

Management Plan
Bir Mehas Wildlife
Sanctuary

(2015-16 to 2024-25)

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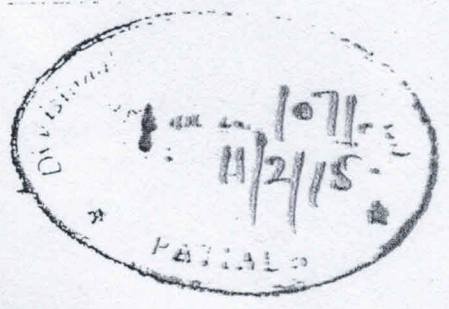
ਪੰਜਾਬ ਸਰਕਾਰ,
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 ਪਟਿਆਲਾ

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EXECUTIVE SUMMARY

Bir Mehas is one of the most important PAs in Patiala district and one of the declared Wildlife Sanctuaries in Punjab. The area represents Indus Plain Subdivision of 4A Punjab Plains Province in 4 Semi-Arid Bio geographic Zone of India.

The area is comparatively rich in biodiversity and harbors many rare and endangered small flora and fauna.

The management history of Bir Mehas dates back to 1952 when it was first notified as a Wildlife Sanctuary (WLS). Thereafter it was managed under regular working plans and continued to be a sanctuary. At present the area spreads over 123.43 Ha. The first working plan for Patiala was written for the period 1955-56 to 1980-81 of which Bir Mehas was a part.

This is the second management plan for the sanctuary as the previous plan expired before it could be implemented. This plan has been written for the year 2011-12 to 2020-21 focusing on management of area with following objectives.

- To secure the conservation of biodiversity and to enhance the status of wildlife by habitat amelioration works in a natural representative habitat of Bir Mehas WLS.
- To maintain and strengthen the protection measures against external disturbances like illegal grazing, collection of fuel wood, fire, disease etc.
- To remove the alien and invasive species from the WLS and restore the natural habitat suitable for wildlife and to safeguard the hydrological and

edaphic factors of the Bir Mehas WLS through soil and moisture restoration.

- To improve the quality of life of people living around WLS by providing them with alternative means of livelihood, which will also reduce their dependence on the PA.
- To promote conservation-education and environmental awareness of the local communities with help of meaningful interpretation and development activities.
- To strengthen the activities of training, research and monitoring for effective management of Wildlife in the sanctuary.
- To develop a mechanism for the interdepartmental, inter-agency dialogue, for achieving the broader goal of welfare of the Wildlife as well as the local inhabitants of the area

Guidelines given by Wildlife Institute of India were followed while writing the plan.

The Plan comprises of three parts-

Part 1-It includes four chapters:

1. Introduction to the area
2. Background information and attributes
3. History of management and present practices
4. Protected area and interface land use situation

Part 2- it deals with eight chapters:

5. Vision, Objectives and Problems
6. Strategies
7. Ecotourism, Interpretation and Conservation education

8. Eco-development
9. Research, Monitoring and Training
10. Organization and administration
11. Budget
12. Schedule of operations and miscellaneous regulations

Part 3- it comprises of annexure, control forms, maps and diagrams etc.

Problems perceived in achieving the objectives are as follows-

- Boundaries without fencing
- Livestock grazing & tress-passing
- Infrastructural and logistical constraints
- Lack of conservation education initiatives
- Human-animal conflicts.

The strategies proposed in Chapter 6 to tackle the problems is to divide the Wildlife Sanctuary into 3 zones-

- Biodiversity Conservation zone
- Ecotourism zone
- Eco-development zone

Each zone has its own set of objectives and strategies.

Five theme plans which are applicable to different areas of the WLS, irrespective of the zonation are as under-

1. General protection plan
2. Habitat restoration plan
3. Species reintroduction plan
4. Wildlife health management plan
5. Inter-agency co-management plan

Chapter 7, 8 and 9 deal with Tourism, Eco-development and Research & monitoring respectively including various measures for conducting these activities.

Chapter 10 deals with present and proposed staff that would be required to manage the sanctuary.

Chapter 11 is about Budget which would be required to fulfill strategies. It will include state allocation and central aid as well as other projects.

Chapter 12 is the last chapter dealing with schedule of operation, month-wise activities of each operation, format for deviation forms etc.

Part 3 consists of annexure & control forms pertaining to WLS and relevant towards formulation & execution of management plan

CHAPTER 1

INTRODUCTION TO THE AREA

1.1 Name, Location, Constitution and Extent

Bir Mehas Wildlife Sanctuary falls in the jurisdiction of Patiala Forest Division (Wildlife), in the tehsil Nabha of Patiala district. The area lies between 76°5' E to 76°15' E longitude and 30° 15' N to 30° 20' N Latitude of the Survey of India toposheet number 53 B/3 (Scale 1"= 8 mile). Total area of Bir is 123.43 hact. There is no distinction between core and buffer area. The sanctuary comprises only 3.43% of total protected areas of Patiala Forest Division (3600.21 hac). The area detail of Protected Areas of Patiala Forest Division is given in Annexure-1. The whole tract is plain and on its north, south and east, there are villages inhabiting mostly agricultural communities. Biogeographically, it falls in Indus plain zone of biogeography province -4A, the Punjab plains of Semi-Arid Zone (Rodgers and Panwar, 1988).

The location wise detail of the Mehas WLS in the state as well as in the district is shown in Map No.1 and Map No.2 respectively.

1.2 Approach and access

Bir Mehas WLS is easily approachable. It is about 1 Km from Nabha Bus Stand, the nearest Tehsil and approx 28km from Patiala the Distt Headquarter. Both the private and govt. buses are available to reach the sanctuary from Nabha as well as Patiala. Summary of the Bir Mehas WLS is attached as **Annexure 1.1**

1.3 Statement of Significance

Bir Mehas WLS falls in Indus plain zone of bio geographic province 4a of the Punjab plains of the Semi Arid zone. It harbors the remarkable breeding potential of various species of Wildlife viz. Blue bull, Jackal,

Porcupine, Rhesus monkeys and species of Birds etc. The sanctuary area is rich in timber, fruit, fodder and other indigenous spp. which helps in the conservation of biodiversity and wild life of the surrounding area and within the sanctuary too. Bir Mehas WLS is one among the 11 sanctuaries and one of the first declared PAs in the state.

CHAPTER 2

BACKGROUND INFORMATION AND ATTRIBUTES

2.1 Boundaries:

Bir Mehas sanctuary area is surrounded by the revenue boundary of the adjoining villages of the area. It is demarcated by the boundary pillars and Kachha Bundhs. A portion of Ghaggar Branch canal forms the eastern boundary and Nabha city forms the part of northern boundary. A Bir Mehas forest has total 9 compartments. The compartment numbers 1, 7, and 8 touches the northern boundary, 4, 5 & 6 touch the western boundary, 3 touch the southern boundary, 2 touch the eastern boundary of the Bir Mehas WLS.

2.1.1 External Boundary

The shape of sanctuary is compact with continuous boundary. Boundary is not fenced. There is a dispute of boundaries between the adjoining school and Bir Mehas WLS which is still pending in the court. However revenue land bordering area needs special care to avoid encroachment problem. A list of villages bordering North, East, South and West of the WLS is given below:

North: Nabha city and Thuhi.

East: Mehas, Rohti Mouran, Rohti Khas

West: Dharonki, Kallamajra, Nabha Khas, Ageta

South: Ramgarh and Rohti Channa

The extent of ecological boundary of Bir Mehas WLS considers all adjoining forest blocks, patches and strips of the territorial forest division Patiala, So ecological boundary may extend up to neighboring forests and bordering revenue lands in non forest areas.

2.2 Geology, rock and soil

The geological formation represented in the sanctuary consists of clay, sand, and silt belt. The soil material forms parts of Indo-Gangetic alluvial plains deposits. The soil is deep varying from clay to sandy loam and poor in available nitrogen and organic matter, but rich in clay contents with slow penetration of water.

2.3 Terrain

The tract forms the part of Indo-Gangetic alluvial plain. Ghaggar Branch Canal is the major perennial course passes by the Bir Mehas. The Canal causes occasional floods especially during the rainy season and ultimately damages the flora and fauna. It provides water for the animals too but it is highly polluted & unhygienic for the animals.

2.4 Climate

The climate is extremely hot in summers and cold in winters. The monsoon begins in the first week of July and extends up to mid September. The winter starts from about the middle October till about middle of February with the coldest months being December- January. The summer starts from middle of April and continue till August, May being the hottest month.

2.4.1 Rainfall

Most of the rains occur during mid July to mid September and small proportion falls during the summer months of April, May and June. The rainfall data of Patiala district for 2001-2010 is given in **Annexure**

2.1

2.4.2 Temperature

The temperature during summer goes as high as 46° C whereas in winter it touches the freezing point sometimes. Frost is common during

these months. May and June are the hottest months whereas December and January are the coldest. The Temperature data from year 2001 to 2010 is given in **Annexure 2.2**

2.4.3 Humidity

As per rainfall and temperature, humidity gradually increases from the month of June to mid October. After that humidity decreases and winter season starts. During December - January the humidity is very low.

2.4.4 Wind

During summer season dry and hot winds cause drought conditions. Dust storms are common during hot weather. Strong winds following rains also cause uprooting of trees and breakage of branches.

2.4.5 Drought and its periodicity

The Bir Mehas WLS experiences dry weather all through the year. Most of the rainfall is received between June to September. During winter there is negligible rain in Bir Mehas WLS. Thus, the overall climate is dry and drought prone.

2.4.6 Frost

During winter season, frost is quite frequent but is very severe sometimes and causes considerable damage to seedlings and even the mature trees of kikar, and neem and sometimes out rightly kills them.

2.4.7 Dew and Hail Storms

Dew does occur during rainy winter months but has not got much significance for the vegetation but certainly for the herbivorous animals. Dense fog reduces visibility which induces chances of hunting under the fog cover.

2.5 Water Sources

Ghaggar Branch Canal which flows near the sanctuary. Although canal water supply is available through outlet of Ghahggar Branch canal

system, water pump with Electric motor have been installed in the sanctuary for forest nursery in the compartment no. 4.

2.6 Range of wildlife, status and distribution

2.6.1 Vegetation

2.6.1.1 The bio geographic classification

As per the bio geographic classification of India (Rodger and Panwar 1988), the area falls under bio geographic zone 4 i.e. 'Semi arid' and biotic province 4A -'Punjab Plains'.

2.6.1.2 The forest types, cover and food for wild animals.

The original vegetation in the sanctuary area were of the type dry tropical thorn and scrub forests which fall under the 'sub group' 5-B (Northern tropical dry mixed deciduous forests, according to the revised classification of the forest types of India by "Champion & Seth" (1968). Due to the various edaphically factors like soil, climate and biotic factors which have played on the natural vegetation of this bir forest the vegetation can be recognized as " Saline and alkaline scrub savannah sub type E8 of group 5-B." The crop consists of both planted and natural, indigenous and exotic trees and shrubs.

The detailed list of flora and vegetation composition of Bir Mehas WLS has been given in **Annexure 2.4 & Annexure 2.5**

2.6.1.3 Species and communities of conservation importance; key areas.

Bir Mehas WLS is an important repository of the diverse floristic elements. Even though it is not as rich in terms of endemic plants or animals, it does harbor many of the important elements of tropical dry deciduous forest.

2.6.2 Animals

2.6.2.1 Vertebrates

The sanctuary is an abode of many herbivorous like Blue bull, Rhesus monkey, Hare, along with small carnivorous species like Jackals, Jungle cat, Snakes etc. A variety of bird species can also be seen along water sources. Among the animals, rhesus monkeys, blue bull, jackals are found in abundance. The population of rhesus monkeys and blue bull is constantly on the increase. The small Indian mongoose is also seen. The population list of wild animals is given as **Annexure 2.6**

A) Mammals

a) Herbivores:-

Rhesus Macaque (*Macaca mulatta*):

Local Names: Hindi-Bandar; Punjabi-Baandar, Bengali-market; Kashmiri-punj ponj; Burmese-meeauk,

Size: Seated, a male rhesus is about 2 feet (60 cm.) high and scales about 15-23 lb. (7 to kg). Females are smaller and slighter and slighter in build. Head and body, 1 $\frac{1}{2}$ feet (45 cm.); weight, 10-14 lb.(5 to 6 kg.). The largest and heaviest animals are found in the westerly ranges of the Himalayas.

(b) Carnivores

Jackal (*Canis aureus*): - The jackal is among the most familiar animals of the country. It is closely related to the wolf, but lacks the elevated forehead and the arching brows. It is smaller than a village dog and possesses a bushy tail. It measures 60-80 cm in the length of head and body and 38-45 cm in height at the shoulder.

B) Birds

Grey Partridge: - *Francolinus pondicerianus* 35cm. Sexes alike. Grey-brown and rufous above, barred and blotched; buffy-rufous below; narrow cross-bars on throat, upper breast; fine black markings on abdomen, flanks; black loop around throat encloses bright rufous-yellow throat; female smaller, with indistinct spur. Small parties, digging and moving amidst scrub and grass; seen on country roads, dust bathing or feeding; quick to take to cover on being alarmed, scattering over the area

Redwattled lapwing: - *Vanellus indicus* 35cm. Sexes alike. Jet-black head, head, neck, breast, bronze-brown upper body; white below, continuing to broad bands up the neck-sides towards eyes; fleshy crimson facial wattles diagnostic. Solitary or pairs when breeding; often large flocks in winter; moves on open ground, feeds during mornings and evenings; vigilant species, its loud cries heralding any new activity in an area; often feeds late into evening.

Rose ringed parakeet:-

Psittacula krameri, 42cm, including long tail **Male:** grass-green plumage; short, hooked, red beak; rosy-pink and black collar distinctive (obtained only during third year). **Female:** lacks the pink and black collar; instead, pale emerald-green around neck. Gregarious; large flocks of this species, familiar sight in India; cause extensive damage to standing crops, orchards and garden fruit-trees; also raids grain depots and markets; large roosting colonies, often along with mynas and crows.

