Therefore, conservation value of this landscape is immense for the conservation of the full range of species found in this region.

Efforts should be made to bring different wildlife managers and all stakeholders together to secure this landscape and develop effective conservation measures for the critical habitat across this landscape.

Tundah wildlife sanctuary houses a number of threatened species of flora and fauna. Concrete efforts should be made to declare this area as critical wildlife habitat.

**Research & Monitoring** – For Tundah Wildlife sanctuary available literature and ecological research data is not sufficient. Regular research and monitoring should be done on periodic basis. Details related to research and monitoring have been given in relevant chapter (Chapter IX -Research, monitoring and evaluation).

**Infrastructure development-** For effective patrolling and other management activities construction of watch towers/ anti poaching huts/ bunkersare proposed.Further details are given in Infrastructure development plan (para 6.5.3).

#### **6.4.2 RESTORATION/CONSERVATION ZONE PLAN:**

- (i) Rehabilitation zone plan
- (ii) Species specific conservation zone plan

##### **6.4.2.1 REHABILITATION ZONE PLAN:**

###### **6.4.2.1.1 OBJECTIVES:**

1. To identify degraded areas insidethe Sanctuary
2. To restore these degraded areas through scientific/ managerial interventions.
3. To improve the habitat quality for different species.

###### **6.4.2.1.2 PRESENT STATUS:**

Due to anthropogenic pressure, habitat in the area is degrading. The areas Janu, Chhandi-Khaini, Lambapar, Chaorla, Jujad, Liundi Dhar, Bansar-Adb, Bari Dhar, Khartta (Deoki) Dhar and Sarotha Dharare vulnerable from illegal grazing and collection of non timber forest produce. The management problem in these areas is over-grazing of grasses by domestic as well as migratory livestock. Over-grazing is the removal of plant leaves from an earlier grazing event at a rate faster than the plant recovers from. The forests in the sanctuary are potential habitat of many species; therefore proper

management is vital for protecting the biodiversity of sanctuary and achieving the objectives of the management plan.



## **WILDLIFE OFFICIALS PATROLLING IN WILDLIFE SANCTUARY**

### **6.4.2.1.3 RECOMMENDED STRATEGIES:**

- ✓ Identify the drivers of degradation such as heavy grazing, exploitation of NTFP
- ✓ Stop the abuse by eliminating or strictly reducing these drivers.
- ✓ Protect the area from further degradation.
- ✓ If necessary re-introduce native species to help restoration of area.
- ✓ Efforts should be made to close these areas on periodic basis.
- ✓ There is hardly any area available for tree plantation in the sanctuary. However, some of the degraded area can be rehabilitated by assisted natural regeneration/plantation.
- ✓ Use native species like Angleton grass (*Dichanthium aristatum*), Spear grass (*Heteropogon contortus*), Fescue grass, (*Festuca spp.*), Creeping bent (*Andropogon pulmis*), Barijhaangrass (*Pennisetum orientale*), Marvel grass (*Dichanthium annulatum*), *Lotus corniculatus*, *Trifolium spp*, *Medicago denticulate* etc.
- ✓ Efforts should be made for site/ faunal species specific plantations.
- ✓ Removal of invasive weeds (if any) along the traditional routes of graziers.
- ✓ The areas where degradation level is high, staggered contour trenches will be constructed and plant native spp. of grasses on the lower berm of the trenches to stop soil erosion.
- ✓ Vegetative structures will be constructed in the areas prone to soil erosion.
- ✓ Plant shrubs of nitrogen fixing species to improve soil fertility.

- ✓ Plantation of fodder trees in the village land/ agriculture land.
- ✓ Efforts should be made to provide alternate grazing sites outside sanctuary.
- ✓ Efforts should be made to provide alternate livelihood to the villagers.
- ✓ Public awareness programmes in 18 villages around Sanctuary.
- ✓

#### **6.4.2.2 SPECIES SPECIFIC CONSERVATION ZONE PLAN:**

##### **6.4.2.2.1 HIMALAYAN BROWN BEAR CONSERVATION SUB PLAN:**

The Himalayan brown bear is listed as “Vulnerable” in the Red Data Book (International Union for Conservation of Nature and Natural Resources, 1969), but not listed as “threatened” in the 1996 Red list of Threatened Animals (IUCN, 2006). It is also listed on Appendix I of CITES (GOI, 1992) and on Schedule I of the Indian Wildlife (Protection) Act, (1997) as amended in 2003. Wildlife species that are listed in Schedule I of the Indian Wildlife (Protection) Act, are considered to be “endangered species and rare” and accorded highest protection. Among the four species of bear in India, the Himalayan brown bear (*Ursus arctos*) is least distributed and occurs in very low densities in the alpine region of the Greater and Trans Himalayan zones in India.

#### **HABITAT PREFERENCE:**

It is rare and usually encountered between 2600m to 4800m elevation. Population of brown bear is largely confined to the western and north western Himalayan regions in India. The Himalayan Brown Bears occur in rolling uplands, alpine meadows, scrub and sub-alpine forests in Tundah Wildlife Sanctuary. The potential habitat areas for brown bear during summer which includes Chadola, Bansar, Bdidhar, Jujad etc.. The elevation ranges from 2700 – 3800m and the grassland areas are most suitable areas.

#### **ACTIVITY PATTERN:**

The activity pattern i.e digging, feeding, moving and resting of Himalayan Brown Bears within Tundah wildlife sanctuary is as follow: They are active mainly during daylight hours in summer and monsoon and also less active during winter when *Prunus* sp., a principal winter food is scarce. The day time activity is maximum in the afternoon (1501-1800 hours), followed by morning and evening. They are seen maximum times within 0 to 500 m from water sources (Rajkishore Mohanta and N.P.S. Chauhan).

#### **FOOD HABITS:**

Understanding food habits is important to implement bear conservation and management and to assess bear distribution and habitat use (MacHutchon & Wellwood 2003). The survival of bears and their physiological activities are governed by the availability of food items and dietary components in their habitat. Both plant and animal are preferred by brown bear in their diet in all the seasons. Animal matter comprised insects, ants and unknown items including hairs, bones, jaws, teeth and claws in the bear diet. Plant matter

comprised 10 plant species, but also included 58.3% unknown plant material. Known species included seeds of *Prunus persica*, *Prunus cornuta*, fruits of *Rhamnus virgatus*, *Viburnum cotinifolium*, *Berberis aristata*, and Guchhi Mushroom (*Morchella esculenta*). Scats also contained 7.2% cultivated species such as wheat (*Triticum aestivum*), jau (*Hordeum vulgare*), bhareesh (*Fagopyrum esculentum*), phullan (*Fagopyrum emarginatum*), maize (*Zea mays*), and fruits of jammu (*Prunus cornuta*), kamulu (*Berberis aristata*) and *Rhamnus virgatus*. Other plants preferred by Himalayan Brown Bears are: *Rumex nepalensis*, *Chaerophyllum reflexum*, guchhi *Morchella esculenta*, *Impatiens scabrida*, *Taraxacum officinale*, *Geranium pratense*, *Potentilla argrophylla*, *Stellaria media*, *Stachys melissaefolia* and *Geum elatum*, *Chaerophyllum reflexum*, *Napeta laevigata*, *Origanum vulgare*, *Typhonum seginatum* and *Gegea elegans* (Bipan C. Rathore & N.P.S. Chauhan)

### **RECOMMENDED ACTIONS:**

For conservation and management of Himalayan Brown Bear population, information on its ecology: population status, habitat use, behaviour, activity and movement patterns, food habits and breeding activity in the affected areas is necessary.

**Protection-** Entire potential habitat of Himalayan Brown Bear needs to be thoroughly combed at least twice in a year. Combing operations should be strictly prohibited during breeding season. For confirmed habitats combing operations should be done at least two times in a year.

### **Himalayan Brown Bear in Tundah WLS**



**Photo by-Rajeev Kumar, IFS**

**Himalayan brown bear research-** There is little knowledge about the population trends, habitat, threats and problems associated with the Himalayan Brown Bear, and there is inadequate research and monitoring of the food, population and habitat of this species. This issue should be addressed by further research and studies throughout the Himalayan Brown Bear's habitat in the area. Population monitoring will be done annually in selected areas by using Silent drive count method. Location for monitoring will be selected on the basis of direct/indirect evidences observed during patrolling of areas.

**Habitat monitoring and the need for habitat restoration-** It is believed that the Himalayan Brown Bear is vulnerable to anthropogenic threats, which limit the viability of the population and preclude its expansion. Furthermore, its habitat range is not fully known and the extent and quality of the brown bear population is unknown. Due to increasing populations of livestock, habitat is believed to be disturbed, fragmented and shrinking. Some pastures have been degraded by heavy livestock grazing. Apart from over-grazing, there is over-exploitation of natural vegetation for medicinal and aromatic plants. In general, there is a lack of a habitat evaluation programs and a lack of monitoring and management strategies. Additionally, there is very little information on the existing and potential biological corridors for brown bears in the area. Potential corridors are increasingly vulnerable to habitat degradation and there is an urgent need for the monitoring, protection and where necessary, restoration of these corridors. Therefore it is necessary that habitat should be monitored regularly for any changes in composition of vegetation. It is suggested that initially base line data may be collected by involving professionals from Wildlife Institute of India/other scientific institutions and proper training should be given to field staff for future monitoring on five yearly basis. It is also suggested that degraded areas should be surveyed properly during patrolling and gaps may be

identified and shrub/ herb species should be planted to increase the food source for Himalayan Brown Bear.

**Reduction in human-brown bear conflict-** Human-brown bear conflict is identified as one of the major problems in ensuring the long-term conservation of the Himalayan Brown Bear. Although not frequent, livestock loss has been associated with brown bears, providing the potential for conflict. Conservation awareness activities are lacking in the remote parts of the Himalayan Brown Bear's distribution range. Further, the people are not aware of the methods and techniques that can be used for the reduction of loss/damage. The damage caused by the brown bear to human livelihoods has meant that in general the local people have a negative attitude towards wildlife conservation. Human-wildlife conflict in the area could be mitigated by awareness programmes among local people of the need for conserving wildlife such as the Himalayan Brown Bear, the introduction of incentive programmes and the involvement of local people in alternative income generation activities that do not present the potential for human-wildlife conflict.

**Support for local people to improve their livelihoods-** Without an improvement in the livelihoods of the local people, it is hard to conserve natural resources such as the brown bear and other wild animals. For this reason, species conservation needs livelihood improvement programmes. Sources of income for local people in the area are livestock (sheep/goat) farming, agriculture, collecting medicinal plants for sale, and tourism. Local people are directly dependent on resources such as fuel wood for their livelihood. Creating employment opportunities for local people will be helpful in promoting sustainable livelihoods. Non-Timber Forest Products (NTFPs)/medicinal plant cultivation on private land or community land is one of the most lucrative potential income-generation activities because the area has a unique ecological character and favours high value medicinal plants. There are considerable prospects for the production of pulses, green vegetables and fruits in the area. Efforts are required to realize these potential developments. Off-farm employment and income opportunities in this region are inadequate. Local resources and traditional skills based on enterprise potentials have not been adequately identified and assessed. Potential exists in handicraft production, in livestock based production and in the area of traditional skills that need to be explored and promoted.

**Awareness and involvement of local people** –Any conservation initiative will not be successful without involving local people. Various eco development programmes that reduces the dependence of local people on the resources of Tundah wildlife sanctuary and strict protection measures are the two main strategies to conserve Himalayan Brown Bear. Regular awareness programmes for locals, students/youth are required to get their support.

#### **6.4.2.2.2 MUSK DEER CONSERVATION SUB PLAN:**

Musk deer is a member of the family Moschidae. It is most threatened species and listed in schedule I of Wildlife (Protection) Act, 1972. Musk deer are small solitary, cryptic and primitive deer like ruminant. They inhabit forested mountain habitats between 2,000 m and tree line and also alpine scrub and meadows.



**Musk Deer: Photograph By: Rajinder Kumar, Forest Guard**

#### **HABITAT PREFERENCE:**

Musk deer generally are found in areas above 2000 meter with a slight seasonal variation and mainly used areas with tree cover mixed with shrubs. Deodar forests having thick shrubs are the main habitat of musk deer. Therefore to maintain the habitat of musk deer shrubs are extremely important as a refuge from predators and as a source of food Habitat preference.

#### **RECOMMENDED ACTIONS:**

**Protection-** Entire potential musk deer habitat needs to be thoroughly combed at least twice in a year (Spring/Summer and autumn). For confirmed habitats combing operations should be done at least three times in a year. Care should be taken that no combing operation will be carried out during breeding season of the species.

**Population Monitoring** – Population monitoring will be done annually in selected areas by using Silent drive count method. Location for monitoring will be selected on the basis of direct/indirect evidences observed during patrolling of areas.

**Habitat Monitoring** – Musk deer is a selective feeder, therefore it is necessary that habitat should be monitored regularly for any changes in composition of vegetation and extent of ground cover. It is suggested that initially base line data may be collected by involving professionals from Wildlife Institute of India/other scientific institutions and proper training should be given to field staff for future monitoring on five yearly basis.

**Habitat improvement** - Musk deer uses ground cover as an anti-predator strategy; musk deer rely primarily on concealment to avoid detection. Female musk deer hide their newborn in dense ground cover vegetation to protect them from predators. Therefore, in those areas dense ground cover has to be maintained. It is suggested that these areas should be surveyed properly during patrolling and gaps maybe identified and shrub species should be planted to increase the ground cover and food source for musk deer.

**Awareness and involvement of local people** –Any conservation initiative will not be successful without involving local people. Various eco development programmes that reduce the dependence of local people on the resources of Tundahwildlife sanctuary and strict protection measures are the two main strategies to conserve musk deer. Regular awareness programmes for locals, students/youth are required to get their support.

#### **6.4.2.2.3 SNOW LEOPARD:**

The presence of snow leopard, an endangered species, listed in Schedule-I of the Wildlife (Protection) Act, 1972. There was no record available about the presence of snow leopard in the sanctuary. In the recent study conducted by NCF (2019), the presence of snow leopard was also recorded in the Bharmour area, though it was not in the sanctuary area. Till now there is no scientific data about the species is available. So it is recommended to conduct proper scientific study about the species.

#### **6.4.2.2.4 BIRDS, AMBHIANS AND REPTILES CONSERVATION PLAN:**

Tundah wildlife sanctuary is very rich in bio diversity and it is imperative that wildlife managers should focus on the conservation of each and every species found in the area. Till now, no specific scientific data about floral and faunal species is available. So, it is recommended that proper scientific study about birds, amphibians, reptiles and even indicative species of flora and fauna be got conducted and the recommendations/ suggestions may be incorporated in the management plan during the mid term evaluation of the same.

#### **6.4.3 ECO TOURISM ZONE/ TRACTS PLAN:**

##### **6.4.3.1 OBJECTIVES:**

1. To enhance the inflow of eco-tourists to the WLS without affecting the main objective of conservation.

2. To involve local people in tourism activities, thereby generating direct and indirect economic activities for them.
3. To provide hassle-free, low volume and truly enriching experience of wilderness to the visitors
4. To create awareness about wildlife conservation among masses.

#### **6.4.3.2 PRESENT STATUS:**

The region has huge potential for eco-tourism, having a very unique and aesthetic view of the entire region. Two areas Tunda-Mumbri Dhar and Tunda-Mumbri-Silpadi-Tandei Dhar-Banni have been identified for development of eco-tourism in this area. The region is worth visiting for its rich forest wealth with very high biodiversity, High Mountain, alpine pastures, small rivers and natural waterfalls. Tundah has a three-bedroom forest rest house. These facilities can be availed for eco-tourism activities. There is scope to develop these areas by providing some temporary eco-friendly infrastructure like camping sites, eco huts, bunkers, rain shelters, trek routes etc. It should be ensured that eco tourism activities should be done with the participation of local people for which a local committee or society will be formed and all eco tourism activities should be executed by that committee/ society itself.

#### **6.4.3.3 RECOMMENDED STRATEGIES:**

- ✓ Development of eco-tourism by enhancing the capacity of community
- ✓ Assessment of carrying capacity of the area to be evaluated.
- ✓ Formation of local eco tourism society/ committee.
- ✓ Capacity building of society and other stake holders.
- ✓ Sanctuary literature (brochures/pamphlets) should be printed.
- ✓ The popular treks should be maintained and monitored on a regular basis.
- ✓ Proper waste management system should be established.
- ✓ Regulatory measures to ensure social, cultural and environmental sustainability as well as safety and security of tourists.
- ✓ Conducting nature camp for school children.
- ✓ Encouragement of visitors by community i.e. development of home stays in around sanctuary
- ✓ Defining the role of visitors.
- ✓ Proper signage and detailed instruction at some prominent places.
- ✓ Further details regarding ecotourism management, capacity building of staff and community, infrastructure development etc. are given in **chapter VII-** Eco Tourism, Interpretation and Conservation Education.

*It must be ensured that all eco-tourism activities to be executed in the PA are as per the provisions of Wildlife (Protection) Act, 1972 as amended from time to time and rules made there under and different guidelines regarding eco-tourism in PA issued from time to time.'*

#### **6.4.4 HUMAN WILDLIFE INTERFACE MANAGEMENT PLAN:**

There are eighteen villages in the vicinity of sanctuary. Crop depredation by wild animals, grazing of cattle and collection of NTFP by Nomadic graziers increase the chances of human wildlife conflict, as a result of which local people are not supportive to conservation of wildlife. Forest department (especially frontline staff) are not getting proper support from local communities, therefore management of human wildlife conflict should be the priority for management of any PA.

##### **6.4.4.1 OBJECTIVES:**

1. To assess the human wildlife conflict situation in surrounding areas of PA
2. To suggest various actions to mitigate human wildlife conflict
3. To strengthen the infrastructure required for managing human wildlife conflict
4. To involve the local people in management of human wildlife conflict on the principals of participatory approach.

##### **6.4.4.2 HUMAN WILDLIFE CONFLICT - SENSITIVE AREAS:**

As discussed earlier, common sites where the wild animals as well as domestic animals feed / graze frequently and the sites nearer to habitats or Goths (where the migratory graziers camp during nights), are vulnerable sites for human wildlife conflict. However, during winter period, the chances of human-wildlife conflict increase near villages, when wild animals migrate from higher reaches to lower elevations in search of food and water. The sensitive areas are Bhadra, Banni, Sarotha, Silpari, Tundah, Badgram and Mandha etc.

##### **6.4.4.3 RECOMMENDED STRATEGIES:**

The Human wildlife conflict is a resultant of various aspects of the natural resource degradation as well as societal stratification. Very often damage caused by the wild animals directly affects the poor, marginalized rural communities living next to the wildlife sanctuary.

**Crop Depredation** – There is a complete ban on the hunting of wild animals. Because of this ban, the number of wild animals has been increasing in the area. The resource-deficient villagers need to resort to labour intensive measures of crop protection and such actions mostly result in disproportionate cost of raising crops by the poor and marginal villagers. The villagers often use retaliatory measures of harming/killing the wild animals of which there is hardly any record or report. The depredation enhances dramatically when there is an increase in the number of livestock as well as the area under cultivation close to the PA; when there is a decline in the availability of the natural food; when there is an increase in the

number of large wild herbivores due to “conservation measures”. In all these circumstances, the crop depredation or killings of livestock are escalated exponentially. The top crop damaged is mainly maize, wheat and top crop raider is Langour followed by Asiatic black bear and Himalayan Brown Bear.

**Livestock Depredation** - Due to harsh weather conditions especially during winters wild animals migrate towards lower elevation resulting in human wildlife conflict. The Rhesus macaque and Chamba sacred langurs are able to adapt themselves to the human presence. The wild animals intrude into agriculture fields as the crops raised are more palatable, and they are located in easy locations. The domestic livestock is very easy prey for the wild animals. The areas mentioned in foregoing paras are more prone to human-wildlife conflict and Asiatic Black Bear is responsible for most of the conflicts. Crop raiding incidents problem is more severe than livestock killing.

**Compensation** - There is a provision of providing compensation to the person whose sheep, goats or cattle have been killed by the wild animals. Similarly, State Government through other departments is also providing compensation for the damage to agriculture and horticulture crops. In future, the situation can be quite alarming as the damage done to their crops by the wild animals is enormous. This may also adversely affect the acceptance of the conservation ideas among the locals.

#### **6.4.4.4 RECOMMENDED ACTIONS:**

**Proactive Actions** – To prevent the damage by the wild animals.

- ✓ The villagers are already using deterrents such as making sounds, beating drums or putting up a scare crow in their fields. The WLS staff and the local villagers need to put up a combined defence against the human-wildlife conflict.
- ✓ There is a need to undertake action research on human-animal conflict so that preventive guidelines are made in consultation with the villagers.
- ✓ Regular census of ungulates and carnivores in the wild will give an insight into the prey-predator relationship. This will also help understand the carrying capacity of their habitats.
- ✓ To increase the availability of food, plantation of wild fruit trees should be done in the forests areas.
- ✓ A Joint Rapid Action Team (a mix of Territorial and wildlife staff) is suggested to be constituted to manage the incidents.
- ✓ Fencing of the cultivated land at strategic points.
- ✓ Encouraging growing of millets instead of maize which is prone to intensive depredation.
- ✓ Proper waste management is very important to avoid attracting wild animals to human settlements and to prevent wild populations being augmented and artificially sustained by human induced food availability. Each stage of waste handling should be addressed, from collection to transportation to disposal. It is suggested that through various

awareness programmes, local people and civil authorities should be encouraged taking this issue seriously. Proper waste disposal is the key strategy to reduce the conflict.

✓ Awareness activities at different levels, for instance in schools or in village level meetings should be held regularly. These programmes are essential for building local capacity in conflict resolution and increasing public understanding of human wildlife conflict. Educating rural villagers in practical skills would help them to deal with wild animal species and to acquire and develop new tools for defending their crops and livestock

**Reactive Actions** - When the damage by the wild animals has already been done.

- ✓ Compensation for damage to livestock must be given timely as per rule.
- ✓ The future of human wildlife conflict resolution lies as much in the involvement of the local communities in the wildlife habitat management.
- ✓ Vide Notification No. FFE-B-A (10)-1/2009 dated 18/09/2018; guidelines for dispensing compensation for life/property losses during human wildlife conflict have already been issued by state government (Annexed as **Annexure XIV**) which should be strictly followed.

**People's participation** – Resolving human wildlife issues becomes difficult without active support from the local communities. It is recommended that to increase the involvement of local stakeholders a Village level response team involving local youth from the vulnerable areas should be formed. Initially these youth should be trained to handle various issues of human wildlife conflict. Following responsibilities may be given to local youth after initial training:

- ✓ Managing the agitated locals to maintain safe distance from the conflict animal
- ✓ Communicating with the forest tranquilization team on time in respective ranges
- ✓ Wherever possible, first aid to small injured animals and birds
- ✓ Medical help to injured villagers in the conflict situation.

**Infrastructure requirement:**

For effective dealing of human wildlife conflict incidences and preventive measures various equipments and other infrastructure like transportation vehicle, communication etc. are necessary requirement.

## **6.5 THEME PLANS:**

### **6.5.1 PROTECTION PLAN:**

#### **6.5.1.1 OBJECTIVES OF PROTECTION PLAN:**

1. To maintain environmental/ecosystem stability of Tundah Wildlife Sanctuary
2. To protect the vast variety of flora and fauna of Tundah Wildlife Sanctuary which represent the remarkable biological diversity and genetic resources
3. To strengthen the infrastructure for sustainable management of WLS
4. To involve the local people in protection of Tundah Wildlife Sanctuary on the principals of participatory approach.

#### **6.5.1.2 POSSIBLE THREATS:**

Following are possible threats –

- ✓ Grazing/ NTFP collection
- ✓ Diseases transmitted through domestic cattle / Communicable diseases
- ✓ Unregulated religious tourism
- ✓ Forest Fire
- ✓ Poaching

#### **6.5.1.3 CONSTRAINTS**

1. Inadequate infrastructure and logistics support
2. Lack of proper communication system and technologies
3. Harsh weather conditions
4. Dependency of local people on natural resources.
5. Tough terrain

#### **INADEQUATE INFRASTRUCTURE AND LOGISTICS:**

The office & residential buildings available at range headquarters and block headquarters are sufficient but some of the buildings being old require immediate maintenance. Infrastructure inside the sanctuary is almost zero. Insufficient Bunker, patrolling huts/anti-poaching huts, patrolling vehicles makes it more difficult to manage the sanctuary.

#### **LACK OF PROPER COMMUNICATION SYSTEM AND TECHNOLOGIES:**

Presently the staffs are mainly located at Bharmour, Badgram, Bhadra and Tundah. Mobile / Phone connectivity is upto Tundah and Bhadra. There is no mobile connectivity inside the sanctuary area. The wireless communication may prove very useful in such areas for better management. Hence, the option of the wireless communication has a very high relevance. Possibility of installing wireless network may be explored.

#### **HARSH WEATHER CONDITIONS:**

The cold temperature conditions are more prevalent in the area. During the winter season sub zero conditions are also witnessed.

## DEPENDENCY OF LOCAL PEOPLE ON NATURAL RESOURCES:

| Threats                       | Over all Status | Remarks                                                                                                                                                                   |
|-------------------------------|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Grazing / NTFP collection     | High            | Fringe villages's people, nomadic graziers are dependent on the resources of Wildlife sanctuary. Deferred grazing and deferred collection of NTFP are possible solutions. |
| Communicable diseases         | low             | A number of cattle population in villages situated along the boundary of Wildlife sanctuary& nomadic graziers. Vaccination of doemstic animal is required.                |
| Unregulated religious tourism | Medium          | Movement of pilgrims. Development of Eco-tourism is possible solution.                                                                                                    |
| Forest Fire                   | Low             | Location of fringe village's Ghasnis (private pastures)<br>Dependence of Fringe villages's people, nomadic graziers on the resources of Wildlife sanctuary.               |
| Poaching/Hunting              | Low             | As a result of human wildlife conflict.                                                                                                                                   |
| Climate Change                | Not assesed     |                                                                                                                                                                           |

The people and nomadic herders of the surrounding villages of the sanctuary depend on the sanctuary for medicinal plants, fuel wood, fodder and cattle grazing. Therefore, reducing the dependency of the people from the sanctuary by providing them with alternate options should be one of the prime objectives of the management.

### **Tough Terrain:**

The area is very tough and risky. One has to crossed grasslands, valleys, ridges, rocky terrain, depression, saddle and spurs to reach from one place to other place. Physiography in the sanctuary varies from gentle Riverine to Steep Rocky. So there is need to maintained the sanctuary paths regularly.

#### **6.5.1.4 THREAT ASSESSMENT:**

#### **6.5.1.5 PLAN OF OPERATION:**

*Before discussing strategies to be adopted for better protection of PA, it is pertinent to mention here that all maps of the sanctuary must be geo referenced upto compartment level with ground truthing of the same in the field. Boundary pillars must be erected along the boundaries and full detail of each boundary pillar i.e. no. of boundary pillar, location, geo coordinates, reference point (if any) must be depicted in boundary pillar register as well as in compartment history files and beat manual.*

#### **6.5.1.5 (A) - GRAZING/ NTFP COLLECTION:**

Fringe villages's people, nomadic Gaddies and Gujjars are dependent on the resources of Wildlife sanctuary. Nomadic graziers use this area as a traditional route for the movement of flocks. The areas viz; Chadola, Chunjala, Saddhar, Badidhar, Jujad, Bansar, Kalicho pass are vulnerable for illegal grazing. The dependence of local people on medicinal plants of the sanctuary area can not be ruled out.

#### **Strategies to be adopted -**

1. Group patrolling
2. Strengthening of Infrastructure/communication system
3. Awareness programmes
4. Regular checking at strategic point
5. Eco development activities (details are given in **Chapter VIII** )

#### **Wildlife Protection Maps:**

There is a great need of preparing the Wildlife Protection Maps, which should indicate the hot spots of the Tundahwildlife sanctuary, topography, water/salt points, the vegetation type of these wildlife hotspots, concerned trekking routes, availability of patrolling huts and other related information.

#### **6.5.1.5(B)- COMMUNICABLE DISEASES:**

Wildlife disease is a major protection issue. In Tundahwildlife sanctuary the chances of infection from the cattle of adjoining villages and migratory graziers cannot be ruled out. The following areas have been listed sensitive as well as key sites on account of common sites where the wild animals as well as domestic animals feed /graze frequently.

| <b>Sr. No.</b> | <b>Location</b>       |
|----------------|-----------------------|
| 1              | Janu                  |
| 2              | Chhandi-Khaini.       |
| 3              | Lambapar.             |
| 4              | Chaorla               |
| 5              | Jujad                 |
| 6              | Lundi Dhar.           |
| 7              | Bansar-Adb.           |
| 8              | Bari Dhar.            |
| 9              | Khartta (Deoki) Dhar. |
| 10             | Sarotha Dhar          |
| 11             | Mumbri Dhar           |
| 12             | Silpari Dhar          |
| 13             | Chunjala Dhar         |
| 14             | Sad Dhar              |
| 15             | Kalichho Pass         |

|    |             |
|----|-------------|
| 16 | Kandel      |
| 17 | Karoru      |
| 18 | Tandei      |
| 19 | Digola Dhar |
| 20 | Keloon      |

Therefore, these areas need to be sanitized, so that the disease from domestic animals does not get transmitted to the wild animals in the vicinity. Further, the sites nearer to habitats or Goths (where the migratory graziers camp during nights), it is necessary to vaccinate the herds of sheep and goats regularly to avoid the transmission of possible diseases. Further details are given in **Wildlife health management plan (Para 6.5.5)**

#### **6.5.1.5(C) - UNREGULATED TOURISM:**

Banni Mata, Chadola Temple, Digu Temple and Kali Choo Pass are major pilgrimage sites as well as a popular trekking destination in Himachal Pradesh. Banni Mata is an incarnation of Kali Mata and is deeply worshiped by the people of Himachal Pradesh, especially the Gaddi tribes of the region. Chadola Temple is the native place of Banni Mata and every year during July-August local people and pilgrims visit this area. Although the Banni Mata temple does not come under the sanctuary but it is part of the eco-sensitive Zone. Kali Cho Pass and Digu Temple are adjacent to each other and are frequently visited by migrant shepherds and hard core trekkers. Kali Chho Pass with an altitude of 4800 meters is open only for three months i.e. from July to September. All the areas except Banni Mata come within the sanctuary. This type of uncontrolled tourism causes damage to vegetation and changes in the behavior patterns of wild animals in general. The problem of garbage and noise pollution, damage to vegetation by local people and other tourism-borne pressures need to be addressed on a high priority.

#### **Possible negative impacts:**

The negative impacts of such kind of tourism can gradually destroy environmental resources on which it depends. Negative impacts from tourism occur when the level of visitor use is greater than the environment stability to cope with this use within acceptable limits of change. Uncontrolled tourism poses potential threats to many natural areas. It can put enormous pressure on an area and lead to impacts such as soil erosion, increased pollution, natural habitat loss, increased pressure on wildlife species and heightened vulnerability to forest fires.

#### **Noise pollution:**

It causes distress to wild animals in the area

**Solid Waste and Littering:**

Waste disposal is a serious problem and improper disposal can be a major despoiler of the natural environment, lake, rivers/ Nallas, scenic areas etc.

**Sewage:**

Unregulated tourism often leads to increased sewage pollution. Wastewater pollutes Nallah and other water sources damaging the flora and fauna and also very dangerous to mankind.

**Extraction of fuel wood:**

This area is having many high altitude threatened floral species including *Betula*, *Rhododendron*, *junipers* and *Taxus* etc. Use of these species as fuel wood poses a threat on the existence of these species.

**Collection of NTFP:**

This sanctuary is a home to very rare and threatened plant species including *Bergenia stracheyi*, *Jurinea dolomiaea*, *Juniperus communis*, *Podophyllum hexandrum*, *Polygonatum verticillatum*, *Aconitum heterophyllum*, *Picrohiza kurroo* and *Selinum tenuifolium* etc. Illegal extraction and trade of these plants during this period can not be ruled out. Hence, this is a serious threat to the bio diversity of this area.



**Bankakri (*Podophyllum hexandrum*):**



**Nag Chatri (*Trillium govanianum*)**



**Dhoop (*Jurinea macrocephala*)**



**Chukari (*Rheum australe*):** Photograph by; Dr. Kuldeep Singh Jamwal, DFO WL

### **Physical impacts:**

Attractive landscape sites, such as high altitude pastures, lakes, mountaintops and slopes, are often transitional zones, characterized by species-rich ecosystems. Typical physical impacts include the degradation of such ecosystems. The ecosystems most threatened with degradation are ecologically fragile type of areas, which are present in this sanctuary.

### **Strategies to be adopted -**

1. The issue of uncontrolled tourism and its negative impacts should be taken up with the local panchayat representatives.
2. Information regarding wildlife sanctuary must be displayed in the entry gate at Tundah, Banni and Bdagram and other vintage points.
3. Group patrolling
4. Strengthening of Infrastructure/communication system
5. Installation of dustbins (Stone) along the tract and disposal of garbage in eco friendly manner should be ensured.
6. Regular cleanliness drives should be organised with local civic bodies, NGOs etc.
7. It should be ensured that proper sewage disposal will be done by the authorities responsible for it.

8. Do's and don'ts of sanctuary area must be displayed at strategic points.
9. Regular checking at strategic point
10. Awareness programmes

***“Tourism has the potential to increase public appreciation of the environment and to spread awareness of environmental problems when it brings people into closer contact with nature and the environment”.***

#### **6.5.1.5(D)- FOREST FIRE**

**Fire sensitive areas** –The following areas in the wildlife sanctuary area sensitive from fire hazards which needs to be taken care of so that there is minimum loss to the habitat as well as to the wild life itself.

| <b>Sr. No.</b> | <b>Name of area.</b> | <b>Area in ha.</b> |
|----------------|----------------------|--------------------|
| 1.             | Tundah DPF.          | 100.00 Ha.         |
| 2.             | Silpari              | 60.00 Ha.          |
| 3.             | Sarotha DPF.         | 308.37 Ha.         |
| 4.             | Thanalla RF-I.       | 78.51 Ha.          |
| 5.             | Thanalla RF-II.      | 101.58 Ha.         |
| 6.             | Digola RF.           | 178.07 Ha.         |
| 7.             | Digola RF-II.        | 125.45 Ha.         |
| 8.             | Digola RF-III.       | 169.97 Ha.         |
| 9.             | Badhrala DPF.        | 109.67 Ha.         |
| 10.            | Thanalla-I.          | 80.94 Ha.          |
| 11.            | Thanalla-II.         | 60.70 Ha.          |
| 12.            | Chharola DPF-I.      | 60.70 Ha.          |
| 13,            | Chharola DPF-II.     | 80.94 Ha.          |
| 14.            | Bhansar Right.       | 226.62 Ha.         |
| 15.            | Bhansar Left.        | 223.75 Ha.         |
|                | <b>Total:-</b>       | <b>2404.06 Ha.</b> |

#### **Strategies to be adopted –**

1. During fire season fire sensitive areas must be patrolled by the front line staff intensively.
2. Introduction of modern firefighting tools and training of staff and labor in their use.
3. Construction of new fire lines if required
4. Construction of water harvesting structures/ Kaccha water ponds in the sanctuary area.
5. Regular cleaning of roads, bridle paths and inspection paths.

6. People's Participation – As almost all the fires result from human activity, the involvement of people is essential for improved prevention and control.
7. Regular meetings/ awareness programmes among local community are essential.
8. Fire fighting operations - During the fire season the following shall be done:
  - ✓ Once fire is detected all hands must proceed to fight the fire, irrespective of range/jurisdictional boundaries
  - ✓ Range headquarter will have enough spare sets of equipment like fire rakers, small axes, sickles, water bottles etc.
  - ✓ Proper reporting of fire incidents will be ensured. The general tendency to under report has to be strongly discouraged.
  - ✓ Fires watch huts/Gang huts/ Watch towers will be established at vantage points. Each watch point will be managed by three-four fire watchers. Fire watchers will be provided with mobiles/Walkie Talkie and fire resistant kits during fire season.
  - ✓ There is a need to develop a rapid response system in case of outbreak of fire. Since people do not get much in terms of fuel, fodder and rights from the sanctuary, in such scenario, people are reluctant to put off fire. It therefore, appears that in the short term an effective network of inspection paths, which are regularly cleaned during and before the dry season is maintained and sufficient provision be made in the annual budget for this. Record of fires needs to be maintained regularly.
9. Development of extension programme to educate villagers and visitors about fire. Sign boards with suitable messages will be displayed at all prominent places in the Wildlife Sanctaury.



**Fire awareness campaign at Tundah**

#### **6.5.1.5(E) - POACHING/ HUNTING:**

Ban on hunting has been of great help to the wildlife. Poaching in the sanctuary area is negligible and no case of poaching has been reported during last so many years. However following actions are recommended –

- ✓ Group Patrolling and Reporting: This aspect of the wildlife protection needs very effective strengthening through patrolling by the wildlife sanctuary staff.
- ✓ Unlike traditional patrolling by one Forest Guard, it is recommended that at least two Forest Guards along with one or two casual workers / local people need to form one patrolling party and conduct three or four long patrols in a month.
- ✓ Each patrol to cover interior areas of the sanctuary. The patrolling party has to have maps with their route shown on it.
- ✓ Full reporting on every patrol including collection of biological information is to be ensured.
- ✓ The biological and other information collected during patrolling must be organized and compiled.
- ✓ In addition to preventing wildlife crime, these patrolling reports may be very useful for the evaluation of management effectiveness and for monitoring habitats and population of target species.
- ✓ A well-accomplished Nature Awareness programme involving school children and locals can arouse public opinion in favour of wildlife conservation.

#### **Anti-Poaching Operations:**

- ✓ Winter season (October-March) is more sensitive period; therefore more intensive operations are required in these months.
- ✓ Wherever possible local people/youths should be involved in anti-poaching operations.

#### **Reward to persons:**

A reward is recommended to be given to a person or villager who renders assistance in the detection of an offence or the apprehension of the offenders. A reward is also recommended to front line staff for doing outstanding job in protection of wildlife.

#### **Capacity enhancement of Front line staff:**

Some of the suggested courses for Forest Guards, Dy. Rangers, and Forest Rangers are:

- ✓ One week module on Identification and prevention of illegal trade in wildlife, its derivatives and parts.
- ✓ One week module on intelligence gathering, investigation and prosecution of wildlife offence cases.
- ✓ One-week module on Wildlife (Protection) Act, 1972 and its application: This course will help develop standard Performa for booking forest and wildlife offences under IFA and WPA, such as Search Warrant, Seizure Memo, Bail Bond, Case Dairy/DR etc. for the

entire state. This will help in making prosecution of cases simple and will reduce the chances of technical errors in filing offence cases in the court of law.

✓ One week module on human wildlife conflict, Nature Conservation Education, and provisions of wildlife compensation.



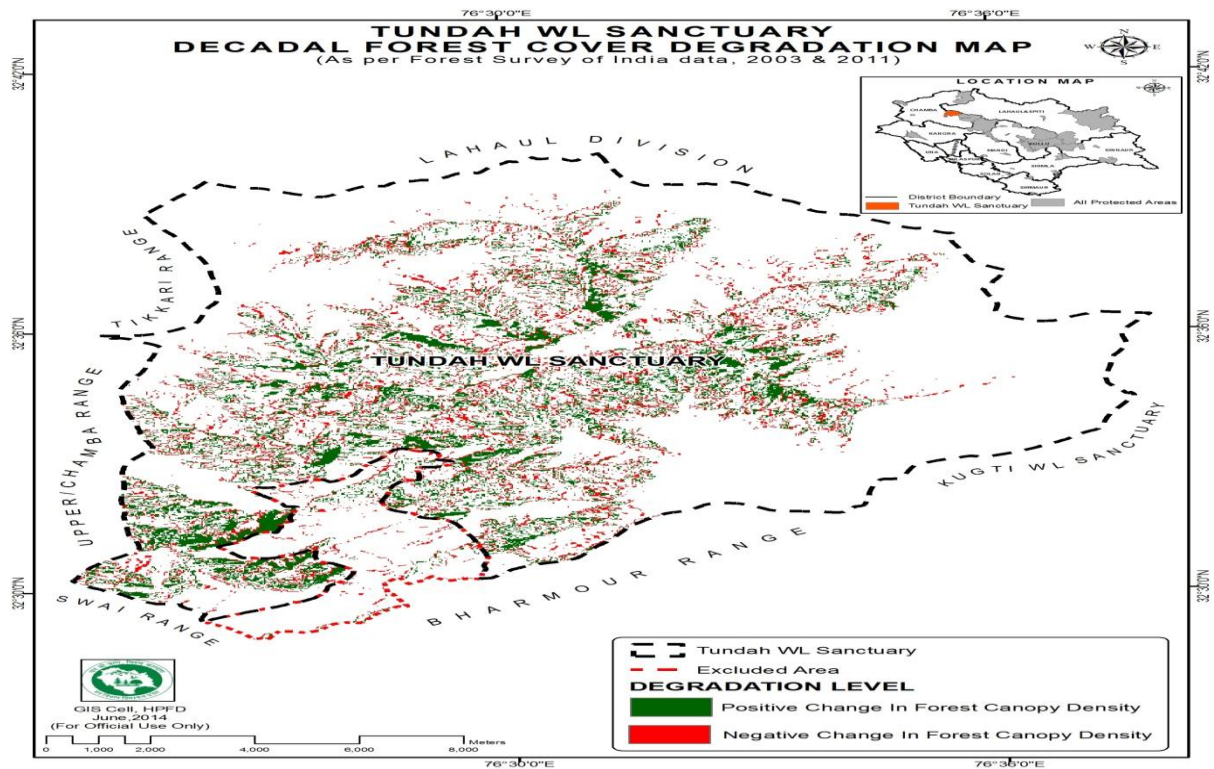
**Group Patrolling with locals**

#### **6.5.1.5(F)-IMPACTS OF CLIMATE CHANGE:**

At present, no specific data is available to assess the impact of climate change on Tundah Wildlife sanctuary. However, it is expected that in future many different types of impacts on biodiversity (individual organisms, species and ecosystems) will be felt.

#### **6.5.2 HABITAT MONITORING PLAN:**

Habitat management within the PA is a key to effective conservation of wildlife. Active managerial intervention, including habitat restoration will be carried out in the sanctuary for development of the forest area as ideal wildlife habitat. This would include carrying out plantations, management of high altitude pastures, soil, moisture conservation works & improvement of water availability etc.



#### 6.5.2.1 OBJECTIVES:

1. To observe the habitat for Long Term Ecological Monitoring for any significant changes and its effect on species.
2. To identify degraded areas inside the Sanctuary.
3. To restore these degraded areas through scientific/ managerial interventions.
4. To improve the habitat quality for different flagship species.

#### 6.5.2.2 PRESENT STATUS:

Due to anthropogenic pressure, habitat in the area is degrading at certain points. Degradation level of various areas within PA is shown in the above map. The forests in the sanctuary are potential habitat of many species; therefore proper management is vital for protecting the biodiversity of sanctuary and achieving the objectives of the management plan.

#### 6.5.2.3 RECOMMENDED STRATEGIES:

##### 6.5.2.3.1 HABITAT MANAGEMENT ACTIVITIES:

##### 6.5.2.3.1 (A) PLANTATIONS:

Area being moderately dense to dense forest, there is no need for tree plantation in the sanctuary. However, the assisted natural regeneration can be taken up at certain places. The rocky habitats will be maintained as such. However, some native fruit tree

species can be planted in the sanctuary area, as it will provide food for the rich Avian-fauna of the area. Following areas need to be restocked through plantation or assisted natural regeneration technique-

Tundah DPF, Silpari DPF, Tandei Dhar, Basnar Dhar, Charola Dhar, sarni Dhar, Sad Dhar, Talawadi Dhar, Jujad Dhar and Thanala dhar etc

**Actions to be taken:**

- ✓ Long Term Ecological Survey to be conducted through Himalyan Forest Research Institute (HFRI) or any other agency.
- ✓ There is hardly any area available for tree plantation in the sanctuary. However, some of the degraded area can be rehabilitated by assisted natural regeneration/plantation.
- ✓ Only native species of trees/ shrubs/ herbs/ grass will be planted and more emphasis will be given to assisted natural regeneration.
- ✓ Efforts should be made for site/ faunal species specific plantations
- ✓ Plantation of trees/ Shrubs/Herbs/ Grasses should be site specific.
- ✓ Three storey plantation model (Trees, Shrubs and herbs/grasses combined) depending upon the objective can also be developed.
- ✓ An integrated approach with plantation and soil and moisture conservation will be followed.
- ✓ Involvement of local people, school children, Mahilamandal, Yuvakmandal etc. will give better results of plantation.

**Following species are proposed for plantation:**

1. *Aesculus indica* ( Horse Chestnut)
2. *Juglans regia* (Walnut)
3. *Quercus semicarofolia* (Ban)
4. *Quercus baloot* (Ban)
5. *Cedrus deodara* (Deodar)
6. *Pinus wallichiana* (Kail)
7. *Pinus smithiana* (Spruce)
8. *Abies pindrow* ( Fir)
9. *Acer pictum* Maple
10. *Pyrus pashia*(Kainth)
11. *Prunus padus*(Bird cherry)
12. *Pyrus pyrifolia* (Sainth)
13. *Salix wallichiana*
14. *Rhododendron* (Burans)
15. *Berberis* (Kasmal)
16. *Fragaria vesca* ( Strawberry)
17. *Geranium wallichianum* (Ratanjot)
18. *Dioscorea deltoidea* (Shinglimingli)
19. *Fragaria indica*(Wild Strawberry)

20. *Rumex* (Arrowleaf Dock)
21. *Solanum* (Mullein nightshade)
22. *Rubus* (Raspberry)
23. *Lonicera hispidula* (pink honey suckle)
24. *Native species of grasses*



#### **6.5.2.3.1 (B) SOIL AND MOISTURE CONSERVATION WORKS - (BIOLOGICAL AND ENGINEERING):**

Since, the sanctuary is being managed for conservation of wildlife, soil and moisture conservation works are of utmost importance. Engineering measures will be supplemented with vegetative measures as per site specific conditions.

The overall objectives of Soil and moisture Conservation works are:

- ✓ Increase filtration into soil
- ✓ Controlling excessive run off
- ✓ Manage and utilize run off for useful purpose.
- ✓ Improving existing water resources



**Soil erosion in Tunda WLS**



### **Actions to be taken/ Recommendations:**

Following actions are proposed to achieve above objectives

- ✓ Biological measures will be preferred over engineering measures (wherever possible)
- ✓ A plan for soil and moisture conservation works will be prepared and work will be done systematically.
- ✓ Small kacchha water ponds
- ✓ Contour staggered trenches along with plantation of local grass species on their lower berm are proposed

- ✓ Soil & Moisture conservation works are proposed in TundahDPF, Thanala DPF, Madhed Nalla, Jaled Nalla ,Bhansar Nalla, Bhadra Nalla, Kuthad nalla Liundi DPF, Digola DPF etc.

#### **6.5.2.3.1 (C) IMPROVEMENT OF WATER AVAILABILITY:**

Although, the sanctuary area has many perennial streams and many seasonal springs but some more water resources are needed to be created especially for the lean period. The type of water retention structure will depend on the site condition. As there is water deficiency the trenches and percolation ponds on higher reaches shall be made so that the water resources and nallahs remain rejuvenated throughout year. The first and foremost step to improve water availability inside the sanctuary is to have the information of all the existing water sources and be aware of their status. This could be done by identifying the perennial and seasonal water sources through intensive survey and water mapping that area using 2x2 km grid. Any Grid square without perennial sources represents a gap. The best way to fight water scarcity is by regenerating natural sources of water and then construction of artificial water holes. Another important criterion to manage water resources inside a PA is by proper site selection. Following points should be considered for any water development works –

- ✓ A gap in water supply is not in itself sufficient reason to establish an additional water source. Clear objectives must be established.
- ✓ A large number of small and widely scattered sources are better than a few large sources.
- ✓ Water development should be avoided in areas where Endemic and rare plant species are present.
- ✓ Water development may trigger erosion on steep lands and fragile soils.
- ✓ Site which has shade trees and tall shrub or grass would be favourable – (escape cover nearby)
- ✓ Sites that are likely to be disturbed frequently by livestock, local people or traffic should be avoided.

#### **6.5.2.3.1 (D) PROVIDING SALT LICKS:**

Provision of artificial salt lick affect the behavior and movement of wild animal and sometimes it also help poachers to locate the presence of the animals. Therefore, it is necessary to provide due care and protection where artificial salt licks have been provided. It is suggested that all the existing natural salt lick locations should be mapped and based on the information decision to provide new salt licks should be taken carefully.

Detail of salt licks is provided as **Annexure-V**.

### 6.5.3 INFRASTRUCTURE DEVELOPMENT PLAN:

For the effective protection and regular monitoring, proper communication system, patrolling huts in remote areas, continuous maintenance of path and small bridges are necessary requirements. In addition, other logistic support like tents and other trekking equipment's are also required.

#### 6.5.3.1 LIST OF TOTAL INFRASTRUCTURES AVAILABLE AND REQUIRED:

##### 1. Forest road/path:

| Existing Situation                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               | Proposed/Recommended action                            |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|
| <b>Bridle paths/ Inspection paths/ Census paths</b><br><br>1. Trek from Tundah to Mumbri Dhar 8 Kms<br>2. Trek from Tundah to Mumbri Dhar – Silpari Dhar- Tandei Dhar- Mandha 12 Kms<br>3. Trek from Tundah to Mumbri Dhar – Silpari Dhar- Tandei Dhar- Banni Top- Banni Mata temple 20 Kms<br>4. Tripna to Bansar 18 Km.<br>5. Bansar to Chadola 15 Km.<br>6. Bansar to Kalichho pass 8 Km.<br>7. Tripna to Badi Dhar 18 Km.<br>8. Banni Mata to Charola 26 Km<br>9. Janu to Lampapad 15 Km<br>10. Banni to Luindi via Thanala 18 Km<br>11. Tripna – Sad Dhar – Digu Dali 12 Km | Maintenance suggested of these path on periodic basis. |

##### 3. Patrolling Huts/ Anti poaching huts/ Bunkers:

| Existing Situation                                         | Proposed/Recommended action                               |               |                   |                         |
|------------------------------------------------------------|-----------------------------------------------------------|---------------|-------------------|-------------------------|
| ✓ For patrolling Six Bunkers has already been constructed. | Construction of Bunkers at following places are proposed: |               |                   |                         |
|                                                            | Sr. No.                                                   | Name of Place | Number of Bunkers | Latitude and Longitude  |
|                                                            | 1                                                         | Digu Dali     | 1                 | 32°32'00"N; 76°30'22" E |
|                                                            | 2                                                         | Bhansar       | 1                 | 32°36'48"N; 76°33'09" E |
|                                                            | 3                                                         | Baddidhar     | 1                 | 32°34'08"N; 76°27'50" E |
|                                                            | 4                                                         | Jujad         | 1                 | 32°35'38"N;             |

|  |   |           |   |                            |  |
|--|---|-----------|---|----------------------------|--|
|  |   |           |   | 76°30'01" E                |  |
|  | 5 | Lamapad   | 1 | 32°35'04"N;<br>76°28'44" E |  |
|  | 6 | Jweth     | 1 | 32°35'55"N;<br>76°31'02" E |  |
|  | 7 | Charola   | 1 | 32°36'52"N;<br>76°30'50" E |  |
|  | 8 | Janu Dhar | 1 | 32°33'33"N;<br>76°27'59" E |  |

#### 4. Office and residential complex for forest officers-

| Existing Situation                                                                                                                                                                                                                      | Proposed/Recommended action                                       |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>✓ 1 No. Range office cum residence</li> <li>✓ 1 No. Block officer residence</li> <li>✓ 4 No. Forest Guard huts residence</li> <li>✓ 2 No. Rest Houses and</li> <li>✓ 1 no. Labour Hut</li> </ul> | Special Maintenance of these buildings suggested on regular basis |

#### 5. Construction of other infrastructures-

| Existing Situation                                                                                                                                           | Proposed/Recommended action                                                                                                                                                                                                                                                                                                                                                                                             |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>✓ No proper demarcation of beats</li> <li>✓ Insufficient signages at each entry point and along the trails</li> </ul> | <ol style="list-style-type: none"> <li>1. Proper boundary with boundary pillars should be demarcated and redefined.</li> <li>2. Effective signage like Do's and Dont's, species rich areas, trekking routes etc. should be demonstrated properly on the display at each entry point and inside the sanctuary.</li> <li>3. Periodic maintenance of the buildings and infrastructures present in the sanctuary</li> </ol> |

#### 6. List of total instruments and logistics available and required:

| Existing Scenario                                                   | Proposed/Recommended action                                                                                 |
|---------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| <b>1. Vehicles for forest staff</b>                                 |                                                                                                             |
| <ul style="list-style-type: none"> <li>✓ One Bolero –DFO</li> </ul> | <ul style="list-style-type: none"> <li>✓ One Patrolling vehicle needs to be purchased</li> <li>✓</li> </ul> |

| <b>2. Instruments and gadgets</b>                                                                                                                                                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> <li>✓ Only one desktop + 1 printer +1 scanner+1 laptop in Range office</li> <li>✓ 8 GPS</li> <li>✓ 6 binoculars</li> <li>✓ 14 compass</li> <li>✓ 8 Range finders</li> <li>✓ 2 Walkie Talkie</li> <li>✓ 8 Trap Camera</li> <li>✓ 3 Digital Camera</li> <li>✓ 1 Snake Handling kit</li> </ul> | <ul style="list-style-type: none"> <li>1. Wireless handsets/ walkie talkie sets for all forest guards</li> <li>2. Snow Gear instruments</li> <li>3. Sufficient Tents, sleeping bags</li> <li>4. Digital Cameras</li> <li>5. Drone cameras</li> <li>6. Fire resistant kits</li> <li>7. Snake handling kits</li> <li>8. Fire arms for self protection</li> </ul> |

#### **6.5.4 ECO DEVELOPMENT PLAN:**

There is a lot of scope to promote the Eco Development activities in and around the sanctuary so that the following objectives could be achieved:

1. To provide healthy, hygienic environment to the general public residing around the sanctuary and to improve their living conditions.
2. To help the local people in ameliorating their economic status.
3. To manage the human wildlife conflict in buffer area.
4. To encourage ancillary occupation in the area.
5. To improve the agricultural productions by adopting better techniques like terracing, soil conservation measures etc.
6. To provide basic medical facilities both to human being as well as cattle.

Detail regarding specific issues, broad strategies Etc. is in **Chapter VIII**

#### **6.5.5 WILDLIFE HEALTH MANAGEMENT PLAN:**

The increase in human-wildlife-domestic interface increases the threat of transmission of diseases from wildlife to human-livestock and vice versa. Therefore, disease transmission has important implications not only for wildlife management, but also for public health, livestock development, and rural livelihoods. Proper surveillance programs all year round are crucial in maintaining management health plans. This will help develop databases which will help in forecasting disease outbreaks and establish early warning systems.

##### **6.5.5.1 IMMUNIZATION:**

All domestic animals and livestock around the Tundah wildlife sanctuary as well as nomadic cattle should be vaccinated against the transmissible diseases. This will

prevent the transmission and introduction of diseases from wild animals to domestic and vice versa.

#### **6.5.5.2 PUBLIC AWARENESS:**

To prevent wild animals from frequenting into human habituated areas, the communities living around the Wildlife Sanctuary should be made aware of the repercussion of irresponsible disposal of garbage and livestock carcasses.

#### **6.5.5.3 EDUCATION AND TRAINING:**

All the stakeholders require education and training for at least basic public health concerns and bio-security to achieve the desired outcome. Protocols for handling carcasses, attending disease outbreaks, etc should be made. The field personnel should be made aware of this and given at least basic training for this purpose.



**Community members of ESZ & Wildlife officials of Tundah WLS with MEE Team**

## CHAPTER- VII

### ECO-TOURISM, INTERPRETATION AND CONSERVATION EDUCATION:

*The eco tourism in a very broad sense means venturing into and enjoying nature in such a way as to assure that negative impacts on the cultural and natural environment are minimized and mitigated. It is therefore responsive tourism which besides being ecologically and culturally sensitive helps the local community in realizing social and economic benefits.*

#### 7.1 GENERAL:

As such there is great potential of eco cum religious tourism in this far flung area having a very unique and aesthetic view of whole of the wildlife sanctuary. The acquaintance with some of the most endangered flora and fauna, entourage to wildlife sanctuary becomes an eye opener and rarest moments of their pilgrimage. Such visitors will be the real ambassadors of wildlife conservation and eco diversity in the Himalayan region. It will also be a great boon for the development of religious cum eco tourism to the state.

***It must be ensured that all eco-tourism activities to be executed in the PA are as per the provisions of Wildlife (Protection) Act, 1972 as amended from time to time and rules made there under and different guidelines regarding eco-tourism in PA issued from time to time.***

#### 7.2 OBJECTIVES:

- ✓ To facilitate eco-tourism and to regulate the inflow of eco-tourists to the WLS without affecting the main objective of conservation.
- ✓ To involve local people in tourism activities, thereby generating direct and indirect economic activities for them.
- ✓ To provide hassle-free, low volume and truly enriching experience of wilderness to the visitors
- ✓ To promote local cultural significant sites.
- ✓ To promote traditional knowledge, cultural values and heritage.
- ✓ To create awareness about wildlife conservation among masses.

#### 7.3 ISSUES AND PROBLEMS:

The non existence of basic amenities, tough terrain, harsh weather and non availability of trekking guides entourage the trekkers as well as wildlife lovers are some of the main bottlenecks and limitations for the promotion of tourism throughout the year which needs to be addressed at very first stage.

## **7.4 THE STRATEGIES:**

### **7.4.1 IDENTIFICATION OF THE ZONE:**

Based upon the zonation of the sanctuary area, the following tracts have been identified for the eco-tourism/ religious tourism activities:

- (i) Trek from Tundah to Mumbri Dhar (8 KM)
- (ii) Trek from Tundah to Mumbri Dhar – Silpari Dhar- Tandeir Dhar- Mandha(12 KM)
- (iii) Trek from Tundah to Mumbri Dhar – Silpari Dhar- Tandeir Dhar- Banni Top- Banni Mata temple (20 KM)
- (iv) Trek from Tripna to Digu Dali Temple (6 KM)



The area is worth to see being a rich forests, high mountainous alpine pasture, natural water falls, small streams, glaciers, passes and religious places. Presence of rare and threatened floral species energize the trekkers/ hiker/ pilgrims during their journey. Presence of religious places in the area gives actual peace of mind. Although a number of wild animals are present in the sanctuary and their sighting is a matter of chance, but the chances are more here as compared to other wildlife sanctuaries in the state.

### **7.4.2 FORMATION OF SOCIETY/ COMMITTEE:**

A Society/ Committee will be constituted with the primary objective to promote and manage eco-tourism activities in the area of operation to get optimum economic returns to the local people in an environmentally and culturally sustainable

way. The Society/ committee shall, for this purpose, retain the revenue receipts generated out of those government assets in its area of operation, the use of which will be allowed to the society/ committee, and utilize the same to fulfill the objectives of the society.

Role of society/ committee will be as under:

- ✓ To create awareness amongst the local people about the potential of eco-tourism in the area and its intimate linkages with conservation of natural resources.
- ✓ To enhance capacity of the local people and concerned government officials in managing eco-tourism in their area.
- ✓ To identify eco-trails/ tracts in the area of operation and develop infrastructural facilities along these trails/ tracts for such tourism.
- ✓ To manage the infrastructure developed by the society/ committee and /or taken over by the society from other organizations under MoU if any.
- ✓ To develop and enforce protocols to minimize the negative impacts of traditional tourism on ecology and social fabric of the area.
- ✓ To develop ways and means to attract responsible nature and adventure tourists to the identified and developed eco-trails/ tracts.
- ✓ To promote cooperatives amongst local artisans for production and sale of handicrafts/ cottage level produce or any local produce to get better returns to them.
- ✓ To set up branches of the society for the said purposes at such places as may be decided by the Governing Body of the society from time to time.
- ✓ To assist or take assistance from and collaborate with other institutions with similar activities in India or elsewhere.
- ✓ To keep close liaison with State Level Eco-tourism Advisory Committee set up in the State Forest Department and work under its broad policy guidelines on the subject.
- ✓ To engage persons for the purpose of the society.
- ✓ To carry out all activities keeping in view various provisions of related Acts, Rules , regulations and guidelines issued by the government from time to time.
- ✓ To do all other lawful things as may be incidental or conducive to achieve the above objectives.

### **7.4.3 INFRASTRUCTURE DEVELOPMENT:**

Main tourism activities in the area could be trekking, hiking and sighting of various faunal species. Glaciers, waterfalls, dense forests and high altitude pastures are also main attractions of the area. For this purpose the basic requirement would be as under:-

#### 7.4.3.1 TREKKING ROUTES:

There are a number of bridle / inspection paths inside the sanctuary area. Regular repair/ improvement of such paths will be required on periodic basis. List of bridle / inspection paths are as under:

| Sr. No. | Name of Trekking route                                                          | Km |
|---------|---------------------------------------------------------------------------------|----|
| 1       | Tripna to Bansar                                                                | 18 |
| 2       | Bansar to Chadola                                                               | 15 |
| 3       | Bansar to Kalichho pass                                                         | 15 |
| 4       | Tripna to Badi Dhar                                                             | 18 |
| 5       | Banni Mata to Chaodla                                                           | 26 |
| 6       | Tundah - Mumbri Dhar – Silpari Dhar- Tandeir Dhar- Banni Top- Banni Mata temple | 20 |
| 7       | Tripna- Sad Dhar- Badi Dhar                                                     | 18 |



#### 7.4.3.2 TREKKING HUTS/ CAMPING SITES:

Besides maintenance of already existing buildings, the following trekking huts/ camping sites are proposed to be constructed at following places:-

| Sr. No. | Name of place | Location               | Beat         | Facility to be created |               |
|---------|---------------|------------------------|--------------|------------------------|---------------|
|         |               |                        |              | Two men tent           | Four men tent |
| 1.      | Bansar        | 32°35'54"N; 76°32'22"E | Bhadra Beat  | 12                     | 8             |
| 2.      | Sad Dhar      | 32°32'31"N; 76°29'57"E | Badgram Beat | 10                     | 22            |
| 3.      | Mumbari       | 32°30'18"N; 76°26'20"E | Tundah       | 14                     | 18            |

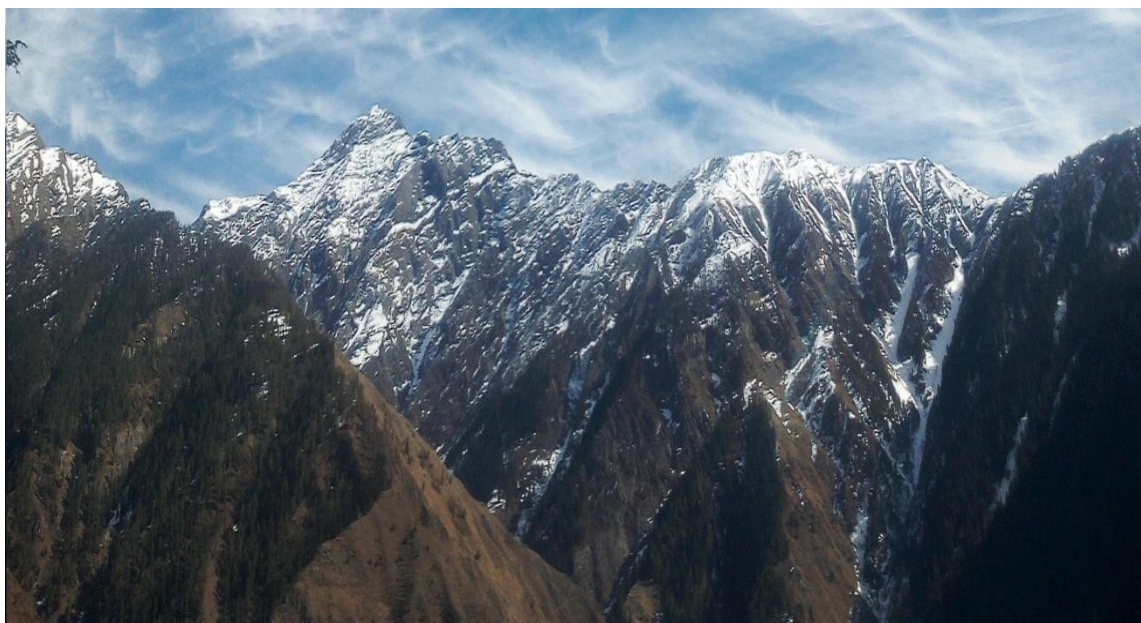
|    |             |                        |             |   |    |
|----|-------------|------------------------|-------------|---|----|
|    | Dhar        |                        | beat        |   |    |
| 4. | Tandei Dhar | 32°31'22"N; 76°26'18"E | Tundah beat | 6 | 10 |
| 5. | Jujad       | 32°36'05"N; 76°30'23"E | Bhadra Beat | 3 | 2  |
| 6. | Banni Top   | 32°33'36"N; 76°27'54"E | Banni Beat  | 7 | 4  |

#### **7.4.3.3 CAMPING SITE/RAIN SHELTERS/ RESTING PLACES AND BENCHES:**

Eco friendly rain shelters/ resting places and Camping sites will be developed along the trek routes to have a rest for a while in the lap of nature.

#### **7.4.3.4 OTHER ACCESSORIES:**

The trekking huts have to be equipped with basic necessities like utensils, LPG connection, necessary bedding, Solar lights etc. Sleeping bags, Mattresses, Tents, Rucksacks, Snow shoes, Ice axe, Snow glasses, solar light arrangements, water bottles (2 Ltr. Capacity) & walking sticks etc are to be provided.



#### **7.4.3.5 TREK GUIDES/HELPERS:**

During the trekking seasons which would be May-June to September-October, some guides/helpers will have to be engaged amongst the local residents to enable them seasonal alternative livelihood who will not only look after the maintenance of the trekking huts but also would act as guides to the tourists and assists them as and when required.

#### **7.4.3.6 INSTALLATION OF DUST BINS:**

Sufficient number of dust bins will be installed along the eco tourism tracts/ trekking huts and camping sites. A proper mechanism will be developed for the disposal of solid waste. Regular cleanliness drives will be organized to keep the area clean and green.

#### **7.4.3.7 SANCTUARY LITERATURE:**

Brochures/pamphlets about the sanctuary will be printed for distribution to tourists. The brochure will give the trekking map of the sanctuary including trails, list of wild animals, birds and plants. It will inform the tourists about the rules to be followed in the sanctuary.

#### **7.4.3.8 SIGNAGES:**

Signage needs to be developed in the sanctuary and be placed at vantage points. Some points for inclusion in the signboards are as follows:

- ✓ Name and area of the sanctuary.
- ✓ Wildlife (Flora & Fauna) found in the sanctuary.
- ✓ Significance of the sanctuary.
- ✓ Historical background of the area.
- ✓ Rules and regulations.
- ✓ Fire safety.
- ✓ Distance from famous places.
- ✓ Do's and don'ts.

It would be ideal to develop a proper signage plan by a professional agency including the location of each signboard and content and design of each signboard. The actual signage put up will be as per the signage plan.

#### **7.4.3.9 DEVELOPMENT OF INTERPRETATION CENTRE:**

Nature interpretation and conservation education are integral part of eco-tourism. Interpretation centers are instrumental in changing the perception of visitors as well as those of the local community in support of conservation. Therefore, to fulfill these twin objectives, a small interpretation centre-cum-souvenir shop can be established at Tundah. The interpretation centre-cum-souvenir shop will perform the following functions:

- ✓ Create awareness about the sanctuary values.
- ✓ Inform people about the biodiversity of the sanctuary.
- ✓ Educate people to follow sanctuary rules.
- ✓

- ✓ To promote cooperatives amongst local artisans for production and sale of handicrafts/ cottage level produce or any local produce to get better returns to them.
- ✓ To promote local culture.

#### **7.4.3.10 CAPACITY ENHANCEMENT:**

Local Eco-guides will be trained to acquaint the tourists about the sanctuary. The main skills for which they need to be trained are as follows:

- ✓ Knowledge of animals, birds and plants in the sanctuary.
- ✓ Wildlife interpretation skills.
- ✓ Basic principles of safety while escorting the tourists.
- ✓ Cleanliness and prevention of littering.

The field staff shall also be trained in these skills so that they can act as resource persons for future trainings. The staff posted in forest rest houses, inspection huts etc. shall be trained in basic hospitality skills by professionals, either private hoteliers or trainers from the Tourism Department.