Hoopoe:-

Upupa epops 31cm.including beak Sexes alike, Fawn colored plumage; black and white markings on wings, back and tail; black and white markings on wings, back and tail; black and white-tipped crest; longish, gently curved beak. Solitary or in scattered pairs; small loose flocks in winter; probes

ground with long beak, sometimes feeding along with other birds; flits among tree branches; crest often fanned open; becomes rather aggressive with onset of breeding season.

Indian Peafowl (*Pavo cristantus*): -

The Indian Peafowl is a colorful, swan-sized bird, with a small head bearing a fan-shaped crest of spatula tipped feathers, a white patch under the eye and a long, slender neck. The sexes are dimorphic. The male (cock) has a metallic bronze-green train of about 200 elongated feathers (upper tail-coverts), each of which is tipped with a purplish black-centered coppery disc. Its length (excluding the train) varies from 92 to 122 cm, while its total length (including the train) varies between 2 and 2.25 m. The neck and the breast are glistening blue in colour, while the lower back is bronze-green with some amount of black. A part of the wing is chestnut in colour. The female (hen) is brown and is slightly smaller than the male. It lacks the train. Its lower neck is metallic green and the breast is Buffy brown with some wash of metallic green. Its wings have no chestnut-colored feathers. The immature male is like the female.

C) Reptiles: Systematic list of reptilian species has not been prepared but reports of occurrence of many reptilian species/sub species in Bir Mehas WLS are available. This includes Cobra, Krait, Viper, Monitor lizard, turtles etc.

Yellow Monitor Lizard:-

The yellow Monitor is of dark brown colour with a reddish tinge on the body. It measures about 36 cm in the head and body length. The tail is strongly compressed and is about 46 cm in length. The snout is short and convex, and the nostrils are oblique slits. The scales on the crown are smaller than the nuchal ones, and the dorsal scales are strongly keeled. The digits are very short.

D) Amphibians and Fishes: The class amphibian is represented by order Anura which includes the frogs and toads. There is no inventory regarding amphibian and fish species found in Bir Mehas WLS.

2.6.2.2 Invertebrates, their status, distribution and habitat

The knowledge of the occurrence and status of the invertebrates in this WLS is important from management point of view. Insects being primary feeders are important part of the ecosystem. Larvae and ants feed extensively on decaying remnants. Honey bees, butterflies, wasps, termite, bugs, beetles and ants etc are different types of insects found in Bir Mehas WLS. The list of animals & birds found in the sanctuary is attached as Annexure 2.7 & 2.8

CHAPTER 3

HISTORY OF MANAGEMENT AND PRESENT PRACTICES

3.1 General History

Prior to the integration of princely states, this bir forest was owned by the erstwhile princely state of Nabha and was maintained as a Game Reserve and grazing ground for state cavalries and hunting ground for the state head. Grazing of cattle of the local villages was permitted on fixed or concessionary grounds.

The area was handed over to the Forest Department during 1958, when a regular programme of raising plantations was initiated. The Bir was brought under irrigated plantations and various species of exotics were introduced after removal of indigenous old growth and research plots were established. Attempts were also been made to reclaim the saline and alkaline patches by application of farm yard manure and gypsum, cultivation of medicinal plants, salt resistant species etc. At present, the crop, therefore, consists of planted kikar, eucalyptus, teak, *Prosopis* (mesquite), mulberry etc.

3.2 Timber Operation including bamboo and firewood harvest

3.2.1 Silvicultural Systems and tending operations

Working plans, under which Mehas forests were systematically managed in past are as follows-

The area was managed under the prescriptions of Sh. Bhagat Singh's Working Plan (1955-56 to 1980-81) and Sh. S.K. Kapur's Working Plan (1981-82 to 1990-91). The objectives of management of these working plans were mainly to increase the growing stock of the forests and prescriptions for wildlife conservation were not dealt with. Sh. R.K. Luna's Working plan (1991-92 to 2000-01) for the first time introduced the

working plan for wildlife protection circle in which Bir Mehas was included in this working circle. The main objects of management were to increase the wildlife population of the sanctuary according to carrying capacity, to identify, preserve and protect the wildlife species representative of the area and finally to improve the ecology of the area. New plantations were also raised under various schemes.

3.2.2 Firewood Harvest and Collection

As per provisions of the Wildlife (Protection) Act 1972, the Bir Mehas WLS is free from all commercial extractions including firewood collection. However sometimes villagers from adjoining areas of Bir Mehas WLS do enter the forest to collect firewood illegally.

3.3 Non Wood Forest Produce (NWFP) Collection

Commercially important minor forest products are negligible in Bir Mehas WLS due to dominance of such species that are not yielding such products.

3.4 Leases.

At present, the Bir Mehas WLS area is not burdened with any type of leases.

3.5 Other Programmes and activities

There is One Pir Baba samadh in compartment no.9. The Forest department has established a nursery in compartment no. 4. No other programme or activity is being entertained which may adversely affect the wildlife and their habitat.

3.6 Forest Protection

3.6.1 Legal Status

A) Notifications

Bir Mehas was maintained as a shikargarh by Nabha State. It was declared as protected forest (second class forest) by Punjab Govt.

Notification No. 2026/Ft (IV)-61/3654-3659 dated 05-07-1961 (**Annexure 3.1**). Prior to this the area was managed as unclassed forest. Bir Mehas was declared as a sanctuary vides Notification No.F-150/50 Dt. 28/2/1952 Under Fana of Patiala act (**Annexure 3.2**) Under Wildlife (protection) Act 1972. No settlement of the rights of local people and concessions has been mentioned in the 1982 notification. Technically no private or community rights are in existence in or over forest area of WLS. Any person desirous of entering in to the sanctuary area shall take the permission from Chief Wildlife Warden (CWLW) or authorized officer.

3.6.2 Hunting

Hunting is totally banned under provision of Wildlife (Protection) Act, 1972. No rights or privileges exist in the area for hunting of wild animals and birds. The list of NOC (no objection certificate) for arms licenses issued within 10 km of the sanctuary area is given as

Annexure 3.3

3.6.3. Illegal activities

3.6.3.1. Poaching

Poaching is generally not common. The details of offence cases, both wildlife and other are listed as nil.

3.6.3.2. Illegal cutting of trees

The villagers around the Bir Mehas WLS sometimes illegally collect timber and firewood from wind fallen branches and dead trees in the surrounding forest areas and whenever get a chance they do resort to illicit felling.

3.6.3.3 Illegal removal of NTFP, encroachment and other illegal activities

There is no commercial harvesting by the department or through contractors. Illegal removal of NTFP is negligible. An encroachment by the adjoining on Sanctuary land is reported. The litigation is still pending school in the local courts.

3.6.4 Livestock Grazing

Illegal grazing from stray cattle remains potential factor contributing towards degradation of forest and reduced forage for wildlife and controlling this is the biggest challenge for the staff. Although the problem is not severe the unequipped staff and poor infrastructure support dilute the efforts of controlling it.

3.6.5 Wild fires

The area being largely dry deciduous is prone to fire, due to the highly combustible undergrowth consisting of a dense mass of dry grass and twigs of *Prosopis*, which dry up during summers. Fire lines are made to check the forest fires and are mentioned time to time.

3.6.6 Insect attacks and pathological problems

No major insects are found to damage the crop here. Termites are found in large scale and at some places trees stumps are covered with termite's mounds.

3.6.7 Wildlife Health

There is no record of wildlife diseases and epidemics in the area. But wild animals need protection against contagious diseases like rinderpest, foot and mouth disease, hemorrhagic septicemia etc which might get transmitted through domestic and stray animals.

3.6.8 Interagency programmes and problems

There are several developmental activities such as tourism, public works and rural development in and around Bir Mehas WLS, which are being implemented by different departments and they should also ensure

that developmental activities undertaken by them are not harmful to the sanctuary and the natural habitat.

3.7 Tourism

The sanctuary because of its situation near Nabha town has great potential for local tourists and can provide a forum for environmental education to the schools and students of the University/colleges, besides providing a source of recreation.

3.8 Research, Monitoring and training

A) Research and monitoring

For effective management, it is necessary to have a basic knowledge about the occurrence of various floral and faunal species, distribution over the area and their population dynamics.

B) Training

The staff is not trained in wildlife management. Special training in population estimation, animal health and habitat study, eco-development and eco tourism are very much required to increase the knowledge and skill of the staff.

3.9 Wildlife Conservation Strategies and their evaluation

In Sri R.K. Luna's working plan (1991-92 to 2000-01) following measures were suggested to restore the ecological status of the area.

1. Demarcation and fencing of area.
2. Provision of Water holes.
3. To control illicit grazing.
4. Planting of fodder stock and pasture lands.
5. Elimination of Eucalyptus crop.
6. Preservation of snags and dens.
7. Fire protection measures.
8. Control of poaching.

9. Census of wild animals and co-ordination between forest and wildlife staff.

3.10 Administrative Setup:

As per the reorganization of Wildlife Department done by the Punjab Govt. Vide Notification No. 34 / 9 / 2000 / FT-IV /2656 dated 19-02-2001, the administrative control of sanctuary falls under the jurisdiction of Divisional Forest Officer (Wildlife), Patiala which comes under Parks & Protected Areas Circle Punjab, Chandigarh headed by a Conservator of Forest (Wildlife). At field level the sanctuary is looked after by one wildlife guard, who report to wildlife warden/Range Forest Officer through the Foresters. The present position of staff under DFO (WL) Patiala is given in **Annexure 3.4**

3.11 Communication

A) Road Communication

There is a network of kutcha paths in the sanctuary. These paths and fire lines are maintained by the department to prevent fire and to access area. The detailed description of these fire lines along with the location in map is given in the **Map 1**.

B) Wireless communication

For quick message transfer, wireless/tele communications are one of the most important tools in any PA but unfortunately Bir Mehas WLS is not having effective network of tele and wireless system. The communication networks need to be strengthened in the interest of wildlife.

C) Vehicles/Mobility

There is only one Petrol Gypsy with the Wildlife Division Office. To make the communication/effective protection and management any PA

needs to be equipped with a variety of vehicles ranging from motorbikes to vans. There is dire need of a pickup van and one tractor- trolley and tanker for this WLS.

3.12 Summary of threats to wildlife

Due to proximity to the urban habitat, natural calamities and other external & internal factors, the sanctuary faces many problems for management of wildlife which are discussed below: -

- (a) Proximity to Town:** - The sanctuary is situated amidst agricultural land and thickly populated villages. This has drawback, as pressure from poachers, wood cutters and grass cutters comes to WLS.
- (b) Overpopulation of monkeys:** - The number of rhesus monkeys has increased in the past which cause damage to the wildlife habitat as well as nearby agricultural crops. This results in the wrath of the farmers who show lack of interest towards wildlife conservation.
- (c) Stray Cattle:** - Sometimes stray cattle sneak into the sanctuary area for grazing and thus take the share out of space and forage meant for the wild animals. This reduces the habitat quality and increases the chance of disease transfer.
- (d) Soil texture and Seepage:** - The sources of drinking water for the wild animals are mainly either the canal water or the tube wells. But during the dry and hot season the animals face water scarcity, when it is needed the most. More tube wells, waterholes and deepening of water channel are needed to meet the water requirements.
- (e) Scarcity of Fruit and Fodder Trees:** - In the natural vegetation, there is very scanty representation of fruit trees, which can provide food to the avifauna, monkeys and other herbivores. To enhance the forage value of area, plantations of fodder and fruit trees need to be raised.

(f) Forest fires: - Forest fires are a great threat to the vegetation and wild animals. Due precautions are to be kept on the road sides, to prevent fire particularly in the hot season. In the harvesting season when farmers burn the crop residues, the fire can spread from the fields to the sanctuary area and may cause irreparable loss. The detailed list of fire lines is attached as **Annexure 3.5**.

CHAPTER 4

THE PROTECTED AREA AND THE INTERFACE LANDUSE SITUATION

4.1 Existing situation in the Zone of Influence

Bir Mehas Wildlife Sanctuary is surrounded by agricultural lands. The villages situated along with or near the periphery of the sanctuary are mainly subjected to interferences (Annexure 4.1). The types of pressure are grazing by domestic livestock, fuel wood collection, illicit felling, poaching, encroachment etc.

The pressure exerted by neighboring villages and the human-animal conflicts need to be considered for formulating the Zone of Influence in the peripheral areas. The areas from where influences are likely to be exerted extend at least 3 km outside the PA. Thus Bir Mehas WLS having its Zone of Influence as follows-

On southern border of Bir Mehas WLS, zone of influence `A' is proposed for area of villages Ramgarh & Rohti Channa

On western side all along the boundary, the sanctuary comes directly in contact with revenue land of villages Dharonki, Kallamajra, Nabha and Ageta, that is proposed as Zone of Influence `B'.

Village Thuhi and Nabha city touches. The boundary of sanctuary from north side, so these villages need to be taken as Zone of Influence `C'.

Eastern border is having villages Mehas, Rohti mouran and Rohti Khas. This will form Zone of Influence `D'.

People of adjoining villages are predominantly farmers of Jat sikh community comprising majority of the total population. Other communities are Scheduled castes, traders and backward classes. Main occupations are agriculture, trade and related commerce. Main festivals are Baisakhi, Lohri, Diwali. Group dance, local fair, community kitchen and social get together are marked activities during festival seasons.

Total population of these 10 villages is about 15300 having 2188 families, out of which 45% are below poverty line. People residing around the PA influence the various characteristics of wildlife and by establishing PA; access of local people is curtailed to the natural resources. This not only affects the attitudes of the local people towards the PA but also results in adverse social impacts on the residents. Therefore, it is necessary to take into consideration the social and economic structure of these villages for tackling the negative impact of people to PA and vice a versa. Socio economic details of these villages are given in **Annexure 4.2**.

Neighboring villages and their residents has serious adverse impact on their surrounds. As villagers leave their non-productive cattle in the forests, they compete for food with wild herbivores, which are thus put to disadvantages. These biotic pressures also lead to over grazing, which seriously disturbs forest ecology. Presence of villages on the immediate border of a Sanctuary leads to hardships to the villagers too, as agriculture crops are prone to damage by wild animals like blue bull, monkeys etc.