#### **7.4.4 REGULATIONS, MONITORING AND EVALUATION:**

The basic information about the sanctuary be displayed from the information centre/ interpretation centre. The troop size of the visitors and timing to visit the sanctuary will be decided as per the availability of infrastructure facilities, weather conditions and subject to the conditions that there is least disturbance to wildlife. To get a feedback, proper record would be kept in the prominent places wherein the tourists can make remarks regarding the sanctuary and other observations for its development. This would also help in making more concrete efforts towards eco tourism promotion. Proper record of the number of visitors will also be maintained. Tourists however, would be desired to create least disturbance in the sanctuary area. No weapon shall be allowed in the sanctuary area. Tourists will also be advised *not to use any kind of polythene/plastic and keep the sanctuary area clean and green*. For ease in management and minimizing the impact of visitors, a number of restrictions will have to be enforced in the sanctuary area from time to time. The following do's and don'ts should be followed by the visitors inside the sanctuary.

#### **7.4.5 Do's & Don'ts:**

##### **a) Do's :**

- ✓ Allow the flora and fauna to flourish in its natural environment
- ✓ The use of polythene and plastics is unhealthy for the environment.

- ✓ Carry away all non-degradable litter-empty bottles, tins, polythene bags etc. and throw them in municipal dustbins only, so that they can be disposed off properly.
- ✓ Observe the sanctity of holy sites. In case of any offerings, contact the staff of the temple committee only.
- ✓ When taking photographs, respect privacy; ask for prior permission and use Restraint.

**b) Don'ts:**

- ✓ Do not taking away cuttings, seeds and roots etc.
- ✓ Avoid using pollutants, such as detergent, in streams or springs.
- ✓ Do not leave smoldering cigarettes or make open fires in the forests. Do not
- ✓ Consume alcohol, drugs or any other intoxicant.
- ✓ Respect local traditions.
- ✓ Do not listen to radios, tape recorders or any other electronic entertainment
- ✓ Equipment at high volume to avoid noise pollution.

**7.4.6 Eco-tourism guidelines:**

- ✓ Activities permitted are trekking, bird watching, photography in the notified
- ✓ Places, and wildlife viewing without disturbing them.
- ✓ Group activities should be encouraged.
- ✓ Guides should be selected, trained and made available to the visitors on cost.
- ✓ The tourists should be given a thorough briefing of do's and don'ts and it should be included in the guidebook.

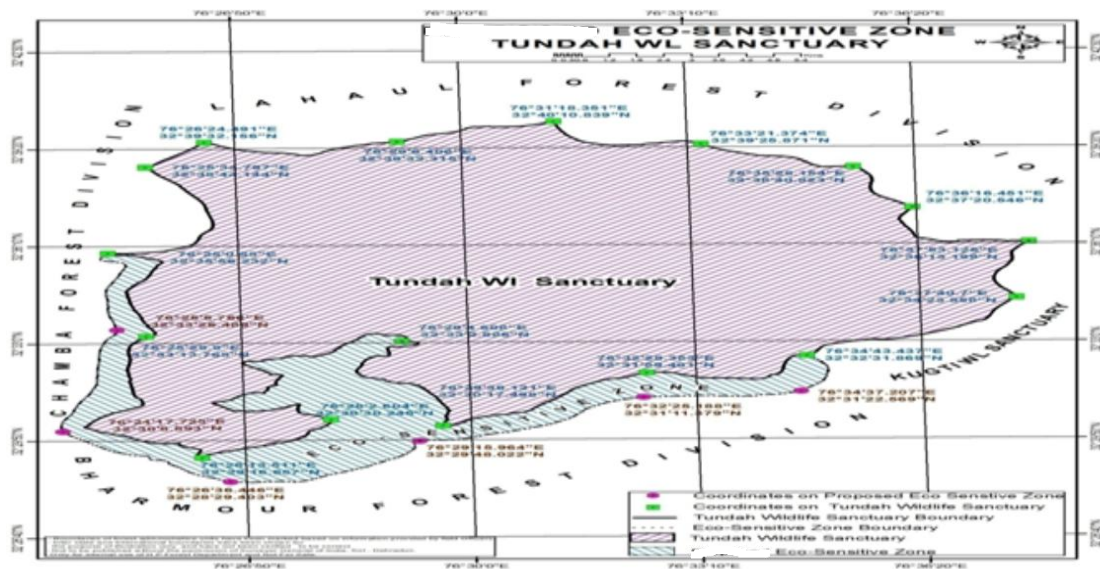
**7.4.7 Monitoring Eco-Tourism:**

Impact of the tourism should be monitored closely by observing the visible impacts of litter, wear out of the trekking paths, degradation of the vegetation, pollution caused because of tourism etc. Close monitoring of these impacts will also help to determine the carrying capacity and accordingly the tourist number should be controlled. A feedback should be obtained from every visitor and follow-up action should be taken consistent with the management objectives.

## CHAPTER VIII

### ECO-DEVELOPMENT

Eco-Development is the process by which the economic well being and quality of life of local community are improved by promoting efficient use of natural resources and alternative livelihood. After rationalization (2013), eighteen villages were excluded from the sanctuary area. There has been a strong bonding between the villagers and forests since times immemorial. Although the gap in relationship has been increasing over the past few years due to migration of people towards towns/ cities but still the villagers are dependent on the natural resources of the sanctuary. Dependency of fringe population on the natural resources exert biotic pressure in the sanctuary and at the same time they also face the problem of human wildlife conflict. So management interventions involving local people will be in the interest of long time conservation of the sanctuary and also well being of local people.



*Location of villages around Tundah Wildlife Sanctuary*

#### 8.1 OBJECTIVES:

Main objectives of various Eco-development activities would be as under:

- ✓ To create a congenial relation between the sanctuary management and the people, this will act as an effective barrier against attempts of poachers and miscreants.
- ✓ To provide healthy, hygienic environment to the general public residing around the sanctuary and to improve their living conditions.
- ✓ To help the local people in ameliorating their economic status.
- ✓ To encourage ancillary occupation in the area.
- ✓ To improve the agricultural/ horticultural productions by adopting better techniques like organic farming, terracing, soil conservation measures etc.

- ✓ To provide basic medical facilities both to human being as well as cattle

## **8.2 SPECIFIC ISSUES:**

Eco-development works will be carried out in the fringe villages by sanctuary managers. This will help in the development of the villages and at the same time it will also help to gain their cooperation for achieving sanctuary objectives. Some activities that may be carried out are as follows:

- ✓ To reduce the people dependency on the forests, it will be necessary to meet the basic requirements like fuel wood, fodder etc. by raising plantations in the vicinity of villages or providing fodder plants to the villagers. Distribution of LPG gas connection and fuel saving devices at subsidized rates will be of great help.
- ✓ People are engaged primarily in agriculture and sheep rearing. To improve their economic status it becomes imperative to initiate better agricultural techniques, better land use, introduction of better cattle breed etc.
- ✓ Construction of Water conservation structures such as check dams, van sarovars, water percolation ponds, Irrigation tanks and trenches.
- ✓ People do not pay much attention to the hygienic aspect. This requires to be improved so that the living conditions of the people are healthy one even by helping them to construct toilets.
- ✓ To aim at harmony between the ecologically dictates and the various developments, it is necessary to generate awareness among the people towards nature in general and wildlife conservation in particular.
- ✓ Other activities depending on needs of each village.

## **8.3 BROAD STRATEGIES:**

There is a need to involve local people in all management practices of the sanctuary. Presence of human population near the sanctuary is an unavoidable reality. The presence of local people affects the sanctuary's biotic components in a number of ways. It is important to manage the interaction of the community with the sanctuary so that the most beneficial results are obtained for the people as well for the sanctuary. Interactions with local community are often ad hoc and without a fixed policy and direction. Therefore, true progress is not achieved without co-operative efforts. Conflicts arise because proper communication does not take place. Taking this into consideration some objectives of interaction with the local community are described in this section. Dealing with local people with well defined objectives and directions will help to achieve progress in the relationship with local people.

The following broad strategies should be adopted while implementing eco-development programme of the sanctuary:

1. Conduct participatory micro-planning and provide implementation support for eco development.

2. Provide assistance for village eco-development program which specify measurable action by villagers to strengthen conservation effort of the Park management.
3. Implementation of eco-development activities which will encourage alternative livelihood and resource use, conservation and protection of the Protected Area.



### **Meeting With Local people of Bhadra Village**

#### **8.4 VILLAGE LEVEL SITE SPECIFIC STRATEGIES:**

##### **8.4.1 Participatory micro-planning and implementation process:**

Micro-planning should be drawn up in consultation with the villagers and the local self help groups. Micro-plan should accommodate all issues such as guidelines, investment criteria, training programme, schedule, and commitment etc. so as to ensure achieving the set objectives.

##### **8.4.2. Methodology to be adopted for eco-development:**

1. Formation of eco-development committees through active participation of all segments of society in planning and decision making.

2. Participatory Rural Appraisal (PRA) technique is to be adopted for mutual interactions and reciprocal arrangements between the protected area management and people.

3. Adoption of simplified Micro-plan format. This will help in incorporating the PRA results in an easier way. Micro-plan should have clear information on objectives, activities proposed, mutual obligations, approved investments, schedule, monitoring and evaluation mechanisms, indicators of success etc.

4. Women, tribal, scheduled castes, back ward castes, peoples from Panchayat and NGOs should be encouraged to contribute in the formulation of plan and decision making. This will enhance the success probability in a big way.

#### **8.4.3 Proposed activities:**

In order to mitigate the pressure on forests directly and to take the people along the following socio eco developmental activities are proposed.

1. Involving the fringe villagers in developing alternate source of biomass, fuel wood, etc., including NTFPs through interventions such as distribution of smokeless chullahs, providing LPG connections, construction of gobar gas plants etc.

2. Reducing man-animal conflict by providing stonewall, solar power fencing, etc., in consultation with the villagers. Efforts should be made to provide immediate and substantive relief in case of damage to life and property by wild animal.

3. Providing gainful employment for the local landless people and marginal landholders through forestry works.

4. Supporting alternate livelihood strategies like guides, transporters, hospitality organizations, etc. Training camps on vermiculture, mushroom cultivation, and sericulture can be arranged as appropriate. Training in bee keeping and distribution of beehive boxes will be helpful to the local people. Distribution of grafts of fruit trees can be thought of to aid and enhance their earning.

5. Encouraging the villagers to go for better breeds and stall-feeding. Medical facilities should be provided in the form of artificial insemination and vaccination to the cattle.

6. Providing solar lights for street lighting and installing micro hydel electricity generating units using gravity water.

#### **8.4.4. Publicity and awareness generation:**

The whole task of management will be rendered easy if the local people are made aware about the significance of wildlife and bio-diversity conservation. So regular conservation education programmes should be taken up for the people in and around the sanctuary. Public opinion makers, youth and school

children should be the main target. Traditional rights of villagers in the buffer zone may be honored to the extent they do not jeopardize the conservation objectives.

**The following activities are suggested:**

1. Nature education camps for students and teachers of schools ,
2. Workshops for local community leaders like members of gram panchayat, taluk panchayat and Zilla panchayat and other elected representatives
3. Publishing posters, handbills, pamphlets, brochures etc.

**8.5. MONITORING AND EVALUATION:**

All the eco-development programmes should have in built monitoring and evaluation mechanism so as ascertain the progress in right direction and also keep the ongoing activities in right track through timely corrective measures. Monitoring team should comprise of PA personnel, representatives of EDC and NGOs. Monitoring formats should be prepared regularly and submitted for regular checking. The progress of the activities will be evaluated on the basis of set indicators of successes



**Sarotha Village**

Regular meetings with all local people will be conducted, in which the progress of all eco-development activities carried out will be monitored. The representatives of local community will also be involved for the decision making, execution and monitoring of eco development activities. Local people, especially school and college children, will be involved in treks, outings and various field programmes for spreading awareness and conservation message among local people. On the basis of the response of villagers and their feedback, further strategies can be worked out and accordingly the modification can be made in the eco development plans for the well being of the habitants around the sanctuary area as well as the wild life of the area.

## **CHAPTER IX**

### **RESEARCH, MONITORING AND TRAINING**

#### **9.1 RESEARCH AND MONITORING:**

##### **9.1.1 MONITORING OBJECTIVES:**

Monitoring of wildlife population is very important aspect of wildlife management as it reveals the results of the management. Without a clear objective, monitoring may absorb considerable time without achieving anything useful. Important conservation questions that monitoring could answer include: how are the populations of species of conservation interests changing on a site? How are the populations of predator species changing? Where are the most important areas for a species? What are the habitat requirements of a species? How do populations respond to changes in the management? Changes whatsoever, in the habitat are manifested in the changing trends of wildlife. Since it is a slow process, the studies in this regard have to be on a long term basis. This comprehension is imperative to arrive at effective management techniques.

The main objectives of monitoring would be as under:

1. To carry out survey and census exercise of main species and monitor their relationship with habitat dynamics.
2. To collect baseline data which is the basic tool around which the management of the sanctuary will revolve
3. To evolve simple method for recording evaluation and observation by the field staff.

##### **9.1.2 BASELINE SURVEY:**

Until and unless the basic data or the species and its number in the sanctuary area is not known, management of the sanctuary cannot take off in right direction. For this purpose, the collection of baseline data is the basic tool around which the management of the sanctuary will revolve. Without knowing the specific number of each wild life species, the prescription of the management will be aiming an arrow in the wilderness. As such the baseline survey will act as booster rocket for the management plan for better results from the sanctuary in near future. To start with the baseline survey first of all tap the available ingredients i.e. the local resources viz a viz recording of spottings of each mammal and bird from each member of the family residing in the sanctuary area. The approximate time, date, year and place of the spotting is to be recorded from all such sources available in side and around the sanctuary area. Secondly similar information is to be gathered from the local as well as migratory graziers of the area. The record on working plans or damages caused by wildlife stands reported to forest officials / other agencies

with the specific location and detail of incidence. The sectarian as well as actarian generation aged people to be consulted or recorded separately for the presence of what kind of wildlife was seen 70-90 years back and when and where they saw or encountered with what kind of wildlife in the area. Further what their fore fathers use to tell about the availability of what kind of wild life species in the said sanctuary area.

The compilation of above information will prove an eye opener and will give a clear idea of what kind of wildlife species is presently available and what has not been spotted for how many years in the said area. If on an average hundred such resource persons have been interrogated the dominance of flagship as well as other associated wildlife of an area will a merge as a proof for the future management of the wildlife of the area. This will further make the management to go ahead with the specific techniques for the baseline survey of the area which can be adopted on the basis of the resources available. The topography and the terrain of the sanctuary area, the accessibility and inaccessibility to be prioritized on the basis on the information collected, making smaller units or grids for survey, line survey etc. will be ensured before taking off the ground level survey. Once the survey report is analyzed, it will be easy to proceed further in the right direction in preparing management plan in future.

## **9.2 MONITORING:**

The main target of the monitoring program is large terrestrial mammals and pheasants. Some of the methods that can be used for monitoring are described in the following sections. The techniques described can be divided into index-based monitoring techniques and absolute population estimation techniques. Monitoring by index-based techniques yields trends in populations. Monitoring must be carried out for a few years before clear population trends emerge.

The techniques described assume an even distribution of animals. Species with clumped populations or high habitat specificity, such as goral and cheer may require different monitoring techniques.

### **9.2.1 MONITORING TECHNIQUES FOR MAMMALS:**

Some mammal species are obvious and can be readily counted. However, most species are difficult to see. Some of the species of greatest conservation interest are both secretive and occur at low densities. Some of the methods of mammal census are as follows.

### **HIMALAYAN BROWN BEAR IN TUNDAH WLS**



Photograph by- Rajeev Kumar, IFS

#### **9.2.1.1 ANIMAL ENCOUNTER RATE:**

In this method a network of routes are marked inside the sanctuary that are well dispersed inside the sanctuary. The routes should not follow the main trails only but should pass through the undisturbed parts of the forest where probability of encounters is higher. Each route should be about 4 to 5 km long. The total length of routes inside the sanctuary should be sufficient to give reliable results. These routes should be regularly walked at fixed hours in the morning and evening, when animal visibility is higher, and animals encountered along the route should be recorded. This exercise should be carried out regularly throughout the year, say once in a month. The encounter rate of a species is defined as follows:

$$\text{Encounter rate (i)} = \frac{\text{Number of animal sighted of } i^{\text{th}} \text{ species}}{\text{(Total length of routes walked X no. of times walked)}}$$

The encounter rate is an index of population density. If this exercise is carried out every year we can get population trends reliably. However, this exercise cannot give estimates of absolute population.

#### **9.2.1.2 SIGN ENCOUNTER RATE:**

The sign encounter rate relies on sighting/ collection of animal signs. It is useful for monitoring populations, since their scats are highly visible. Sign

encounter routes are laid as above. Since there is no compulsion on walking during morning hours or evening, the length of route can be increased to 10 km. The routes should be broad and clear with no vegetation growth so that scats can be spotted easily. Heavy human traffic should not be there on the routes so that scats are not trampled. These routes are also walked a number of times in a year and scats of leopard and other carnivores with highly visible scats, are collected.

$$\text{Scat encounter rate (i)} = \frac{\text{Number of scats sighted of } i^{\text{th}} \text{ species}}{(\text{Total length of routes walked} \times \text{no. of times walked})}$$



**Black bear droppings Photograph By; Sanjeev Singh HPFS**

The scat encounter rate is an index of population density. It is possible to obtain population trends if this exercise is carried out every year. This exercise also cannot give estimates of absolute population. It is less reliable than animal encounter rates which relies on direct sightings. However, it is useful for monitoring population trends in species wherein sightings are very low, such as leopards.

Leopard scats collected during the exercise can be analysed by microscopic examination of hair of prey in the scat samples to determine the dietary pattern of leopards.

#### **9.2.1.3 PELLET DENSITIES:**

This method is used for monitoring population of ungulates by estimating density of their dung pellets. Pellet densities are estimated by laying plots

in the forest all over the sanctuary and counting the pellet groups in each plot. The pellet groups refer to the small pellets deposited during a single defecation at one place. In this method, the basic assumption is that rate of defecation is constant for the species. The plots should be laid in the same season and month every year. The number of pellet groups divided by the defecation rate gives the number of the total deer population as indicated below:



**Himalayan Ibex (Droppings/pellets): Photograph By; Sanjeev Singh HPFS**

Total Deer Population= Number of pellet groups divided by Number of days for the count

This method is fairly simple but it cannot give absolute population estimates.

#### **9.2.1.4 LINE TRANSECTS SAMPLING:**

Line transects sampling is used for estimating absolute densities of wild animal populations. A large number of straight lines, known as transects, are laid in the forest in a scientifically designed pattern. Each transect has a fixed length, generally 3 to 4 km, and a fixed orientation. Transects are clearly marked by marking the trees along transect in red or yellow paint. Bush cutting is necessary only if undergrowth is very thick.

These transects are walked by observers according to a specific sampling design and observations of each animal sighting are recorded. The distance of the group is estimated by a rangefinder and a compass bearing is taken for each encounter. This data is used to estimate the perpendicular distance of the animal from transect. In this manner all transects are walked and animal sightings recorded. All transects must be walked a number of times so that sufficient observations are obtained to make reliable population estimates. If number of observations is low, reliable estimates cannot be made. Typically 5 to 10 repetitions may be necessary. It may be possible to carry out the sampling by making monthly rounds of observations without much loss of accuracy.

Line transect sampling requires a high level of training of the observers for proper recording of observations such as compass bearings and distance estimation by rangefinders. It is also a fairly laborious technique. The advantage is that it can give reliable estimates of animal populations.

Design and layout of line transects need considerable effort. These transects need to be remarked annually if they are to be used on a repetitive basis. Considerable effort is also needed in carrying out observations. Nature enthusiast volunteers from nearby towns and even youth from local villages may be invited to participate in the monitoring exercise. If necessary, labourers may be engaged for making the observations.

#### **9.2.1.5 POPULATION ESTIMATION BY WATERHOLE COUNT:**

Waterhole count is a traditional method used in India for estimating wildlife populations. The waterhole count is not useful if there are extended water bodies such as perennial streams or lakes since it is difficult to count animal all along such extended water bodies. It is carried out at the peak of summer, either in May or June, depending on the date of arrival of monsoon.

Well-camouflaged machans are built on trees near all perennial water sources including natural and artificial waterholes. Hides are made if it is not possible to have machans. A team of three persons keeps watch at each waterhole for 24 hours and records the mammals and large birds such pheasants coming to drink water at the waterhole. The total count of animals of each species for all waterholes is the population of that species. The method suffers from some uncertainties but is nevertheless a useful method for population estimation.

#### **9.2.1.6 TERRITORY MAPPING:**

Mapping is best for those species that are clearly territorial such as many primates and carnivores. In mapping, the location of sightings and territorial calls are mapped. In many mammals the territory may be held by a group and thus mean group size has also to be determined.

Territory mapping can be better done with the help of radio telemetry. The territory mapping for each animal can be fixed with regular field verification and use of telemetry.

#### **9.2.1.7 PUGMARK METHOD FOR MONITORING LEOPARD POPULATION:**

The pugmark method has been traditionally used for estimating tiger populations in protected areas in India. It has not been regularly used for estimating leopard population but the technique can easily be used for estimating leopard populations also. Since leopard pugmarks are smaller there is greater possibility of

making mistakes in identification since small mistakes in tracing can alter the shape of the pugmark. Hence greater care needs to be exercised in tracing pugmarks.

To achieve proper impressions of the pugmarks should be on a hard surface with a thin layer of fine dust. These conditions are achieved on forest roads and trails in summer. Hence pugmark census is generally carried out in the month of May.

The original pugmark method relied on tracings on glass plates, which created possibility of error while tracing. Digital cameras can be used for taking photographs that can later be converted to pugmark outlines after transferring to the computer. This can increase the reliability of the method. Alternatively there are special optical instruments that can increase the accuracy of the tracing and minimize errors.

The pugmark census is carried out over a period of a few days, generally a week. All forest roads and trails are searched intensively for pugmarks during this period.

#### **9.2.1.8 POPULATION ESTIMATION OF LEOPARDS BY DNA ANALYSIS OF SCATS:**

DNA analysis of leopard scats can be used for population estimation. DNA analysis can be done by taking mucous layer covering the scat and then analysing it in the laboratory. The technique is still at an experimental stage in the country. The technique may soon become generally available, but it is definitely expensive. The technique requires collection of fresh scat (within 24 hours) and its preservation by an appropriate method. DNA analysis is carried out in specially-equipped laboratories.

#### **9.2.2 MONITORING TECHNIQUES FOR BIRDS:**

Birds have the advantages that they are often reasonably conspicuous; have diagnostic calls or songs and many people have the expertise necessary to identify them in the field. As a result of the ease of counting them, birds are good for monitoring environmental change. Monitoring techniques for birds are as follows:



**The Himalayan Monal; Photograph by: Sachin Sirmouri FGD**

#### **9.2.2.1 FOOT TRANSECTS:**

Counts along transect lines, are useful for estimating relative abundances, as well as for estimating densities.

Line transect is a simple, easy to execute method that can help in obtaining density estimate for pheasants in India. In this method, one walks along a straight line and counts animals on both sides of the line. Line transect could be permanently marked and vegetation trimmed for the observer to walk easily and carefully look for animals. In case of temporary transects, the observer walks in a straight line using a compass on a predetermined bearing. At least 2 or 3 transects of length ranging between 1 and 3 km to be laid in each habitat/area and walked at least 2 or 3 times in a month during the early morning hours. For every sighting, species, number, age and sex (if possible), sighting angle and sighting distance are measured. This information will be useful in calculating the encounter rates and density of pheasants in an area. This technique is best suited for pheasants. Software such as distance could be used to analyse line transect data for obtaining encounter rate and density estimates.

The actual number of birds encountered on transect can act as a simple index of abundance for comparative purposes. Care must; however, be taken to ensure that the visibility in the habitat is similar during all the counts being compared. A decrease in visibility may lead to fewer birds being encountered, even though the actual number may be the same. Since visibility often changes seasonally as a function of the amount of foliage, counting in the same season is an effective way of controlling for visibility. The conspicuousness of a bird also depends on its behaviour; birds, especially males, are highly visible during the breeding season

when they are singing and advertising their territories. The best season for counts is thus the breeding season, when birds are most conspicuous.

#### **9.2.2.2 POINT COUNT:**



**Red Billed Chough (*Pyrrocorax pyrrhocorax*) Pic. by: Dr. Kuldeep Singh Jamwal DFO WL**

A variation of the transect count is the point count. Here the observer stands at a fixed point for a specific period and count all birds, either within a specified circle (of say 25m or 50 m radius), or as far as birds can be seen (open radius). This is actually like a transect count of length zero. Each individual should be counted just once. It is often sensible to wait 5 minutes before counting so that the birds are less disturbed. The count is for a fixed period of 3-10 minutes depending upon how conspicuous the birds are. The counts should be completed as quickly as possible to reduce the risk of double counting and allow more points to be visited. Points should be at least 200 m apart to prevent double counting.

Point counts are particularly useful in areas of difficult terrain such as hills or swamps, where one cannot easily lay a straight, continuous transect.

#### **9.2.2.3 CALL COUNTS SURVEY:**

This method can be used for most of the pheasants which call during morning hours in their breeding season. The counts can be made from strategic point in the habitat of the particular pheasant. The number obtained can be doubled for obtaining the estimate of breeding population.

The counts of calling males assume that all the existing males in the area will call every morning. In case of Koklass the best time to carry out this count is January to June and September to December (Gaston 1980; Young et al. 1987; Ridley 1986). Most of the observations are made during the short time period of about half an hour. For observation strategic points which allow the observer to hear the birds over as wide an area as possible, should be selected. A point on the ridge

allows the observer to listen to the pheasant calls on both the sides. Observation points should be marked at an interval of about 500m to 600m. All the observers must visit their observation points on the previous evening of the survey day. They should be in position well before dawn so that all the calling pheasants are counted.

#### **9.2.2.4 TERRITORY MAPPING:**

This is a standard method of counting birds in most ornithological studies, and regarded as the most reliable. The technique is based on locating singing males in an area on a map. This is done repeatedly (3-4 times) within a limited period (maybe a week, or the breeding season). A composite map is then prepared by overlaying the locations of each separate count. One can then find clusters of locations indicating territories of individual males. The number of each cluster is thus number of territorial males in the area, and assuming all of these are monogamous, one can then estimate the breeding population.

An obvious limitation of this technique is its being restricted only to the breeding season and non-breeding members are left out. The technique also requires skill in identifying territories correctly from clusters (correct mapping) otherwise it can lead to interpretational errors. This would require a degree of familiarity with the general ecology of the species, which would require extra efforts. Hence this is of more limited use for a manager, than the generalised transect or point counts.

#### **9.2.2.5 ENCOUNTER RATES:**

Encounter rate is the simple index for abundance estimation and is expressed as number seen per unit effort. The unit effort could be time spent in intensively searching for animals in an area or it could be the distance travelled in an area intensively searching for animals. Number seen could be based on direct evidences (sightings) or indirect evidences such as calls, droppings and other signs such as digging signs for feeding.

Survey could be done along existing roads, paths, trails, ridges, and nullas or along a predetermined bearing using a compass or GPS. If the distance travelled is measured, then one could use that as effort ( $ER = \text{number seen} / \text{km walked}$ ). In cases when distance travelled is not known, one could use the time spent in searching that area as effort ( $ER = \text{number seen} / \text{time spent}$ ). Indirect evidences such as calls and droppings could also be used, but one should be very careful in identification of calls of different species and calls of different individuals of the same species. Similarly, care should be taken to identify droppings or other signs of a species.

Encounter rates are good for monitoring the abundance of pheasants in an area, if done regularly (monthly/ seasonally/ annually). Comparison of ER of a

species in two similar habitats located in different areas could be made. Adequate number of walks per month or season is necessary for calculating mean ER and standard errors. The technique is applicable for most of the pheasants.

### **9.2.3 MONITORING TECHNIQUES FOR PLANTS:**

Vegetation is a major component of wildlife habitat. It is made up of a number of plant communities, which can be distinct entities or more diffuse merging slowly into each other. The value of the habitat for wildlife species is directly linked to the type and variety of plant communities and their conditions. Changes will have a positive or negative effect on the overall quality of a habitat for a particular habitat species.

Assessing and monitoring vegetation as a basis for manipulating it in tune with management objective is one of the important aspect of protected area management. It involves qualitative processes such as floristic inventory and community description as well as quantification of factors such as vegetation cover. Some of the monitoring techniques for plants are as follows:

#### **9.2.3.1 TOTAL COUNTS OF PLANTS:**

Total counts seem easier than they usually are. Unless carried out methodically it is easy to miss individuals or count them twice. One approach is to grid out the entire area and systematically search each grid square, marking each individual with a flag once found. This can be very accurate and provide excellent information on distribution but is time consuming.

#### **9.2.3.2 QUADRATS:**

Quadrats are the most widely techniques used for the plant census. Quadrats could be rectangular strips, square (10mX10m) or circular (10m radius).

The number of individuals of the species of interest can be counted. It is usual to only count those rooting in the quadrat. Percentage cover may be used for mat-forming species or when it takes too long to count all individuals, but it is less accurate. Percentage cover is often used when the observer can stand above the vegetation or for estimating canopy cover above the observer, but it is difficult to estimate scrub or tall herbaceous vegetation at the observer's height.

### **9.2.4 MONITORING ENVIRONMENTAL VARIABLES:**

It is often impossible to interpret the changes over a period of time unless there is a programme of monitoring environmental variables. Some of the environmental variables which can be measured are as follows:

#### **9.2.4.1 TEMPERATURE:**

Maximum-minimum thermometers can be used to give the daily temperature range. They are best located 1.25 m above ground as this is the standard height for meteorology (and thus best for comparison with other sites).

For conservation studies, thermometers are often located in relation to the ecology of the species being studied. Recording of temperature at set intervals is very good for ecological measures of microclimate. For ectotherms in temperate areas, temperature is often critical; sward height, aspect, slope and colour may all have marked effects on the local temperature and detailed measurements can help interpret the ecology and behaviour.

#### **9.2.4.2 RAINFALL:**

Rain can be collected in open containers, but they are likely to be inaccurate due to evaporation. For accuracy rain-gauge can be used.

$$\text{Rainfall} = \frac{\text{ml or cm}^3 \text{ of rain}}{(\text{Diameter of rim of gauge in cm})^2}$$

A rain gauge should be positioned such that water does not get splashed in and all the standing objects like trees etc. are four times their height away. Rain gauges are usually emptied daily at a fixed time. If visited irregularly then a little oil may be added to reduce evaporation.

#### **9.2.5 MONITORING HUMAN IMPACT:**

It is often useful to be able to document human impacts such as the number of offences, number of visitors and mining in the area etc. The approach is same as in monitoring populations or environmental variables. It is necessary to find a sensible sampling regime and a repeatable way of monitoring. Without precise definition it is difficult to distinguish variation in classification from actual changes.

#### **9.2.6 PHOTOGRAPHIC MONITORING:**

Photographs are a good way of documenting changes to sites. Photographs are not usually useful for documenting small scale changes for which data from Quadrats is usually preferred. Aerial photographs are invaluable for monitoring and documenting gross changes to sites, such as changes in the extent of woodland. A series of photographs may show changes imperceptible to site managers, especially when managers change. Photographs may also be valuable for legal uses although the documentation must then be rigorous. Photographs can be a very dramatic way of illustrating change and problems and are likely to be of more widespread public interest than, presenting data on changes in species composition within a quadrat.

#### **9.2.7 RECOMMENDED POPULATION ESTIMATION AND MONITORING METHODS:**

The **animal encounter rate** and **sign encounter rate** technique will be used. Trails 4 to 5 km long should be laid. The trail should be walked on a fixed date once every month. The data collection on the trail should include animal encounter, animal signs and habitat parameters. Animal sign survey and animal encounter rate survey should be carried out separately. Data analysis should be done carefully.

The **pugmark method** will be used for estimating leopard population. Training in the proper technique is very important to prevent the staff from making mistakes.

The **line transect** method will be started for population estimation in the sanctuary. Design of the line transect is very important. A well designed line transect network should be laid in the sanctuary area. The length of each transect should be 3 to 4 km. Due care should be taken in data analysis. The transect lines will be walked once a month. Training in recording the observations is very important. The staff should be well trained in making observations at the beginning of the exercise. Hiring manpower may be necessary for line transect surveys since every transect needs to be walked by two people. Educated and intelligent young men should be identified and hired from the surrounding villages. Volunteers from Chamba and nearby town may also be called for the line transect exercise. Care should be taken that they are well trained.

The **point count** method of population estimation of birds will be used. For point count 500 m distance should be divided into 5 segments 100m each. Birds should be counted at 6 points i.e. starting point, 100 m, 200m, 300m, 400m and 500m. Observations like species, number, perpendicular distance and activity should be recorded. Data analysis should be done carefully.

The **territory mapping** method of counting pheasants will be followed. Due care should be taken in identifying the call, recording observation and overlaying the locations on the map.

**Line transect** method will be used for density estimation of pheasants. **Encounter rate** method should be used for relative abundance of the pheasants.

In addition to above methods, modern day tools and techniques like **Trap cameras** should also be used for effective monitoring of faunal species especially nocturnal ones. The modern camera trap is simply a digital camera connected to an infrared sensor which can see warm objects that are moving, like animals. When an animal moves past the sensor it causes the camera to fire, recording an image or video to the memory card for later retrieval. Camera traps can be left in the field to continuously watch an area of habitat for weeks or even

months, recording the rarest events which occur in nature. Camera traps are also wildlife friendly as they cause little or no disturbance to wildlife.

For monitoring of plants **circular Quadrats** will be laid. Centre point of the quadrat should be fixed and observation should be taken annually on a fixed date of a particular month. Circular plots of 10m radius for trees and sapling, 5m radius for shrubs and seedlings and 1m radius for ground cover should be laid.

Monitoring of indicative species of flora and fauna (orchids, lichens, insects amphibians etc.) will be done regularly.

#### **9.2.8 MONITORING DURING REGULAR PATROLLING WALKS:**

Animal encounters and animal signs observed during regular patrolling walks should be recorded in specified formats. The animal signs recorded shall be mainly of Black Bear and leopard pug marks and well preserved scats.

#### **9.2.9 RESEARCH NEEDS IN THE SANCTUARY:**

Sanctuary managers often function in an information vacuum. Research in a sanctuary can contribute considerably to effective management of the sanctuary by providing useful information on the biological features of the sanctuary.

Research studies may be carried out according to the preferences of the researcher. Some important areas for research in the sanctuary are:

Surveys of flora, pheasants, mammals, reptiles and amphibians, carrying capacity of the area, evaluation of eco system services, behavior and habits of mammals etc.

- ✓ Hydrological studies
- ✓ Studies on prey-predator ecology
- ✓ To conduct studies regarding food habits of important animals and impact of migratory graziers on the wildlife
- ✓ Evaluation of pastures
- ✓ Man-animal conflict
- ✓ Corridor studies and other landscape level planning studies

Research/ studies already done are attached as **Annexure- XVIII**

#### **9.3 TRAINING:**

Training is a very important tool for capacity building and improving the professionalism of sanctuary staff. The sanctuary staffs, while carrying on their

normal protection duties, also need to develop an understanding of various issues related to sanctuary management at a professional level. Capacity building in this regard can best be achieved through trainings designed for this purpose.

Improving the knowledge and capacity of the staff has several benefits. It helps them to carry out their duty with an increased understanding and awareness and hence with increased dedication. It gives them more confidence in their work. This helps them to deal with various stakeholder groups, such as local people and tourists, with more confidence. Improved skills and knowledge will improve their productivity and quality of output.

#### **9.3.1 ON JOB TRAINING:**

To manage ecosystem with the basic purpose of wildlife management is a highly technical subject. Wildlife is dynamic component of the ecosystem which requires a well trained forester to comprehend, appreciate and manage. It is highly imperative that short trainings, in house trainings, refresher courses, exposure visits etc. for the field staff are made a regular feature, so that they keep abreast with the latest developments regarding different management techniques.

#### **9.3.2 FORMAL TRAINING COURSES:**

Regular training courses being conducted at wildlife Institute Dehradun impart a useful technical know how. The officers/officials dealing with the wildlife management will be trained. Besides this to acquaint with the latest management techniques adopted in different states on India, short training will be arranged for the officers and field staff. Some areas where training will benefit the staff are as follows:

- ✓ Knowledge and identification of mammal species found in the sanctuary, habits of species, biology and ecology of important species
- ✓ Identification of bird species found in the sanctuary
- ✓ Knowledge of reptile and amphibian species found in the sanctuary
- ✓ Knowledge and identification of plants, including medicinal plants found in the sanctuary
- ✓ Soil and water conservation techniques
- ✓ Sanctuary ecology, inter dependence of plant and animal species
- ✓ Monitoring methods, population estimation methods
- ✓ Anti-poaching skills and documentation of offence cases
- ✓ Wildlife interpretation skills

- ✓ Wildlife tracking and field signs
- ✓ Conflict resolution skills for dealing with local people
- ✓ Weapon training
- ✓ Controlled burning techniques
- ✓ Nursery techniques
- ✓ Darting and trapping wild animals
- ✓ Use of instruments such as compass, binoculars, digital camera etc.
- ✓ GPS skills
- ✓ Computer literacy
- ✓

Field staff will be given small projects on which they should collect information from the field such as information on mammal, bird or plant species. They should make write-ups and give presentations on their project.

Training will also be imparted to local people, particularly guide and tour operators with the intention of upgrading their skills for tourism. Some training subjects are:

- ✓ Sanctuary rules
- ✓ Skills of dealing with tourists
- ✓ Interpretation skills
- ✓ Basic information on identification of species, tracks and signs, habits of species. Professional organizations will be involved in developing and conducting training programmes. Officers of the department should also be involved in training programmes.

### **9.3.3 EXISTING CENSUS / TREKKING ROUTES AND TRANSECTS:**

The existing census / trekking routes and transects meant for the census purpose are as under:-

| Sr. No. | Name of Path                             | Particular     | Length (in KM) |
|---------|------------------------------------------|----------------|----------------|
| 1       | Tundah to Banni via Silpari- tandei Dhar | Trekking Route | 8              |
| 2       | Tripna to Bansar                         | Trekking Route | 18             |
| 3       | Bansar to Chadola                        | Trekking Route | 15             |

|   |                               |                |    |
|---|-------------------------------|----------------|----|
| 4 | Bansar to Kalichho pass       | Trekking Route | 8  |
| 5 | Tripna to Badi Dhar           | Trekking Route | 18 |
| 6 | Banni Mata to Charola         | Trekking Route | 26 |
| 7 | Janu to Lampapad              | Trekking Route | 15 |
| 8 | Banni to Luindi via Thanala   | Trekking Route | 18 |
| 9 | Tripna – Sad Dhar – Digu Dali | Trekking Route | 12 |

These paths alongwith their Geo Coordinates are required to be depicted on the map.

#### **9.4 EVALUATION OF ECOSYSTEM SERVICES:**

The advantage of including the concept of ecosystem services in management is that it encourages a wider consideration of the benefits and stakeholders involved in an area. Ecosystem services are usually categorized into Provisioning, Regulating, Cultural and Supporting services which include all type of physical goods and non extractive benefits from the environment. Consideration of this range of services and of who benefits from them locally and in other areas helps to build sustainability and wider societal support for management decisions. So, evaluation of various ecosysyem services is must and will be got done by some professional agency.

#### **9.5 MANAGEMENT EFFECTIVENESS EVALUATION (MEE):**

Management Effectiveness Evaluation (MEE) is an useful tool to assess the effectiveness of management initiatives and to understand better what is working and what is not, and to plan any necessary changes as efficiently as possible. Normally management effective evaluation is done by regional expert committee. In addition to this it should also be done (in house) on regular basis to assess the effective implementation of the management plan.

#### **9.6 REVIEW OF MANAGEMENT PLAN:**

***“Mid term review of the management plan will be carried out by some expert agency. The purpose of mid term review is to assess the extent to which management of PA to which the plan applies has been undertaken in accordance with the plan, including the extent to which key performance indicator targets are being achieved”.***

***This review will be strategic review and all the component of Management plan including Vision, Goals and Objectives will be reviewd to make it updated as per current policies, rules and requirements.***

***It is suggested that every year all the monitoring and evaluation data will be compiled and analyzed. Based on this analysis APO for the next year will be modified.***

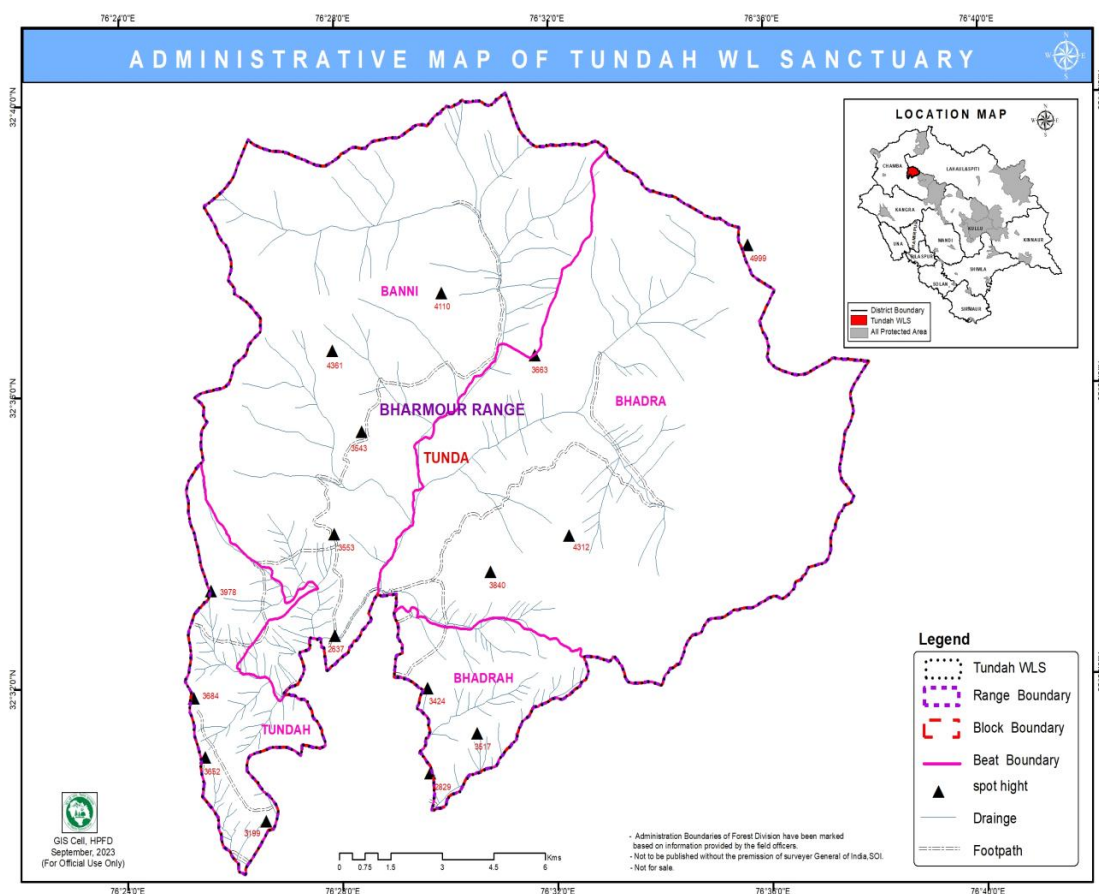
## CHAPTER -X

### ORGANISATION AND ADMINISTRATION

#### 10.1 STRUCTURE AND RESPONSIBILITIES:

In the present set up Tundah Wildlife sanctuary is controlled by a Range Forest Officer (Wildlife) stationed at Bharmour. There is one block officer stationed at Tundah. The administrative/management unit is the Beat. The Beats are managed by forest guards. The detail of beats is as under:-

| Block  | Block HQs | Beat    | Beat HQs          | Area of beat<br>(In Hac.) |
|--------|-----------|---------|-------------------|---------------------------|
| Tundah | Tundah    | Banni   | Mandha            | 2278.14                   |
|        |           | Bhadra  | Bhadra            | 1982.14                   |
|        |           | Badgram | Badgram           | 1359.74                   |
|        |           | Tundah  | Tundah            | 779.98                    |
|        |           |         | <b>Total Area</b> | <b>6400.00</b>            |



Over all supervision of works is done by Range Officer, Wildlife Range Bharmour. He draws out the plan of operation and accordingly the works are executed after its due approval. The Block officer gets the various development works executed through the Forest Guards. The Forest Guards, besides undertaking plantation and other infrastructure works are also the main guardians of wildlife

within their respective jurisdictions. They have to ensure the protection of wildlife by way of effective patrolling within the sanctuary and making continuous awareness campaign among the local public regarding the significance of wildlife and nature conservation.

Censuses/Survey operation and other related activities become a joint venture of the staff and experts with association of local residents which makes them more and more aware and sensitized about the importance and co existence of wildlife with that of man.

Keeping in view the envisaged multifarious developmental activities throughout the year, larger area of the sanctuary, tough terrain and harsh weather conditions it is proposed to create two more beats for effective management of sanctuary. The staff strength is also required to be increased accordingly. Following staff is proposed for strengthening the human resource in the wild life sanctuary:-

#### **10.1.1 SITUATION OF THE PRESENT STAFF AND FUTURE REQUIREMENTS:**

| Sr. No. | Post                                                | Existing staff | Posts to be created | Remarks                          |
|---------|-----------------------------------------------------|----------------|---------------------|----------------------------------|
| 1       | Divisional Forest Officer, Wildlife division Chamba | 1              | 0                   | -                                |
| 2       | Assistant Conservator of Forests, Wildlife division | 0              | 0                   | -                                |
| 3       | Range Officer, Wildlife Range Bharmour              | 1              | 0                   | -                                |
| 4       | Block Officer                                       | 0              | 1                   |                                  |
| 6       | Forest Guards                                       | 4              | 4                   |                                  |
| 7       | Class IV workers                                    | 2              | 4                   | For office, FRH, Patrolling huts |

#### **10.1.2 RECOMMENDATION:**

At present, there is only four forest guards. For effective management of the sanctuary it is suggested that additional class IV workers posts may be created to strengthen the management of Tundah Wildlife sanctuary.

## **10.2 STAFF AMENITIES:**

### **10.2.1 RESIDENTIAL ACCOMMODATION:**

The Staff posted in the sanctuary is provided with Govt. accommodation. The existing Buildings/ housing for the staff and additional requirement are as under:-

| 1<br>0<br>.<br>2<br>.<br>2 | Sr.<br>no. | Post                              | Currently available | Total needed |
|----------------------------|------------|-----------------------------------|---------------------|--------------|
|                            | 1          | Range Office at Bharmour          | 1                   | 1            |
|                            | 2          | Range officer Residence, Bharmour | 1                   | 1            |
|                            | 3          | Block Officer Residence           | 1                   | 1            |
|                            | 4          | Forest Guard quarters             | 4                   | 4            |

### **UNIFORM AND FIELD EQUIPMENTS:**

Proper uniforms and field equipments (including field gear and equipment for high-altitude climbing and trekking) should be provided to the frontline staff regularly.

### **10.2.3 INCENTIVES AND AWARD:**

For management of PA, motivated frontline staff is necessary requirement. Therefore, it is recommended that suitable appreciation, recognition, award or some incentives should be given to staff who perform outstanding duties.

## **10.3 EDUCATION FACILITY:**

For education purposes, the schools exist at following places:-

| Name of School                 | Standard         | Location |
|--------------------------------|------------------|----------|
| Govt.SSS Mandha                | Senior Secondary | Mandha   |
| Govt. SSS Badgram              | Senior Secondary | Badgram  |
| Govt. Middle School, Tundah    | Middle School    | Tundah   |
| Govt. Middle School, Bhadra    | Middle School    | Bhadra   |
| Govt. primary School Banni     | Primary School   | Banni    |
| Govt. primary School Kumarkadi | Primary School   | Sarotha  |

## **10.4. MEDICAL FACILITY:**

1. Govt. Aurvedic Dispensary at Tundah and Primary Health Centre Mandha

- i. However, since the staff has to negotiate tough terrain & inclement weather condition & mobility is also mainly on foot, thus to meet exigency on account of ill health in such areas, it is necessary to impart basic training to the staff regarding First Aid and should be provided with the necessary Kits, so that not only staff but local residents can also be rendered help in hard situations. Vaccination and life insurance of the staff is also an integral part of medical facility.

#### **10.5 CAPACITY BUILDING OF THE FIELD STAFF:**

The following are basic topics, which should be known by everyone in the field staff (Forest Guard, block officer and Forest Ranger) in varying degree of details and understanding:

- ✓ The importance of nature conservation and Protected Area
- ✓ Use of GPS, Camera traps, Drone Cameras and other modern equipments.
- ✓ A few terms relevant to biodiversity conservation
- ✓ Introduction and identification of local flora, vegetation/forest types
- ✓ Introduction and identification of local fauna (mammals, birds, reptiles, etc)
- ✓ Elementary field methods for vegetation and animal population sampling
- ✓ Laws regarding forest and WL protection
- ✓ Effective dealing with human wildlife conflicts
- ✓ Protection measure , intelligence gathering and crime control
- ✓ Patrolling and Reporting
- ✓ Conducting Anti-poaching operations
- ✓ Law enforcement procedures
- ✓ Collection of evidence effectively for forensic examination
- ✓ Maintenance of equipment and other facilities
- ✓ Fires and control of Forest fires
- ✓ Map-reading
- ✓ First Aid and medical care
- ✓ Monitoring of the impact of villages and community on the PA
- ✓ Importance of local people in nature conservation
- ✓ Importance of linking conservation efforts to the livelihoods of the villagers
- ✓ Importance of local knowledge in biodiversity conservation

#### **10.6 TRAINING FOR THE LOCAL PEOPLE/OTHER STAKEHOLDERS:**

- ✓ Capacity building workshops for local villagers (alternative livelihoods)
- ✓ Orientation and vocational training of tourist guides.
- ✓ Awareness /sensitization workshop for hotel/home stay owners , shop owners
- ✓ Special educative programs for school teacher and students
- ✓ Waste management training

## CHAPTER-XI

### Environment and climate change



#### 11.1 Environment:

The word environment is derived from a French word "environia" which means to surround. It refers to both abiotic (physical or non-living) and biotic (living) environment. The word environment means the environment in which living beings live. Environment and organisms are two organized and complex components of nature. Environment controls the life of living beings including humans. Humans interact with the environment more rapidly than other organisms. Generally, environment refers to the substances and forces that surround living organisms.

Environment can be defined as the surroundings or conditions in which a person, animal or plant lives or operates. The term "environment" refers to all the elements of the physical and biological world, as well as the interactions between them. Environment plays a major role in the life cycle of humans, animals and plants as their life is highly dependent on the environment. Environment is the condition in which an organism has to survive or maintain its life process. It affects the growth and development of organisms. In other words environment refers to those surroundings that surrounds living beings from all sides and affect their lives in Toto. It consists of atmosphere, hydrosphere, lithosphere and biosphere. Its chief components are soil, water, air, organisms and solar energy. It has provided us all the resources for leading a comfortable life.

Thus, environment refers to anything that is in the immediate vicinity of an object and has a direct effect on it. Our environment refers to those things or agencies that

affect our daily life or activity even though we are separate from us. The environment in which man or animal is surrounded and is influenced by factors which may be natural, artificial, social, biological and psychological.

### **Components of the environment:**

The environment mainly includes the atmosphere, hydrosphere, lithosphere and biosphere. But it can be broadly divided into two types such as (a) micro environment and (b) macro environment. It can also be divided into two other types namely (c) physical and (d) biological environment.

a) Microenvironment means the immediate local environment of the organism.

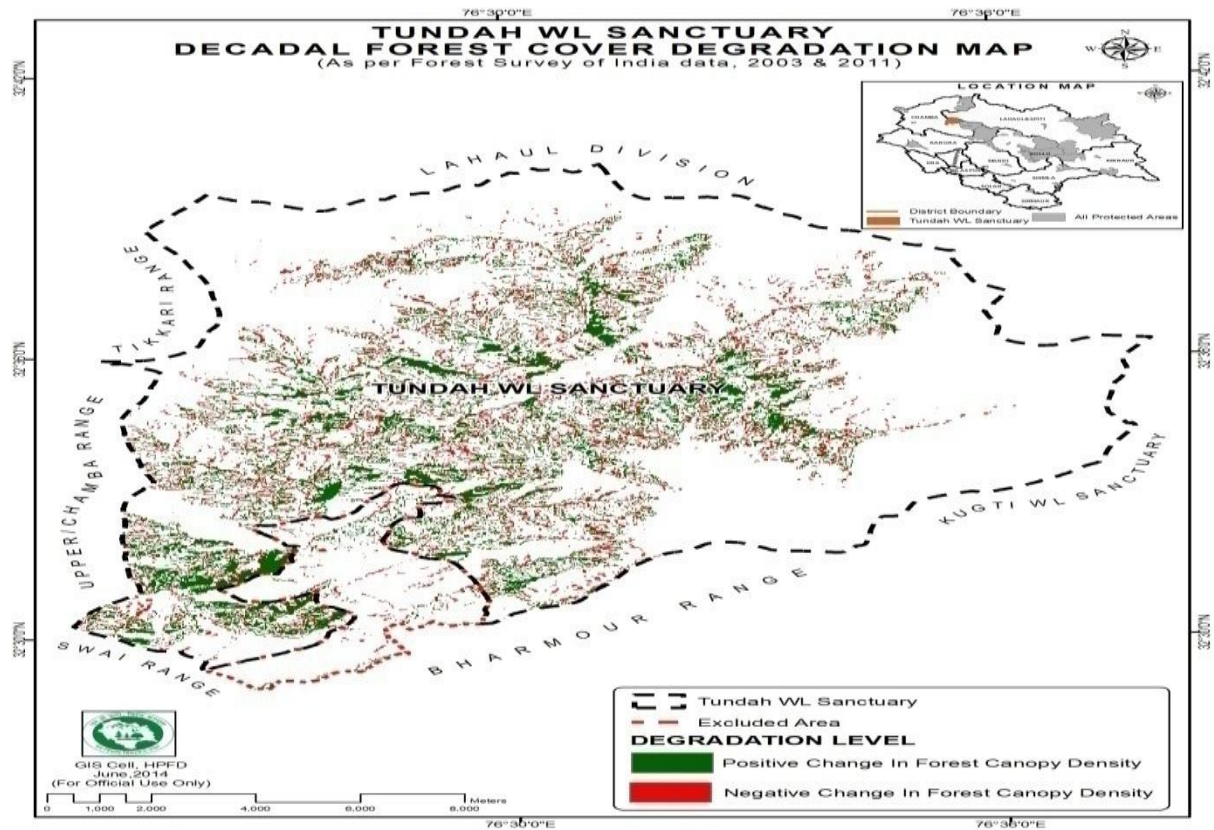
(b) Macro environment means all those physical and biological conditions which surround the organism externally.

(c) Physical environment refers to all the abiotic factors or conditions like temperature, light, rainfall, soil, minerals etc. This includes the atmosphere, the lithosphere and the hydrosphere.

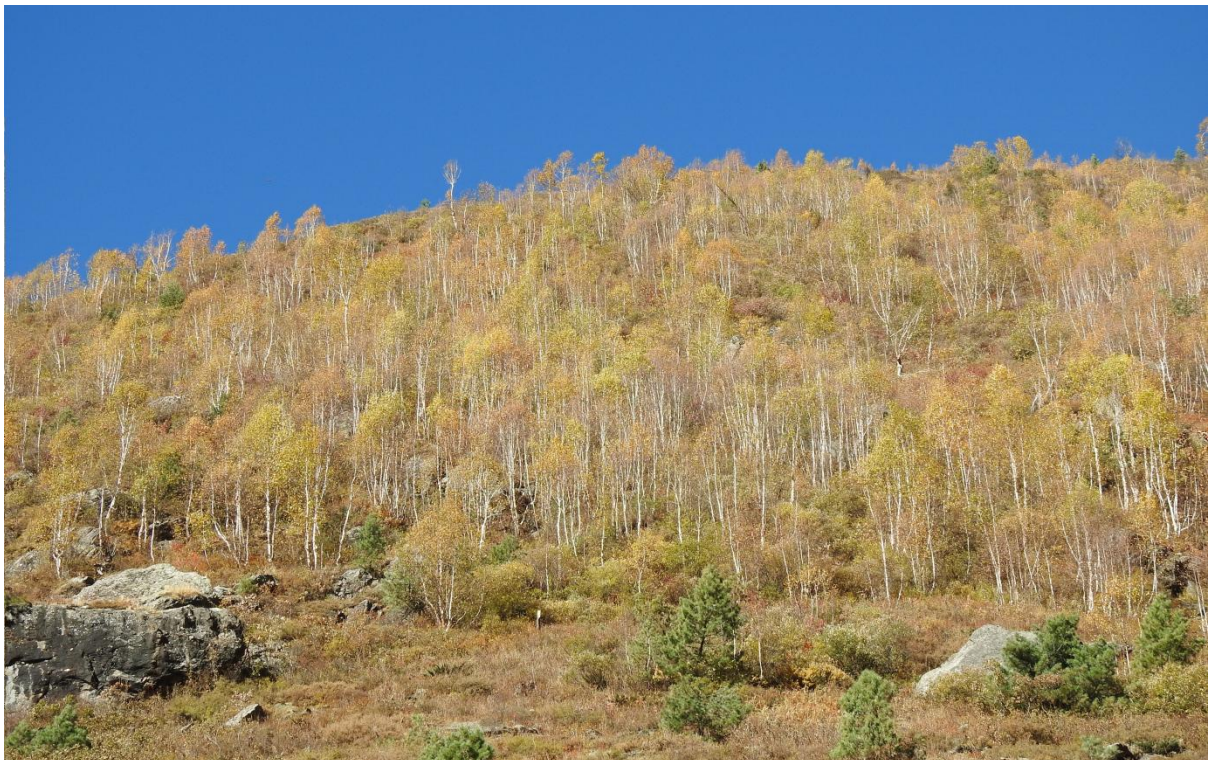
(d) Biological environment includes all biological factors or living forms such as plants, animals, micro-organisms.

## **11.2 What is Climate Change:**

Climate change refers to changes in environmental conditions such as changes in temperature and weather patterns. This is caused by many internal and external factors. Climate change has become a global concern in the last few decades. In addition, these climate changes affect life on Earth in different ways. Climate change refers to the adverse changes in the environment and its effects on the living organisms on the earth. Earth's climate has warmed over the past two million years, for which climate change and global warming are responsible. The absurd increase in atmospheric temperature causes various drastic changes in the Earth, for example, the change of seasons. Deforestation, burning of fossil fuels and other human activities are the most important causes of global warming, which cause changes in climate. These changes that we have made to the ecosystem are not reversible. The only thing we can do is try to make the biosphere a better place to live. Because in the coming days it is predicted that the temperature of the earth will increase day by day due to which life will end and the reason for this is increasing quantity. There are signs that **rising temperatures are affecting biodiversity**, while changing rainfall patterns, extreme weather events, and ocean acidification are putting pressure on species already threatened by other human activities.



### 11.2.1 How climate change is affecting flora and fauna:



Apart from human interference and over exploitation of natural resources, climate change is now another global factor affecting our planet's ecosystems, biodiversity and human in many ways:-

1. Changes in climate and weather can force species to migrate to new areas.
2. Changes in climate may threaten native species, as invasive species (both predators and competitors) expand their range.
3. Species that are already threatened are highly vulnerable to environmental change, particularly vulnerable to extreme events, invasive species, disease outbreaks and further habitat loss.
4. Climate change also changes the life cycle of plants and animals. Rising temperatures reduce the survival rates of many species, leading to less food, less successful breeding, and environmental interference for native wildlife.
5. The effects of climate change in the Himalayan region are increasing the extinction rate of flora and fauna species, changing rainfall patterns, changing the duration and maturity of vegetation growth and the overall growth of crop plants.
6. Climate change destroys the environment, especially the natural habitats on which animals rely for food, shelter and other vital resources. Local plants and animals will wither or die.
7. The climate of an area affects the types of plants that grow there. Plant growth depends on rainfall and temperature. Plants may not grow well if rainfall levels are too high or too low or if temperatures are too high or too low. Vegetation influences the climate at macro and micro levels. Growing evidence suggests that undisturbed forests can help to maintain the rainfall in its immediate vicinity by recycling water vapour at a steady rate back into the atmosphere, and also through the canopy's effect in promoting atmospheric turbulence.
8. The IPCC (Intergovernmental Panel on Climate Change) cautions that malicious actions can damage biodiversity and ecosystem resilience and may also disrupt ecosystem services. Warming and increased frequency, severity and duration of extreme events will put many terrestrial, freshwater, coastal and marine ecosystems at high or very high risk of biodiversity loss.

### **11.3 Strategy to be adopted to cope with the effects of climate change:**

**1. Climate change adaptation planning** —Adaptation planning is a process of adjustment to the impacts of climate change, including actions taken to reduce the negative impacts of climate change, or to take advantage of emerging opportunities. Some of the most promising ways to mitigate climate change are what we call “natural climate solutions”: the **conservation, restoration, and improved management of land**, in order to increase carbon storage or avoid greenhouse-gas emissions in landscapes. We have to identify the real threat that climate change poses to species and ecosystems. How biodiversity may be affected in protected sites due to climate change needs to be identified and strategies developed to address these vulnerabilities. We have to recognize how the flora and fauna of sanctuaries are being affected by climate change and how to respond to these changes without destroying their local ecosystem.

**2. Protect the habitats**– Habitat loss has significant, consistently negative effects on biodiversity. Habitat loss negatively influences biodiversity directly through its impact on species abundance, genetic diversity, species richness, species distribution, and also indirectly. Land degradation is a significant contributor to climate change. Deforestation, the destruction of wetlands and other forms of land conversion can release massive amounts of carbon into the atmosphere, which may worsen global warming. Forests are perhaps most recognized for their role in regulating atmospheric gases (and therefore climate), nearly all ecosystems play a role in the storage of carbon, from grasslands and soils to rivers and oceans. There is therefore a need to protect threatened species and ecosystems with the added benefit of preserving these carbon reserves, and ensuring that they function healthily and perform this important service. Animals and their interactions increase the amount of carbon stored in soils and trees. When carbon is stored, this helps to slow down climate change, because that carbon is removed from the atmosphere. But animal populations worldwide are decreasing. There is need to control or restrict over grazing and over exploitation of the natural resources of the protected areas by the surrounding dwellers/villagers for sustainability. Aware and help them with alternative livelihood and resources. **Habitat loss** is the single greatest threat to biodiversity on Earth today and in fact it is the second largest threat to our existence on this planet next to Climate Change.

**3. Scientific guidance, consultation of the experts**- Biodiversity is affected by climate change at different levels from low land to high mountains and from small rivers to deep seas. Some species have become extinct while others are endangered. Extinctions can disrupt fundamental ecological processes. So from time to time requires field survey, monitoring of the biodiversity & habitat status of the protected area for updating with scientific reports by the experts (ecologists, field biologists, scientists, etc) for sustainable habitat protection and management of the protected areas. This scientific data will be very useful for studying the impact of climate change and based on this data future planning of protected area can be done. Field staff also needs education, training, and conservation awareness.

Destroying natural ecosystems, especially various types of forests, and then trying to compensate for this loss by poor planning is an example of how our approach to mitigating climate change is causing more problems. That is why we need good and scientific planning to reduce climate impact. Regular studies especially through experts should be conducted in protected areas to study the impact of climate change.

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## **CHAPTER-XII**

### **Biodiversity Status and Initiative in Himachal Pradesh**

#### **12.1 Introduction:**

Himachal Pradesh is situated in the lap of North-Western Himalaya having beautiful landscapes, lush green forests, bubbling streams, emerald meadows, enchanting lakes, eternal snows, ethnic communities and colorful people. It is bounded by Tibet in the east, Jammu and Kashmir in the north, Uttaranchal in south east. Haryana in the south and Punjab in the West. It is located between 30° 22' 40" to 33° 12' 40" North Latitude and 75° 47' 55" to 79° 04' 20" East Longitudes having geographical area 55,673 km<sup>2</sup> which is 1.7% of the country's area and 10.54% of the Himalayan land mass. Himachal Pradesh is a hilly state and harbours one of the richest diversity of mountain landscapes with altitude ranging from 350 MSL at boundary along Punjab planes to 6816 MSL at Reo-Purgial in the Zaskar range in Kinnaur.

The altitude increases from west to east and south to north. The general landscape presents an intricate mosaic of mountain ranges, hills and valleys. Important mountain ranges in the State include the Shiwaliks, Dhauladhar, Pirpanjal, Great Himalaya and the Zaskar. Separated by valleys, glens and hills, there are distinct physiographic zones which run almost parallel throughout the length of the State from west to east. The state can be divided into three main topographic regions i.e. (i) the Shiwaliks, (ii) the Lesser Himalaya and (iii) the Greater Himalaya. The climate of Himachal Pradesh varies from semi-tropical to semi-arctic from place to place depending upon the altitude of the region. Varied physiographic and climatic factors have given rise to diverse natural ecosystems, namely, forests, grasslands and pastures, rivers, lakes and wetlands, glaciers etc. Which are the store house of rich biodiversity.

#### **12.2 WHAT IS BIODIVERSITY?**

Biodiversity or biological diversity is the variability within and between all micro-organisms plants and animals both wild and domesticated and the ecological systems which they co-exist and inhabit. It is one of the greater wealth of the planet. It starts with genes and

manifests itself as organisms, species, populations and communities which lead to the formation of ecosystems, landscapes and ultimately biosphere. Biodiversity manifests at three levels:

- Species Diversity - diversity among species in an ecosystem.
- Genetic Diversity - diversity of genes within a species. There is genetic variability among the populations and the individuals of the same species.
- Ecosystem Diversity - diversity at higher level of organization, the ecosystem.

### **12.3 IMPORTANCE OF BIODIVERSITY:**

Biodiversity has direct consumptive value in food, agriculture, medicine and industry. Approximately 80,000 plants have been used at one time and in the human history of which, only 150 have been cultivated on a large scale. Today 10 to 20 species provide 80-90% of food requirements of the world. At one time, nearly all medicines were derived from the biological resources. Even today, 67- 70% of modern medicine are derived from natural products. In addition to food and medicines, biodiversity provide us with many other products without which life would be difficult. Wood, fuel, fodder, clothing and shelter, material for industries are some of the examples.

Biodiversity also has aesthetic and recreational values. Biodiversity maintains ecological balance and continuous evolutionary process. The indirect ecosystem services provided through biodiversity are photosynthesis, pollination, transpiration, chemical cycling, nutrient cycling, soil maintenance, climate regulation, air, water system management, waste treatment and pest control. Conservation and sustainable use of biodiversity are therefore, fundamental to ecological sustainable development. In fact, the very survival of mankind is dependent on biological diversity i.e. plants, animals and microbes.

### **12.4 STATUS OF BIODIVERSITY IN HIMACHAL PRADESH:**

Himachal Pradesh is bestowed with distinctive floral and faunal biodiversity having aesthetic, cultural, commercial and genetic values. It is a mountainous state and have vast repository of flora and fauna having profuse variation in intra and inter-species levels. Variable

treasures of the biological resources are because of its varied topography, geological formations, altitudinal ranges and climatic conditions. The range of biodiversity elements represented in the state varies from sub-tropical region to that of temperate, dry temperate and alpine region. 95% of the floral and faunal species available in the state are endemic and 5% of the other species existing are of Exotic nature.

## **12.5 FLORAL DIVERSITY:**

Floral biodiversity in the State is described under forest vegetation, medicinal and aromatic plants, diversity in agriculture crops including unexploited and lesser known cereal crops, wild fruits and wild ornamental plants. Out of the total 47,000 plant species found in the country as many as 3295 species are reported from Himachal Pradesh. Floral wealth of the state consists of higher plants, ferns, Mosses, fungi and lichens. There are 3120 species of angiosperms, 13 species of gymnosperms and 124 pteridophytes and 38 species of orchid.

The vegetation is a blend of Ban Oak Forest, Moist Temperature Deciduous Forest, Himalayan Alpine Pastures and Rhododendron Scrub Forest. The lower ranges have the growth of blue pine while the higher altitudes have firs and spruce. Coniferous forest dominates the mid and high hills with Oaks in depressions. In the foothills, forests are dry residuals with Sal as the predominant species. In dry localities Chir pine occur as the dominant species.