A) Agriculture and land use pattern

In this region about 12% of the total families are landless, 52% families have land up to 1 Acre and 36% families have land varying from 1 Acre to 5 Acre. Agriculture is totally irrigated and drains, water canals,

tube wells and diesel pumps etc. are used for it. Fertilizers and pesticides are used in most of the cases. These chemicals used by farmers around the sanctuary do cause negative effect on wildlife populations including avifauna which stray to outside fields for food.

B) Resource Dependency

All the communities residing around Bir Mehas WLS do not directly depend on the forest resources, about 80% of the total families use LPG, agricultural waste & cow dung as fuel. Rest of the families is dependent totally or partially on forest for their need of fuel wood. Indirect dependence on the forest is in the form of head loading, grass cutting, encroachment, leaving their stray cattle within sanctuary etc.

4.1.1 Forest/Protected Area Management practices and their implication for people

Restriction on resource extraction from sanctuary has caused resentment and indifferent attitude towards the WLS. Problem posed by overpopulated monkeys and crops destruction by blue bull are sensitive issues in the surrounding of the Bir Mehas WLS. These problems have been affecting local communities and this requires strategies for better management and long term conservation of Bir Mehas WLS.

4.2 Development programmes and conservation issues

The Zila Parishad in this area takes up different development programmes. Different schemes such as M.G.NREGA, Sampurna Gramin Rojgar Yojna (SGRY), Punjab Nirman Programme, Integrated Rural Development Programme, Agriculture sub-plan etc are taken up. Education facilities in form of primary and secondary schools are existing in Zone of Influence area. There are primary health centers for looking after the

health of the people. Community building, organization of villagers, awareness in health and education etc. are needed to be done by NGOs.

The local products and hence local communities are trying to compete with market forces and as a result ecological concerns might get neglected. There is constant demand of timber wood and fuel wood in the surrounding areas. This negative market factors disturb the economy of people and ecology of Bir Mehas WLS.

There are 10 villages within 10 km of the Bir Mehas WLS. The problems which are being faced by these villagers are as follows:

Wild animals sometimes stray out from sanctuary to these crop fields for readily available food. This brings local population in conflict with wildlife. All these aspects indicate that livelihood of adjoining areas need to be taken into consideration while devising a management plan for WLS. The stray cattle need to be kept out of sanctuary in order to ensure better habitat for wildlife population.

Due to declaration of PA the extraction of forest produce have been stopped from the Bir Mehas WLS. This has resulted in the frequent illegal removal of firewood and is one of the causes of conflict with local population.

Most of the villagers in Zone of Influence are still not fully educated and lack awareness about biodiversity and wildlife.

CHAPTER 5

VISION, OBJECTIVES AND PROBLEMS

5.1 The Vision

Bir Mehas had been one of the important block forests of Patiala Forest Division. Due to extensive exploitations of natural vegetation existing in Bir forest in the past few decades and bringing the area under new plantation cover, the ecology of Bir Mehas has changed tremendously. The bir forests is attracted the main attention of forester and environmentalists alike, therefore there was a strong thinking that the block forest may be preserved in situ to conserve the little left wildlife fauna and rare remains of forests in Punjab. In the years to follow, many measures have been taken to bring back the glory and ecology of the past. In the future the sanctuary is set forth to attract more and more tourists to see the wildlife in nature itself. Therefore the vision for the Bir Mehas WLS is "Restoring the past glory of representative biodiversity of Punjab plains with emphasis on water conservation along with natural flora and faunal representation and the involvement of local people."

5.2 Objectives of management

And

5.3 Problems in achieving objectives

Objective 1: To secure the conservation of biodiversity and to enhance the status of wildlife by habitat amelioration works in a natural representative habitat of Bir Mehas WLS.

Problems: The problems in achieving above target include poaching, habitat deterioration, poor protection and law enforcement, anthropogenic pressures, poor herbivore population, poor research and monitoring activities, lack of fencing, protection related problems due to the unskilled and unequipped field staff, lack of awareness.

Objective 2: To maintain and strengthen the protection measures against external disturbances like illegal grazing, trespassing, collection of fuel wood, fire, disease etc.

Problems: Habitat deterioration, anthropogenic pressures, illegal grazing, uncontrolled trespass activities due to lack of fencing, monkey menace, vehicular traffic, disease threats.

Objective 3: To remove the alien and invasive species from the WLS and restore the natural habitat suitable for wildlife and to safeguard the hydrological and edaphic factors of the Bir Mehas WLS through soil and moisture restoration

Problems: Fire, encroachment, poor soil quality, poor regeneration, poor cover, microhabitat disturbance, weed infestation, lack of natural water resource, human pressure, lack of information regarding original floristic, prolific regeneration of *Prosopis*, monocultures, funds availability, insufficient research inputs, grazing, fire, weed infestation, over population of monkeys.

Objective 4: To improve the quality of life of people living around sanctuaries by providing them with alternative means of livelihood.

Problems: Extensive agriculture, agriculture pattern in surrounding areas using pesticide etc, market demand, increased population pressure, lack of awareness, feeling of freely accessible resource, delay in fencing work, lack of socio-economic studies.

Objective 5: To promote conservation-education and environmental awareness of the local communities with help of meaningful interpretation and development activities.

Problems: Traditions and customs (feeding monkeys and cows etc), shortage of trained staff, absence of institutionalized schemes & programme, inadequate infrastructure, weak inter-departmental co-ordination, lack of extension activities, inadequate motivation among the local people, inadequate publicity efforts.

Objective 6: To strengthen the activities of training, research and monitoring for effective management of wildlife in the sanctuary.

Problems: Inadequate infrastructure facilities, shortage of funds, no scientific research input, untrained staff, unsystematic monitoring protocol, lack of institutional coordination

Objective 7: To develop a mechanism for the interdepartmental, inter-agency dialogue, for achieving the broader goal of welfare of the wildlife as well as the local inhabitants of the area.

Problems: less coordination, difference in priorities of different agencies, lack of awareness, inadequate efforts in creating awareness, target approach, lack of political will.

Details of problem analysis in the form of problem matrix is given in

Annexure 5.1 as the swot analysis

CHAPTER 6

The Strategies

6.1 Boundaries

The detail of physical boundaries has been discussed in section 2.1 of part I of the plan. The outer boundary is shared with the revenue areas of neighboring villages. Some of the problems with boundary of Bir Mehas wildlife sanctuary are:-

1. The ecological boundaries of Bir Mehas Wildlife Sanctuary go beyond its physical boundaries. The herbivores especially blue bull venture out into the adjoining agricultural fields.
2. The continuity of Bir Mehas Wildlife Sanctuary forests with the other territorial forest blocks of Patiala forest Division needs to be translated in field and managed under coordinated and compatible working & management plan. Their administrative objectives need to be similar.

6.2 Zonation

The Bir Mehas wildlife sanctuary consists of 9 compartments. At present, no zonation is there in the sanctuary. The visitors are not allowed unless and until permission is given by Divisional Forest Officer, Wildlife Division, Patiala. The main emphasis will be given to habitat preservation with efforts to restore the ecology and original vegetation. Zonation for the entire sanctuary including the trans-boundary areas is as follows:

Sr. No	Name of Zone	Details
1	Biodiversity Conservation Zone	Entire area of sanctuary except ecotourism zone
2	Ecotourism zone	Compartment no. 4, 3, 2, 9, 8, 5.

6.3 Zone Plans

6.3.1 Biodiversity Conservation Zone

6.3.1.1 Constitution

Bir Mehas area was declared as sanctuary not only to protect wild animals but also to conserve the biodiversity of the tropical deciduous forests of Punjab plains. Hence, for continuation of measures taken since its inception, the entire sanctuary (except tourism zone) will be treated under the Biodiversity Conservation Zone during this management plan period.

6.3.1.2 Objectives

1. To conserve the representative biodiversity and to safeguard the natural ecological succession in the area by ameliorating the degraded weed infested habitat and water resources to make it habitable for wildlife.
2. To minimize the external disturbances by accelerating process of elimination of causative factors if any.
3. To undertake research and monitoring work to understand the ecological process.

6.3.1.3 Problems

The major problem in management is poor habitat quality. Dominance of Eucalyptus and Prosopis in some of the compartments has

lead to imbalance in habitat composition and depletion of grasses. Population of existing stray cattle is one of the major problem. The high population of rhesus monkey is also creating nuisance in the area. In addition, funds, manpower, water supply in summers, vehicular traffic and anthropogenic pressures like trespassing and firewood collection.

6.3.1.4 Past management approach

Plantation of fodder, fruits and medicinal plants has been undertaken in past through out the area of the sanctuary. Fire lines have been constructed to divide dividing the sanctuary into 9 compartments.

6.3.1.5 Management strategy

A) General Strategies

The Biodiversity Conservation Zone will be managed in following manner:

- i) No tourists or any other person except the authorized wildlife staff and their vehicles will be allowed inside this zone of sanctuary. Visits of researchers and public (in areas other than tourism zone) will be possible only after the permission from the CWLW or his authorized officer.
- ii) No person will be allowed to halt within the sanctuary during night time without prior permission except the authorized staff and officers and the census staff during wildlife census. All labour oriented work (except watch & ward) will be done only during day time.
- iii) No activity should be undertaken in this area except the approved maintenance works, habitat restoration and improvement works, forest and fire protection works and research and monitoring.
- iv) Proper protection of the boundary fencing should be ensured through day and night patrolling.

- v) The other regular habitat management activities like weed control, habitat amelioration, fire protection, moisture conservation, water hole, fodder development etc will be carried out as per the requirement of site and as prescribed in the theme plans.

6.3.1.6 Monitoring/Evaluation

- i) Protection measures and enforcement will be monitored by regular vigil, inspection and surprise checks by authorities at all level.
- ii) Monitoring of the vegetation and related habitat change can be done using the permanent plots that will be laid within the area.
- iii) For the treated areas, vegetation and soil characteristics changes will be monitored, so that comparison can be made in later years.
- iv) The increased wildlife use will itself be the indicator of success.

6.4 Theme Plans

Several strategies on virtue of their nature are azonal or common to several or all zones e.g. anti-poaching, fire protection, maintenance of water sources, control of weeds etc. Five theme plans visualized for this sanctuary are as follows-

6.4.1 General protection plan

6.4.2 Habitat restoration plan

6.4.3 Species reintroduction plan

6.4.4 Wildlife health management plan

6.4.5 Inter-agency co-management plan

6.4.1. General protection plan

General protection plan deals with the protection of Bir Mehas Sanctuary from all the threats including natural calamity. It is very necessary to protect it from external disturbances like encroachment, illicit felling, poaching, illegal grazing, trespassing, flood, fire etc.

Objective

1. To safeguard the wildlife and their habitat against ill effects of illegal anthropogenic activities
2. To protect the microclimate and the natural ecological processes and functions of the area.

Limiting factors

The limiting factors are presence of stray animals, trespassing, location amidst habitation, over population of monkeys, poor surveillance, shortage of funds and manpower etc. The area of the sanctuary is not very large but limited number of staff, mobility, communication and various other factors make management a challenge.

Strategy

General protection is very important for the conservation of biodiversity of Mehas WLS. For the better coordination of protection activities, there is need of a permanent post of a Deputy DFO/ Wildlife Warden who will also be heading the vigilance squad. (Details are given in chapter 10.1.1) The fire lines will be kept clean of debris and unwanted growth to prevent fire and will also be used as inspection path. Wireless communication will be revived and strengthened. Keeping track of habitual offenders, wildlife trade etc. through developing rapport with the surrounded villagers and through informers, and liaison with police department. Creation of registered secret special service fund on the line of police department can be done by pursuing the matter at the higher level and to secure fund for this purpose. A separate registered wildlife development society can be made for the controlled development works for the WLS. It is important to maintain the integrity of boundary. Encroachment in the forest area is although not a common feature in Mehas but people might tend to expand their agricultural fields if

boundary fencing is not properly maintained. Staff should remain vigilant and no trespass/encroachment will be allowed. Offenders should be prosecuted accordingly. Biological fence of *Capparis*, *Cactus*, *Agave*, *Bougenvillia* etc. will be erected all along the fencing to strengthen it. For fire prevention the strategies will be implemented as Cutting and burning of internal and external fire lines of different width is prescribed. During fire seasons 6 additional fire watchers will be deployed to patrol the entire area in addition to regular watch & ward. 2 new permanent watch towers will be fixed at different locations. There is a need to develop good rapport with the villagers and convince them about ill effects of fire. During fire season a vehicle and the squad will be kept ready round the clock to attend the fire. The fire fighting equipment will be procured in advance. Fire reporting will be done by the beat in-charge and sent to the Wildlife Warden for division record. The report will contain:

- Name of Bir, beat and compartment numbers
- Extent of area burnt, losses shown on Map
- Probable cause of fire
- Time of occurrence and putting off the fire, date.
- Fire line network in that area
- Name of offender if known

Miscellaneous management

- i) Vehicles like pick up van will be made available for the patrolling staff.
- ii) Mobile/wireless handset will be provided at all the important points to field staff.

- iii) Staff may be given arms training and arms & ammunition.
- iv) Steps will be taken to appoint the young and motivated staff.
- v) The detailed record keeping of offences/problems will be maintained.
- vi) The important issues of protection will be discussed in the monthly meeting with DFO (Territorial) at district level and with CF (Parks & PA) at circle level.

Monitoring and evaluation

The effectiveness of the protection measures taken will reflect in the initial increase in the number of the 'Offence Report' but decline later on.

6.4.2 Habitat restoration plan

Habitat management in wildlife areas primarily involves restoration of natural vegetation, undisturbed habitat, proper water regime, improvement of ecological balance etc with adoption of suitable practices for the long term conservation.

Objectives

1. To ensure habitable conditions to the flora and fauna so as to bring the area as close as possible to its natural functioning.
2. To protect the available natural resources for attaining the goal of conservation
3. To maintain and improve the ground water and other water resources and the soil quality which will help in improving the ecology

6.4.2.3 Limiting factors

Important limiting factors include monoculture, anthropogenic pressure, invasive species, poor crop composition, grazing, water scarcity, shortage of funds and manpower, poor baseline data for analysis, etc.

6.4.2.4 Strategy

Since the area has been exposed to the greater level of human and cattle disturbances it is essential to undertake ameliorative works on priority to develop the habitat conducive for wildlife. The habitat management of Bir Mehas wildlife sanctuary will be a multi-pronged approach. It involves following activities Bir Mehas wildlife sanctuary has been infested with many invasive and alien at some places the species like *Prosopis juliflora*, *Capparis seiparia*, and *Parthenium* etc. have spread over large areas which need to be checked. This deteriorates habitat quality in terms of area reduction, other than this; a large part of area is covered under *Eucalyptus* plantation in form of monoculture which has changed the original vegetation type. Following measures will be taken to control these undesirable species.

- i) A study to decide the extent of *Prosopis*/ *Eucalyptus* removal.
- ii) Compartment-wise distribution maps, extent of needed uprooting, present status of regeneration, and areas to be treated etc will be recorded and shown on map.
- iii) The uprooting of *Prosopis* will be done in selected areas. Removal of *Prosopis juliflora* is proposed initially. Uprooting of *Prosopis* will be done just after monsoon, before the flowering season.
- iv) Gradual removal of *Eucalyptus* will also be targeted, beginning with dead and dry trees.
- v) Strict grazing control in the uprooted area will be done to prevent damage to regeneration.
- vi) *Prosopis*, *Capparis*, *Lantana* etc. present along the boundary of the sanctuary, near water sources and less shrubby area will be retained.

vii) *Shisham* with mixed trees areas show less spread of weeds. Artificial regeneration will be done to create this composition as a long term strategy.

Uncontrolled illegal grazing not only reduces the quality and quantity of browse and fodder but also affects forest regeneration, causes soil depletion and creates openings for the weeds. Following measures are suggested for improving forage availability for wildlife.

- i) The foremost activity should be to ensure strict enforcement to stop illegal grazing in the WLS.
- ii) There are many degraded sites in the sanctuary, which do not support vegetation at present. Such sites should be developed for forage and fodder development for wildlife. Meadows so developed would be prime areas for wildlife.
- iii) It is recommended to develop several grass meadows after complete removal of all the exotic trees and shrub vegetation. Treatment map will be prepared to carry out different type of habitat development works.
- iv) For the better grass growth the area will be control burnt in the month of December-January depending upon the drying of vegetation.
- v) To augment forage value of land, plantation of fruit bearing, nutritious species will be undertaken where ever possible and desirable.
- vi) Treatment of soil with gypsum, farm manure etc before plantations. Construction of stoned pitched forest ponds etc. will help improve soil quality and water balance of the area.
- vii) For plantation under any scheme or project the choice of species will be as per requirement of wildlife. Plantation sites, area and extent

will be selected by DFO (WL). Maintenance and protection will also be ensured and covered in the plantation expenditure.

viii) Artificial Saltlicks will be provided to fulfill mineral requirement of the wildlife; artificial wallows will be made near waterholes. (Blue bull may require such wallows).

The sanctuary falls under the semi arid zone of western India. The plants and animals have evolved with the water as a limiting factor. However wildlife faces hardship in peak summers hence some manipulation is needed.

- i) Water will be maintained in all the water holes, drain and pools through out the year. Annual clearing and de silting works will be undertaken. Wherever needed the ground water recharge will be ensured by undertaking moisture conservation activities.
- ii) The continuous stretch of low lying topographical features inside the sanctuary should be suitably developed as permanent water body.
- iii) Water can be channelised to the water course passing through the sanctuary. This water structure will improve the microclimate of the sanctuary as well as attract migratory birds during the winter and will be major tourist attraction.
- iv) Suitable fish seed/fingerlings can be introduced in this water body to fulfill the need of piscivorous birds and animals . In addition small reptiles like turtles etc may be released with suitable improvement in the habitat.
- v) It is proposed to develop maximum of the area as water bodies in the sanctuary by replacing diesel pumps and electric motors with solar operated motors.

- vi) The temporary water holes will be converted into permanent structures by providing stone pitching and/or cement base.
- vii) Check dams will be constructed in the water course which runs through the sanctuary where required.

This will require removal of the factors which give artificial look to the area and do not merge with the surroundings. Sanctuary area should be made free from unnecessary concrete structures as far as possible. Sanctuary area should be devoid of any residential buildings since their existence leads to biotic interference.

Due to in-effective fencing, large number of stray cattle and dogs make their way in the sanctuary. They are detrimental to sanctuary habitat and its wildlife population. It has been reported that approximately 185 stray cattle and approx. 40 stray dogs are sharing the natural resources on which the wild animals primarily depend for their survival. . This stray population should be shifted from the sanctuary area at the earliest. The only feasible option for shifting the stray cattle seems to lie in offering them to various 'Gaushalas' , However proper fencing of the sanctuary is essential before shifting such animals so as to avoid their re-entry in future. It is estimated that approximately 800 rhesus monkeys are wandering freely in the sanctuary area .Their Population is always increasing due to fast breeding.

The problem is further aggravated by the people who offer religious sanctity to this species and provide sumptuous food to them outside the sanctuary boundary. The population seems to be addicted to such type of luxuries and is reluctant to leave the place. One of the feasible options for their translocation from the sanctuary is to establish rescue center for them. It is advisable to segregate the sexes in the rescue center to restrict their further breeding. Alternatively, impact of

introduction of langur population to shift the rhesus monkey from the sanctuary area should also be considered, Expert opinion may be sought to ensure that langur population may not create any problem in future.

Monitoring and evaluation

Regular vegetation monitoring and analysis will be done to see the changes in the quality of habitat and composition of species.

- i) The change in the habitat use by wild animals will be recorded.
- ii) Pre weeding and post weeding effects in meadows will be studied by laying down **special 5m X5 m quadrants** in the area of operation.
- iii) Water level in all water sources will be recorded in the month of March every year. Any drastic decrease in level at any time indicates that there may be water shortage that year and augmentation is needed from outside.

6.4.3 Species reintroduction plan

The area was once a very good habitat for herbivores like spotted deer, Hog deer, Black buck, Blue bull and other deer and antelopes. It is expected that once the habitat is improved through development of grassy meadows, plantation of suitable tree and shrub species and development of water resources, the condition will be conducive for breeding and rehabilitation of these species. It is, therefore, recommended that suitable wildlife species should be introduced and rehabilitation in the improved habitat of the sanctuary.

Objectives

1. To maintain overall faunal diversity and prevent their local extinction.

2. To reintroduce a small population of selected deer species such as Hog deer, Black buck by translocation a breeding group from other area or Zoo or Deer park.
3. To ensure and maintain a viable population of blackbuck along with other deer species for scientific, aesthetic, cultural and ecological values.

Limiting factors

Main constraints will be water scarcity, poor habitat quality and excessive biotic interference etc. The plan also needs to be analyzed for the past experience, extent of area and surrounding land use pattern.

Strategies

The following conservation imperatives are very significant for the survival of small populations of reintroduced species.

- i) Pre reintroduction planning: Translocations from deer parks or other areas will be done in phased manner. It is proposed to shift excess population of blackbuck from Motibagh Deer Park to WLS. The WLS can be used as a shelter for rescued animals to be released here.
- ii) Preparation of site: Before reintroduction the WLS requires relief for some time to recover from various biotic and a biotic pressures. Keeping this in view the PA management will carry out practice of erecting fenced enclosures in some portions of the grasslands.
- iii) **Release and reintroduction: three carnivore-proof enclosures of size 1-2 acres** would be constructed in selected recuperated areas for immediate release of animal after translocation from source population.
- iv) Post release operation-From these small enclosures animals would be released gradually to the larger enclosures and finally open in WLS, once they increase in number and their density builds up.

Monitoring and evaluation

All the introduced animals will be regularly monitored. PA management must ensure that the social structure of the population is maintained including all possible age and sex classes of the species.

6.4.4 Wildlife health management plan

Although no big epidemic so far has been reported from this area but management should keep itself ready for any disaster or emergency situation.

Objectives

1. To introduce and maintain the wildlife health monitoring protocol and disease surveillance system
2. To prevent and control the epizootic diseases to the wild animals
3. To improve wild animal rescue and rehabilitation facilities.

Limiting factors

Presence of stray animals, lack of expertise and infrastructure, lack of trained staff and event of bird flu etc are some of the constraints.

Strategy

- i) Wild animals need protection against contagious diseases transmitted through domestic cattle/dogs. The most important prevention is to immediately drive out stray cattle and dogs from sanctuary.
- ii) Measure should be taken to vaccinate all the cattle of adjoining villages. Immunization should be ensured with certificate or tagging of the animals.
- iii) Help of local animal husbandry department will be taken for immunization, prevention and control.

- iv) All cases of major cattle and poultry diseases etc in adjoining areas will be reported.
- v) General health of wild animals will be regularly monitored. Staff will be trained in collecting samples and study disease symptoms.
- vi) The rescue and rehabilitation facility for treatment of diseased animal needs to be strengthened. Selected staff will be trained in tranquilization and rescue operations.

Monitoring and evaluation

- i) Regular sample analysis and body health condition studies will be done to monitor any change in health of wild animals.
- ii) Documentation of disease spread in adjoining villages will also help in monitoring.

6.4.5 Inter-agency co-management plan

Although thick human habitation areas surrounding Mehas WLS provides little scope to visualize corridor connecting it to other potential areas of territorial 'Bir' forests or PAs still for wildlife conservation planning at larger landscape, it is required to incorporate similar approaches in working plan of territorial forests as well. Therefore it is prudent to take into account the mutually impacting management practices of adjoining areas and policies of other agencies so as to achieve the environment friendly approach and better conservation of the wildlife.

Objectives

1. To minimize the adverse impact of conflicting management practices.
2. To ensure the better co-ordination and institutionalized mechanisms to achieve long term wildlife conservation.

Limiting factors

Low priority areas in state agenda, different jurisdiction in neighboring forests, need based approach, procedural delay, inadequate coordination among various departments, lack of integrated approach, lack of financial support, legal hurdles, shortage of trained staff, low profile of wilderness area.

Strategy

- i) Peripheral areas co-management committee: A quarterly meeting of territorial and wildlife division of Patiala under the chairmanship of CF (WL), Parks and PAs, Punjab, needs to be institutionalized, to discuss all related issues. These may include staff positions, communication measures, forestry operation works in wildlife divisions, analysis of working plan prescriptions, FDA works, man animal conflict cases in territorial area, combined patrolling, coordinated rescue operation, raids and intelligence sharing etc.
- ii) District level coordination committee: The district level coordination committee, as per state government notification no. F-150/50 Dt 28/2/1952 Under Fana of Patiala Act should immediately be set up with a view to promote effective inter-departmental coordination for the control of illegal trade in wildlife and wildlife products in the state. This committee will work as per guidelines of the said notification.
- iii) Creation of the sanctuary level Advisory committee: The process of constituting a sanctuary level advisory committee under the provision of Wildlife (Protection) Act 1972 section 33-B, will be expedite at competent level. The committee will work as per provisions in the Act.

Monitoring and evaluation

The success of these mechanisms can be evaluated against the smoother functioning of the departments, more reliable data on various parameters and acceleration of the pending activities due to the various administrative hassles.

CHAPTER 7

ECOTOURISM, INTERPRETATION AND CONSERVATION EDUCATION

7.1 General

The importance of wildlife in the survival of human being is well known. It is therefore, essential to make the people aware of its importance. Facilities for wildlife viewing such as nature trails, watch towers and hides should be developed to encourage the people to visit the sanctuary. Considering its location near Nabha town and Patiala, the area is suitable for strengthening and promoting the ecotourism activities.

7.2 Objectives

Ecotourism can become more meaningful mean of spreading conservation education, when supported with adequate interpretation facilities. Objectives of each of them are interlinked and can be summarized as follows-

1. To explore the possibilities of promoting ecotourism within the potential of the area.
2. To gather the public support for long term conservation.
3. To promote conservation education through interpretative skills and educative activities.

7.3 Issues and Problems

At present no entry fee is charged for visit to the sanctuary. Some of the constraints which management faces in developing ecotourism are as follows

1. Insufficient infrastructure and facilities to handle educational groups and visitors.

2. Lack of coordination among the various agencies.
3. Absence of professional approach for promoting ecotourism.
4. Shortage of manpower and trained staff.
5. Inadequate publicity and information, shortage of funds

7.4 The strategies

This will include area where visitors can go for wildlife viewing. The area will be demarcated properly and no visitor will be allowed to deviate or diverted from the path assigned.

7.4.1 Identification of the tourism zone

Table 7.1 Zonation

Sr. No	Name of the zone	Details
1	Bir Mehas Nature Trail	Parts of compartments no. 4,3,2,9,8 & 5

7.4.2 Strategies for the development of Ecotourism

After improving the habitat and subsequent introduction of Hog deer the sanctuary can be opened for the visitors with strict rules and regulations. Visitor facilities need to be developed within tourism zone of WLS.

Mehas Nature trail

A fee structure can be decided by Chief Wildlife Warden for future. Those having a permit to enter sanctuary only will be allowed in tourism zone.

There is possibility to develop a nature trail which can become very good mean of educating people, giving them first hand experience of forests and promote the ecotourism. Before laying down trail deepening of water course is needed to increase its capacity and beauty of the area. This nature trail is proposed as a part of daily tourism for nature education.

No camping will be allowed to any visitor. No unauthorized, unapproved visit will be permitted. No person will try to feed any animal inside the sanctuary. No litter will be thrown inside the sanctuary. The offender will be duly prosecuted. All the relevant rules of sanctuary regarding entry and activities inside will be binding on tourists.

D) Expanding the tourism activities '*beyond*' Mehas

Activities like bird watching, nature trail walk, competitions, quiz, 'paryavaran yatra', talk shows and workshops etc. can be conducted for school children and volunteer youths.