The state is rich in medicinal herbal plant wealth and people in the villages in some pockets are dependent on the medicinal herbal plant wealth for their livelihood. By the regular extraction of the plants of medicinal and aromatic utility from the forests and alpine pastures nearly 60 species of medicinal plants fall under the category of endangered species presently as per the IUCN criteria in the state.



**Grey Goral (*Naemorhedus goral*); Photograph By: Kuldeep Singh Jamwal DFO WL**

The state harbors a large faunal diversity. The fauna of Himachal Pradesh is very diverse and unique. Out of 89,451 species of animals in India, the state harbors 5,721 species of the Indian fauna which shows richness of biological resources of the state considering its small geographical area, which is only 1.7% of the country. This faunal diversity includes 649 Chordates (77 Mammals, 447 Birds, 440 Amphibians and 83 Fishes), 4543 Arthropods (2 Bryozoans, 4362 Insects, 195 Arachnids, 11 Myriapods and 73 Crustaceans) and 412 others (60 Annelids, 73 Molluscs, 2 Acanthocephala, 132 Nematodes, 16 Rotifers, 90 Platyhelminthes, 2 Cnidarians, 3 Porifera and 34 Protozoan). Among the pheasants, with increasing altitude area are Kalij in the foothills, Koklas and Monal in the temperate and Mid-level forests, and the Snow cock in the Alpine areas. The Western Tragopan, a rare and endangered species, is confined only to the western Himalayas. Himachal Pradesh also has probably the largest population of Chir pheasants in the world. Mammals include the Himalayan and long tail marmots, Himalayan squirrels and voles. Among herbivores are the Ibex, Serow, Blue sheep, Tahr, Musk deer, Goral and the Barking deer. A large variety of carnivores, which are either rare or of intermediate status such as Black Bear, Brown Bear, Himalayan Weasel, Yellow Throated Martin, Stone Martin and Wolf are also found here. The Common Leopard and Snow leopard is representative of the larger cats.

Biodiversity has contributed in many ways to the development of Human culture, and, in turn, human communities have played a major role in shaping the diversity of nature at genetic, species and ecological levels. Man's relation with biodiversity is as old as the evolution of man itself. He has been dependent upon the biodiversity for fulfillment of his entire livelihood needs. The people of Himachal Pradesh, a predominantly rural and agrarian State, have very strong linkages with biodiversity. The cereals, millets, pulses, the vegetables and the fruits are all plant based. The natural forests in the area provide wood for building of houses, furniture, bridges, agriculture implements, stakes for agriculture crops in addition to providing much needed fuel wood. Fiber is also extracted from many plants. Many wild relatives of domesticated plants find home in the State and this wild germplasm is highly sought after for development of high yielding and disease resistant domesticated crops. People are also dependent upon the native land races of life stock for agriculture purposes and their daily needs of milk, meat, wool and hide. A large proportion of this livestock feeds on the grasses and leaves of trees obtained from both wild and domesticated habitats. The leaf litter collected from the forests is used as bedding for the cattle and then applied to the agriculture fields as manure.

Many people of the state draw raw material from wild plant resources to make baskets, ropes, mats, leaf plates, artifacts, etc to generate income. Collection and sale of medicinal plants from the wild forms another source of income to the rural people. Wild mushrooms and Guchii (*Morchella* spp) are the sources of alternate income of the rural people which are collected from the local forest during the fruiting seasons of the fungal wealth of the state.

No religious ceremony in the State is complete without use of plants. Many plants including 'dhoop' and 'juniper' are used as incense in religious ceremonies and many others like 'bael', 'Tulsi' etc. are used as offerings to the deities. Whereas 'barged' forms the tree of choice in religious groves in the lower belts, it is 'Deodar' that forms the main species in sacred groves in the higher hills. Gates backed with fresh leaves of local keystone species are put up to

welcome guests. Such is the relevance of biodiversity to the people of the State that 'Deodar' has been adopted as the State tree, 'Pink Rhododendron' as the State flower, 'Snow Leopard' as the state animal and 'Western Tragopan' as the state bird.

## **12.8 NEED FOR CONSERVATION OF BIODIVERSITY:**

Biodiversity of Himachal Pradesh is becoming threatened due to biotic and abiotic factors in the absence of perspective strategic action plans for conservation of the biological resources. Many species have critically a low population which is further being affected by catastrophies or over exploitation leading to the elimination of species. Due to developmental activity many species of flora and fauna have been estimated to be threatened. The percentage of the threatened species in the fragile mountaineers region has been observed comparatively much higher in the state because of the dependence of the local people on biological resources for livelihood in the state. Survival of many valuable species of animals and birds, medicinal herbs ,aquatic and domesticated floral and faunal species is at risk because of the continuous and unscientific extraction and hunting etc. from their natural habitats. The situation is fast deteriorating due to continuous and indiscriminate use of chemicals as fertilizers and spray of highly toxic insecticides/ fungicides/ pesticides/ weedicides etc. in agriculture and horticulture fields, which is spoiling the soil strata as well as microbial biodiversity of the soil in the state. Introduction of Exotic species are threatening the survival of local species of terrestrial and aquatic ecosystems in the state. Incidences of forest fires are causing irreparable loss to biodiversity. Some of the floral and faunal species facing threat to their existence are list as follows:

## **12.9 THREATENED/ ENDANGRED FAUNA:**

Butterflies : Freak, Scarce Siren; Golden Emperor, Broad Banded Sailor, Banded Apollo, Ladakh Banded Apollo, Pale Jezebel.

Reptile : Common Indian Monitor, Yellow Monitor, Indian Rock Python.

Birds: Cheer Pheasant, Monal Pheasant, Mountain Quail, Snow cock, Tragopan, Himalayan Bearded Vulture, Himalayan Golden Eagle, Lagger Falcon.

Animals : Himalayan Brown Bear, Snow Leopard, Himalayan Lynx, Kashmir Stag, Himalayan Ibex, Himalayan Tahr etc.

#### **12.10 THREATENED/ ENDANGERED FLORA**

Atis, Chora, Singli-Mingli, Somlata, Kaur, Karu, Banhaldi, Patrala, Dhoop, Bankakri, Chukhri, Kuth, Talispatra, Mushakbala, Pushkarmool, Ratanjot, Salampanja, Jeevak, Rishbhak, Mahameda, Ravandchini, Chiraita, Rasna, Rakhal.

#### **12.11 ISSUE OF CONCERN:**

- There is a lack of information and awareness among the stakeholders about importance of biodiversity both wild and domesticated (existing vegetation and cultivated crops including pseudo-cereals) medicinal/ aromatic herbs/ plants and traditional knowledge about plant uses.
- Unscientific methods of harvesting medicinal and aromatic plants and poor control of contractors for medicinal plants collection resulting into loss of biodiversity.
- Lack of knowledge about the importance of sustainable minor forests produce (NTFP) development and related research.
- Lack of adequate funds, facilities, trained man power, long term research plans and appropriate extension facilities.
- Poor co-ordination amongst developmental plan executing bodies, local communities, and research and academic institution which is adversely affecting biodiversity conservation initiatives.
- Transformation from joint families to a nuclear family system leading towards erosion of traditional knowledge base.
- Human-Wildlife conflict resolution existing
- Use of subsidized chemicals in the form of fertilizers, pesticides, fungicides, insecticides etc. in agricultural landscapes is causing harm to soil strata and threat to micro-diversity.
- Inadequate efforts to biodiversity enterprise based enhancement for improvement of quality of life of local communities.
- Due to extreme and prolonged winter, heavy demand for fuel wood takes toll of existing vegetation, shrubs and perennial species along with their roots.

- High rate of soil erosion due to wind and water in cold deserts, flash floods in rivers in Kinnaur and Lahaul leads to biodiversity loss in the area.
- Transformation from diversified animal-crop system to a system of monocultures of Apple/Pea-Potatoes and keeping just jersey cows as compared to a variety of traditional life stock assemblage leading towards unrecoverable erosion of local genetics breeds and cultural diversity
- Excessive grazing by domesticated and migratory animals during spring and summer also cause a great loss to biodiversity in the area.
- Hunting is still prevalent in the state in spite of ban imposed by the Government.
- Traditional animal husbandry and traditional crops cultivation decreasing in the area.
- Destruction of habitat due to construction of large hydro electric dams, roads and buildings, industries leading to excessive land slide causing a great threat to biodiversity.
- Lack of understanding of traditional farming practices leading to erosion of agro-biodiversity in all agro climatic zones.
- Lack of policies for compensation for loss of agro-diversity due to development activities viz. roads, dams, industries etc.
- Exotic weeds, namely Lantana camera, Ageratum, Eupatorium and Parthenium spreading rapidly in both agriculture and Govt. lands.
- Danger to aquatic biodiversity due to developmental activities, introduction of numerous exotic fishing practices and use of chemicals.
- Inadequate documentation of indigenous knowledge and local traditions related to conservation and use of biodiversity.
- Inadequate information on microbial diversity and limited knowledge of beneficial microbes.
- Loss of local animal genetic resources due to low productivity of the local breeds leading to replacement of local strains.
- Inadequate information, co-ordination and adoption of appropriate technologies for propagation and conservation of health related bio-resources.

#### **12.12 BIODIVERSITY INITIATIVES:**

- Biodiversity Strategy and Action Plan formulated for conservation of Biodiversity of the State and Sub-State Site (Lahaul-Spiti & Kinnaur District).

- Himachal Pradesh State Biodiversity Board has been constituted for conservation and regulation of biological resources in the State.
- Draft Rules framed for the State Biodiversity Board.
- Prepared Bibliography of Biodiversity of North-Western Himalayas with focus on Himachal Pradesh.
- Prepared literature for awareness on Biodiversity for the stake holders.
- Draft of Policy guidelines for conservation of biodiversity in the State prepared.
- People Biodiversity Registers in five Panchayats are to be prepared on pilot basis in the State.
- Information on various facets of Biodiversity being collected and collated for formulation of a database on biodiversity.
- Conversion of Pine needles biomass into briquettes and its use as fuel in the rural areas viz. a viz. income generation in the State through organization of awareness cum demonstration trainings to the farmers/farm woman, NGOs, PRIs, Self Help Groups, Mahila Mandals and IRDP families.
- Awareness for the implementation on biological diversity Act, 2002 amongst the stake holders of biodiversity is being carried out.
- Environment friendly farm practices being popularized through demonstration trainings in the state.



**Bearded Vulture (Lammergeier); Photograph by, Dr. Kuldeep Singh Jamwal DFO**

## **CHAPTER XIII**

### **BUDGET**

#### **13.1 BUDGET SUMMARY:**

The Forest department will be the main executing agency for the implementation of the present Management Plan for the Tundah wildlife sanctuary. The management of habitat, protection activities, eco-tourism, eco-development, human-wildlife conflict, monitoring, capacity building of the staff and community are the main focal points for this Management Plan.

#### **13.2 FUNDING AGENCIES:**

The main funding agencies for the Management Plan of Tundah wildlife sanctuary will be as under:

- ✓ H.P. Forest Department
- ✓ Government of India - Centrally Sponsored Schemes (CSS)
- ✓ CAMPA funds
- ✓ Tribal Sub Plan Schemes

#### **13.3 ITEMS OF BUDGET COMPONENTS:**

##### **13.3.1 NON RECURRING:**

##### **1. Infrastructure, Protection and Communication:**

- ✓ Vehicle.
- ✓ Wireless system.
- ✓ Arms and ammunition
- ✓ Field equipments such as binoculars, digital cameras etc.
- ✓ Construction of new quarters for the staff.
- ✓ Construction of new anti poaching camps.
- ✓ Improvement of existing camps

##### **2. Protected Area Management:**

- ✓ Survey and demarcation
- ✓ Improvement of road network
- ✓ Bridges/ Culverts.
- ✓ Habitat Improvement works such as desilting of tanks etc.
- ✓ Creation of new fire lines

### **3. Tourism Development:**

- ✓ Establishment of nature camp
- ✓ Creation of nature trails.
- ✓ Creation of camping facilities

### **4. Eco-development:**

- ✓ Entry point investment.
- ✓ Village Eco-development programme.

### **5. Research, Monitoring and training:**

- ✓ Conducting basic research on the ecological and socio-economic aspects etc.
- ✓ Training of staff on legal and other management aspects.
- ✓ Training of teachers, school children, villagers etc
- ✓ Conducting census of important species

### **6. Environmental Education:**

- ✓ Development and procurement of education material for awareness generation such as pamphlets, brochures.
- ✓ Establishing a library of wildlife books and reference material.
- ✓ Erection of boards and signage's at important points
- ✓ Development of Educational Audio Visual Programmes.

## **13.3.2 RECURRING COST:**

### **1. Establishment Cost:**

- ✓ Salaries and allowance.
- ✓ TA/ Medical.
- ✓ Office expenses.

### **2. Maintenance Cost:**

- ✓ Maintenance of camps and Buildings.
- ✓ Maintenance of vehicles.
- ✓ Maintenance of roads, patrolling paths, bridges/ culverts etc.
- ✓ Ammunition.
- ✓ Uniform and other staff amenities (Torch, Kerosene, Drinking water etc.)
- ✓ Compensation arising out of man animal conflict.
- ✓ Training.
- ✓ Awareness programme.
- ✓ Staff welfare.
- ✓ Co-ordination.
- ✓ Immunization programme

## **CHAPTER-XIV**

### **THE SCHEDULE OF OPERATIONS AND MISCELLANEOUS REGULATIONS**

#### **14.1 THE SCHEDULE:**

The area being high altitude one, works are necessarily to be executed before the winter season. With this time constraint the works have to be meticulously planned. In this context the instructions issued from time to time have to be followed in letter and spirit.

#### **14.2 RECORD OF DEVIATION AND IMPLEMENTED TARGETS:**

The final execution of works would depend upon the finance availability. But still the deviation from the plan prescriptions should be brought on record so that the plan objectives are not defeated.

#### **14.3 THE RECORD OF EMPLOYMENT POTENTIAL:**

All works in the sanctuary though will improve and manage the habitat for Wildlife, yet at the same time there has to be a healthy and cordial relation with the common people of the area around the wildlife sanctuary. For their benefit, we have to give them gainful employment through various developmental works. In this way not only their income will be supplemented but also they will feel involved in this activity.

#### **14.4 MAINTENANCE OF COMPARTMENT HISTORIES AND BEAT MANUALS:**

The Compartment histories and beat manuals would be maintained in such a way that all forestry operations carried out in the area as well as general condition of the forests with relation to the wildlife trends, digital maps of the forests upto compartment level, Geo- coordinates of boundary pillars, census results will also be recorded.

**NOTIFICATION OF THE SANCTUARY (FACS IMILE)**

**GOVERNMENT OF HIMACHAL PRADESH**

**FOREST DEPARTMENT**

No.6-25/73-SF

Dated Shimla -2 the 17<sup>th</sup> September 1975

**NOTIFICATION**

In exercise of the powers conferred under section 18 of the Wildlife (Protection) Act. 1972 and after having considered the area of sufficient ecological Floral, Faunal, Geomorphologic, Natural and Zoological significance, the Governor of Himachal Pradesh is pleased to declare the area specified below as Game Sanctuary for protection propagation and development of Wildlife and its environments:-

| <b><u>Sr.No.</u></b> | <b><u>Name of Sanctuary.</u></b> | <b><u>Name of Distt, Divn, Range.</u></b> | <b><u>Situation of the Sanctuary</u></b>                                                                                                          |
|----------------------|----------------------------------|-------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------|
| <b><u>1.</u></b>     | <b><u>2.</u></b>                 | <b><u>3.</u></b>                          | <b><u>4.</u></b>                                                                                                                                  |
| 1.                   | Tundah                           | Chamba,<br>Upper Ravi,<br>Bharmour.       | North: Bhansar UF.<br>East: Sad Dhar.<br>South: Badgram UF<br>(Badgram)<br>West: Boundaries of<br>Tundah, Silpon Sivudi<br>UF's, Thanala Reserve. |

**By Order**

**P.N. Mattoo,**

**Secty. (Forests) to the**

**Govt. of H.P.**

**ANNEXURE- I (a)**

**(Authorative English Text of this Department Notification No. FFE-B-F (6)-5/99 dated 23-10-1999 as required under clause into (3) - of Article 348 of the constitution of India).**

GOVERNMENT OF HIMACHAL PRADESH.  
DEPARTMENT OF FORESTS.

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No. FFE-B-F(6)-5/1999  
NOTIFICATION.

Dated Shimla-2, the/ 23-10-1999

Whereas Notification under Section 18 of the Wild Life Protection Act, 1972 was issued vide Govt. Notification No. 6-25/73-SF dated 17-09-1975 declaring its intention to constitute Tundah Sanctuary in Distt. Chamba.

AND WHEREAS proclamation as required under Section 21 of the said Act was published in the regional language and circulated in every town and village covered by the above Notification on 11-12-1997. No objection but so ever were received from the public within the prescribed period. It is therefore felt that there is no need either to exclude or include any land from the limits of the sanctuary and consequently no action is required to be taken under Section 24 & 25 of the Act.

AND whereas the Governor of Himachal Pradesh considers that Tundah Wild Life Sanctuary is of adequate ecological founal geomorphological natural or zoological significance.

NOW therefore the Governor Himachal Pradesh in exercise of the powers vested in her under Section (26A) of the said Act is pleased to declare Tundah as sanctuary with immediate effect for the purpose of protecting, propagating or developing wildlife or its environment.

The limits of the area of the sanctuary shall be as under:-

North: Bhaissar U.F.  
East: Dad Dhar.  
South: Dadgram U.F.  
West: Boundaries of Tundah, Silpon, Sivudi UFs, Thanala Reserves.  
Area: 64 Sq. Kms,

By order

Commissioner-cum-Secy (Fts.)  
Government of Himachal Pradesh.

Endst. No. /FFE-B-F (6)-5/1999-

dated Shimla-2, the/ 23-10-1999

**Copy forwarded for favour of information and necessary action to:**

1. All the Administrative Secretaries to the Govt. of Himachal Pradesh, Shimla-2.
2. All the Divisional commissioners in H.P.
3. All the Heads of Departments in H.P.
4. The Principal Chief Conservator of Forests H.P. Shimla-171001.
5. The Chief Wild Life Warden H.P. Shimla-171002.
6. All the Dy. Commissioners in H.P.
7. The Controller, Printing and Stationary Deptt. H.P. Shimla-171005 for publication in Rajpatra. Five copies of the Rajpatra be sent to this Deptt.
8. Chief Conservator of Forests in H.P.
9. All the Divisional Forest Officers Wild Life in H.P.
10. Guard file. (100 copies).

Secretary Forests) to

Govt. of Himachal Pradesh.

## ANNEXURE- II

### LIST OF FOREST / COMPARTMENT AND AREA IN HA.

| Sr. No. | Name of compartment.                 | Forest type.                     | Area in hac.  |
|---------|--------------------------------------|----------------------------------|---------------|
| 1.      | 2.                                   | 3.                               | 4.            |
|         | <b>Reserve Forests.</b>              |                                  |               |
| 1.      | Thanala RF-I.                        | 12/Cid, e Mixed Conifer Forests. | 78.51         |
| 2.      | Thanala RF-II.                       | -do-                             | 101.58        |
| 3.      | Digola RF-I.                         | -do-                             | 178.07        |
| 4.      | Digola RF –II.                       | -do-                             | 125.45        |
| 5.      | Digola RF-III.                       | -do-                             | 169.97        |
| 6.      | Dadoon RF.                           | -do-                             | 76.89         |
| 7.      | Sua RF.                              | -do-                             | 60.69         |
| 8.      | Kated RF.                            | -do-                             | 36.02         |
|         | <b>Total:-</b>                       |                                  | <b>827.18</b> |
|         |                                      |                                  |               |
|         | <b>Demarcated Protected Forests.</b> |                                  |               |
| 1.      | Gowar DPF.                           | -do-                             | 28.91         |
| 2.      | Tundah DPF-I.                        | -do-                             | 25.00         |
| 3.      | Tundah –II.                          | -do-                             | 0             |
| 4.      | Tundah –III.                         | -do-                             | 0             |
| 5.      | Tundah –IV.                          | -do-                             | 30.00         |
| 6.      | Tundah –V.                           | -do-                             | 100.00        |
| 7.      | Tundah-VI.                           | -do-                             | 24.00         |
| 8.      | Tundah –VII.                         | -do-                             | 0             |
| 9.      | Tundah –VIII.                        | -do-                             | 30.00         |
| 10.     | Tundah –IX.                          | -do-                             | 70.07         |
| 11.     | Tundah –X.                           | -do-                             | 0             |
| 12.     | Kuthal DPF.                          | -do-                             | 0             |
| 13.     | Silpari-I.                           | -do-                             | 0             |
| 14.     | Silpari-II.                          | -do-                             | 60.00         |
| 15.     | Silpari-III.                         | -do-                             | 68.00         |
| 16.     | Silpari-IV.                          | -do-                             | 0             |
| 17.     | Sarotha DPF.                         | -do-                             | 308.37        |
| 18.     | Mandha DPF.                          | -do-                             | 50.99         |
| 19.     | Padhrola DPF.                        | -do-                             | 109.67        |
| 20.     | Banni DPF.                           |                                  | 20.00         |
| 21.     | Thanalla-I.                          | -do-                             | 80.94         |
| 22.     | Thanalla-II.                         | -do-                             | 60.70         |
| 23.     | Thanalla-III.                        | -do-                             | 60.70         |
| 24.     | Chharolla DPF-I.                     | -do-                             | 60.70         |
| 25.     | Chharolla DPF-II.                    | -do-                             | 80.94         |
| 26.     | Liundi DPF.                          |                                  | 78.91         |
| 27.     | Bhansar Right DPF.                   | -do-                             | 226.62        |
| 28.     | Bhansar Left DPF.                    | -do-                             | 323.75        |

|     |                              |                                 |                     |
|-----|------------------------------|---------------------------------|---------------------|
| 29. | Digola DPF-I                 | -do-                            | 80.94               |
| 30. | Digola DPF-II.               | -do-                            | 0                   |
| 31. | Chunjala DPF.                | -do-                            | 69.20               |
| 32. | Dadoon DPF.                  | -do-                            | 30.35               |
| 33. | Sardhar DPF.                 | -do-                            | 45.00               |
| 34. | Kated DPF-I.                 | -do-                            | 0                   |
| 35. | Kated DPF-II                 | -do-                            | 77.29               |
| 36. | Khanbag DPF.                 | -do-                            | 55.85               |
| 37. | Badgran DPF.                 | -do-                            | 0                   |
| 38. | Kuthar DPF.                  | -do-                            | 0                   |
| 39. | Morthu DPF.                  | -do-                            | 132.73              |
| 40. | Plani DPF-I.                 | -do-                            | 0                   |
| 41. | Plani DPF-II.                | -do-                            | 0                   |
|     | <b>Total:-</b>               |                                 | <b>2389.63</b>      |
|     |                              |                                 |                     |
|     | <b>Dhars DPFs.</b>           |                                 |                     |
| 1.  | Mumbri Dhar.                 | 15/C-I, II, III Alpine Pasture. | 56.67               |
| 2.  | Ardpanei Dhar.               | -do-                            | 230.27              |
| 3.  | Silpari Dhar.                | -do-                            | 57.06               |
| 4.  | Tandei Dhar.                 | -do-                            | 1144.04             |
| 5.  | Chandei Dhar.                | -do-                            | 121.00              |
| 6.  | Liundi Dhar.                 | -do-                            | 698.88              |
| 7.  | Sardhar.                     | -do-                            | 506.60              |
| 8.  | Deoki Dhar.                  | -do-                            | 368.67              |
|     | <b>Total:-</b>               |                                 | <b>3183.19</b>      |
|     | <b>A. Total Govt. land.</b>  |                                 | <b>6400.00 Hac.</b> |
|     | <b>B. Private land.</b>      |                                 | <b>0</b>            |
|     | <b>Total area A &amp; B.</b> |                                 | <b>6400.00 Hac.</b> |

### ANNEXURE- III

#### LIST OF NATURAL WATER RESOURCE

| <u>Sr. No.</u> | <u>Name of Resource / Nallahs</u> | <u>Perennial</u> | <u>Seasonal</u> | <u>Remarks.</u>             |
|----------------|-----------------------------------|------------------|-----------------|-----------------------------|
| 1.             | Chhoo Nalla.                      | -do-             | -               | Flow data is not available. |
| 2.             | Kuthari Nalla.                    | -do-             | -               |                             |
| 3.             | Dadun Nalla.                      | -do-             | -               |                             |
| 4.             | Bhadra Nalla.                     | -do-             | -               |                             |
| 5.             | Kathla Nalla.                     | -do-             | -               |                             |
| 6.             | Bhadani Nalla.                    | -do-             | -               |                             |
| 7.             | Digola Nalla.                     | -do-             | -               |                             |
| 8.             | Raskund Nalla.                    | -do-             | -               |                             |
| 9.             | Talnu Nalla.                      | -do-             | -               |                             |
| 10.            | Gaj Nalla.                        | -do-             | -               |                             |
| 11.            | Kathed Nalla.                     | -do-             | -               |                             |
| 12.            | Juhi Nalla.                       | -do-             | -               |                             |
| 13.            | Kandeil Nalla.                    | -do-             | -               |                             |
| 14.            | Karolu Nalla.                     | -do-             | -               |                             |
| 15.            | Bhansar Nalla.                    | -do-             | -               |                             |
| 16.            | Charola Nalla.                    | -do-             | -               |                             |
| 17.            | Thanala Nalla.                    | -do-             | -               |                             |
| 18.            | Banni/Mahdedh Nalla.              | -do-             | -               |                             |
| 19.            | Sarotha Nalla.                    | -do-             | -               |                             |
| 20.            | Mandha Nalla.                     | -do-             | -               |                             |
| 21.            | Kuthal Nalla.                     | -do-             | -               |                             |
| 22.            | Tundah Nalla.                     | -do-             | -               |                             |
| 23.            | Diggu-Ki-Dalli.                   | -do-             | -               |                             |
| 24.            | Adb Spring.                       | -do-             | -               |                             |
| 25.            | Liundi Spring                     | -do-             | -               |                             |
| 26.            | Thanala Spring                    | -do-             | -               |                             |

## ANNEXURE-IV

## LIST OF PLANTATIONS.

| Sr. No. | Name of plantation. | Spp. planted.                                                                      | Area (Hac.). | Year of Establishment. |
|---------|---------------------|------------------------------------------------------------------------------------|--------------|------------------------|
| 1.      | 2.                  | 3.                                                                                 | 4.           | 5.                     |
| 1.      | Kuthari CA          | H.C. Nut = 500<br>Chuli = 1500<br>Drek = 2000<br><b>Total = 4000</b>               | 5 Hac.       | 2005-06                |
| 2.      | Phat CA.            | H.C. Nut = 600<br>Robinia = 400<br>Chuli = 850<br>Drek = 50<br><b>Total = 5500</b> | 5 Hac.       | -do-                   |
| 3.      | Kinjla CA.          | H.C. Nut = 900<br>Robinia = 4500<br>Chuli = 100<br><b>Total = 5500</b>             | 5 Hac.       | -do-                   |
| 4.      | Sinda CA.           | H.C. Nut = 100<br>Robinia = 3000<br>Chuli = 900<br><b>Total = 4000</b>             | 5 Hac.       | -do-                   |
| 5.      | Ladogi CA.          | H.C. Nut = 500<br>Robinia = 3300<br>Chuli = 1700<br><b>Total = 5500</b>            | 5 Hac.       | -do-                   |
| 6.      | Bhadra CA.          | H.C. Nut = 100<br>Robinia = 2200<br>Chuli = 1000<br><b>Total = 3300</b>            | 3 Hac.       | -do-                   |
| 7.      | Tundah CA.          | H.C. Nut = 1200<br>Robinia = 2000<br>Chuli = 100<br><b>Total = 3300</b>            | 3 Hac.       | -do-                   |
|         |                     |                                                                                    |              |                        |
| 1.      | Tundah CA.          | Deodar = 4400<br><b>Total = 4400</b>                                               | 4 Hac.       | 2006-07                |
| 2.      | Kopthari CA.        | Deodar = 4400<br><b>Total = 4400</b>                                               | 4 Hac.       | -do-                   |
| 3.      | Gowari CA.          | H.C. Nut = 1400<br>Chuli = 200<br>Robinia = 1700<br><b>Total = 3300</b>            | 3 Hac.       | -do-                   |
| 4.      | Chunjala CA.        | H.C. Nut = 1100                                                                    | 3 Hac.       | -do-                   |

|     |              |                                                                                                                         |          |      |
|-----|--------------|-------------------------------------------------------------------------------------------------------------------------|----------|------|
|     |              | 5.Robinia = 1200<br>A6.linthus = 1000<br><b>Total = 3300</b>                                                            |          |      |
| 5.  | Palani CA.   | Robinia = 3300                                                                                                          | 3 Hac.   | -do- |
| 6.  | Kated CA.    | Deodar = 5000<br>Kail = 4000<br><b>Total = 9000</b>                                                                     | 7.5 Hac. | -do- |
| 7.  | Parol CA.    | Deodar = 10500<br><b>Total = 10500</b>                                                                                  | 7 Hac.   | -do- |
| 8.  | Khlog CA.    | H.C. Nut = 1000<br>Chuli = 1000<br>Robinai = 7000<br><b>Total = 9000</b>                                                | 6 Hac.   | -do- |
| 9.  | Chdola CA.   | H.C. Nut = 7000<br>Robinia = 2000<br><b>Total = 9000</b>                                                                | 6 Hac.   | -do- |
| 10. | Guted CA.    | H.C. Nut = 8000<br>Kail = 500<br>Robinai = 2000<br><b>Total = 10500</b>                                                 | 7 hac.   | -do- |
| 11. | Banni CA.    | Deodar = 4000<br>Robinia = 5000<br><b>Total = 9000</b>                                                                  | 6 Hac.   | -do- |
| 12. | Sarotha CA.  | Deodar = 10000<br>H.C. Nut = 500<br><b>Total = 10500</b>                                                                | 7 Hac.   | -do- |
| 13. | Sutlu CA.    | Deodar = 7800<br>Kail = 2500<br>Cheer = 4000<br>Chuli = 200<br>Robinia = 300<br>Ailanthus = 200<br><b>Total = 15000</b> | 10 Hac.  | -do- |
| 14. | Gowar CA.    | H.C. Nut = 160<br>Chuli = 300<br>Robinia = 2600<br><b>Total = 4500</b>                                                  | 3 Hac.   | -do- |
| 15. | Kuthal CA.   | Deodar = 6000<br>H.C. Nut = 200<br>Robinia = 800<br>Ailanthus = 500<br><b>Total = 7500</b>                              | 5 Hac.   | -do- |
| 16. | Chulad CA.   | Deodar = 4000<br>Chuli = 1000<br>Robinia = 6000<br>Ailanthus = 1000<br><b>Total = 12000</b>                             | 8 Hac.   | -do- |
| 17. | Chunjala CA. | Kail = 8500<br>Robinia = 2000                                                                                           | 8 Hac.   | -do- |

|     |               |                                                                                        |         |                |
|-----|---------------|----------------------------------------------------------------------------------------|---------|----------------|
|     |               | Ailanthus = 1500<br><b>Total = 12000</b>                                               |         |                |
| 18. | Gadda CA.     | Deodar = 6000<br>Kail = 1500<br><b>Total = 7500</b>                                    | 5 Hac.  | -do-           |
| 19. | Tundah CA.    | H.C. Nut = 100<br>Robinia = 200<br>G. sowing = 900<br><b>Total = 3000</b>              | 4 Hac.  | -do-           |
| 20. | Polani CA.    | Robinia = 1500<br>Ailanthus = 1300<br><b>Total = 2800</b>                              | 4 Hac.  | -do-           |
| 21. | Chadola Dhar. | H.C. Nut = 2800<br><b>Total = 2800</b>                                                 | 5 Hac.  |                |
| 22. | Thanala CA.   | H.C. Nut = 1400<br>Robinaia = 1400<br>P.sowing = 1200<br><b>Total = 4000</b>           | 4 Hac.  | -do-           |
| 23. | Tund CA.      | H.C. Nut = 1400<br>Robinia = 1400<br>P. sowing = 1200<br><b>Total = 4000</b>           | 4 Hac.  | -do-           |
| 24. | Silpari CA.   | H.C. Nut = 700<br>Chuli = 400<br>Robinia = 1000<br><b>Total = 2100</b>                 | 3 Hac.  | -do-           |
| 25. | Bhadra CA.    | Robinia = 2100<br>P.Sowing = 900<br><b>Total = 3000</b>                                | 3 Hac.  | -do-           |
|     |               |                                                                                        |         |                |
| 1.  | Chhadola CA.  | Deodar = 15000<br><b>Total = 15000</b>                                                 | 10 Hac. | <b>2007-08</b> |
| 2.  | Kiduthu CA.   | Robiniia = 19500<br>H.C. Nut = 4500<br><b>Total = 15000</b>                            | 10 Hac. | -do-           |
| 3.  | Banni CA.     | Kail = 1750<br>Ban = 2500<br>Robina = 7525<br>H..C. Nut = 3225<br><b>Total = 15000</b> | 10 Hac. | -do-           |
| 4.  | Thanalla CA.  | Robinia = 7325<br>Ailanthus = 650<br>H.C. Nut = 2525<br><b>Total = 10500</b>           | 7 Hac.  | -do-           |
| 5.  | Bhansar CA.   | Kail = 500<br>Deodar = 7000<br><b>Total = 7500</b>                                     | 5 Hac.  | -do-           |
| 6.  | Ghei CA.      | Deodar = 5000<br>Robinia = 10000                                                       | 10 hac. | -do-           |