7.4.3 Regulations, monitoring and evaluation

Operational guidelines will be issued for all the stakeholders/partners for non invasive tourism. For whatever activity within the sanctuary area, all the rules and regulations of PA's will be strictly followed. Guidelines will be displayed prominently. Maximum permissible number of tourist at a time will be monitored. No vehicle or walk will be allowed during night time. All the details of number of tourists, areas allowed will be maintained and used for the evaluation.

CHAPTER 8

ECODEVELOPMENT

8.1 Objectives

1. To mitigate biotic pressure and reduce the resource dependency of local communities.
2. To generate alternative livelihood options for the local communities through eco-development.
3. To ensure people's participation in management for a peaceful co-existence between human & animal
4. To raise awareness level among local community for the long term conservation.

8.2 Specific Issues

The impact zone consists of villages, areas around the sanctuary, which are closely interlinked with the forests and affected with any activity within sanctuary and vice-a-versa. The region falls under productive agricultural belt and almost entire population depends upon agriculture for domestic as well as commercial needs. People do not have large stake on forests. However, they do indulge in illegal grazing, illicit felling, trespassing, setting fire, poaching etc. Most of the stray, weak and unwanted cattle are dumped in the forests for grazing. There are few instances of crop raiding by wild animals. In general the PA-people interface is not very smooth as there is contrast in the objectives and priorities on the two sides of periphery. Due to several restrictions in the forest resource use and human animal conflict, people are not so friendly with the PA management.

The main problems that need to be tackled under eco-development and problems perceived in success of eco-development are as below.

A) Problems that need to be tackled under Eco-development

- i) Growing rift between local people and PA management
- ii) Illicit felling/ firewood collection
- iii) Human-animal conflict
- iv) Encroachment on forest land
- v) Poaching and hunting
- vi) Illegal grazing and presence of stray cattle within sanctuary
- vii) Increasing monkey population
- viii) Low motivation and awareness level of people

B) Problems perceived in success of Eco-development

- i) Unavailability of funds
- ii) No background of any such scheme or project
- iii) Poor response from people and delay in changing mindset of people
- iv) Low motivation level of staff and officials
- v) Shortage of trained manpower
- vi) Failure in follow up actions
- vii) Institutionalization of such programs

8.3 General Strategies

A) Constitution of Eco-development committee.

Eco-development zone will be selected from the zone of influence as given in section 4.1 and 6.2. PRA exercise will be conducted in selected villages to assess the people's perception about wildlife, eco-development, their needs, dependence, problems, apprehensions, socio-economic condition, mentality, values and ethos. They will be allowed to identify and prioritize their needs. Micro-planning will be done in phased manner taking 3 villages per year. The village eco-development committee (EDC) will be

selected by villagers themselves. Works to be undertaken will be finalized with mutual discussions between EDC and department.

B) Co-operation and mutual trust building

Integrating the activities of other departments and ensuring coordination and trust building among the stake holders will be done through district level coordination committee.

C) Addressing administrative, financial and technical constraints

Shortage of funds, policies of government, legal aspects, and technical constraints will be taken care of. Funds for such activities can be procured from state government or Govt. of India under different schemes.

D) Training and awareness

The awareness among people as well as staff is the crucial issue in such activities. Visits and study tours to other protected areas for staff and EDCs will be conducted to show them success story. Resource persons from such areas and institutions will be invited for experience sharing and motivating villagers. Efforts will be made to make people think of their welfare, ecological needs, and importance of Bir Mehas WLS etc. People will be trained adequately in the chosen income generation activities.

E) Entry point activities (EPA)

EPA will be identified and implemented initially to gain the trust of the people and to ensure smooth functioning of other activities. For example supply of hand pumps and submersible pumps, Construction of small community hall/ *Gaushala* / rescue centre as per requirement, Supply of alternative energy devices like solar cooker and improved chullahs to minimize illicit use of forest resource.

Supply of sports kit and home gyms to the youth may show good

response, Providing fan, water coolers, stationery and other infrastructure to schools, Construction of Cattle proof trenches around farm land etc, Supply of adequate medicinal help to domestic cattle of surroundings villages to check the transfer of disease, Supply subsidized medicines to the villagers, Supply of sewing machines to sewing centers for girls and ladies. The Financial Forecast is shown as **Annexure**

8.1

8.4 Sector wise strategies and summary of proposals

A) Grazing regulation and cattle management-The stray cattle exert tremendous pressure on the forests and degrades the habitat drastically. Efforts will be taken to eliminate the cattle from the sanctuary and check their re-entry by proper fencing. The cattle driven out of sanctuary will be kept in *Gaushalas* established for this purpose. Efforts will be made to convince the EDC to establish new *Gaushalas* if not existing. The responsibility of managing these units can be given to EDC. Veterinary health camps will be organized with help of animal husbandry department. Immunization will be ensured as per norms of WL (P) Act.

B) Problem of crop raiding by Blue bull-

Crop raiding by Blue bull in the fringe areas, is a big social challenge which needs to be addressed through eco-development. Crop-raiding is seen more towards boundary. The sanctuary area needs to be fenced. Some sort of compensation can be thought of for the crop damage incurred to the farmers. EDC will be motivated to form a patrolling team among themselves who will patrol and protect their crop during night. Special efforts will be taken to ensure sufficient forage and food material for wildlife within WLS through adequate habitat enrichment measures.

C) Control of Rhesus monkey population

Excess monkey population has turned into a problem for the nearby areas as well as wildlife habitat. To control this there is a need to make people aware about the consequences of such action. Proper publicity will be ensured by putting sign boards and hoardings deterring people from such activities. Strict action should be ensured as per provision of the Act to prevent this. There could be a rescue centre established for monkeys on the pattern of *Gaushalas* which will be managed and maintained by EDC. Technical support and initial investments will be provided under eco-development. Population control in the rescue centre will be achieved by segregating the sexes. To control the population in wild, sterilization and rehabilitation of excess population will be tried.

D) Control and Prevention of illegal removal of forest resource

EDC can be given share in extracted forest produce taken as a result of habitat management works, with prior approval of CWLW. EDC will decide how to distribute it among the beneficiaries. It will be given task of preventing fuel and firewood collection within their villages. Awareness will be raised against all types of illegal activities through EDC. Regular meetings of EDCs will be conducted and concerned guard will attend it as member secretary.

E) Social and Economical empowerment

The villagers will be assisted in getting benefits of all available government schemes which are not detrimental to the sanctuary and its elements. Cultural programmes promoting local tradition, folk arts will be organized in collaboration with other agencies to provide recognition as well as culture exposure. For economic empowerment, activities will be proposed and finalized village wise, with discussions with EDC. Promote agro forestry in neighboring fields, by supplying saplings of high yielding

trees and monitor the progress closely for 3-4 years.

Improved seeds and organic fertilizers/ vermi-compost for villagers will be supplied. Training of Organic farming methods using compost and neem cake etc will be encouraged by training and demonstration. Promoting village based/cottage industries or group activities like basket making, ropes from local grasses, fisheries, poultry industry, mango and jamun syrup and pickles, honey bee keeping, sericulture on toot trees etc. Training of tailoring activity for women Self-help groups will be promoted in the later phase once people become empowered in other sense. Training, awareness programme, visits will be undertaken for villagers and staff.

8.5 Monitoring and evaluation

For monitoring and evaluation, analysis will be based on the goal, objectives, indicators and the assumptions. This will help evaluate the success of eco-development programme.

CHAPTER 9

RESEARCH, MONITORING AND TRAINING

9.1 Research and Monitoring

Bir Mehas WLS does not have any history of basic or applied research, which is an important management tool in deciding the future strategy and careful implementation. The past activities in the sanctuary although not directional towards scientific management, but have contributed a lot in the overall understanding of the wildlife value of the area and issues related to the management.

A) Identification of the thrust areas and development of long term research strategy

The thrust areas for research in Bir Mehas WLS can be Research on the habitat, vegetation, its changed pattern, habitat factors, fodder quality and availability, the detailed inventory of different species, their population estimation and distribution in the sanctuary. Soil analysis, ground water availability water holding capacity, animal parasites, faecal analysis, and disease related researches. Role of *Prosopis* and *Eucalyptus* its positive and negative effects, threshold level for its removal, cover characteristics, Socio-economic studies on local people, their needs, ethos, values and general mentality, impact of eco-development, Movement pattern of blue bull and other animals to peripheral forests, spill over populations, Study of inter-specific relationship between stray dogs and jackals vis-à-vis negative effect of domestic predators on wild carnivores, Study on animal's response to reintroduction, post reintroduction changes in habitat (after reintroduction), Study of

positive and negative effects of microclimate on reintroduction of animals.

B) The GIS and RS based database generation and management information system

GIS based mapping of Bir Mehas WLS needs to be done to generate reliable baseline data. Detailed information of area, identification and distribution of plant and animal species, availability of food, habitat, water sources, changes, habitat use around the PA, encroachment, weed infestation etc will be documented, periodically, seasonally or annually depending upon management requirement analyzed and conclusions will be drawn. The computer based management information system at the division level is also suggested to aid quick management decisions. Help of research & information wing of the department can be taken in this activity.

C) Research infrastructure development and coordination

- i) Various equipments like GPS, range finder, computer (software and hardware), field and laboratory equipments will be procured during the plan period.
- ii) Research fields will be selected and outside partners will be selected for collaborative works. These include among other Universities and Institutes of India.

9.2 Monitoring

Monitoring is an important tool in understanding the impact of management activities, ecological changes that take place and future course of action. In Bir Mehas WLS following monitoring activities will be undertaken.

A) Vegetation monitoring

10 permanent monitoring sample plots of size 0.1 Ha will be monitored for various parameters like ground vegetation, crop density, crop composition, weed infestation, regeneration, soil quality, ground water availability, grazing percentage, fire effects, diseases etc.

B) Monitoring for climatic and edaphic factors

Annual data on weather, rainfall, temperature, humidity, hailstorm, will be collected from weather monitoring centre of the district or metrological department. Study of soil quality, soil erosion will be conducted with help from Universities etc.

C) Monitoring the socio-economic changes and land use pattern around Bir Mehas WLS.

This will be done with collaboration of educational and research institutes, territorial forest division and other line departments. It will throw light on the impact of eco-development, government policies, and change in land use pattern. The pattern of agriculture, education level, agricultural inputs, use of eco-friendly technology, attitudinal change etc will be studied.

D) Monitoring of animals, population structure, densities etc

As per the guidelines available by the Wildlife Institute of India the population estimation will be undertaken in entire area to monitor herbivores and other animals. The census methodology will be made available to field staff. Birds, butterflies and lower angiosperms are good indicators of habitat change. Their abundance, change in distribution over a period will be monitored. Unique/special habitats and microhabitats will be continuously monitored and habitat use or discontinuation in their use will be recorded.

E) Wildlife health monitoring

Animal health, food pattern etc will be studied with help of pellet analysis, general physical and behavioral attributes etc. Details are given in theme plan under section 6.4.4

9.3 Training

Wildlife management needs specialized approach to manage and deal with. Staff, in absence of formal training, may not perform well even if they are good at general forestry activities.

9.3.1 On the job training

The staff posted at PA can serve the area better if they are exposed to short term trainings like census methodology, age, sex and health assessment, reading indirect evidences, rescue and rehabilitation, sample collection, identification of plants, birds and animals, habitat monitoring etc. Regular refresher courses should be conducted in collaboration with state level training college. The staff will also be trained in application of wildlife law, weapon handling, PRA exercise for eco-development, some inputs on ecotourism and interpretation. They need to be exposed to the other well managed PAs of different states to broaden their approach and vision.

9.3.2 Formal training courses

Arrangement of formal training of frontline field staff should be pursued, to maintain the momentum of research, monitoring and scientific management work. Field staff should be encouraged to attend the short term refresher courses even in the other departments on eco-development, wildlife health, ecotourism etc whenever possible. Some short module for frontline wildlife staff on the pattern of diploma and certificate courses of WII can be initiated at state training college.

CHAPTER 10

ORGANIZATION AND ADMINISTRATION

10.1 Structure and responsibilities

There is a need of change and reorganization at range level and Block and Beat level. A regular post of Deputy Divisional Forests Officer (Dy. DFO), /wild life warden assisted by one Deputy Ranger and three guards, heading the vigilance squad needs to be created. He will also deal with the legal cases in addition to regular working of the division. One short term post of community development officer may be created at divisional level on contract basis, under the control of CF (Parks & PA) to monitor and coordinate the eco-development activities.

A full time wildlife trained veterinary officer will be posted at division level to look after the animal health and rescue operation. He will be assisted by one lab assistant. A qualified GIS based database assistant will be appointed in the DFO (WL) office. Post will be filled up on ad-hoc basis and can be made permanent depending upon the scope of the work.

10.2 Staff amenities and welfare

To motivate the staff for better performance and making them to stay in the headquarters, following suggestions are made;

1. Amenities

All the staff up to guard level should be given some mode of transport in the form of Motorbike. Vehicles for new posts proposed will be procured as per need. Construction of new check posts, watch towers and other infrastructure will facilitate staff in patrolling and

management. Facilities like safe drinking water, electricity, furniture, field kit, boots etc for the staff should be ensured.

2. Incentives

For the field staff the biggest incentives will be providing sufficient logistic and managerial support. A system of rewards and recognition for the good work done by the deserving candidates should be initiated and accordingly proposal will be made to the government.

3. Weapons

All the trained staff should be provided with rifles and revolvers as per their entitlements.

4. Staff quarters & other buildings

During the plan period new quarters will be constructed and existing will be renovated. It is proposed to construct check posts, one residential quarter for wildlife inspector, two quarters for wildlife guards and one wireless room. The detailed estimates will be submitted accordingly.

5. Creation of staff welfare fund

There should be provision of staff welfare fund in forest department. A special welfare fund can be created at DFO (WL) level. A part of entry-gate collection and sanctioned contributions, sale of booklets, pamphlets will be deposited in such funds. This fund will be institutionalized in the form of 'Patiala Wildlife Foundation'. The money can be used to provide loan, awards and scholarships to the meritorious children of the staff. It will provide a strong base for the auxiliary activities and welfare measures.