|     |                  |                                                                                                                          |          |      |
|-----|------------------|--------------------------------------------------------------------------------------------------------------------------|----------|------|
|     |                  | Total = 15000                                                                                                            |          |      |
| 7.  | Tundha CA.       | Kail = 5000<br>Deodar = 10000<br><b>Total = 15000</b>                                                                    | 10 Hac.  | -do- |
| 8.  | Talnu CA.        | Kail = 2000<br>Deodar = 13000<br><b>Total = 15000</b>                                                                    | 10 Hac.  | -do- |
| 9.  | Kathala-I CA.    | Deodar = 3000<br>Ban = 6000<br><b>Total = 9000</b>                                                                       | 6 Hac.   | -do- |
| 10. | Kathla-II CA.    | Deodar = 6000<br><b>Total = 6000</b>                                                                                     | 4 Hac.   | -do- |
| 11. | Chunjala CA.     | Kail = 2000<br>Robinia = 8000<br>Ailanthus = 3000<br>H.C. Nut = 2000<br><b>Total = 15000</b>                             | 10 Hac.  | -do- |
| 12. | Gopi Goth CA.    | Deodar = 12000<br>Robinai = 1050<br>Alunthus = 1150<br>H.C. Nut = 800<br><b>Total = 15000</b>                            | 10 Hac.  | -do- |
| 13. | Bhajun CA.       | Deodar = 310<br>Chil = 7240<br>Robinia = 3930<br>Ailanthus = 3150<br>H.C. Nut = 390<br><b>Total = 15000</b>              | 10 Hac.  | -do- |
| 14. | Sinda CA.        | Robinia = 5200<br>Alunthus = 2000<br>H.C. Nut = 3300<br><b>Total = 10500</b>                                             | 7 Hac.   | -do- |
| 15. | Tripna CA..      | Deodar = 2830<br>Kail = 7620<br>Ban = 1750<br>Robinia = 1200<br>Ailanthus = 1000<br>W. Nut = 600<br><b>Total = 15000</b> | 10 Hac.  | -do- |
| 16. | Pharka CA.       | Deodar = 2500<br>Ban = 1250<br>Total = 3750                                                                              | 2.5 Hac. | -do- |
| 17. | Chhobu CA.       | Deodar = 12300<br>Robinia = 2000<br>H.C. Nut = 700<br><b>Total = 15000</b>                                               | 10 Hac.  | -do- |
| 18. | Badgran Phat CA. | Kail = 2500<br>Ban = 2500                                                                                                | 10 Hac.  | -do- |

|     |                   |                                                                                                |         |      |
|-----|-------------------|------------------------------------------------------------------------------------------------|---------|------|
|     |                   | Deodar = 6000<br>Robinia = 2200<br>Drek = 1800<br><b>Total = 15000</b>                         |         |      |
| 19. | Silpari CA.       | Deodar = 10000<br>Ban = 5000<br><b>Total = 15000</b>                                           | 10 Hac. | -do- |
| 20. | Kalichho CA.      | Deodar = 10000                                                                                 | 10 Hac. | -do- |
| 21. | Badi CA.          | Deodar = 8000                                                                                  | 8 Hac.  | -do- |
| 22. | Gadda CA.         | Deodar = 10000                                                                                 | 10 Hac. | -do- |
| 23. | Chhadula CA.      | Deodar = 2000<br>Robinia = 4000<br>H.C. Nut = 2000<br><b>Total = 8000</b>                      | 10 Hac. | -do- |
| 24. | Bhansar CA.       | Deodar = 8000                                                                                  | 10 Hac. | -do- |
| 25. | Chunjala CA.      | Deodar = 8000                                                                                  | 10 Hac. | -do- |
| 26. | Tundah PB-I.      | Deodar = 8000                                                                                  | 10 Hac. | -do- |
| 27. | Khapru CA.        | Deodar = 4000                                                                                  | 5 Hac.  | -do- |
| 28. | Badi CA.          | Dhoop & Kour = 3000                                                                            | 2 Hac.  | -do- |
| 29. | Liundi CA.        | Robinia = 3000<br>H.C. Nut = 4000<br>Grass tuff = 3000<br><b>Total = 10000</b>                 | 10 Hac. | -do- |
| 30  | Thanalla Dhar CA. | Robinia = 2000<br>H.C. Nut = 2200<br>G. tuff = 1800<br><b>Total = 6000</b>                     | 6 Hac.  | -do- |
| 31. | Thanalla CA.      | Robinia = 2100<br>H.C. Nut = 2100<br>G. Tuffs = 1800<br><b>Total = 6000</b>                    | 6 Hac.  | -do- |
| 32. | Bhansar Dhar.     | Robinia = 1800<br>H.C. Nut = 1000<br>G. Tuffs = 1200<br><b>Total = 4000</b>                    | 4 Hac.  | -do- |
| 33. | Ghai Dhar CA.     | Robinia = 2000<br>H.c. Nut = 800<br>G. Tuffs = 1200<br><b>Total = 4000</b>                     | 4 Hac.  | -do- |
| 34. | Sad Dhar CA.      | Robinia = 3000<br>H.C. Nut = 1000<br>Ailanthus = 900<br>G. Tuffs = 2100<br><b>Total = 7000</b> | 7 Hac.  | -do- |
| 35. | Bhadra CA.        | Robinia = 3000<br>H. C. Nut = 1200<br>P. sowing = 1800<br><b>Total = 6000</b>                  | 6 Hac.  | -do- |

|     |            |                                                                                                |        |      |
|-----|------------|------------------------------------------------------------------------------------------------|--------|------|
| 36. | Phati CA.  | Robinia = 1800<br>H. C. Nut = 1000<br>G. Tuffs = 1200<br>Total = 4000                          | 4 Hac. | -do- |
| 37. | Tundah CA. | Robinai = 1500<br>H.C. Nut = 600<br>G. Tuffs = 900<br><b>Total = 3000</b>                      | 3 Hac. | -do- |
| 38. | Plani CA.  | Robinia = 2000<br>H.C. Nut = 1000<br>Alunthus = 500<br>G. Tuffs = 1 500<br><b>Total = 5000</b> | 5 Hac. | -do- |
| 39. | Tundah CA. | Robinia = 800<br>H.C. Nut = 600<br>G. Tuffs = 600<br><b>Total = 2000</b>                       | 2 Hac. | -do- |

**ANNEXURE- V****LIST OF NATURAL SALT LICKS AND PROPOSED LOCATION FOR  
ARTIFICIAL SALT LICKS****A. NATURAL SALT LICKS**

| <b><u>Sr. No.</u></b> | <b><u>Place.</u></b> | <b><u>Location.</u></b> |
|-----------------------|----------------------|-------------------------|
| 1.                    | Kharta Goth.         | Deoki Dhar.             |
| 2.                    | Ghadala-ka-Choo.     | Bhansar Nalla.          |
| 3.                    | Chhiri Dhug..        | Jujhar Dhar.            |
| 4.                    | Odda                 | Liundi Dhar.            |
| 5.                    | Dudha-Ra-Kud.        | Right Bhansar.          |
| 6.                    | Balud.               | Kandeli Dhar.           |
| 7.                    | Meodeirna.           | Karolu Dhar.            |
| 8.                    | Kudaig.              | Lambapar Dhar.          |
| 9.                    | Brehima.             | Janu Dhar.              |
| 10.                   | Kated                | Chadola Dhar            |

**B. ARTIFICIAL SALT LICKS**

| <b><u>Sr. No.</u></b> | <b><u>Place.</u></b> | <b><u>Location.</u></b> | <b><u>Year of creation</u></b> | <b><u>Lat. &amp; Long.</u></b> |
|-----------------------|----------------------|-------------------------|--------------------------------|--------------------------------|
| 1.                    | Padhri Goth.         | Mahdherh DPF.           | 2011-12                        | 32°30'26"N; 76°26'28"E         |
| 3.                    | Kaida Goth.          | Janu Dhar.              | 2011-12                        | 32°33'57"N; 76°27'54"E         |
| 4.                    | Renoth.              | Bahrli Juhi.            | 2011-12                        | 32°36'31"N; 76°30'01"E         |
| 5.                    | Kadoth.              | Anderli Juhi.           | 2012-13                        | 32°36'09"N; 76°29'43"E         |
| 6.                    | Dehri.               | Chharola Dhar.          | 2012-13                        | 32°37'05"N; 76°31'23"E         |
| 7.                    | Liundi ridge.        | Right Bhansar.          | 2012-13                        | 32°36'01"N; 76°31'03"E         |
| 8.                    | Diggu-Di-Ghori.      | Bhansar Nalla.          | 2012-13                        | 32°36'34"N; 76°32'58"E         |
| 9.                    | Adb.                 | Bhansar Goth.           | 2013-14                        | 32°34'45"N; 76°34'10"E         |
| 10.                   | Talbarri.            | Talnu Dhar.             | 2013-14                        | 32°34'29"N; 76°31'01"E         |
| 11.                   | Kharta-da-Goth.      | Sad Dhar.               | 2013-14                        | 32°32'05"N; 76°29'44"E         |
| 12.                   | Chhoi-da-Goth.       | Deoki Dhar.             | 2013-14                        | 32°31'45"N; 76°29'51"E         |
| 13.                   | Mumri                | Mumri Dhar              | 2016-17                        | 32°30'19"N; 76°26'18"E         |
| 14.                   | Tandei               | Tandei Dhar             | 2016-17                        | 32°31'43"N; 76°25'30"E         |
| 15.                   | Thanla               | Thanla RF               | 2016-17                        | 32°33'49"N; 76°28'38"E         |
| 16.                   | Banni                | Banni DPF               | 2016-17                        | 32°32'47"N; 76°27'45"E         |
| 17.                   | Sarni                | Sarni Dhar              | 2016-17                        | 32°26'53"N; 76°42'56"E         |
| 18.                   | Jujad                | Jujad DPF               | 2016-17                        | 32°35'52"N; 76°30'20"E         |
| 19.                   | Talwari              | Talwari Dhar            | 2016-17                        | 32°34'21"N; 76°31'19"E         |

**LIST OF BUILDINGS, ROADS & PATHS**

| <b>Sr. No.</b> | <b>Name of Building</b>    | <b>Location</b>                 | <b>Year of Construction</b> |
|----------------|----------------------------|---------------------------------|-----------------------------|
| 1              | Range Office cum Residence | Dadma                           | -                           |
| 2              | Block Officer' Residence   | Tundah                          | -                           |
| 3              | Forest Guard Hut           | Bhadra/Tundah/Badgram and Banni | -                           |
| 6              | Forest Rest House          | Tundah and Tripna               | -                           |
|                | Labour Hut                 | Mandha                          |                             |

| <b>Sr. No.</b> | <b>Particulars</b>                                                                         | <b>Length</b> |
|----------------|--------------------------------------------------------------------------------------------|---------------|
| 1              | Trek from Tundah to Mumbri Dhar                                                            | 8 Kms         |
| 2              | Trek from Tundah to Mumbri Dhar – Silpari Dhar- Tandeir Dhar- Mandha                       | 12 Kms        |
| 3              | Trek from Tundah to Mumbri Dhar – Silpari Dhar- Tandeir Dhar- Banni-Top- Banni Mata temple | 20 Kms        |
| 4              | Tripna to Bansar                                                                           | 18 Km.        |
| 5              | Bansar to Chadola                                                                          | 15 Km         |
| 6              | Bansar to Kalichho pass                                                                    | 8 Km.         |
| 7              | Tripna to Badi Dhar                                                                        | 18 Km.        |
| 8              | Banni Mata to Charola                                                                      | 26 Km         |
| 9              | Janu to Lampapad                                                                           | 15 Km         |
| 10             | Banni to Luindi via Thanala                                                                | 18 Km         |
| 11             | Tripna – Sad Dhar – Digu Dali                                                              | 12 Km         |

## ANNEXURE-VII

### List of already constructed Bunkers

| Sr. No. | Name of Place  | Year of Construction | Location               |
|---------|----------------|----------------------|------------------------|
| 1.      | Mumbri Dhar    | 2017-18              | 32°30'19"N; 76°26'20"E |
| 2       | Tandei Dhar    | 2016-17              | 32°31'29"N; 76°26'12"E |
| 3       | Silpari Dhar   | 2013-14              | 32°31'10"N; 76°26'46"E |
| 4       | Chaloth        | 2014-15              | 32°33'47"N; 76°28'07"E |
| 5       | Thanla Dhar    | 2015-16              | 32°34'10"N; 76°28'36"E |
| 6       | Bhanani-Digola | 2015-16              | 32°33'46"N; 76°29'20"E |

### List of Proposed Bunkers

| Sr. No. | Name of Place | Number of Bunkers | Latitude and Longitude  |
|---------|---------------|-------------------|-------------------------|
| 1       | Digu Dali     | 1                 | 32°32'00"N; 76°30'22" E |
| 2       | Bhansar       | 1                 | 32°36'48"N; 76°33'09" E |
| 3       | Baddi dhar    | 1                 | 32°34'08"N; 76°27'50" E |
| 4       | Jujad         | 1                 | 32°35'38"N; 76°30'01" E |
| 5       | Lamapad       | 1                 | 32°35'04"N; 76°28'44" E |
| 6       | Jweth         | 1                 | 32°35'55"N; 76°31'02" E |
| 7       | Charola       | 1                 | 32°36'52"N; 76°30'50" E |
| 8       | Janu Dhar     | 1                 | 32°33'33"N; 76°27'59" E |

**ANNEXURE – VIII**

**LIST OF EXISTING NURSERIES.**

| <b>Sr.<br/>No.</b> | <b>Name of<br/>nursery.</b> | <b>Location.</b> | <b>Area.</b> | <b>Year of<br/>establishment.</b> | <b>Latitude and Longitude</b> |
|--------------------|-----------------------------|------------------|--------------|-----------------------------------|-------------------------------|
| <b>1.</b>          | <b>2.</b>                   | <b>3.</b>        | <b>4.</b>    | <b>5.</b>                         | <b>6.</b>                     |
| 1.                 | Mandha.                     | Mandha           | 0.50<br>Ha.  | 1981-82                           | 32°32'22"N; 76°27'18"E        |

## ANNEXURE-XIX

### List of fire prone Areas.

The following areas in the wild life sanctuary area sensitive from fire hazards which needs to be taken care of so that there is minimum loss to the habitat as well as to the wildlife itself.

| Sr. No. | Name of Fire Sensitive Area | Area in ha.        |
|---------|-----------------------------|--------------------|
| 1.      | 2.                          | 3.                 |
| 1.      | Tundah DPF.                 | 100.00 Ha.         |
| 4.      | Silpari                     | 60.00 Ha.          |
| 6.      | Sarotha DPF.                | 308.37 Ha.         |
| 7.      | Thanalla RF-I.              | 78.51 Ha.          |
| 8.      | Thanalla RF-II.             | 101.58 Ha.         |
| 9.      | Digola RF.                  | 178.07 Ha.         |
| 10.     | Digola RF-II.               | 125.45 Ha.         |
| 11.     | Digola RF-III.              | 169.97 Ha.         |
| 12.     | Badhrala DPF.               | 109.67 Ha.         |
| 13.     | Thanalla-I.                 | 80.94 Ha.          |
| 14.     | Thanalla-II.                | 60.70 Ha.          |
| 16.     | Chharola DPF-I.             | 60.70 Ha.          |
| 17.     | Chharola DPF-II.            | 80.94 Ha.          |
| 18.     | Bhansar Right.              | 226.62 Ha.         |
| 19.     | Bhansar Left.               | 223.75 Ha.         |
|         | <b>Total:-</b>              | <b>2404.06 Ha.</b> |

## ANNEXURE- X

## LIST OF VILLAGES OUTSIDE WLS i.e. (Eco-Zone).

| Sr. No. | Name of village. | Latitude       | Longitude      | Population human. | Cattle/Sheep/Goat. |
|---------|------------------|----------------|----------------|-------------------|--------------------|
| 1.      | 2.               | 3.             | 4.             | 5.                | 6.                 |
| 1.      | Thalla           | 76°26'9.809"E  | 32°28'56.414"N |                   |                    |
| 2.      | Sulla            | 76°26'45.47"E  | 32°29'12.711"N |                   |                    |
| 3.      | Gwar             | 76°27'46.754"E | 32°29'51.171"N |                   |                    |
| 4.      | Panjar           | 76°28'51.323"E | 32°30'1.481"N  |                   |                    |
| 5.      | Tundah           | 76°28'8.524"E  | 32°30'37.304"N |                   |                    |
| 6.      | Bhajund          | 76°28'52.507"E | 32°30'42.555"N |                   |                    |
| 7.      | Palan            | 76°29'26.302"E | 32°30'30.663"N |                   |                    |
| 8.      | Kuthar           | 76°29'15.148"E | 32°31'13.008"N |                   |                    |
| 9.      | Phat             | 76°28'42.877"E | 32°31'10.149"N |                   |                    |
| 10.     | Ladhog           | 76°28'33.456"E | 32°31'25.999"N |                   |                    |
| 11.     | Morthu           | 76°28'22.414"E | 32°31'8.483"N  |                   |                    |
| 12.     | Kuttal           | 76°27'20.62"E  | 32°31'3.891"N  |                   |                    |
| 13.     | Badgaram         | 76°28'26.985"E | 32°31'44.209"N |                   |                    |
| 14.     | Khanbagga        | 76°27'58.146"E | 32°31'45.43"N  |                   |                    |
| 15.     | Kumarkari        | 76°27'17.806"E | 32°32'3.185"N  |                   |                    |
| 16.     | Mandha           | 76°27'29.626"E | 32°32'14.48"N  |                   |                    |
| 17.     | Sirot            | 76°27'10.437"E | 32°32'13.211"N |                   |                    |
| 18.     | Bhadra           | 76°28'59.764"E | 32°33'8.748"N  |                   |                    |
| 19.     | Dal              | 76°25'48.403"E | 32°29'40.426"N |                   |                    |
| 20.     | Liundi           | 76°29'40.46"E  | 32°34'55.29"N  |                   |                    |
| 21.     | Dhar Sar         | 76°29'23.826"E | 32°32'12.576"N |                   |                    |
| 22.     | Mummar           | 76°26'30.294"E | 32°30'18.012"N |                   |                    |
| 23.     | Banni            | 76°27'39.98"E  | 32°32'26.33"N  |                   |                    |

## Annexure- XI

## LIST OF MAMMALS

| Sr. No. | Scientific Name               | Local Name         | English Name             | Schedule WL Act, 1972 | IUCN Status           |
|---------|-------------------------------|--------------------|--------------------------|-----------------------|-----------------------|
| 1       | <i>Macaca mulatta</i>         | Bander             | Rhesus macaque           | Sch I Part –I<br>-A   | Least Concern         |
| 2       | <i>Presbytis entellus</i>     | Langoor            | Common Langoor           | Sch I Part –I         | Least Concern         |
| 3       | <i>Semnopithecus ajax</i>     | Gaula              | Chamba Sacred Langoor    | Sch I Part –I         | Critically Endangered |
| 4       | <i>Vulpes vulpes</i>          | Lomri              | Fox                      | Sch I Part –I         | Least Concern         |
| 5       | <i>Selenarctos thibetanus</i> | Kala Bhaloo        | Black Bear               | Sch I Part –I         | Vulnerable            |
| 6       | <i>Ursus arctos</i>           | Bhriгу, Lal Bhaloo | Brown Bear               | Sch I Part –I         | Least Concern         |
| 7       | <i>Martes flavigula</i>       | Dhiklu             | Yellow-Throated Marten   | Sch I Part –I         | Least Concern         |
| 8       | <i>Paguma larvata</i>         | Sakralu            | Palm civet               | Sch I Part –I         | Least Concern         |
| 9       | <i>Felis chaus</i>            | Bilao              | Jungle cat               | Sch I Part –I         | Least Concern         |
| 10      | <i>Panthera pardus</i>        | Mirg, Bagh         | Leopard                  | Sch I Part –I         | Vulnerable            |
| 11      | <i>Mustela sibirica</i>       |                    | Himalayan weasel         | Sch I Part –I         | Least Concern         |
| 12      | <i>Hystrix indica</i>         | Sail               | Indian crested porcupine | Sch I Part –I         | Least Concern         |

|    |                                  |              |                                    |               |                    |
|----|----------------------------------|--------------|------------------------------------|---------------|--------------------|
| 13 | <i>Petaurista petaurista</i>     |              | Common<br>giant flying<br>squirrel | Sch I Part –I | Least<br>Concern   |
| 14 | <i>Moschus<br/>moschiferus</i>   | Rons,Rastura | Musk Deer                          | Sch I Part –I | Vulnerable         |
| 15 | <i>Nemorhadeus goral</i>         | Pij          | Goral                              | Sch I Part –I | Near<br>threatened |
| 16 | <i>Hemitragus<br/>jemlahicus</i> | Karath       | Himalayan<br>Tahr                  | Sch I Part –I | Near<br>threatened |

## Annexure-XII

## LIST OF BIRDS

| Scientific Name                  | Common Name                  | Schedule WL Act, 1972 | IUCN Status     |
|----------------------------------|------------------------------|-----------------------|-----------------|
| <i>Accipiter badius</i>          | Shikra                       | Sch.I Part-I-B        | Least Concern   |
| <i>Aquila Chrysaetos</i>         | Golden Eagle                 | Sch.I Part-I-B        | Least Concern   |
| <i>Sarcogyps calvus</i>          | King vulture                 | Sch.I Part-I-B        | Least Concern   |
| <i>Gyps fulvus</i>               | Griffon vulture              | Sch.I Part-I-B        | Least Concern   |
| <i>Gyps himalayensis</i>         | Himalayan griffon vulture    | Sch.I Part-I-B        | Near Threatened |
| <i>Neophron pescnopterus</i>     | Egyptian vulture             | Sch.I Part I-B        | Endangered      |
| <i>Falico peregrinus</i>         | Shaheen falcon               | Sch.I Part I-B        | Least Concern   |
| <i>Folco tinnuculus</i>          | Kestrel                      | Sch.I Part I-B        | Least Concern   |
| <i>Lerwa lerwa</i>               | Snow partridge               | Sch.I Part I-B        | Least Concern   |
| <i>Tetraogallus himalayensis</i> | Himalayan Snow cock          | Sch.I Part I-B        | Least Concern   |
| <i>Alectoris chukar</i>          | Chukor                       | Sch.I Part I-B        | Least Concern   |
| <i>Lophophorus impejanus</i>     | Monal                        | Sch.I Part I-B        | Least Concern   |
| <i>Pucrasia macrolopha</i>       | Koklass                      | Sch.I Part I-B        | Least Concern   |
| <i>Catreus wallichi</i>          | Cheer                        | Sch.I Part I-B        | Vulnerable      |
| <i>Streptopelia chinensis</i>    | Spotted Dove                 | Sch.I Part I-B        | Least Concern   |
| <i>Streptopelia decaoto</i>      | Indian Ring Dove             | Sch.I Part I-B        | Least Concern   |
| <i>Columba palumbus</i>          | Common Wood Pigeon           | Sch.I Part I-B        | Least Concern   |
| <i>Cuculus saturates</i>         | Himalayan Cuckoo             | Sch.I Part I-B        | Least Concern   |
| <i>Eudynamys scolopaceus</i>     | Koel                         | Sch.I Part I-B        | Least Concern   |
| <i>Glaucidium cuculoides</i>     | Barred Owlet                 | Sch.I Part I-B        | Least Concern   |
| <i>Strix aluco</i>               | Himalayan wood owl           | Sch.I Part I-B        | Least Concern   |
| <i>Collocalia brevirostris</i>   | Himalayan swiftlet           | Sch.I Part I-B        | Least Concern   |
| <i>Apus melba</i>                | Alpine swift                 | Sch.I Part I-B        | Least Concern   |
| <i>Apus affinis</i>              | House swift                  | Sch.I Part I-B        | Least Concern   |
| <i>Merops orientalis</i>         | Small green bee eater        | Sch.I Part I-B        | Least Concern   |
| <i>Upupa epops</i>               | Hoopoe                       | Sch.I Part I-B        | Least Concern   |
| <i>Mergalaima virens</i>         | Himalayan green barbet       | Sch.I Part I-B        | Least Concern   |
| <i>Picus squamatus</i>           | Scaly woodpecker             | Sch.I Part I-B        | Least Concern   |
| <i>Dendrocopos himalayensis</i>  | Himalyan Pied woodpecker     | Sch.I Part I-B        | Least Concern   |
| <i>Lanius schach</i>             | Rufous backed shrike -       | Sch.I Part I-B        | Least Concern   |
| <i>Dicrurus macrocerus</i>       | Black drongo                 | Sch.I Part I-B        | Least Concern   |
| <i>Acridotheres tristis</i>      | Common myna                  | Sch.I Part I-B        | Least Concern   |
| <i>Urocissa flavirostris</i>     | Yellow billed blue magpie    | Sch.I Part I-B        | Least Concern   |
| <i>U. erythrorhyncha</i>         | Red billed blue magpie       | Sch.I Part I-B        | Least Concern   |
| <i>Dendrocita formosae</i>       | Himalayan tree pie           | Sch.I Part I-B        | Least Concern   |
| <i>Nucifraga caryocatactes</i>   | Himalayan nutcracker         | Sch.I Part I-B        | Least Concern   |
| <i>Corvus macrorhynchos</i>      | Jungle crow                  | Sch.I Part I-B        | Least Concern   |
| <i>Pyconotus cafer</i>           | Red vented bulbul            | Sch.I Part I-B        | Least Concern   |
| <i>Garrulax albogularis</i>      | White throat laughing thrush | Sch.I Part I-B        | Least Concern   |
| <i>Eumyias thalassina</i>        | Verditer Flycatcher          | Sch.I Part I-B        | Least Concern   |
| <i>Rhipidura hypoxantha</i>      | Fantail flycatcher           | Sch.I Part I-B        | Least Concern   |

|                                    |                           |                |               |
|------------------------------------|---------------------------|----------------|---------------|
| <i>Luscinia svecica</i>            | Blue throat               | Sch.I Part I-B | Least Concern |
| <i>Tarsiger cyranus</i>            | Orange flanked bush Robin | Sch.I Part I-B | Least Concern |
| <i>Phoenicurus ochruros</i>        | Black redstart            | Sch.I Part I-B | Least Concern |
| <i>Phoenicurus frontalis</i>       | Blue fronted redstart     | Sch.I Part I-B | Least Concern |
| <i>Enicarus scouleria</i>          | Forktail                  | Sch.I Part I-B | Least Concern |
| <i>Saxicola caprata</i>            | Pied Bushchat             | Sch.I Part I-B | Least Concern |
| <i>Chaimarrornis leucocephalus</i> | White-capped red start    | Sch.I Part I-B | Least Concern |
| <i>Monticola solitarius</i>        | Blue Rock- Thrush         | Sch.I Part I-B | Least Concern |
| <i>Monticola cinclorhynchus</i>    | Blue- headed Rock- Thrush | Sch.I Part I-B | Least Concern |
| <i>Turdus merula</i>               | Blackbird<br>Concern      | Sch.I Part I-B | Least Concern |
| <i>Zoothera wardii</i>             | Pied Ground-Thrush        | Sch.I Part I-B | Least Concern |
| <i>Cinclus cinclus</i>             | White-Throated Dipper     | Sch.I Part I-B | Least Concern |
| <i>Pyrrhus major</i>               | Great Tit<br>Concern      | Sch.I Part I-B | Least Concern |
| <i>Sitta leucopsis</i>             | White-cheeked Nuthatch    | Sch.I Part I-B | Least Concern |
| <i>Certhia himalayana</i>          | Himalayan tree creeper    | Sch.I Part I-B | Least Concern |
| <i>Anthus hodgsoni</i>             | Indian tree pipit         | Sch.I Part I-B | Least Concern |
| <i>Motacilla citreola</i>          | Yellow-headed Wagtail     | Sch.I Part I-B | Least Concern |
| <i>Motacilla cinerea</i>           | Grey Wagtail<br>Concern   | Sch.I Part I-B | Least Concern |
| <i>Motacilla alba</i>              | White Wagtail             | Sch.I Part I-B | Least Concern |
| <i>Passer domesticus</i>           | House Sparrow<br>Concern  | Sch.I Part I-B | Least Concern |
| <i>Carduelis carduelis</i>         | Gold Finch<br>Concern     | Sch.I Part I-B | Least Concern |
| <i>Carduelis spinoides</i>         | Himalayan Greenfinch      | Sch.I Part I-B | Least Concern |
| <i>Carpodacus erythrinus</i>       | Common Rosefinch.         | Sch.I Part I-B | Least Concern |
| 65 <i>Columba leuconota</i>        | Snow pigeon .             | Sch.I Part I-B | Least Concern |
| 66 <i>Leucosticte nemoricola</i>   | Plain Mountain finches .  | Sch.I Part I-B | Least Concern |
| 67 <i>Cinclus pallasii</i>         | Brown dipper              | Sch.I Part I-B | Least Concern |
| 68 <i>Prunella collaris</i>        | Alpine accentor           | Sch.I Part I-B | Least Concern |
| 69 <i>Prunella rubeculoides</i>    | Robin accentor            | Sch.I Part I-B | Least Concern |
| 70 <i>Troglodytes hiemalis</i>     | Winter wren .             | Sch.I Part I-B | Least Concern |
| 71 <i>Pyrrhocorax pyrrhocorax</i>  | Red billed chough         | Sch.I Part I-B | Least Concern |
| 72 <i>Pyrrhocorax graculus</i>     | Yellow billed chough      | Sch.I Part I-B | Least Concern |
| 73 <i>Accipiter nisus</i>          | Eurasian sparrowhawk      | Sch.I Part I-B | Least Concern |

## GLOSSARY OF TREES, SHRUBS AND CLIMBERS

**A. TREES**

| S. No. | Scientific Name                    | Local Name       | English Name             | IUCN status     |
|--------|------------------------------------|------------------|--------------------------|-----------------|
| 1      | <i>Abies pindrow</i>               | Rai              | Silver Fir               | Least Concern   |
| 2      | <i>Acer caesium</i>                | Mandhar          | Indian Maple             | Least Concern   |
| 3      | <i>Acer caudatum</i>               | Mandhar          | Maple                    | Least Concern   |
| 4      | <i>Acer pictum</i>                 | Mandhar          | The Painted Maple        | Least Concern   |
| 5      | <i>Acer villosum</i>               | Mandhar          | Maple                    | Least Concern   |
| 6      | <i>Aesculus indica</i>             | Goon             | Indian Horse chestnut    | Vulnerable      |
| 7      | <i>Alnus nepalensis</i>            | Piak             | Alder                    | Least Concern   |
| 8      | <i>Alnus nitida</i>                | Piak             | Alder                    | Least Concern   |
| 9      | <i>Betula alnoides</i>             | Bhuj             | Himalayan Birch          | Least Concern   |
| 10     | <i>Betula utilis</i>               | Bhuj             | Himalayan White Birch    | Least Concern   |
| 11     | <i>Buxus sampervirens</i>          | Samshad          | Wild wood                | Least Concern   |
| 12     | <i>Carpinus caoinea</i>            | Bhakri           | NA.                      | -NA-            |
| 13     | <i>Cedrela serrata</i>             | Dhori            | NA                       | Least Concern   |
| 14     | <i>Celtis australis</i>            | Khirak           | Nettle Tree              | Least Concern   |
| 15     | <i>Cedrus deodara</i>              | Diyar            | Himalayan cedar          | Least Concern   |
| 16     | <i>Cornus macrophylla</i>          | Halen            | Large Leaf Dog Wood      | Least Concern   |
| 17     | <i>Ficus glomerata</i>             | Phagoora         | Indian fig tree          | Least Concern   |
| 18     | <i>Ficus aurea</i>                 | Phagoora         | Stranger fig             | Vulnerable      |
| 19     | <i>Fraxinus floribunda</i>         | Sunnu            | Himalayan Ash            | Least Concern   |
| 20     | <i>Juglans regia</i>               | Khor             | Walnut                   | Near Threatened |
| 21     | <i>Litsea umbrosa</i>              | Chirindi         | NA.                      | -NA-            |
| 22     | <i>Lonicera quiqueloculareis</i>   | Bak              | Translucent honey suckle | -NA-            |
| 23     | <i>Morus serrata</i>               | Karun            | Himalayan Mulberry       | -NA-            |
| 24     | <i>Morus alba</i>                  | Karun            | White Mulberry           | Least Concern   |
| 25     | <i>Parrotiopsis cacquemontiana</i> | Killar           | Parrotia                 | -NA-            |
| 26     | <i>Picea morinda</i>               | Tosh             | Spruce                   | Least Concern   |
| 27     | <i>Pleris ovalifolia</i>           | Ailan            | NA.                      | -NA-            |
| 28     | <i>Populus alba</i>                | Chaloon          | Poplar                   | -NA-            |
| 29     | <i>Populus ciliata</i>             | Pahari Chulanooj | Himalayan Poplar         | Least Concern   |
| 30     | <i>Prunus armenika</i>             | Chir             | Apricot                  | Least Concern   |
| 31     | <i>Prunus communis</i>             | Aloocha          | Plum                     | Least Concern   |

|    |                                  |         |                       |               |
|----|----------------------------------|---------|-----------------------|---------------|
| 32 | <i>Prunus cornuta</i>            | Jammu   | Himalayan Bird Cherry | -NA-          |
| 33 | <i>Prunus padus</i>              | Jammu   | Bird cherry           | Least Concern |
| 34 | <i>Prunus persica</i>            | Aru     | Peach                 | -NA-          |
| 35 | <i>Pyrus baccata</i>             | Lewar   | Siberian Crab Apple   | Least Concern |
| 36 | <i>Pyrus communis</i>            | Nakh    | Pear                  | Least Concern |
| 37 | <i>Pyrus lanata</i>              | Amlor   | NA.                   | -NA-          |
| 38 | <i>Pyrus malus</i>               | Seo     | Wild apple            | -NA-          |
| 39 | <i>Pyrus pashia</i>              | Kainth  | Indian Wild pear      | Least Concern |
| 40 | <i>Quercus dilatata</i>          | Moru    | Moru Oak(Mid Zone)    | Least Concern |
| 41 | <i>Quercus incana</i>            | Ban     | Baan Oak(Low Zone)    | Least Concern |
| 42 | <i>Quercus semecarpifolia</i>    | Khareu  | Kharsu Oak(High Zone) | Least Concern |
| 43 | <i>Rhododendron arboreum</i>     | Cheers  | Red Burans            | Least Concern |
| 44 | <i>Rhododendron campanulatum</i> | Cheo    | Rhododendron          | Least Concern |
| 45 | <i>Salix wallichiana</i>         | Bedah   | Wallich Willow        | -NA-          |
| 46 | <i>Taxus wallichiana</i>         | Rakhaal | Himalayan Yew         | -NA-          |
| 47 | <i>Ulmus wallichiana</i>         | Maral   | Himalayan elm.        | Vulnerable    |