CHAPTER 11

BUDGET

11.1 Plan budget

At present the main source of funding for Bir Mehas WLS is budgetary allocations of Punjab government to the wildlife division. This can be done by undertaking works under various schemes and programmes of territorial forest division. Development programmes of DRDA can also be channelised if these are in harmony with the management plan objectives. Funds will be sought under CSS scheme, grants from GOI, under NAP programme of NAEB, under NP/Sanctuary allocation of MoEF and FDA project

For research, monitoring, health activities relevant projects will be formulated and get sanctioned. Joint research activities with research institutes, universities will help strengthening targeted tasks. The urban and rural development activities will be linked with eco-development activities. Equipments, logistic provisions, uniforms, shoes, other material needed for protection purpose, animal health lab equipments, chemicals, some items for interpretation, nature education, publications etc will be tried to be procured with collaboration of NGOs and other agencies.

11.2 Planning of the activities

The work plan for the period 2015-16 to 2024-25 has been given in **Annexure. 11.1**

CHAPTER 12

THE SCHEDULE OF OPERATIONS AND MISCELLANEOUS REGULATIONS

12.1 The schedule

The targeted activities over the plan period will be carried out with annual physical and financial targets. The schedule of operations will be further fine tuned with annual plan of operations. Any shortfall in funds or activity due to specific reasons will be adjusted against the next year plan.

12.2 Record of deviations and implemented targets

For several reasons management will have to deviate from the plan strategy. This is due to change in policy, change in expected output, constraints of funds, circumstantial needs etc. All such deviations should be prepared in the form of deviation proposals. At division level a book will be maintained for such deviations. All such deviations should be duly sanctioned by sanctioning authorities.

12.3 The record of employment potential

The management strategies proposed in this plan will generate many man-days of work. Each activity will be entered under the respective work schedule. Records of all permanent, casual, seasonal, potential and actual generation of employment will be maintained at level of DFO (WL).

12.4 The control forms

Control forms are essential to monitor the activities undertaken under the plan prescriptions.

12.5 Maintenance of compartment history

The compartment history gives us better idea about the treatment, modification and output obtained by the compartment over the years. This information will be entered in the prescribed formats. As long as GIS based information is not available these forms will be maintained by beat guards and submitted to the DFO (WL). Compartment histories will be prepared on annual basis.

12.6 Use of a pocket field guide for plan implementers.

A pocket guide for the field staff will be prepared in 'Gurumukhi' containing following information-

- Location details & compartment wise detailed map of Mehas
- Objectives & Strategies of the plan
- Implementation tips
- Monitoring methodology and field observations to be made
- Concepts of habitat change, their distribution, monitoring etc.

Photographs of Bir Mehas Wildlife Sanctuary



Eucalytus tree



Cactus



Muskat Tree (Prosopis juliflora)



Flahi Tree



Neem tree



Kendu tree



Grass



Heens



Saagwaan plants



Aanwla tree



Pilcan tree (Bir Mehas WLS)



Berry



Khajoor



Pipal



Stray Cattle



Pir Samadh Compartment- No. 9



Abandoned well in Compartment- No. 9



P.P.school Nabha near the boundary



Tubewell pump house in Nursery



Fire Line between Compartment No. 5-6



Fire Line between C.No.8-9



Fencing and Plantation in Bir Mehas WLS



Abandoned Pucca Water Hole



kachcha Water hole in Compartment No.2, 3



Nursery of territorial Division Nursery



Old and abandoned building of fishery Department

Appendix 1.1

Summary of Sanctuary Bio-data

Date of Establishment	:	Notification no 2026/Ft(IV)-61/3654 dated 5 July,1961
Area	:	123.43 hac.
Biotic Province	:	4A (Punjab Plains)
Location	:	District Patiala; Latitudinal Range: 30° 15' N to 30°20' N Longitudinal Range 76°05' E to 76°15'E: Nearest Town Nabha (1Km): Nearest Railhead: Nabha(2Km).
Topography	:	Altitudinal Range: 0-25m; Temperature: 3.5° C to 46°C; Average Rainfall: 870mm.
Vegetation Forests	:	Sub type E8 Saline and alkaline scrub savannah.
Fauna	:	Mammals: Blue bull, Jungle cat, Jackal and Black naped hare etc. Birds: Grey and Black Partridges, Peafowl, Large Indian Parakeet, Rose Ringed Parakeet, Reptiles: Cobra, Rat Snake, Monitor Lizard, Porcupine.
Management Details	:	1. Elimination of Prosopis and Eucalyptus and other alien and weedy growth 2. Growing of fodder, fruit and leguminous plants and grasses. 3. Reintroduction of deer species
Human Pressure	:	Surrounded by thickly populated area.
Information for visitors	:	When to visit - November to February Where to stay - Hotels, Guest Houses, Resorts etc available at Patiala and Nabha.

Approach : 28 Km. from Patiala city & 1 km from Nabha city

Contact Address : Divisional Forest Officer (Wildlife), Opposite
Mini Secretariat, Patiala.

Conservator of Forests (Wildlife) Parks & PA
circle, SCO No. 26-27, Sector 34A
Chandigarh

Chief Wild Life Warden, Punjab, Sector 34A,
Chandigarh

Appendix 2.1
ANNUAL RAINFALL (MM) IN PATIALA DISTRICT

Month	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	Average
January	48.5	1.8	57.6	51	28.9	34.7	4.10	8.00	-	4.00	8.00	12.00	5.40	65.20	25.323077
February	6.4	34.2	36.8	-	46.6	42.2	4.60	-	15.00	10.00	3.00	0.00	41.80	32.00	22.716667
March	21.9	18.4	3.2	-	27	16.9	4.10	-	25.00	-	20.00	0.00	24.20	54.00	19.518182
April	30.6	3.9	-	5.1	6.3	5.7	-	22.08	21.50	-	0.00	34.00	3.00	22.60	14.070909
May	15.2	41.9	4.1	28.3	1.6	-	7.20	113.20	-	-	19.00	1.00	0.20	38.00	24.518182
June	33.5	9	33.6	63.44	69.5	36.2	20.78	254.80	28.00	39.00	240.40	3.00	125.10	53.00	72.094286
July	52.5	62	191	30.9	225.5	101.2	26.90	167.80	161.00	409.50	49.00	73.00	55.20	54.00	118.535714
August	60	92.2	65.4	429.6	78.9	66.7	35.52	139.20	20.00	148.00	121.00	116.20	97.10	22.00	106.558571
September	-	168.8	104	30.3	100.3	-	18.62	239.20	122.00	248.00	82.00	57.40	27.40	101.00	108.251667
October	-	7.1	-	62.6	-	-	2.38	4.20	-	-	0.00	0.00	6.40	10.00	11.585000
November	-	-	-	-	-	6.1	-	1.70	-	-	0.00	0.00	1.40	0.00	1.533333
December	5	5.5	9.1	5	-	4.7	-	-	-	37.00	6.00	9.80	16.80	46.00	14.490000
Average	30.4	40.44	56.09	78.47	64.96	34.93	13.80	105.58	56.07	127.93	45.70	25.53	33.67	41.48	53.93172439

Source: Statistics of Patiala Agriculture Deptt.)

Appendix 2.2

TEMPERATURE DATA OF PATIALA DISTRICT

Month/ Yr	2001		2002		2003		2004		2005		2006		2007		2008		2009		2010	
	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min	Max	Min
January	18	2.9	18.1	5.7	15.8	5.4	17	7.9	18.8	6.4	18.2	5.7	15.62	4.26	15.5	7.03	15.3	7.2	11.8	7.18
February	23.9	4.9	22.3	8.3	21.5	9.6	23.8	9	20.6	9.4	20	9.7	23.92	13.4	18.2	15.6	16.87	16	19.4	16.4
March	28.7	8.5	28.7	14.5	27.4	13.5	31.7	15	28	14.3	27.6	13.7	23.79	11.07	29.6	19.6	29.8	20	30.7	19.9
April	41.2	11.5	40.3	13.2	42.1	14.1	42.7	13	39.3	13.1	40.5	14.1	30.83	14.46	29.7	21.8	27.4	22	37.1	18.94
May	43.2	17.9	43.8	17.9	42.6	19.1	41.9	19	42.6	18.7	42.6	17.9	42.88	25.45	20.6	34.3	28.51	20	41.3	24.59
June	41.1	23.8	43.4	23.9	44.4	27.8	45.2	26	43.8	23.9	44.6	24.1	42.99	27.74	33.2	31.7	32.88	32	43.3	42.41
July	40.7	24.3	41.8	22.7	42.3	21.8	43.2	22	42.5	22.7	41.6	21.9	38.72	25.16	34.8	26.8	34.77	27	36.9	32.55
August	38.2	23.2	37.9	29.9	39.3	23.4	40.3	24	38.7	22.3	39.1	21.6	35.36	27.8	33.7	26	33.64	26	32.1	25.16
September	35.2	18.1	34.1	17.8	34.5	18.3	33.9	19	34	17.7	36.2	16.9	34.06	23.62	34.1	30.5	34.32	25	32.8	24.65
October	32.8	18.2	31.6	17.4	32.2	16	30.3	17	32.5	16.6	32.1	16.6	24.18	16.75	35.6	17.3	35.53	15	33.1	13.2
November	28.8	10.6	27.9	11.1	27	10	27.7	12	28.4	10.1	27.9	10.6	16.56	13.8	30.4	10	30.26	9.9	9.88	9.5
December	23	5.6	22.9	7.5	19.8	9.1	21.8	8.9	22.1	4.7	21.8	6.2	22.99	9.5	25.6	9.04	25.66	9.1	10.4	8.89

(Source: Working Plan Patiala)

Source: Thapar College Patiala.

Appendix 2.3

Water Resources within Bir Mehas WLS

Sr.no	Water resource	Location	Number	Condition
1	Motor Pump	Mehas WLS	1	Functional (for forest nursery in Comppt.No.4)
2	Water hole (kachha natural)	Mehas WLS	3	Functional

(Source: - Field data by staff of Bir Mehas WLS)

Appendix 2.4

Compartment wise Vegetation composition (Bir Mehas WLS)

Serial/ Compartment No.	Name of Species						
	Eucalyptus	Mesquite	Shisham	Acacia	Teak	Misc	Blank/Buildings Misc
1	40%	44%	2%	2%	-	2%	10%
2	43%	38%	2%	2%	-	6%	9%
3	25%	25%	3%	2%	-	17%	28%
4	68%	17%	1%	2%	-	-	12%
5	67%	13%	-	5%	-	4%	13%
6	48%	25%	30%	3%	-	8%	13%
7	65%	20%	-	10%	-	4%	10%
8	67%	15%	-	2%	-	-	16%
9	55%	25%	2%	2%	3%	4%	11%

(Source: - Field data by staff of Bir Mehas WLS)

Appendix 2.5

List of trees, shrubs and grasses (both indigenous and exotic) (Bir Mehas WLS)

<u>S.No.</u>	<u>Local Name</u>	<u>Botanical Name</u>	<u>Family</u>	<u>Habit</u>
<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
	TREES			
1	Amb	<u>Mangifera indica</u>	Anacardiaceae	A large evergreen tree.
2	Amaltas	<u>Cassia fistula</u>	Leguminosae	A medium sized deciduous tree.
3	Arjun	<u>Terminalia arjuna</u>	Combretaceae	A large evergreen tree.
4	Ber, Beri	<u>Zizyphus mauritiana</u>	Rhamnaceae	A fruit tree.
5	Barh	<u>Ficus benghalensis</u>	Urticaceae	A large sized deciduous tree.
6	Bottle brush	<u>Callistemon viminalis</u>	Myrtaceae	A small sized evergreen tree.
7	Bahera	<u>T. belerica</u>	Combretaceae	A large evergreen tree.
8	Bel	<u>Aegle marmelos</u>	Rutaceae	Evergreen armed tree.
9	Dhak, flame	<u>Butea monosperma</u>	Leguminosae	A moderate deciduous tree.
10	Drek	<u>Melia azadirach</u>	Meliaceae	A small sized deciduous tree.
11	Farash Kasir	<u>Capparis aphylla</u>	Capparidaceae	Evergreen shrub
12	Gular	<u>Ficus glomerata</u>	Urticaceae	A large sized deciduous tree.
13	Hins	<u>Capparis sepieria</u>	Capparidaceae	Evergreen shrub
14	Jand	<u>P. cineraria</u>	Leguminosae	Deciduous tree.
15	Jamun	<u>Syzygium cumini</u>	Myrtaceae	A large evergreen tree.
16	Khair	<u>Acacia catechu</u>	Leguminosae	A small sized deciduous thorny tree.
17	Kikar	<u>Acacia nilotica</u>	Leguminosae	A moderate to large deciduous thorny tree.
18	Kala siris	<u>Albizia lebbeck</u>	Leguminosae	A medium sized deciduous tree.
19	Karaunda	<u>Carissa carandas</u>	Apocynaceae	Evergreen shrub
20	Lasura	<u>Cordia dichotoma</u>	Boraginaceae	A medium sized tree.
21	Mesquite	<u>Prosopis juliflora</u>	Leguminosae	A shrub to middle sized thorny tree.