## **B. SHRUBS**

| Sr. No | Scientific Name                  | Local Name         | English Name          | IUCN Status   |
|--------|----------------------------------|--------------------|-----------------------|---------------|
| 1.     | <i>Berberis aristata</i>         | Kemel              | Indian Barberry       | Least Concern |
| 2.     | <i>Berberis jaeschkeana</i>      | Lal Kemel          | Jaeschke's Barberry   | Least Concern |
| 3.     | <i>Colebrookea oppositifolia</i> | -                  | Indian Squirrel tail  | -NA-          |
| 4.     | <i>Coria nepalensis</i>          | Ancha              | Masuri Berry          | -NA-          |
| 5.     | <i>Cotoneaster bacillaris</i>    | -                  | Rons                  | -NA-          |
| 6.     | <i>Cotoneaster microphyllus</i>  | -                  | Rockspray Cotoneaster | -NA-          |
| 7.     | <i>Daphne mucronata</i>          | -                  | Kashmir Daphne        | -NA-          |
| 8.     | <i>Deutzia staminea</i>          | Bathi              | Brown Deutzia         | -NA-          |
| 9.     | <i>Elsholtzia fruticosa</i>      | -                  | Shrubby Mint          | -NA-          |
| 10.    | <i>Giradian diversifolia</i>     | Jungli/Pahari Ahem | Himalayan Nettle      | -NA-          |

|     |                                  |              |                            |                 |
|-----|----------------------------------|--------------|----------------------------|-----------------|
| 11. | <i>Juniperus communis</i>        | Bitthal      | Common Juniper             | Least Concern   |
| 12. | <i>Juniperus indica</i>          | Bitthal      | Black Juniper              | Least Concern   |
| 13. | <i>Juniperus recurva</i>         | Bitthal      | Drooping Juniper           | Least Concern   |
| 14. | <i>Neillia rubriflora</i>        | -            | East Himalayan Neillia     | -NA-            |
| 15. | <i>Prunus Cerasoides</i>         | Krangora     | Wild Himalayan Cherry      | Least Concern   |
| 16. | <i>Rhododendron anthopogon</i>   | -            | Dwary Rhododendron         | Least Concern   |
| 17. | <i>Rhododendron companulatum</i> | Sarngal      | Pink Buran                 | -NA-            |
| 18. | <i>Rhododendron lapidosum</i>    | Talshi Pata  | Pink Scary Rhododendron    | Threatened      |
| 19. | <i>Rosa macrophylla</i>          | -            | Big Hip Rose               | -NA-            |
| 20. | <i>Rosa moschata</i>             | Ban Gulab    | The Musk Rose              | -NA-            |
| 21. | <i>Rubus biflorus</i>            | -            | Two Flowered Raspberry     | -NA-            |
| 22. | <i>Rubus Ellipticus</i>          | Aakhee       | Golden Himalayan Raspberry | Least Concern   |
| 23. | <i>Rubus moluccanus</i>          | Kali Aankhee | Blackberry                 | Least Concern   |
| 24. | <i>Salix denticulata</i>         | Chota Bedah  | Elegant Willow             | Least Concern   |
| 25. | <i>Sarcococca saligna</i>        | -            | The Sweet Box              | -NA-            |
| 26. | <i>Saussurea albescens</i>       | -            | Pink Saw Wort              | -NA-            |
| 27. | <i>Sorbaria tomentosa</i>        | -            | Kashmir False Spirea       | Near Threatened |
| 28. | <i>Spiraea canescens</i>         | -            | Grey Stem Spiraea          | Least Concern   |
| 29. | <i>Urtica dioica</i>             | Alun         | Stinging Nettle            | Least Concern   |
| 30. | <i>Viburnum grandiflorum</i>     | Trandolu     | Grand Viburnum             | -NA-            |
| 31. | <i>Wikstroemia canescens</i>     | Chambat      | Himalayan Tie Bush         | -NA-            |
| 32. | <i>Zanthoxylum armatum</i>       | Timber       | Winged Prickly Ash         | Least Concern   |

### **C. CLIMBERS**

| Sr. No | Scientific Name                   | Local Name | English Name       | IUCN Status |
|--------|-----------------------------------|------------|--------------------|-------------|
| 1.     | <i>Ficus pumila</i>               | -          | Creeping fig       | -NA-        |
| 2.     | <i>Hedera nepalensis</i>          | -          | Himalayan Ivy      | -NA-        |
| 3.     | <i>Parthenocissus semicordata</i> | -          | Himalayan Woodbine | -NA-        |
| 4.     | <i>Smilax glaucophylla</i>        | -          | Elegant Smilax     | -NA-        |

#### **D. MEDICINAL PLANTS**

| <b>Sr. No</b> | <b>Scientific Name</b>               | <b>Local Name</b>  | <b>English Name</b>        | <b>IUCN Status</b>    |
|---------------|--------------------------------------|--------------------|----------------------------|-----------------------|
| 1.            | <i>Acomastylis elata</i>             | -                  | High Avens                 | -NA-                  |
| 2.            | <i>Aconitium Chasmanthum</i>         | Keri Patis         | Gaping Monkshood           | Critically Endangered |
| 3.            | <i>Aconitium heterophyllum</i>       | Mithi Patis        | Patis                      | Endangered            |
| 4.            | <i>Aconitum violaceum</i>            | Dudhia/Mitha Telia | Violet monkshood           | Vulnerable            |
| 5.            | <i>Actea spicata L. varacuminata</i> | -                  | Himalayan baneberry        | -NA-                  |
| 6.            | <i>Ainsliaea aptera</i>              | -                  | Wingless Ainsliaea         | -NA-                  |
| 7.            | <i>Anaphalis margaritacea</i>        | Bhull              | Western Pearly Everlasting | Least Concern         |
| 8.            | <i>Anaphalis triplinervis</i>        | -                  | Wooly Pearly Everlasting   | Least Concern         |
| 9.            | <i>Melanoseris macrorhiza</i>        | Chyate             | Violet Dandelion           | -NA-                  |
| 10.           | <i>Androsace primuloides</i>         | -                  | Rock Jaismine              | -NA-                  |
| 11.           | <i>Androsace rotundifolia</i>        | -                  | Round Leaf Rock Jasmine    | -NA-                  |
| 12.           | <i>Androsace sarmentosa</i>          | -                  | Rock Jaismine              | -NA-                  |
| 13.           | <i>Anemonastum obtusilobum</i>       | Ratan Jot          | Himalayan Thimble Weed     | -NA-                  |
| 14.           | <i>Anemone rupicola</i>              | -                  | Rock Anemone               | -NA-                  |
| 15.           | <i>Angelica glauca</i>               | Chaura             | Smooth Angelica            | Endangered            |
| 16.           | <i>Aquilegia pubiflora</i>           | -                  | Himalayan Colimbine        | -NA-                  |
| 17.           | <i>Arisaema flavum</i>               | -                  | Yellow Cobra Lilly         | -NA-                  |
| 18.           | <i>Arisaema griffthi</i>             | Kidabuti           | Griffth's Cobra Lilly      | -NA-                  |
| 19.           | <i>Arisaema propinquum</i>           | Kidabuti           | Wallach's Cobra Lilly      | -NA-                  |

|     |                                                 |               |                           |                       |
|-----|-------------------------------------------------|---------------|---------------------------|-----------------------|
| 20. | <i>Asragalus rhizanthus subsp. candolleanus</i> | -             | Candolle's Milk Vetch     | -NA-                  |
| 21. | <i>Aster albescen's</i>                         | -             | Fading Himalayan Aster    | -NA-                  |
| 22. | <i>Aster himalaicus</i>                         | -             | Himalayan Aster           | -NA-                  |
| 23. | <i>Aster thomsonii</i>                          | -             | Thomson's aster           | -NA-                  |
| 24. | <i>Astragalus grahamianus</i>                   | -             | Grahm's Milk Vetch        | -NA-                  |
| 25. | <i>Bergenia ciliata</i>                         | -             | Frilly bergenia           | -NA-                  |
| 26. | <i>Caltha palustris</i>                         | -             | Marsh Marigold            | Least Concern         |
| 27. | <i>Cassiope fastigiata</i>                      | -             | Himalayan Heather         | -NA-                  |
| 28. | <i>Chaerophyllum reflexum</i>                   | -             | Kashmir Chervil           | -NA-                  |
| 29. | <i>Cirsium falconeri</i>                        | Pahari sentha | Falconers Thistle         | -NA-                  |
| 30. | <i>Frageria nubicola</i>                        | -             | Himalayan Strawberry      | -NA-                  |
| 31. | <i>Corydalis govaniana</i>                      | -             | Govan's Corydalis         | -NA-                  |
| 32. | <i>Corydalis rutifolia</i>                      | -             | -                         | -NA-                  |
| 33. | <i>Cremathodium arnicoides</i>                  | -             | Himalayan Daisy           | -NA-                  |
| 34. | <i>Cremanthotium ellisii</i>                    | -             | Himalayan Mini Sun Flower | -NA-                  |
| 35. | <i>Dactylorhiza hatagirea</i>                   | Salam Panja   | Himalayan Marsh Orchid    | -NA-                  |
| 36. | <i>Delphinium cashmerianum</i>                  | -             | Kashmir Larkspur          | -NA-                  |
| 37. | <i>Delphinium roylei</i>                        | -             | Royale's Larlaspur        | -NA-                  |
| 38. | <i>Dioscorea deltoidea</i>                      | Khildiri      | Nepal Yam                 | Critically Endangered |
| 39. | <i>Dolomiaea macrocephala</i>                   | Pahari Dhoop  | Himalayan Dolomiaea       | -NA-                  |
| 40. | <i>Dracocephalum nutans</i>                     | -             | Nodding Dragon Head       | -NA-                  |
| 41. | <i>Elsholtzia fruticosa</i>                     | -             | Shrubby Mint              | -NA-                  |

|     |                                 |                    |                             |                       |
|-----|---------------------------------|--------------------|-----------------------------|-----------------------|
| 42. | <i>Epilobium laxum</i>          | -                  | Lax Willow Herb             | -NA-                  |
| 43. | <i>Epilobium wallichiana</i>    | -                  | Willow Herb                 | -NA-                  |
| 44. | <i>Erigeron multiradiatus</i>   | -                  | Himalayan Fleabane          | -NA-                  |
| 45. | <i>Erysimum melicentae</i>      | -                  | Himalayan Wall Flower       | -NA-                  |
| 46. | <i>Euphorbia cognate</i>        | -                  | -                           | -NA-                  |
| 47. | <i>Fragaria nubicola</i>        | -                  | Himalayan Strawberry        | -NA-                  |
| 48. | <i>Fritilaria roylei</i>        | Jungli Kufera      | Yellow Himalayan fritillary | Critically Endangered |
| 49. | <i>Gentiana carinata</i>        | Kadu               | Dark Blue Gentia            | -NA-                  |
| 50. | <i>Gentiana kurroo</i>          | -                  | Himalayan Gentian           | Critically Endangered |
| 51. | <i>Geranium himalayense</i>     | Lal Jari           | Himalayan Geranium          | -NA-                  |
| 52. | <i>Geranium wallichianum</i>    | Lal Jari/Ratan Jot | Wallich Geranium            | -NA-                  |
| 53. | <i>Gerbera gossypina</i>        | Jhulu Kuferu       | Hairy Gerbera Daisy         | -NA-                  |
| 54. | <i>Gypsophila cerastioides</i>  | -                  | Himalayan Baby Breath       | -NA-                  |
| 55. | <i>Hackelia uncinata</i>        | -                  | Hooked stickseed            | -NA-                  |
| 56. | <i>Hyoscyamus niger</i>         | Kaljager           | Blackhenbane                | -NA-                  |
| 57. | <i>Impatiens glandulifera</i>   | -                  | Himalayan Balsam            | -NA-                  |
| 58. | <i>Impatiens scabrida</i>       | -                  | Three horned balsam         | -NA-                  |
| 59. | <i>Indigofera heterantha</i>    | Pree               | Himalayan Indigo            | -NA-                  |
| 60. | <i>Inula grandiflora</i>        | -                  | Showy Inula                 | Endangered            |
| 61. | <i>Inula royleana</i>           | Pauskara           | Himalayan Elecampane        | -NA-                  |
| 62. | <i>Iris kemaonensis</i>         | -                  | Kumaon Iris                 | -NA-                  |
| 63. | <i>Leontopodium himalayanum</i> | -                  | Himalayan Edelweiss         | -NA-                  |

|     |                                      |           |                              |               |
|-----|--------------------------------------|-----------|------------------------------|---------------|
|     |                                      |           |                              |               |
| 64. | <i>Lingularia amplexicaulis</i>      | -         | Stem Claspiney<br>ligularia  | -NA-          |
| 65. | <i>Logistic kunawurensis</i>         | -         | Kinnaur Lagotis              | -NA-          |
| 66. | <i>Lomatogonium<br/>carinthiacum</i> | -         | Blue Felt Wort               | -NA-          |
| 67. | <i>Meconopsis aculeata</i>           | Kanta     | Blue Poppy                   | -NA-          |
| 68. | <i>Megacarpaea polyandra</i>         | Ban Palak | Barmola Rook                 | -NA-          |
| 69. | <i>Melanoseris macrorhiza</i>        | Chyate    | Violet Dandelion             | -NA-          |
| 70. | <i>Morina Coulteriana</i>            | -         | Yellow Whorl<br>Flower       | -NA-          |
| 71. | <i>Morina longifolia</i>             | -         | Himalayan<br>Whorl Flower    | -NA-          |
| 72. | <i>Morina polyphylla</i>             | -         | Many Leaved<br>Whorl Flower  | -NA-          |
| 73. | <i>Myosotis Sylvatica</i>            | -         | Wood Forget-<br>me-not       | -NA-          |
| 74. | <i>Oxytropis lapponica</i>           | -         | Northen Milk<br>Vetch        | -NA-          |
| 75. | <i>Pedicularis bicornuta</i>         | -         | Horned<br>Lousewort          | -NA-          |
| 76. | <i>Pedicularis pyramidata</i>        | -         | Pyramid<br>Lousewort         | Least Concern |
| 77. | <i>Persicaria nepalensis</i>         | -         | Spolted<br>Ladysthumb        | -NA-          |
| 78. | <i>Picrorhiza kurroa</i>             | Karoo     | Kutki                        | Endangered    |
| 79. | <i>Pleurospermum candollei</i>       | Gughi     | Paper Cup<br>Flower          | -NA-          |
| 80. | <i>Podophyllum bezecuidrum</i>       | Ban Kakri | Himalayan<br>Mapple          | Threatened    |
| 81. | <i>Polygontum cirrhifolium</i>       | -         | Coiling Leaf<br>Soloman Seal | -NA-          |
| 82. | <i>Polygonum molle</i>               | Trod      | Sikkim<br>Knotweed           | -NA-          |
| 83. | <i>Potentilla argyrophylla</i>       | -         | Himalayan<br>cinquefoil      | -NA-          |
| 84. | <i>Potentilla atrosanguinea</i>      | -         | Himalayan<br>cinquefoil      | -NA-          |

|      |                                  |           |                        |      |
|------|----------------------------------|-----------|------------------------|------|
| 85.  | <i>Potentilla cuneata</i>        | -         | Five finger cinquefoil | -NA- |
| 86.  | <i>Potentilla nepalensis</i>     | -         | Nepal cinquefoil       | -NA- |
| 87.  | <i>Primula denticulate</i>       | Salkute   | Drum Stick Primula     | -NA- |
| 88.  | <i>Primula involucrata</i>       | -         | Tall Pose Primrose     | -NA- |
| 89.  | <i>Primula macrophylla</i>       |           | Moorcraft Primros      | -NA- |
| 90.  | <i>Primula reptans</i>           | -         | Creeping Primrose      | -NA- |
| 91.  | <i>Pseudomertensia malkioide</i> | -         | -                      | -NA- |
| 92.  | <i>Ranunculus diffusus</i>       | -         | Spreading Butter Cup   | -NA- |
| 93.  | <i>Rheum austral</i>             | Chukhri   | Red-veinet Pie Plant   | -NA- |
| 94.  | <i>Rhodiola himalensis</i>       | -         | Himalayas Rhodiola     | -NA- |
| 95.  | <i>Rhodiola imbricate</i>        | Rose Root | Rhodiola               | -NA- |
| 96.  | <i>Ribes griffthi</i>            | -         | -                      | -NA- |
| 97.  | <i>Roscoe purpurea</i>           | -         | Purple Roscoe Lily     | -NA- |
| 98.  | <i>Saussurea albescens</i>       | Pirya     | Pink Saw Wort          | -NA- |
| 99.  | <i>Saussurea graminifolia</i>    | Baan      | Grass leaved Saw Wort  | -NA- |
| 100. | <i>Saussurea nepalensis</i>      | -         | Nepal Saw Wort         | -NA- |
| 101. | <i>Saxifraga sibirica</i>        | -         | Siberian saxifrage     | -NA- |
| 102. | <i>Selium vaginatum</i>          | -         | Bhut Keshi             | -NA- |
| 103. | <i>Semenovia candicans</i>       | -         | White leaf Hogweed     | -NA- |
| 104. | <i>Senecio chrysanthemoides</i>  | -         | Cherful Senico         | -NA- |
| 105. | <i>Senerio Jacquementianus</i>   | -         | -                      | -NA- |
| 106. | <i>Silene edgeworthii</i>        | -         | Edgeworth's Champion   | -NA- |

|      |                                 |               |                         |      |
|------|---------------------------------|---------------|-------------------------|------|
| 107. | <i>Swertia cordata</i>          | -             | Heart Leaf Swertia      | -NA- |
| 108. | <i>Tanacetum dolichophyllum</i> | Ghuggulu      | Himalayan Tansies       | -NA- |
| 109. | <i>Thermopsis barbata</i>       | -             | Black Pea               | -NA- |
| 110. | <i>Thymus linearis</i>          | Jungli Ajwain | Wild Thyme              | -NA- |
| 111  | <i>Trillium govanianum</i>      | Naag Chattri  | Himalayan Trillium      | -NA- |
| 112. | <i>Trollius acaulis</i>         | -             | Dwarf Globe Flower      | -NA- |
| 113. | <i>Valeriana jatamansi</i>      | Smak          | Jatamansi Mushkbala     | -NA- |
| 114. | <i>Viola biflora</i>            | -             | Alpine yellow violet    | -NA- |
| 115. | <i>Waldheimia globra</i>        | -             | Smooth Ground Daisy     | -NA- |
| 116. | <i>Waldheimia tomentoses</i>    | -             | White Leaf Ground Daisy | -NA- |

Government of Himachal Pradesh  
Forest Department

No. FFE-B-A (10)-1/2009

18 Dated Shimla-2, the

**Notification**

In supersession of all previous Notification Nos. Fts (F)6-7/82-Loose, Fts-B(B)-6-7/82-II, FFE-B-A(10)-2005 and FFE-B-A(10)-1/2009 dated 09.04.1996, 27.08.2001, 20.07.2006 and 04.03.2014 regarding relief due to losses caused to human beings and domestic livestock by the Wild animals as defined in Wildlife (Protection) Act, 1972, the Governor, Himachal Pradesh is pleased to notify the following enhanced relief rates as under:-

| S.No | Particulars                                                                                                                                              | Enhanced Rates<br>(in Rupees) |
|------|----------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------|
| 1.   | In case of death of human being.                                                                                                                         | 4,00,000/-                    |
| 2.   | In case of permanent disability to human being.                                                                                                          | 2,00,000/-                    |
| 3.   | In case of grievous injuries/partial disability to human being.                                                                                          | 75,000/-                      |
| 4.   | In case of simple injury to human being as per actual cost of medical treatment subject to maximum.                                                      | 15,000/-                      |
| 5.   | In case of loss of Horse, Mule, Buffalo, Ox, Yak and Camel                                                                                               | 30,000/-                      |
| 6.   | In case of loss of Cow Jersey and cross breed.                                                                                                           | 15,000/-                      |
| 7.   | In case of loss of Cow (local breed), Donkey, Churu, Churi & Pashmina Goat.                                                                              | 6,000/-                       |
| 8.   | In case of loss of Sheep, Goat and Pig.                                                                                                                  | 3,000/-                       |
| 9.   | In case of loss of young ones of Buffalo, Cow Jersey and all other breeds, Mule, Yak, Horse, Camel, Churu, Churi, Donkey, Pashmina Goat, Sheep and Goat. | 15,00/-                       |

The following guidelines will be followed for grant of relief:-

- i) Production of postmortem report in case of loss of human life, certificate in case of grievous injury, partial & permanent disability and prescription slip as well as verification of actual cost of Medical treatment in case of simple injury (including Monkey bites) from the Medical officer of a Government Institution/Govt. recognized Medical Institution, as the case may be.
- ii) The verification of loss of cattle that was actually caused by wild animal can be done by the Pradhan/Up Pradhan of Panchayat/Patwari/President Notified Area Committee/ Chairman, Municipal Committee, Commissioner/ Mayor/Deputy Mayor, Municipal Corporation of the area/Elected Member of the Cantonment Board area/Councilor of the area, Range Officer/Deputy Ranger/Forest Guard or any other forest officer higher in rank than a Range Officer, Veterinary Officer or Veterinary Pharmacist or officer authorized by Veterinary officer of the area.
- iii) All DFOs in HP shall be the final authority to sanction all cases of relief claims on account of losses caused by the wild animals to humans and domestic livestock.
- iv) The DFOs shall release 25% of the amount of relief prescribed for human loss/permanent & partial disability/grievous injury on receipt of report as interim relief immediately to the family of the deceased/affected person after due

Endst. No. As above Dated Shimla-2 the

18 August, 2018

Copy forwarded to the following for information and necessary action:-

1. All the Additional Chief Secretaries/ Principal Secretaries /Secretaries to the Government of Himachal Pradesh.
2. All the Heads of Departments in Himachal Pradesh.
3. All the Deputy Commissioners in Himachal Pradesh.
4. The Principal Chief Conservator of Forests, (HoFF) HP Shimla-1.
- ✓ 5. The Principal Chief Conservator of Forests, (Wildlife) HP Shimla-1.
6. APCCFs (IT), CCFs/DFOs (Territorial & Wildlife).
7. Controller, HP Printing Press, Shimla for publication in H.P., Rajpatra.
8. Guard file.



(Sat Pal Dhiman) 18-8-2018

Joint Secretary (Forests) to the  
Government of Himachal Pradesh  
Ph.No. 0177-2621874

Endst. No. WL/Compensation Rates/ WLM/ 3840-99 dated/ 25-09-2018

Copy is forwarded to all CCFs/CFs/DFOs (Territorial) and (Wildlife) in H.P.  
for information and necessary action please.



Chief Conservator of Forests (Wildlife)  
O/o Principal Chief Conservator of Forest, (Wildlife)  
-cum-Chief Wildlife Warden, HP Shimla-171001

33  
24/9/18 O/L

verification in anticipation of formal sanction without delay. The balance amount will be released after receipt of the complete relief claim.

- v) For immediate disbursement of relief claim, a corpus fund will be created at the level of Principal Chief Conservator of Forests (Wildlife)-cum Chief Wildlife Warden. All the budget allocations from the state as well as from State CAMPA in respect of relief shall be deposited in the aforesaid corpus fund. The PCCF (WL) will ensure the disbursement of relief amount in respect of aforesaid categories of losses on the same day on receipt of a request from the concerned DFO. The DFO concerned will ensure to send such requests by E-mail/ Fax asking for funds of relief amount on the same day of incident or on the day of receipt of information of the incident from the claimant. DFO will make payment of aforesaid 25% of the relief amount immediately from the budget available with him under any scheme and same will be recouped on receipt of funds from the Chief Wildlife Warden.
- vi) All claims in respect of simple injury to humans shall be restricted to actual cost of medical treatment verified by the Medical Officer of a Government Institution/Govt. recognized Medical Institution subject to maximum of Rupees 15,000/- as prescribed above in the categories of losses.
- vii) All cases of losses caused by the wild animals should be reported by the applicant to the nearest Forest Office within seven days of the incident and claims for relief is filed within one month to the nearest Range Forest Office under control of Divisional Forest Officer (territorial or wildlife). The claim can be filed either at the place where the loss by wild animal has occurred/reported or where the applicant resides. All time barred cases shall be sent to Govt. of Himachal Pradesh for approval.
- viii) The relief will be granted in case of loss of livestock to the owner of the livestock. These rates would be applicable for killing of domestic animals by wild animals as defined in Wildlife (Protection) Act, 1972 in cattlesheds/cowsheds, private land, private premises and forests.
- ix) The relief in case of loss of the human being will be granted in the order of preference given below:-
- (a) Wife or husband, as the case may be.
  - (b) Sons, unmarried or divorced daughters and children of predeceased son (equal share).
  - (c) Daughters. (equal share).
  - (d) Grand Children being children of his/her sons or daughters who died before him/her (equal share).
  - (e) Father or Mother.
  - (f) Brothers or sisters or children of the deceased brothers (equal share).
  - (g) Failing all above any other next of kin entitled to a share in the estate.
- All the prescribed rates shall be made applicable with immediate effect.

By Order,

**Tarun Kapoor**  
**Additional Chief Secretary (Forests) to the**  
**Government of Himachal Pradesh**



## **Annexure-XV**

### **List of already constructed Bunkers**

| <b>Sr. No.</b> | <b>Name of Place</b> | <b>Year of Construction</b> |
|----------------|----------------------|-----------------------------|
| 1              | Mumbri Dhar          | 2017-18                     |
| 2              | Tandei Dhar          | 2016-17                     |
| 3              | Silpari Dhar         | 2013-14                     |
| 4              | Chaloth              | 2014-15                     |
| 5              | Thanla Dhar          | 2015-16                     |
| 6              | Bhanani- Digola      | 2015-16                     |

### **List of Proposed Bunkers**

| <b>Sr. No.</b> | <b>Name of Place</b> | <b>Number of Bunkers</b> |
|----------------|----------------------|--------------------------|
| 1              | Digu Dali            | 1                        |
| 2              | Bhansar              | 1                        |
| 3              | Baddi dhar           | 1                        |
| 4              | Jujad                | 1                        |
| 5              | Lamapad              | 1                        |
| 6              | Jweth                | 1                        |
| 7              | Charola              | 1                        |
| 8              | Janu Dhar            | 1                        |

## ANNEXURE-XVI

Year Wise expenditure done under different heads (2004-05 to 2021-22)

| Sr. No. | Item of Work                                      | 2004-05 | 2005-06 | 2006-07 | 2007-08 | 2008-09 | 2009-10 | 2010-11 | 2011-12 | 2012-13 | 2013-14 | 2014-15 | 2015-16 | 2016-17 | 2017-18 | 2018-19 | 2019-20 | 2020-21 | 2021-22 |
|---------|---------------------------------------------------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|---------|
| 1       | Infrastructure Development                        | 0.495   | 1.63    | 5.58    | 1.00    | 4.23    | 7.08    | 0.55    | 2.00    | 2.4     | 11.17   | 14.38   | 10.88   | 15.09   | 17.81   | 2.58    | 0.80    | 0.00    | 2.00    |
| 2       | Habitat improvement                               | 0       | 0       | 0       | 0       | 19.74   | 10.70   | 24.12   | 42.04   | 36.64   | 112.60  | 93.19   | 92.16   | 49.50   | 29.8000 | 16.25   | 10.39   | 7.05    | 10.7    |
| 3       | Capacity Building/Training/ Research & Monitoring | 0       | 0       | 0       | 0       | 0.25    | 0.00    | 0.00    | 0.00    | 0.00    | 0.50    | 0.00    | 1.50    | 0       | 1.50    | 0.50    | 0.50    | 0.90    | 0       |
| 4       | Wildlife Protection and Conservation Activities   | 0       | 0       | 0       | 0       | 4.00    | 1.50    | 0.25    | 0.00    | 0.00    | 6.00    | 8.650   | 1.90    | 8.85    | 2.550   | 2.00    | 1.17    | 2.30    | 1.48    |
| 5       | Education and Awareness Generation                | 0       | 0       | 0       | 0       | 0.15    | 0.75    | 0.00    | 0.00    | 0.00    | 0.20    | 0.00    | 0.00    | 0.00    | 0.00    | 0.00    | 0.00    | 0.00    | 0.55    |
| 6       | Wildlife Tourism Management                       | 0       | 0       | 0       | 0       | 0.00    | 0.00    | 0.00    | 0.00    | 0.00    | 0.00    | 0.00    | 0.00    | 0.00    | 0.00    | 0.00    | 0.50    | 0.00    | 0       |
| 7       | Field equipment                                   | 0       | 0       | 0       | 0       | 0.00    | 0.00    | 0.00    | 0.00    | 0.00    | 0.00    | 0.58    | 1.35    | 4.20    | 3.45    | 1.35    | 0.00    | 2.20    | 0       |
| 8       | Office expenses                                   | 0       | 0       | 0       | 0       | 0.00    | 0.00    | 0.00    | 0.00    | 0.00    | 0.00    | 0.00    | 0.00    | 0.00    | 0.00    | 0.00    | 0.20    | 0.00    | 0.00    |
| 9       | Community Development through Participation       | 0       | 0       | 0       | 0       | 0.00    | 0.00    | 0.00    | 0.00    | 0.00    | 0.00    | 0.00    | 0.00    | 0.00    | 0.00    | 0.00    | 0.00    | 0.00    | 0.00    |
| 10      | Human-wild animal Conflict                        | 0       | 0       | 0       | 0       | 0.00    | 0.00    | 0.00    | 0.00    | 0.00    | 0.00    | 0.00    | 0.00    | 0.00    | 0.00    | 0.00    | 0.00    | 0.00    | 0.00    |
| 12      | Operational Support                               | 0       | 0       | 0       | 0       | 0.05    | 0.25    | 0.00    | 0.00    | 1.00    | 0.90    | 0.00    | 0.00    | 0.10    | 5.40    | 4.70    | 0.40    | 0.9     | 0.17    |

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EXTRAORDINARY

PART II- Section 3- Sub-section (ii)

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NEW DELHI, TUESDAY, FEBRUARY 1, 2022/MAGHA 12, 1943

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MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE

NOTIFICATION

New Delhi, the 1<sup>st</sup> February, 2022

**S.O. 409 (E)-** WHEREAS, a draft notification was published in the Gazette of India, Extraordinary on the 12<sup>th</sup> March, 2021, vide notification of the Government of India in the Ministry of Environment, Forest and Climate Change number S.O. 1195(E), dated the 12<sup>th</sup> March, 2021, inviting objections and suggestions from all persons likely to be affected thereby within the period of sixty days from the date on which copies of the Gazette containing the said notification were made available to the public;

**AND WHEREAS,** copies of the Gazette containing the said draft notification were made available to the public on the 12<sup>th</sup> March, 2021;

**AND WHEREAS,** objections and suggestions received from persons and stakeholders in response to the aforesaid draft notification were considered by the Central Government;

**AND WHEREAS,** the Tundah Wildlife Sanctuary is spread over an area of sixty four square kilometres and is located in the Bharmour sub-division of Chamba district and falls under the administrative control of Wildlife Division, Chamba in Himachal Pradesh. The Tundah Wildlife Sanctuary is located between 76° 24' E to 76° 38' E longitude and 32° 40' N to 32° 76' N latitude and is at a distance of seven kilometers from Dhakog on Chamba-Bharmour main road.

**AND WHEREAS,** the Tundah Wildlife Sanctuary was given the status of Wildlife sanctuary vide Notification No. Ft. 43-51/50-IV dated 19<sup>th</sup> September 1962, further revised vide No. 6-25/73-SF dated 17<sup>th</sup> September 1975 and the final Notification issued vide notification no. FFE-B-F(6)-11/2005-II dated 7<sup>th</sup> June, 2013 under Section 26 A of the Wildlife (Protection) Act 1972, rationalized the boundary of the sanctuary.

**AND WHEREAS,** the Wildlife Sanctuary is rich in floral diversity with species such as deodar (*Cedrus deodara*), silver fir (*Abies Pindrow*), spruce (*Picea smithiana*), kail (*Pinus wallichiana*), ban (*Quercus semecarpifolia*) etc and there is good interlave of wooded area and vast expenses of pastures that forms an ideal habitat for animals as well as birds.

**AND WHEREAS,** the major faunal species found in the sanctuary are common leopard (*Panthera pardus*), black bear (*Selenarctos thibetanus*), brown bear (*Ursus arctos*), goral (*Naemorhedus goral*), Himalayan thar (*Hemitragus jemlachicus*), Himalayan ibex (*Capra ibex*), Himalayan monal (*Lophophorus impejanus*), snow cock (*Tetraogallus himalayensis*), chir pheasant (*Catreus wallichii*), koklas (*Pucrasia macrolopha*), chakor (*alectoris chukar*) etc.

**AND WHEREAS,** it is necessary to conserve and protect the area, the extent and boundaries of Tundah Wildlife Sanctuary which are specified in paragraph 1 as Eco-sensitive Zone from ecological, environmental and biodiversity point of view and to prohibit industries or class of industries and their operations and processes in the said Eco-sensitive Zone.

**NOW, THEREFORE,** in exercise of the powers conferred by sub-section (1) and clauses (v) and (xiv) of sub-section (2) and sub-section (3) of section 3 of the Environment (Protection) Act, 1986 (29 of 1986) (hereafter in this notification referred to as the Environment act), read with sub-rule (3) of rule 5 of the Environment (Protection) Rules, 1986, the Central Government hereby notifies an area to an extent varying from zero to one kilometres around the boundary of Tundah Wildlife Sanctuary, in Chamba District in the State of Himachal Pradesh as the Tundah Wildlife Sanctuary Eco-sensitive Zone (hereafter in this notification referred to as the Eco-sensitive Zone) details of which are as under, namely:-

**1. Extent and boundaries of Eco-sensitive Zone.-** (1) The Eco-sensitive Zone shall be to an extent of zero to one kilometres around the boundary of Tundah Wildlife Sanctuary and the area

of the Eco-sensitive zone is 46.74 square kilometres and the zero extent of Eco-sensitive Zone towards Northern and North Eastern side is due to presence of district boundary of Lahul and Spiti exhibiting snow bound mountains with glaciers and inaccessible terrains.

(2) The boundary description of the Tundah Wildlife Sanctuary and its Eco-sensitive Zone is appended as **Annexure-I**.

(3) The maps of the Tundah Wildlife Sanctuary demarcating Eco-sensitive Zone along with boundary details and latitudes and longitudes are appended as **Annexure-II A, Annexure-II B and Annexure-II C**.

(4) Lists of geo-coordinates of the boundary of the Tundah Wildlife Sanctuary and Eco-sensitive Zone are given in Table A and Table B of Annexure-III.

(5) The list of villages falling in the Eco-sensitive Zone along with their geo co-ordinates at prominent points is appended as Annexure-IV.