<u>S.No.</u>	<u>Local Name</u>	<u>Botanical Name</u>	<u>Family</u>	<u>Habit</u>
<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
22	Mulberry, Toot	<u>Morus alba</u>	Urticaceae	A small deciduous tree.
23	Neem	<u>Azadirachta indica</u>	Meliaceae	A large sized evergreen tree.
24	Pipal	<u>Ficus religiosa</u>	Urticaceae	A large sized deciduous tree.
25	Parkinsonia	<u>Parkinsonia aculeata</u>	Leguminosae	A small sized tree.
26	Phalahi	<u>Acacia modesta</u>	Leguminosae	A small to middle sized thorny tree.
27	Rehru	<u>Acacia leucophloea</u>	Leguminosae	A small sized shrub or tree.
28	Safeda or Mysore gum	<u>Eucalyptus hybrid</u> or <u>E.tereticornis</u>	Myrtaceae	A large sized evergreen tree.
29	Shisham, Tahli	<u>Dalbergia sissoo</u>	Leguminosae	A large sized evergreen tree.
30	Subabul	<u>Leucaena leucocephala</u>	Leguminosae	A small sized shrub or tree.
31	Simbal	<u>Bombax ceiba</u>	Malvaceae	A medium sized tree.
32	Tun	<u>Toona ciliata</u>	Meliaceae	A large sized deciduous tree.
33	Teak, Sagwan	<u>Tactona grandis</u>	Combretaceae	A large sized deciduous tree.
	SHRUBS			
1	Ak	<u>Calotropis procera</u>	Asclepidaceae	A shrub
2	Basuti	<u>Adhatoda vasica</u>	Acanthaceae	An evergreen shrub
3	Bathu	<u>Chenopodium album</u>	Chenopodiaceae	A annual weed
4	Bhang	<u>Cannabis sativa</u>	Urticaceae	A tall annual weed.
5	Clerodendium	<u>Clerodendrum multiflorum</u>	Verbenaceae	A perennial shrub
6	Gandhela	<u>Murraya koengii</u>	Rutaceae	A deciduous shrub
7	Giloe	<u>Tinospora malabarica</u>	Menispermaceae	A twining large sized climber
8	Ipomoea	<u>Ipomoea fistulosa</u>	Convolvulaceae	A perennial shrub
9	Jindoo	<u>Xanthium strumarium</u>	Apocynaceae	A gregarious shrub.
10	Kau	<u>Capparis decidua</u>	Capparidaceae	A thorny shrub
11	Kangu	<u>Flocourtia indica</u>	Bixaceae	A thorny shrub
12	Karaunda	<u>Capissa spinariun</u>	Apocynaceae	A thorny shrub

<u>S.No.</u>	<u>Local Name</u>	<u>Botanical Name</u>	<u>Family</u>	<u>Habit</u>
<u>1</u>	<u>2</u>	<u>3</u>	<u>4</u>	<u>5</u>
13	Kaner	<u>Nerium odrum</u>	Apocynaceae	Ornamental evergreen shrub.
14	Mallah	<u>Ziziphus nummularia</u>	Rhamnaceae	A bushy shrub
15	Panchphuli	<u>Lantana camara</u>	Verbenaceae	Evergreen Straggling
16	Pahari Beri	<u>Ziziphus oenoplia</u>	Rhamnaceae	A thorny shrub
17	Puthkanda	<u>Achyranthes aspera</u>	amaranthaesae	An erect shrub
	GRASSES			
54	Anjan	<u>Cenchrus ciliaris</u>	Gramineae	A perennial grass
60	Bhabbar	<u>Euloliopsis binata</u>	Gramineae	Tuft grass
63	Bater	<u>Typha elephantina</u>	Gramineae	A tall merely grass
56	Dib	<u>Desmostachya bipinnara</u>	Gramineae	A perennial grass
55	Khabbal	<u>Cynodon dactylon</u>	Gramineae	A perennial grass
59	Kahi	<u>Saccharum spontaneum</u>	Gramineae	A tall grass
62	Lunji	<u>Themeda anathera</u>	Gramineae	A fodder grass
58	Munji	<u>Erianthus munja</u>	Gramineae	A tall grass
52	Nara	<u>Arundinaria falcata</u>	Gramineae	A shrub like bamboo grass
53	Nari	<u>Phragmites maxima</u>	Gramineae	A tall sized perennial grass.
57	Palwan	<u>Dicanthium annulatum</u>	Gramineae	A perennial grass
61	Sariala	<u>Heteropogon contortis</u>	Gramineae	A grass

The list is not exhaustive

Wildlife Population Estimation in Mehas WLS

The census was attempted on 2010 and the results are tabulated below

Sr.No.	Species	Male	Female	Young	Total
1	Blue Bull	25	30	15	70
2	Jackal	13	17	4	34
3	Jungle Cat	4	3	2	9
4	Rhesus Monkey	300	400	83	783
5	Goh	15	9	-	24
6	Indian Hare	15	17	3	35
7	Snakes	10	-	-	10
8	Peafowl	12	8	2	22
9	Parakeet	5	6	1	12
10	Parrots	52	48	-	100
11	Partridge	16	10	5	31
12	Bush Quail	8	4	3	15
13	Porcupine	2	2	1	5

Check list of Wild Animals of Bir Mehas WLS Patiala

S.No.	Common Name	Scientific Name
1	Blue bull	Boselaphus tragocamelus
2	Common Indian Hare	Lepus nigricollis
3	Common Mongoose	Herpestes adwardsi
4	Common house rat	Rattus rattus
5	Common squirrel	Funambulus pennantii
6	Cobra	Naja naja
7	Fruit bat	Rousettus leschenaultia
8	Hog deer	Axis porcinus
9	Indian Porcupine	Hystrix indica
10	Jackal	Canis aureus
11	Jungle Cat	Felis chaus (Gille tenstaedt)
12	Krait	Bungarus caeruleus
13	Monitor Lizard	Varanus spp.
14	Rhesus Monkey	Macaca mulatta
15	Smaller Indian Civet	Vivestricula indica
16	Viper	Daboia russelii

The list is not exhaustive

Appendix 2.8

Check list of Wild Birds of Bir Mehas Wildlife Sanctuary, Patiala

<u>Sr.No.</u>	<u>Common Name</u>	<u>Scientific Name</u>
1	Blackwinged kite	Elanus caeruleus
2	Brahminy kite	Haliastur Indus
3	Black partridges	Francolinus francolinus
4	Black drongo	Dicrurus adsimiliss
5	Bank Myna	Acridotheres ginginianus
6	Brahmany Mynah	Strunus pagodarun
7	Cattle Egret	Bulbulcus ibis
8	Common Babbler	Turdoides caudatus
9	Cuckoo	Clamator jacobiana
10	Grey partridges	Francolinus francolinus
11	House Crow	Corvus splendens
12	House sparrow	Passer domesticus
13	Hoopoe	Upupa epopus
14	Indian ring dove	Streptopelia decocto decocto
15	Indian Robbin	Corvus corax
16	Indian weaver bird	Ploceas phillippinus
17	Jungle Babbler	Turdoides Striatus
18	Koel	Eudyanamy scolopacea scolopacea
19	Large Indian Parakeet	Psittacula egpatria
20	Magpie Robin	Copsychus saularis
21	Pond Heron	Ardeola grayii
22	Pied Myna	Strunus contra
23	Pea fowl	Pavo cristatus
24	Purple Sunbird	Nectarinia asiatica
25	Red wattled lapwing	Venellus leucurus
26	Rose Ringed Parakeet	Psittacula krameri
27	Red vented Bulbul	Pucnonotus café
28	Red Munia	Estrilda amandava
29	Shi-kra	Accipitar badius
30	Scavenger vulture	Neoplron peronopterus
31	Spotted Dove	streptopelia chirenis
32	Tailor Bird	Orthothomous sutorius

The list is not exhaustive

**AGRICULTURE DEPARTMENT
FORESTS
NOTIFICATION
The 5th July, 1961**

No. 2026/Ft. (IV)-61/3654- In experience of the powers conferred by the provision to sub-section (3) of section 29 of the Patiala Forest Act 1999 (No.VII of 1999 BK) and all other powers enabling him in this behalf, the Governor of Punjab is pleased to declare the area of Government Birs demarcated by boundary pillars, whether under tree growth or not, described in the following schedule to be Second Class Forests.

SCHEDULE

	District	Tehsil	Name of Bir	Hadbast No.	Description Khasra Nos.	Area in acres
	1	2	3	4	5	6
1	Patiala	Patiala	Bir Bhunerheri	154	1 to 152	2058
2	--do--	--do--	Miranpur	267	1 to 92	839
3	--do--	--do--	Bir Sarkar (Kheri Mallah)	76	1 to 14	159
4	--do--	--do--	Bir Ghogpur (Bhagwanpura)	263	1 to 32	274
5	--do--	Rajpura	Bir Chaat	285	1 to 22, 23-min 24 to 28, 29-min, 30, 31. 32 min, 33min, 34 min, 35 to 37, 38min, 39 min, 41 to 52, 54, 56, 58 to 64	606
6	--do--	Patiala	Bir Kule Majra	143	1 to 23, 60/24, 25/1, 61/25, 64/26, 66/37, 68/29, 70/32, 33 to 36/3 72/37, 33 to 58	694
7	--do--	--do--	Bir Kheri Gujran	34	195 to 315	176
8	--do--	--do--	Bir Sanaur	121	1 to 54,	330
9	--do--	--do--	Bir Majal	207	1 to 23/1	291
10	--do--	--do--	Bir Motibagh	67	1 to 73	1296
11	--do--	Nabha	Bauran	203	1 to 6 8 to 11, 17, 18, 242/29, 243/29, 48 To 50, 52 to	997

					57, 59, 287/61, 289/61 294/62, 63, 64 253/64, 253/65, 255/69, 258/70 min, 71 min, 72 to 77, 79, 81 to 99, 100 min, 106 min 107 to 109, 111 to 117	
			Annhi Dehrian (Mashmula Nabha-Khas)		3,5,7 & 16, 2091	1013
11	Patiala	Nabha	Bauran	203	1 to 6, 8 to 11, 17, 18, 242/29, 243/29, 48 to 50, 52 to 57, 59, 287/61, 289/61, 294/62, 63, 64, 253/64, 253/65, 255/69, 258/70 min, 71 min, 72 to 77, 79, 81 to 99, 100 min, 106 min, 107 to 109, 111 to 127	997
			Annhi Dehrian (Mashmula Nabha-Khas)		Khasra Numbers 3, 5,7 and 16, 2091	1013
12	--do--	--do--	Bir Doshajhan	207	7 To 22,23 min, 33 min, 39 min, 41 min, 42 min, 43 to 47, 48 min, 49 to 55/1, 57, 58 min, 59 min, 61 min, 139/62,65, 149/63, 75 min, 88 to 83, 84 min 85 to 87, 157/88, 159/88, 155/89 min, 90 min, 161/91, 92 min, 93 to 126.	1279
13	--do--	--do--	Bir Mehas		188, 169/3, 4, 180/5, 185/8 196/9, 199/16,	

					11, 12, 15, 17 to 32, 200/33, 34, to 207/33, 34, 36, 38 to 46, 48 to 61, 72, 75 to 78, 115 to 128.	
			Bir Mohshmula Nahba		Kharra No. 1331, 2614 and 2753	4/524
14	Patiala	Nabha	Bir Bhadson	142	1 to 157	2662
15	--do--	--do--	Bir Agaul	167	1 to 172, 174	2931
16	--do--	--do--	Bir Amloh	27	1, 27 min, 44 min, 51, 58 min, 59 to 62, 248/63, 64, 249/65, 259/65, 264/147, 266/65, 279/65, 71, 96, 111, 282/147, 14, 389/152, 153, 390/154,	
17	Sangrur	Sangrur	Bir Aishban	38	1 to 17, 18 min, 20 min, 21 min, 23	661

No. 2026/Ft-IV-61/3655- Whereas by Punjab Government Notification No. 2026/Ft- (IV)-61/3654, dated the 5th July, 1961, certain Government waste lands demarcated by boundary pillars whether under tree growth or not as mentioned in the Schedule annexed to the said notification have been declared to be II Class Forests under section 29 of the Patiala Forest Act, 1999-BK.

Now, therefore, the Governor of Punjab in exercise of the power conferred by Section 30 of the said Act is pleased:-

- (i) to declare all tree standing upon those lands to be reserved the date of Publication of this notification in the official Gazette; and
- (ii) to prohibit from the same date, the quarrying of stones, bur of lime or charcoal or collection or subjection to any ring process, or removal of any forest produce in the said Forests and the breaking up or clearing for cultivation for building, herding cattle or for any purpose, of any land any of the said Forests.

No.2026/Ft-(IV)-613656- whereas by Punjab Government notification No.2026/Ft-(IV)/3654 dated the 5th July, 1961 certain Government waste lands whether tree growth or not mentioned in the Schedule annexed to the said

notification has been declared to be Second Class Forest under section 29 of the Patiala Forest Act, 1999-BK

Now, therefore, in exercise of the powers conferred section 52 of the Act, The Governor of Punjab is pleased to make the following rules applicable lands specification in the schedule of the aforesaid notification:-

RULES

- 1 No person shall cut, saw, convert and remove trees and timber and cell manufactures and remove forest produce from these area concepts with the premise of the Divisional Forest Officer concerned.
- 2 No person shall clear and break up land for cultivation or for others purposes with the permission of the Divisional Forest Officer concerned will consult conservator of Forests concerned, before according such permission.
- 3 No person shall cut grass and pasture any cattle without the previous permission of the Divisional Forest Officer provided the right holders entitle to graze their cattle according to the entries in the Revenue recording may graze their cattle in the thrown openby the said officer for exercise of the right by the right holders.
- 4 No person shall set fire, or kindly a fire without taking reasonable permutations to prevent its spreading to any tree reserved- vide Punjab Government Notification No.2026/Ft/(IV) 61-3654, dated 5th July, 1961 whether standing, felled or fallen or any portion of the said forests.
- 5 No person shall leave burning any fire kindled by him in the vicinity or any such tree of the said forests.
- 6 No person shall fell any tree or drag any timber so as to damage any tree reserved as aforesaid.
- 7 Fishing, hunting and shooting is prohibited except with the permission of the Divisional Forest Officer Concerned.

Copy of Notification No.F-150/50 dated 28.2.1952 published in Patiala and East Punjab State Union Government Gazette Extraordinary dated 9-3-1952 part I-sec. I page 1954

**AGRICULTURE & FORESTS
DEPARTMENT**

**NOTIFICATION
No.F-150/50 dated 28-2-1952.**

In exercise of the powers conferred by sub-section (I) of Patiala Act, 1996 (No.I of 1996) and in super session of Notification No.I appended to the printed copy of the preservation faunae of Patiala order 2006 this highness the Rajpramukh is pleased to declare the following forest areas in the State to be Wild Life Sanctuaries, namely:-

1. Tara Devi
2. Karoi
3. Chail and Pashgaon
4. Bir Motibagh
5. Bir Shikargarh
6. Bir Bhunerheri
7. Bir Mehswala
8. Doshanjan
9. Bhadson and Aishwan
10. Bhupinder Sagar.