**1. Zonal Master Plan for Eco-sensitive Zone.**-(1) The State Government shall, for the purpose of the Eco-sensitive Zone prepare a Zonal Master Plan within a period of two years from the date of publication of this notification in the Official Gazette, in consultation with local people and adhering to the stipulations given in this notification and get it duly approved by the competent authority in the state.

(2) The Zonal master Plan for the Eco-sensitive Zone shall be prepared by the State Government in such manner as is specified in this notification and also in consonance with the relevant Central and State laws and the guidelines issued by the Central Government, if any.

(3) The Zonal Master Plan shall be prepared in consultation with the following Departments of the State Government, for integrating the ecological and environmental considerations into the said plan-

- i) Environment;
- ii) Forest and Wildlife;
- iii) Agriculture;
- iv) Revenue;
- v) Urban Development;
- vi) Tourism;
- vii) Municipal;
- viii) Himachal State Pollution Control Board.

(4) The Zonal Master Plan shall not impose any restriction on the approved existing land use, infrastructure and activities, unless so specified in this notification and the Zonal master Plan shall factor in improvement of all infrastructure and activities to be more efficient and eco-friendly.

(5) The Zonal Master Plan shall provide for restoration of denuded areas, conservation of existing water bodies management of catchment areas, watershed management, groundwater

management, soil and moisture conservation, needs of local community and such other aspect of the ecology and environment that need attention.

(6) The Zonal master Plan shall demarcate all the existing worshipping places, villages and urban settlements, types and kinds of forests, agricultural areas, fertile lands, green area, such as, parks and like places, horticultural areas, orchards, lakes and other water bodies with supporting maps giving details of existing and proposed land use features.

(7) The Zonal Master Plan shall provide mechanism for regulating developmental activities in Eco-sensitive Zone and adhere to prohibited and regulated activities listed in the Table in paragraph 4 and also ensure and promote eco-friendly development for security of local communities livelihood.

(8) The Zonal Master Plan shall be co-terminus with the Regional Development Plan.

(9) The Zonal Master Plan so approved by the State Government shall be the reference document for the Monitoring Committee for carrying out its functions of monitoring in accordance with the provisions of this notification.

**2. Measures to be taken by the State Government.-** The State Government shall take the following measures for giving effect to the provisions of this notification, namely:-

**(1) Land use.-** (a) Forests, horticulture areas, agricultural areas, parks and open spaces earmarked for recreational purposes in the Eco-sensitive Zone shall not be used or converted into areas for commercial or residential or industrial activities:

Provided that the conversion of agricultural and other lands for the purposes other than that specified herein above, within the Eco-sensitive Zone may be permitted on the recommendation of the Monitoring Committee, and with the prior approval of the competent authority under Regional Town Planning Act and other rules and regulations of Central Government or State government as applicable and vide provisions of this notification, to meet the residential needs of the local residents and for activities such as-

- (i) Widening and strengthening of existing roads and construction of new roads;
- (ii) Construction and renovation of infrastructure and civic amenities;
- (iii) Small scale industries not causing pollution;
- (iv) Cottage industries including village industries; convenience stores and local amenities supporting eco-tourism including home stay; and
- (v) Promoted activities given under paragraph 4;

Provided further that no use of tribal land shall be permitted for commercial and industrial development activities without the prior approval of the competent authority under Regional Town Planning act and other rules and regulations of the State Government and without compliance of the provisions of article 244 of the Constitution or the law for the time being in force, including the Scheduled Tribes and Other Traditional Forest Dwellers (Recognition of Forest Rights) Act, 2006 (2 of 2007);

Provided also that any error appearing in the land records within the eco-sensitive Zone shall be corrected by the State Government, after obtaining the views of Monitoring Committee, once in each case and the correction of said error shall be intimated to the Central Government in the Ministry of Environment, Forest and Climate Change;

Provided also that the correction of error shall not include change of land use in any case except as provided under this sub-paragraph.

(b) Efforts shall be made to reforest the unused or unproductive agricultural area with Afforestation and habitat restoration activities.

**(2) Natural Water Bodies.-** The catchment areas of all natural springs shall be identified and plans for their conservation and rejuvenation shall be incorporated on the Zonal Master Plan and the guidelines shall be drawn up by the State Government in such a manner as to prohibit development activities at or near these areas which are detrimental to such areas.

**(3) Tourism or eco-tourism.-** (a) All new eco-tourism activities or expansion of existing tourism activities within the Eco-sensitive zone shall be as per the Tourism Master Plan for the Eco-sensitive Zone.

(b) The Tourism Master Plan shall be prepared by the State Department of Tourism in consultation with the State Department of Environment and Forests.

(c) The Tourism Master Plan shall form a component of the Zonal Master Plan.

(d) The Tourism Master Plan shall be drawn based on the study of carrying capacity of the Eco-sensitive Zone.

(e) The activities of eco-tourism shall be regulated as under, namely:-

(i) New construction of hotels and resorts shall not be allowed within one kilometre from the boundary of the protected area or up to the extent of the Eco-sensitive zone, whichever is nearer;

Provided that beyond the distance of one kilometre from the boundary of the protected area till the extent of the Eco-sensitive Zone, the establishment of new hotels and resorts shall be allowed only in pre-defined and designated areas for eco-tourism facilities as per Tourism Master Plan;

(ii) All new tourism activities or expansion of existing tourism activities within the Eco-sensitive Zone shall be in accordance with the guidelines issued by the Central government in the Ministry of Environment, Forest and Climate change and the eco-tourism guidelines issued by the National tiger Conservation Authority (as amended from time to time) with emphasis on eco-tourism, eco-education and eco-development;

(iii) Until the Zonal Master Plan is approved, development for tourism and expansion of existing tourism activities shall be permitted by the concerned regulatory authorities based on the actual site specific scrutiny and recommendation of the Monitoring Committee and no new hotel, resort or commercial establishment construction shall be permitted within Eco-sensitive Zone area.

- (4) **Natural Heritage-** All sites of valuable natural heritage in the Eco-sensitive Zone, such as the gene pool reserve areas, rock formations, waterfalls, springs, gorges, groves, caves, points, walks, rides, cliffs, etc shall be identified and a heritage conservation plan shall be drawn up for their preservation and conservation as a part of the Zonal master Plan.
- (5) **Man-made heritage sites-** Buildings, structures, artefacts, areas and precincts of historical, architectural, aesthetic and cultural significance shall be identified in the Eco-sensitive Zone and heritage conservation plan for their conservation shall be prepared as part of the Zonal Master Plan.
- (6) **Noise Pollution-** Prevention and control of noise pollution in the Eco-sensitive Zone shall be carried out in accordance with the provisions of the Noise Pollution (Regulation and Control) Rules, 2000 made under the Environment Act.
- (7) **Air pollution-** Prevention and control of air pollution in the Eco-sensitive Zone shall be carried out in accordance with the provisions of the Air (Prevention and Control of Pollution) Act, 1981 (14 of 1981) and the rules made thereunder.
- (8) **Discharge of effluents-** Discharge of treated effluents in the Eco-sensitive Zone shall be in accordance with the provisions of the General Standards for Discharge of Environmental Pollutants covered under the Environment Act and the rules made thereunder or standards stipulated by the State Government, whichever is more stringent.
- (9) **Solid Wastes-** Disposal and Management of solid wastes shall be as under-
- (a) The solid waste disposal and management in the Eco-sensitive Zone shall be carried out in accordance with the Solid Waste Management Rules, 2016, published by the Government of India in the Ministry of Environment, Forest and Climate Change vide notification number S.O. 1357 (E), dated the 8<sup>th</sup> April, 2016; the inorganic material may be disposed of in an environmental acceptable manner at site identified outside the Eco-sensitive Zone;
- (b) Safe and Environmentally Sound management of Solid wastes in conformity with the existing rules and regulations using identified technologies may be allowed within the Eco-sensitive Zone.
- (10) **Bio-Medical Waste-** Bio-Medical Waste Management shall be as under-
- (a) The Bio-Medical Waste disposal in the Eco-sensitive Zone shall be carried out in accordance with the Bio-medical Waste Management Rules, 2016, published by the

government of India in the Ministry of Environment, Forest and Climate Change vide notification number G.S.R. 343 )E), dated the 28<sup>th</sup> march, 2016;

- (b) Safe and Environmentally Sound Management of Bio-Medical Wastes in conformity with the existing rules and regulations using identified technologies may be allowed within the Eco-sensitive Zone.
- (11) **Plastic waste management-** The plastic waste management in the Eco-sensitive Zone shall be carried out as per the provisions of the Plastic Waste management Rules, 2016, published by the Government of India in the Ministry of Environment, Forest and Climate Change vide notification number G.S.R. 340(E), dated the 18<sup>th</sup> March, 2016, as amended from time to time.
- (12) **Construction and demolition waste management-** The construction and demolition waste management in the Eco-sensitive Zone shall be carried out as per the provisions of the Construction and Demolition Waste Management Rules, 2016 published by the Government of India in the Ministry of Environment, Forest and Climate Change vide notification number G.S.R. 317(E), dated the 29<sup>th</sup> March, 2016, as amended from time to time.
- (13) **E-waste-** The e-waste management in the Eco-sensitive Zone shall be carried out as per the provisions of the E-Waste Management Rules, 2016, published by the Government of India in the Ministry of Environment, Forest and Climate Change, as amended from time to time.
- (14) **Vehicular traffic-** The vehicular movement of traffic shall be regulated in a habitat friendly manner and specific provisions in this regard shall be incorporated in the Zonal Master Plan and till such time as the Zonal Master plan is prepared and approved by the competent authority in the State Government, the Monitoring Committee shall monitor compliance of vehicular movement under the relevant Acts, rules and regulations made thereunder.
- (15) **Vehicular pollution-** Prevention and control of vehicular pollution shall be in compliance with applicable laws and efforts shall be made for use of cleaner fuels.
- (16) **Industrial units-** (a) On or after the publication of this notification in the Official Gazette, no new polluting industries shall be permitted to be set up within the Eco-sensitive Zone.  
(c) Only non- polluting industries shall be allowed within Eco-sensitive Zone as per the classification of Industries in the guidelines issued by the Central Pollution Control Board in February, 2016, as amended from time to time, unless so specified in this notification, and in addition, the non-polluting cottage industries shall be promoted.
- (17) **Protection of hill slopes-** The protection of hill slopes shall be as under-  
(a) The Zonal Master Plan shall indicate areas on hill slopes where no construction shall be permitted;

- (b) Construction on existing steep hill slopes or slopes with a high degree of erosion shall not be permitted.

- 3. List of activities prohibited or to be regulated within Eco-sensitive Zone-** All activities in the Eco-sensitive Zone shall be governed by the provisions of the Environment Act and the rules made there under including the Coastal Regulation Zone, 2011 and the Environmental Impact Assessment Notification, 2006 and other applicable laws including the Forest (Conservation) Act, 1980 (69 of 1980), the Indian Forest Act, 1927 (16 of 1927), the Wildlife (Protection) Act, 1972 (53 of 1972 and amendments made thereto and be regulated in the manner specified in the Table below, namely:-

**TABLE**

| S. No.<br>(1)                   | Activity<br>(2)                                                         | Description<br>(3)                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|---------------------------------|-------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>A. Prohibited Activities</b> |                                                                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 1.                              | Commercial mining, stone quarrying and crushing units.                  | (a) All new and existing mining (minor and major minerals), stone quarrying and crushing units shall be prohibited with immediate effect except for meeting the domestic needs of bona fide local residents including digging of earth for construction or repair of houses within Eco-sensitive Zone;<br>(b) The mining operations shall be carried out in accordance with the order of the Hon'ble Supreme Court dated the 4 <sup>th</sup> August, 2006 in the matter of T.N. Godavarman Thirumulpad Vs. UOI in W.P.(C) No. 202 of 1995 and dated the 21 <sup>st</sup> April, 2014 in the matter of Goa foundation Vs. UOI in W.P.(C) No. 435 of 2012. |
| 2.                              | Setting of industries causing pollution (Water, Air, Soil, Noise, etc.) | New industries and expansion of existing pollution industries in the Eco-sensitive Zone shall not be permitted;<br>Provided that, non-polluting industries shall be allowed within Eco-Sensitive Zone as per classification of Industries in the guidelines issued by the Central Pollution Control Board in February, 2016, as amended from time to time, unless so specified in this notification and in addition, the non-polluting cottage industries                                                                                                                                                                                                |

|                                |                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
|--------------------------------|------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                |                                                                        | shall be promoted.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| 3.                             | Establishment of major hydroelectric project.                          | Prohibited.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 4.                             | Use or production or processing of any hazardous substance.            | Prohibited.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 5.                             | Discharge of untreated effluents in natural water bodies or land area. | Prohibited.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 6.                             | Setting up of new saw mills.                                           | New or expansion of existing saw mills shall not be permitted within the Eco-sensitive Zone.                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| 7.                             | Setting up of brick kilns.                                             | Prohibited.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 8.                             | Use of polythene bags.                                                 | Prohibited.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 9.                             | Commercial use of firewood.                                            | Prohibited.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| 10                             | Introduction of exotic species.                                        | Prohibited.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| <b>B. Regulated Activities</b> |                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 11.                            | Commercial establishment of hotels and resorts.                        | <p>No new commercial hotels and resorts shall be permitted within one kilometre of the boundary of the Protected Area or upto the extent of the Eco-sensitive Zone, whichever is nearer, except for small temporary structures for Eco-tourism activities:</p> <p>Provided that, beyond one kilometre from the boundary of the protected Area or upto the extent of the Eco-sensitive Zone whichever is nearer, all new tourist activities or expansion of existing activities shall be in conformity with the Tourism Master Plan and guidelines as applicable.</p> |
| 12                             | Construction activities.                                               | <p>(a) New commercial construction of any kind shall not be permitted within one kilometre from the boundary of the Protected Area or upto extent of the Eco-sensitive Zone whichever is nearer:</p> <p>Provided that, local people shall be permitted to undertake construction in their land for their use including the activities listed in sub-paragraph (1) of paragraph 3 as per building bye-laws to meet the residential needs of the local residents:</p>                                                                                                  |

|     |                                                                                                 |                                                                                                                                                                                                                                                                                                                                                                                                        |
|-----|-------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|     |                                                                                                 | <p>Provided that the construction activity related to small scale industries not causing pollution shall be regulated and kept at the minimum, with the prior permission from the competent authority as per applicable rules and regulations, if any.</p> <p>(b) Beyond one kilometre it shall be regulated as per the Zonal Master Plan.</p>                                                         |
| 13. | Small scale non polluting industries.                                                           | Non polluting industries as per classification of industries issued by the Central Pollution Control Board in February, 2016, as amended from time to time and non-hazardous, small-scale and service industry, agriculture, floriculture, horticulture or agro-based industry producing products from indigenous materials from the Eco-sensitive Zone shall be permitted by the competent Authority. |
| 14. | Felling of trees.                                                                               | <p>(a) There shall be no felling of trees in the forest or Government or revenue or private lands without prior permission of the competent authority in the State Government.</p> <p>(b) The felling of trees shall be regulated in accordance with the provisions of the concerned Central or State Act and the rules made there under.</p>                                                          |
| 15. | Collection of Forest Produce or Non-Timber Forest Produce.                                      | Regulated under applicable laws.                                                                                                                                                                                                                                                                                                                                                                       |
| 16. | Erection of electrical and communication towers and laying of cables and other infrastructures. | Regulated under applicable laws of underground cabling may be promoted.                                                                                                                                                                                                                                                                                                                                |
| 17. | Infrastructure including civic amenities.                                                       | Taking measures of mitigation, as per applicable laws, rules and regulation and available guidelines.                                                                                                                                                                                                                                                                                                  |
| 18. | Widening and strengthening of existing roads and construction of new roads.                     | Taking measures of mitigation, as per applicable laws, rules and regulation and available guidelines.                                                                                                                                                                                                                                                                                                  |
| 19. | Undertaking other activities related to tourism like over                                       | Regulated as per the applicable laws.                                                                                                                                                                                                                                                                                                                                                                  |

|                               |                                                                                                                                   |                                                                                                                                                                                                                                                                                  |
|-------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                               | flying over the Eco-sensitive Zone area by hot air balloon, helicopter, drones, Microlites, etc.                                  |                                                                                                                                                                                                                                                                                  |
| 20.                           | Protection of hill slopes and river banks.                                                                                        | Regulated as per the applicable laws.                                                                                                                                                                                                                                            |
| 21.                           | Movement of vehicular traffic at night.                                                                                           | Regulated for commercial purpose under applicable laws.                                                                                                                                                                                                                          |
| 22.                           | Ongoing agriculture and horticulture practices by local communities along with dairies, dairy farming, aquaculture and fisheries. | Permitted as per the applicable laws for use of locals.                                                                                                                                                                                                                          |
| 23.                           | Discharge of treated waste water/effluents in natural water bodies or land area.                                                  | The discharge of treated waste water or effluents shall be avoided to enter into the water bodies and efforts shall be made for recycle and reuse of treated waste water. Otherwise the discharge of treated waste water/effluent shall be regulated as per the applicable laws. |
| 24.                           | Commercial extraction of surface and ground water.                                                                                | Regulated under applicable laws.                                                                                                                                                                                                                                                 |
| 25.                           | Establishment of large-scale commercial livestock and poultry farms by firms, corporate and companies.                            | Regulated as per applicable laws except for meeting local needs                                                                                                                                                                                                                  |
| 26.                           | Open well, bore well, etc. for agriculture or other usage.                                                                        | Regulated and the activity should be strictly monitored by the appropriate authority.                                                                                                                                                                                            |
| 27.                           | Solid waste management.                                                                                                           | Regulated as per the applicable laws.                                                                                                                                                                                                                                            |
| 28.                           | Eco-tourism.                                                                                                                      | Regulated as per the applicable laws.                                                                                                                                                                                                                                            |
| 29.                           | Commercial sign boards and hoardings.                                                                                             | Regulated as per the applicable laws.                                                                                                                                                                                                                                            |
| <b>C. Promoted Activities</b> |                                                                                                                                   |                                                                                                                                                                                                                                                                                  |
| 30.                           | Rain water harvesting.                                                                                                            | Shall be actively promoted.                                                                                                                                                                                                                                                      |
| 31.                           | Organic farming.                                                                                                                  | Shall be actively promoted.                                                                                                                                                                                                                                                      |
| 32.                           | Adoption of green technology for all activities.                                                                                  | Shall be actively promoted.                                                                                                                                                                                                                                                      |
| 33.                           | Cottage industries including village artisans, etc.                                                                               | Shall be actively promoted.                                                                                                                                                                                                                                                      |
| 34.                           | Use of renewable energy and fuels.                                                                                                | Bio-gas, solar light etc. shall be actively promoted.                                                                                                                                                                                                                            |

|     |                                               |                             |
|-----|-----------------------------------------------|-----------------------------|
| 35. | Agro-forestry.                                | Shall be actively promoted. |
| 36. | Plantation of horticulture and herbals.       | Shall be actively promoted. |
| 37. | Use of eco-friendly transport.                | Shall be actively promoted. |
| 38. | Skill development.                            | Shall be actively promoted. |
| 39. | Restoration of degraded land/forests/habitat. | Shall be actively promoted. |
| 40. | Environmental awareness.                      | Shall be actively promoted. |

**4. Monitoring Committee for Monitoring the Eco-sensitive Zone Notification-** for effective monitoring of the provisions of this notification under sub-section (3) of section 3 of the Environment Act, the Central Government hereby constitutes a Monitoring Committee, comprising of the following, namely:-

| S. No. | Constituent of the Monitoring Committee                                                                                                                          | Designation      |
|--------|------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------|
| 1.     | Chief Conservator of Forests, Chamba Forest Circle, Chamba                                                                                                       | Chairman;        |
| 2.     | A representative of non-governmental organisation working in the field of environment (including heritage conservation) to be nominated by the State Government. | Member;          |
| 3.     | An expert in Ecology and Environment to be nominated by the State Government.                                                                                    | Member;          |
| 4.     | Regional Executive Engineer of State Pollution Control Board                                                                                                     | Member;          |
| 5.     | A representative of State Biodiversity Board                                                                                                                     | Member;          |
| 6.     | Divisional Forest Officer, Bharmour                                                                                                                              | Member;          |
| 7.     | Sub-Divisional magistrate Bharmour of his representative                                                                                                         | Member;          |
| 8.     | Divisional Forest Officer (Wildlife), Chamba                                                                                                                     | Member-Secretary |

**5. Terms of reference-** (1) The Monitoring Committee shall monitor the compliance of the provisions of this notification.

(2) The tenure of the Monitoring committee shall be till further orders, provided that the non-official members of the Committee shall be nominated by the State Government from time to time.

(3) The activities that are covered in the Schedule to the notification of the government of India in the erstwhile Ministry of Environment and Forests number S.O. 1533(E), dated the 14<sup>th</sup> September, 2006, and are falling in the Eco-sensitive Zone, except for the prohibited activities as specified in the Table under paragraph 4 thereof, shall be scrutinised by the Monitoring Committee based on the actual site-specific conditions and referred to the Central Government in the Ministry of Environment, Forest and Climate Change for prior environmental clearances under the provisions of the said notification.

(4) The activities that are not covered in the Schedule to the notification of the Government of India in the erstwhile Ministry of Environment and Forest number S.O. 11533 (E), dated the 14<sup>th</sup> September, 2006 and are falling in the Eco-sensitive Zone, except for the prohibited activities as specified in the Table under paragraph 4 thereof, shall be scrutinised by the Monitoring Committee based on the actual site-specific condition and referred to the concerned regulatory authorities.

(5) The Member-Secretary of the Monitoring Committee or the concerned Deputy Commissioner shall be competent to file complaint under section 19 of the Environment Act, against any person who contravenes the provisions of this notification.

(6) The Monitoring Committee may invite representative or expert from concerned Department, representative from industry associations or concerned stakeholders to assist in its deliberations depending on the requirements on issue to issue basis.

(7) The Monitoring Committee shall submit the annual action taken report of its activities as on the 31<sup>st</sup> March of every day by the 30<sup>th</sup> June of that year to the Chief Wildlife Warden in the State as per proforma appended at Annexure V.

(8) The Central Government in the Ministry of Environment, Forest and Climate Change may give such directions, as it deems fit, to the Monitoring Committee for effective discharge of its functions.

**6. Additional Measures-** The Central Government and State Government may specify additional measures, if any, for giving effect to provisions of this notification.

**7. Order of Court or Tribunal-** The provisions of this notification shall be subject to the orders, if any passed or to be passed by the Hon'ble Supreme court of India or High court or the National Green Tribunal.

[F. No. 25/24/2016-ESZ-RE]

Dr. SATISH C. GARKOTI, Scientist "G"

## **ANNEXURE-I**

### **BOUNDARY DESCRIPTION OF TUNDAH WILDLIFE SANCTUARY AND ITS ECO-SENSITIVE ZONE IN THE STATE OF HIMACHAL PRADESH**

#### **A. BOUNDARY DESCRIPTION OF TUNDAH WILDLIFE SANCTUARY**

| <b>S. No.</b> | <b>Direction</b> | <b>Boundary Description</b>                                                                                                                                              |
|---------------|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1             | <b>NORTH</b>     | North boundary of the proposed Eco-sensitive Zone starts from 76°25'0.793"E 32°35'56.225" N on the western side of the sanctuary and upto 76°24'48.622"E 32°31'44.503"N. |
| 2.            | <b>EAST</b>      | Starts from 76°34'42.37"E 32°32'32.94"N upto 76°29'15.033"E 32°29'48.688" N.                                                                                             |

|    |              |                                                                                |
|----|--------------|--------------------------------------------------------------------------------|
| 3. | <b>SOUTH</b> | Starts from 76°26'36.440"E 32°28'29.403"N upto 76°26'13.738"E 32°29'16.35" N.  |
| 4. | <b>WEST</b>  | Starts from 76°24'35.817"E 32°30'17.474"N upto 76°24'48.622"E 32°31'44.503" N. |

**B. BOUNDARY DESCRIPTION OF ECO-SENSITIVE ZONE AROUND TUNDAH WILDLIFE SANCTUARY**

| <b>S. No.</b> | <b>Direction</b> | <b>Boundary Description</b>                                                                                                                                              |
|---------------|------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1             | <b>NORTH</b>     | North boundary of the proposed Eco-sensitive Zone starts from 76°25'0.793"E 32°35'56.225" N on the western side of the sanctuary and upto 76°24'48.622"E 32°31'44.503"N. |
| 2.            | <b>EAST</b>      | Starts from 76°34'42.37"E 32°32'32.94"N upto 76°29'15.033"E 32°29'48.688" N.                                                                                             |
| 3.            | <b>SOUTH</b>     | Starts from 76°26'36.440"E 32°28'29.403"N upto 76°26'13.738"E 32°29'16.35" N.                                                                                            |
| 4.            | <b>WEST</b>      | Starts from 76°24'35.817"E 32°30'17.474"N upto 76°24'48.622"E 32°31'44.503" N.                                                                                           |

**ANNEXURE-III**

**TABLE A: GEO-COORDINATES OF FOUR CORNERS ALONG BOUNDARY OF TUNDAH WILDLIFE SANCTUARY**

| <b>S. NO.</b> | <b>Longitude</b> | <b>Latitude</b> |
|---------------|------------------|-----------------|
| 1.            | 76°25'34.797"E   | 32°38'44.144"N  |
| 2.            | 76°29'6.406"E    | 32°39'32.315"N  |
| 3.            | 76°35'28.154"E   | 32°38'40.823"N  |
| 4.            | 76°37'53.126"E   | 32°36'13.199"N  |
| 5.            | 76°29'14.608"E   | 32°33'2.886"N   |
| 6.            | 76°25'0.58"E     | 32°35'56.232"N  |

**TABLE B: GEO-COORDINATES OF PROMINENT LOCATIONS OF ECO-SENSITIVE ZONE**

| <b>S. NO.</b> | <b>Longitude</b> | <b>Latitude</b> |
|---------------|------------------|-----------------|
| 1.            | 76°25'5.766"E    | 32°33'26.489"N  |
| 2.            | 76°25'29.967"E   | 32°29'13.529"N  |
| 3.            | 76°26'36.446"E   | 32°28'29.403"N  |
| 4.            | 76°24'35.817"E   | 32°30'17.474"N  |
| 5.            | 76°32'25.188"E   | 32°31'11.379"N  |
| 6.            | 76°24'48.622"E   | 32°31'44.503"N  |

**ANNEXURE-IV**

**LIST OF VILLAGES FALLING UNDER ECO-SENSITIVE ZONE OF TUNDAH WILDLIFE SANCTUARY ALONG WITH GEO-COORDINATES**

| <b>Sr. No.</b> | <b>Name of Village</b> | <b>Co-ordinates</b>           |
|----------------|------------------------|-------------------------------|
| 1              | Thalla                 | 76°26'9.809"E 32°28'56.414"N  |
| 2              | Sulla                  | 76°26'45.47"E 32°29'12.711"N  |
| 3              | Gwar                   | 76°27'46.754"E 32°29'51.171"N |
| 4              | Panjar                 | 76°28'51.323"E 32°30'1.481"N  |
| 5              | Tundah                 | 76°28'8.524"E 32°30'37.304"N  |
| 6              | Bhajund                | 76°28'52.507"E 32°30'42.555"N |
| 7              | Palan                  | 76°29'26.302"E 32°30'30.663"N |
| 8              | Kuthar                 | 76°29'15.148"E 32°31'13.008"N |
| 9              | Phat                   | 76°28'42.877"E 32°31'10.149"N |
| 10             | Ladhog                 | 76°28'33.456"E 32°31'25.999"N |
| 11             | Morthu                 | 76°28'22.414"E 32°31'8.483"N  |
| 12             | Kuttal                 | 76°27'20.62"E 32°31'3.891"N   |
| 13             | Badgaram               | 76°28'26.985"E 32°31'44.209"N |
| 14             | Khanbagga              | 76°27'58.146"E 32°31'45.43"N  |
| 15             | Kumarkari              | 76°27'17.806"E 32°32'3.185"N  |
| 16             | Mandha                 | 76°27'29.626"E 32°32'14.48"N  |
| 17             | Siroth                 | 76°27'10.437"E 32°32'13.211"N |
| 18             | Bhadra                 | 76°28'59.764"E 32°33'8.748"N  |
| 19             | Dal                    | 76°25'48.403"E 32°29'40.426"N |
| 20             | Liundi                 | 76°29'40.46"E 32°34'55.29"N   |
| 21             | Dhar Sar               | 76°29'23.826"E 32°32'12.576"N |
| 22             | Mummar                 | 76°26'30.294"E 32°30'18.012"N |
| 23             | Banni                  | 76°27'39.98"E 32°32'26.33"N   |

## **ANNEXURE-V**

### **Performa of Action Taken Report:-**

1. Number and date of meetings.
2. Minutes of the meetings: (mention noteworthy points. Attach minutes of the meeting as separate Annexure).
3. Status of preparation of Zonal master Plan including Tourism Master Plan.
4. Summary of cases dealt with rectification of error apparent on face of land record (Eco-sensitive Zone wise). Detail may be attached as Annexure.
5. Summary of cases scrutinised for activities covered under the Environment Impact Assessment Notification 2006 (Details may be attached as separate Annexure).
6. Summary of cases scrutinised for activities not covered under the Environment Impact Assessment Notification, 2006 (Details may be attached as separate Annexure).
7. Summary of complaints lodged under section 19 of the Environment (Protection) Act, 1986.
8. Any other matter of importance.

**Annexure XVIII**

| <b>TENTATIVE APO OF TUNDAH WILDLIFE SANCTUARY (2024-25 TO 2033-34)</b> |                                                              |                            |                            |                            |                            |                            |                            |                            |                            |                            |                            |                    |
|------------------------------------------------------------------------|--------------------------------------------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|----------------------------|--------------------|
| <b>Sr. No.</b>                                                         | <b>Item of Work</b>                                          | <b>2024<br/>-25</b>        | <b>2025<br/>-26</b>        | <b>2026<br/>-27</b>        | <b>2027<br/>-28</b>        | <b>2028<br/>-29</b>        | <b>2029<br/>-30</b>        | <b>2030<br/>-31</b>        | <b>2031<br/>-32</b>        | <b>2032<br/>-33</b>        | <b>2033<br/>-34</b>        | <b>TOT<br/>AL</b>  |
|                                                                        |                                                              | <b>Rs.<br/>In<br/>Lac.</b> | <b>Rs.<br/>In<br/>Lac.</b> | <b>Rs.<br/>In<br/>Lac.</b> | <b>Rs.<br/>In<br/>Lac.</b> | <b>Rs.<br/>In<br/>Lac.</b> | <b>Rs.<br/>In<br/>Lac.</b> | <b>Rs.<br/>In<br/>Lac.</b> | <b>Rs.<br/>In<br/>Lac.</b> | <b>Rs.<br/>In<br/>Lac.</b> | <b>Rs.<br/>In<br/>Lac.</b> |                    |
| <b>A.I</b>                                                             | <b>Infrastructure Development</b>                            | 3.50                       | 2.50                       | 3.50                       | 2.50                       | 2.50                       | 2.00                       | 2.00                       | 2.50                       | 3.00                       | 4.00                       | <b>24.00</b>       |
| <b>A.II</b>                                                            | <b>Habitat improvement</b>                                   | 5.00                       | 5.00                       | 5.00                       | 4.50                       | 4.50                       | 4.00                       | 4.50                       | 4.00                       | 5.00                       | 6.00                       | <b>41.50</b>       |
| <b>A.II<br/>I</b>                                                      | <b>Capacity Building/Training/ Research &amp; Monitoring</b> | 0.62                       | 1.00                       | 1.00                       | 0.75                       | 1.00                       | 2.00                       | 2.00                       | 2.00                       | 2.50                       | 2.80                       | <b>12.87</b>       |
| <b>A.I<br/>V</b>                                                       | <b>Wildlife Protection and Conservation Activities</b>       | 2.00                       | 2.50                       | 2.00                       | 2.50                       | 2.00                       | 2.50                       | 2.50                       | 3.00                       | 3.00                       | 2.50                       | <b>22.00</b>       |
| <b>A. V</b>                                                            | <b>Education and Awareness Generation</b>                    | 0.50                       | 1.00                       | 0.50                       | 1.00                       | 1.00                       | 1.00                       | 0.40                       | 0.50                       | 0.50                       | 0.60                       | <b>6.40</b>        |
| <b>A.V<br/>I</b>                                                       | <b>Wildlife Tourism Management</b>                           | 1.00                       | 0.50                       | 0.50                       | 0.60                       | 1.00                       | 1.00                       | 1.00                       | 0.80                       | 1.00                       | 1.00                       | <b>7.40</b>        |
| <b>A.V<br/>II</b>                                                      | <b>Field equipment</b>                                       | 0.00                       | 0.00                       | 0.00                       | 0.00                       | 0.00                       | 0.00                       | 0.00                       | 0.00                       | 0.00                       | 0.00                       | <b>0.00</b>        |
| <b>A.<br/>VIII</b>                                                     | <b>Office expenses</b>                                       | 0.13                       | 0.15                       | 0.15                       | 0.20                       | 0.20                       | 0.25                       | 0.15                       | 0.20                       | 0.30                       | 0.20                       | <b>1.73</b>        |
| <b>A.I<br/>X</b>                                                       | <b>Community Development through Participation</b>           | 1.00                       | 0.40                       | 0.50                       | 1.00                       | 1.00                       | 0.50                       | 1.00                       | 1.00                       | 0.50                       | 0.80                       | <b>6.90</b>        |
| <b>A. X</b>                                                            | <b>Human-wild animal Conflict</b>                            | 0.25                       | 0.50                       | 0.25                       | 0.50                       | 0.50                       | 0.50                       | 0.50                       | 0.25                       | 0.75                       | 0.25                       | <b>4.00</b>        |
| <b>A.X<br/>II</b>                                                      | <b>Operational Support</b>                                   | 0.00                       | 0.00                       | 0.00                       | 0.00                       | 0.00                       | 0.00                       | 0.00                       | 0.00                       | 0.00                       | 0.00                       | <b>0.00</b>        |
|                                                                        | <b>G.Total:-</b>                                             | <b>14.0<br/>0</b>          | <b>13.5<br/>5</b>          | <b>13.4<br/>0</b>          | <b>13.5<br/>5</b>          | <b>13.7<br/>0</b>          | <b>13.7<br/>5</b>          | <b>14.0<br/>5</b>          | <b>14.2<br/>5</b>          | <b>16.5<br/>5</b>          | <b>18.1<br/>5</b>          | <b>126.8<br/>0</b> |