JAIDEV SINGH
Secretary to Government

Appendix-3.3

List of No Objection Certificates issued for Arms Licence within 10 km of Bir Mehas Wildlife Sanctuary

Sr. No	Name of village	2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13	2013-14	Total
1	Thoohi	-	1	2	-	-	-	1	4	5	3	1	-	-	17
2	Mehas	-	-	-	-	-	-	-	-	-	1	-	-	-	1
3	Kalyana	-	-	1	-	-	-	-	-	-	-	-	-	-	1
4	Ageta, Ageti	-	1	1	1	1	4	-	1	2	1	-	1	-	13
5	Bharo	-	-	1	-	-	-	-	-	-	-	-	-	-	1
6	Rohti	-	1	-	-	-	-	-	-	2	-	-	1	-	4
7	Basta(Rohti)	3	-	-	-	-	-	-	2	3	-	-	1	-	9
8	Rohta Sahib	-	-	-	-	-	-	-	1	1	-	-	-	-	2
9	Banera	-	-	1	-	-	2	-	-	-	1	-	-	-	4
10	Turmana	-	-	-	-	-	-	-	-	-	-	-	-	-	0
11	Kaleh Majra	-	-	-	-	2	1	-	-	1	-	-	-	-	4
12	Surajpur	-	-	-	-	-	-	-	-	-	-	-	-	-	0
13	Bharaj	-	-	-	-	-	-	-	-	-	-	-	-	-	0
14	Ramgarh	-	-	1	-	2	-	-	-	1	-	1	-	-	5
15	Nabha	-	-	-	-	-	-	-	21	24	10	5	11	1	72
16	Souja	-	-	-	-	-	-	-	1	-	-	-	-	-	1
17	Ghamroda	-	-	-	-	-	-	-	2	-	-	-	-	-	2
18	Kakrala	-	-	-	-	-	-	-	1	-	2	-	-	-	3
19	Marourh	-	-	-	-	-	-	-	1	-	-	-	1	-	2
20	Sangatpura (Bhonki)	-	-	-	-	-	-	-	-	2	-	-	1	-	3
21	Ichhewal	-	-	-	-	-	-	-	-	1	2	-	5	1	9
22	Hiyana Kalan	-	-	-	-	-	-	-	-	1	-	-	-	-	1
23	Rohti Mouran	-	-	-	-	-	-	-	-	1	-	1	-	-	2
24	Bouran Khurad	-	-	-	-	-	-	-	2	1	-	1	-	-	4
	Total	3	3	7	1	5	7	1	36	45	20	9	21	2	160

Appendix- 3.4**Details of Staff in O/o DFO (WL) Patiala**

S.No.	Designation	Sanctioned strength	Present strength	Vacant post
1	DFO (WL)	1	1	-
2	Deputy DFO (ACF)	1	-	1
3	Veterinary pharmacist	0	1	-
4	Range Forest Officer(RFO)	3	1	2
5	Dy. Ranger	1	3	-
6	Forester	5	4	1
7	Forest Guard	13	12	1
8	Multipurpose Workers	6	25	-
	Office Staff			
1	Office Superintendent	1	1	-
2	Sr. assistant	1	1	-
3	Clerks/ Jr. Assistant	3	2	1
4	Drivers	1	1	-
5	Peon	2	1	1
6	Hygiene Worker	-	1	-
	Total	38	54	7

Appendix- 3.5

Abstract of fire lines in Bir Mehas WLS

Sr. No.	Compartment No.	Length of Fire Lines (Mt)
1	Compartment No. 2 & 3 Fireline outside the Canal)	1275
2	Crossed Fire Line Compartment No. 2,9,8 & 7 (School Gate & upto Mehas Bridge)	1007
3	Compartment No. 7 & 6 Behind the Ex. MLA House (Ramesh Singla) Fire Line	1162
4	Crossed outside Fire line Compartment No.3,4,5,6	1097
5	Compartment No. 2 & 9, 3 & 4 Fire line	1207
6	Compartment No. 9 & 8, 4 & 5 Fire line	1082
7	Compartment No. 8 & 7, 5 & 6 Fire line	1082
8	Compartment No. 1 Boundary Fire line	578
	Total	8490

Detail of adjoining villages of Mehas WLS

Sr. No	Name of village
1	Thoochi
2	Dharoki
3	Kalleh Majra
4	Ageta
5	Ageti
6	Ramgarh
7	Mehas
8	Rohti Morha
9	Rohti Khas
10	Rohti Chhanna

Appendix- 4.2

Land holding Pattern of Households in adjoining villages of Bir Mehas WLS

Sr. No	Name of village	Household less than 5 hac	Total household having land	Total household	No. of landless household
1	Thoohi	193	99	78	16
2	Dharoki	169	87	69	13
3	Kalleh Majra	198	103	68	27
4	Ageta	158	82	59	17
5	Ageti	163	85	67	11
6	Ramgarh	253	119	98	36
7	Mehas	227	121	79	27
8	Rohti Morha	297	156	99	42
9	Rohti Khas	213	109	83	21
10	Rohti Chhanna	317	167	107	43
	Total	2188	1128	807	253

Swot Analysis

STRENGTH	OPPURTUNITY
<ol style="list-style-type: none"> 1. Rich biodiversity area amidst agriculture background 2. Learning centre for common especially local people. 3. Remnants of indigenous animal species like blue bull, jungle cat, jackals & hog deer found. 4. Shelter for many local native birds, reptile and other small invertebrates 5. In-situ as well as Ex-situ conservation unit 	<ol style="list-style-type: none"> 1. Considerable size to provide long term conservation. 2. Investment can give good results like restoration of area. 3. Can be developed as tourism destination for the region. 4. Research and studies can be taken up as area is accessible and compact. 5. Local people can get economical and social benefits by promoting it.
THREATS	WEAKNESS
<ol style="list-style-type: none"> 1. High level of external disturbance in the area due to its proximity to town. 2. Increasing monkey population 3. Encroachment/Expansion of Agriculture 4. Low Priority in state level agenda 	<ol style="list-style-type: none"> 1. Invasive species like Prosopis etc. 2. Monoculture of Eucalyptus, Kikar 3. Stray domestic cattle, dogs. 4. Less habitat diversity 5. Water is limiting factor 6. Objectives of other agencies are not in harmony with conservation and biodiversity.

			-	-	-	-	-	-	-	-	-	-	-	0
		One wild life guard residence	-	-	7	-	-	-	-	-	-	-	-	7
		store room	-	-	2	-	-	-	-	-	-	-	-	2
		one check Post	-	-	2.5	-	-	-	-	-	-	-	-	2.5
3.2	Construction of Three Check posts	one post in compartment 2,4,9	--	-	2.5	2.5	2.5	--	--	--	--	--	--	7.5
3.3	Two Watch towers	One each in compartments 5 & 8			2.5	2.5	--	--	--	--	--	--	--	5
3.5	Two Submersible pump sets , Repair of old pumps	One in compartment 4/8 with electric connection, Repair of existing tube well in comptt. 4 to be revived	--		3.5	3.5	--	--	--	--	--	--	--	7.0
3.6	Development of paths & fire lines	Improvement of Kaccha path all along the periphery in the form of a periphery road.	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5
3.7	Five Patrolling kits @ 10000 / kit	Consisting of Powerful torch, raincoat, sling bag (waterproof), gumboots, hat/cap, Swiss knife, measuring tape, compass, notebook, and pen.	--	0.20	0.20	0.10	--	--	--	--	--	--	--	0.50
3.8	Wireless Communication / Mobile phones	Wireless station in range office needs to be revived, replacement of old sets. 4 new walky talky sets and 2 mobile phones for guards	0.2	0.2	0.2	--	--	--	--	--	--	--	--	0.6
3.8	Development of electric supply	Electricity connection at check post CP 1 in comptt. 4	0.6	--	--	--	--	--	--	--	--	--	--	0.6
3.9	Entrance gate	Creation of new entry gate in comptt 4/ Repair	--	1.0	0.5	0.3	0.2	0.2	--	--	--	--	--	2.2

v)	Fencing and protection to these grassland for first 2 years		--	1.5	1.5	--	1.5	--	--	--		--	4.5
4.4	Plantation of indigenous species	In phased manner in all compartments @ 10 ha/ yr											
i)	(approx. 100 ha.)	@ 0.1/ha	1.0	1.0	1.0	1.0	1.0	1.0	1.5	1.5	1.5	1.5	12.0
ii)	Land leveling, dig pitting	@0.1/ha	1.0	1.0	1.0	1.0	1.0	1.0	1.5	1.5	1.5	1.5	12.0
iii)	Plantation	@ 0.05/ha	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	5.4
iv)	Hand watering for 3 years	@ 0.05/ha	0.5	0.5	0.5	0.5	0.5	0.5	0.6	0.6	0.6	0.6	5.4
	2 weeding in first year												
4.5	Plantation of fruit/fodder trees and shrubs	In phased manner in all compartments @ 2 ha/ yr											
i)	(approx. 20 ha.)	@ 0.1/ha	0.20	0.20	0.20	0.20	0.25	0.25	0.25	0.3	0.3	0.3	2.45
ii)	Land leveling, dig pitting	@0.2/ha	0.40	0.40	0.40	0.40	0.45	0.45	0.45	0.5	0.5	0.5	4.45
iii)	Plantation	@ 0.05/ha	0.10	0.10	0.10	0.10	0.15	0.15	0.15	0.15	0.15	0.15	1.3
iv)	Irrigation for 3 years	@ 0.05/ha	0.10	0.10	0.10	0.10	0.15	0.15	0.15	0.15	0.15	0.15	1.3
	2 weeding in first year												
4.6	Development of saltlicks	Artificial saltlicks to be developed near each water hole and check dam		0.05	0.05	0.06	0.06	0.07	0.07	0.08	0.08	0.08	0.6

ii)	External training	Suitable organizations such as WII, BNHS, and other resource persons should be requested for imparting training in areas such as estimating habitat quality, monitoring of introduced species, behavioral ecology of wild ungulates etc	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5.0
	Total of 8		2.75	3	3	3	3.75	3.75	4	4	4.5	5	36.75
9	Recurring expenditure												
9.1													
i)	Boundary	Repair & maintenance	--	--	0.5	0.5	0.5	0.5	0.5	0.5	0.75	0.75	4.5
ii)	Check post	-do-	--	--	--	0.2	0.2	0.25	0.25	0.25	0.3	0.3	1.75
iii)	Watch tower	-do-	--	--	0.05	0.1	0.15	0.15	0.2	0.2	0.25	0.25	1.35
iv)	Fire line	-do-	--	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	1.0	9.0
v)	Pump sets (old and new)	-do-	--	0.05	0.05	0.075	0.075	0.1	0.1	0.125	0.125	0.15	0.85
vi)	Culverts/ Check dams	-do-	--	--	0.1	--	0.1	--	0.125	--	0.125	0.15	0.6
vii)	water holes	-do-	0.15	0.15	0.2	0.2	0.2	0.25	0.25	0.25	0.3	0.3	2.25
viii)	wireless/ patrolling kit	-do-	0.1	--	0.1	--	0.15	--	0.2	--	0.2	0.25	1.0
ix)	Nature Interpretation Centre Building	-do-	--	--	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	4
x)	Electronic items in NIC	-do-	--	--	0.05	0.05	0.1	0.1	0.15	0.15	0.2	0.2	1.0
xi)	Staff Amenities	Awards/ incentives	1.5	1.5	2	2.25	2.5	2.75	3	3.5	4	4.5	27.5
xii)	Vehicle / POL/equipment	Repair & maintenance	--	0.25	0.3	0.35	0.4	0.45	0.5	0.6	0.6	0.7	4.15
9.2	Staffing												

i)	Wildlife Watch & Ward	@ Rs 5000/month (Approx)	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	2.4	1.08	1.08	21.36
ii)	Multimedia operator	1 @ Rs 4000/month(Approx)	--	--	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	4.0
iii)	Driver	1 @ Rs 4000/month(Approx)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	5.0
iv)	Sweeper	1 @ Rs 2000/month(Approx)	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	2.5
	Total of 9		4.9	6.1	8.5	8.875	9.525	9.7	10.425	10.725	10.68	11.38	90.81	
	Grand total		29.4	65.9	96.7	44.685	38.735	26.42	25.995	26.405	26.56	27.76	408.6	

Glossary

<u>Local</u>	<u>Meaning</u>
Bir	Dense Forest Patch
Choe	Seasonal drain or water channel
Darkhat	Trees
Tahli	Shisham
Dunga	Deep
Pind	Village
Safeda	Eucalyptus
Rajbaha	Water drain
Dakar	local soil of poor quality
Kallar	alkaline soil
Loo	hot dry winds of summer

Abbreviations used

Act	Wildlife (Protection) Act 1972
BNHS	Bombay Natural history society
CF (PPA)	Conservator of forests (Parks & Protected Area)
CCF(WL)	Chief Conservator of forests (Wildlife)
CWLW	Chief Wildlife warden
Dy.DFO	Deputy Divisional Forest Officer
DFO (WL)	Divisional Forest Officer (Wildlife)
EDC	Eco development committee
FMD	Foot and Mouth Disease
GIS	Geographical Information system
GPS	Geographical positioning system
IRDp	Integrated Rural development Project
NGO	Non Governmental organization
NGI	Non Governmental Institute
NTFP	Non Timber forest produce
PA	Protected Area
RFO	Range Forest Officer
RS	Remote sensing
SMC	Soil and Moisture Conservation
TCM	Trench cum Mound
WPA	Wildlife (Protection) Act
WII	Wildlife Institute of India
WL(P)Act1972	Wildlife Protection Act 1972
WLS	Wildlife Sanctuary

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