

Saman Bird Sanctuary

Management Plan

(Part- I & II)

for

2010-11 to 2019-2020

Prepared by

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Introduction

The management plan of the Saman Bird Sanctuary was prepared for 2000-01 to 2009-10. This plan period is ending this year. There is a binding of preparing a management plan for each PA to get central financial assistance under various schemes. Therefore, this plan has been written for the next 10 years i.e. for 2010-11 to 2019-20.

Before writing the plan the area has been observed thoroughly. For data and information, secondary sources were also relied upon. The publications related to SBS were searched and referred to. The field realities were explored through interactions with the Range Forest Officer, the staff and with the neighbouring villagers. The other stakeholders were consulted through one-to-one dialogue. The history of past management was shared by the managers who worked in this area previously. The DFOs from the adjoining areas too shared their views on the wildlife issues in the landscape.

As the area is very little researched upon by the scientific community, not much hard facts are available.

Still, this document is based on wide array of field experience, knowledge and published information about the area. If implemented fully, it will achieve the objectives set upon in this plan as well as provide solid basis for writing the next plan in future.

The Executive Summary

Saman Bird Sanctuary is located Bhogaon *tehsil* of Mainpuri district in the State of Uttar Pradesh. The notified area of the sanctuary is 526.3 ha. It is situated in the upper Gangetic plain biotic province.

This Management Plan has been prepared with a view to conserve the unique and rich avian and floral diversity present in Saman Bird Sanctuary for posterity and to manage the sanctuary on scientific lines. Based on the national policies and international conventions the vision of the plan is **“the long term conservation of Saman Bird Sanctuary for posterity and the maintenance of the ecological processes and functions supported by it for the benefit of the nation and the humanity”**. It is valid for a period of 10 years with effect from 2010-11 to 2019-20 with a provision of mid term review after 5 years.

The plan is divided into three parts. Part I of the plan gives the information about the existing situation in the protected area with information about the location, constitution and its significance in Chapter 1.

Chapter 2 gives the information about the external geological and climatic features of the area. Chapter 3 of the plan gives history of management practices and present management practices. The park-people interface is very important for the management of a PA. Chapter 4 deals with this aspect.

Part II of the plan proposes the prescriptions and strategies for the plan period based on the information provided and issues identified in Part I. Like corporate world, every protected area should have a vision. Vision of SBS is mentioned in Chapter 5. On the basis of values identified and their ranking with respect to territorial importance, objective of management and the problems in achieving those objectives have been listed in this chapter.

The incompatibility among the objectives identified above is resolved through the strategy of zonation in Chapter 6. 2 non overlapping zones have been designated for achieving various objectives. The plans for both the zones and the theme plans on protection, fire, habitat management etc have been included here.

SBS is yet to emerge as an ecotourism hotspot in this region. Chapter 7 on ecotourism, interpretation and conservation education evaluates the tourism and interpretation infrastructure and the interface issues. An exclusive tourism zone has not been prescribed. The interpretation and nature education related facilities have been recommended for improvement through professional agency.

Chapter 8 on ecodevelopment deals with the Park-People interface issues. The approach in the plan is to build capacity and minimize dependence. An attempt to convert the conflicts into stakes has been made with lots of emphasis of awareness generation. Ecodevelopment will continue to be used as tool to generate social capital of SBS.

The all important topics of research, monitoring and training find a place in Chapter 9. Based on the available literature and field realities broad areas of management oriented research have been suggested. Research on Sarus crane, impact of fire and weed, limits of tourism are to be given priority. The efficacy of management intervention will be judged by designing suitable monitoring protocols and accordingly modifications will be made.

To improve the efficiency of the organization, some changes have been suggested in Chapter 10 on Organisation and administration. Sanction of more field level staff has been suggested.

Chapter 11 on budget tells the resource requirement to execute the plan. A plan support of Rs 5280 lakh will be required during plan period for fully implementing the plan. Bulk of this, Rs 5000 lakh is needed for settlement purpose. It is a gross estimate. It does not include the expenditure on salary of the permanent staff. The present sources of funds are from Centrally sponsored schemes, such as Integrated Development of Wildlife Habitat and Wetland programme, of Government of India.

Part III of the plan has the appendices and maps referred in all the chapters.

It is believed that if the prescriptions of the plan are implemented fully it will be able to meet its avowed objectives.

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Chapter 1

The Protected Area: Existing Situation

Introduction

Saman Bird Sanctuary (SBS) is a small but important bird sanctuary in the state of Uttar Pradesh. It comprises of a natural fresh water shallow wetland or *jheel*. Seeing the large number of migratory as well as resident birds arriving in this wetland year-after-year, the area was brought under Protected Area (PA) network by declaring it a sanctuary under Section 18 of the Wildlife (Protection) Act, 1972 vide notification number 5121/14-3-84/86 dated 23.05.1990 by the Government of Uttar Pradesh (UP). The total area of the Sanctuary is 1315.75 acre or 526.3 ha.

It has been named after the village Saman in which the bird sanctuary is situated.

1.1 Location, constitution and the extent

Saman Bird Sanctuary is located at 27° 01' 23" N latitude and 79° 11' 31" E latitude. SBS falls administratively in the Mainpuri revenue district of Uttar Pradesh State.

Details of land notified in the sanctuary:

1. Gram Samaj land	: 69.70 acre
2. Private land	: 841.66 acre
3. Forest land	: 365.05 acre
4. Gram Samaj land given to Wildlife Preservation Organisation by the District Magistrate	: 39.34 acre
Total	: 1315.75 acre or 526.3 ha.

For administrative purpose SBS consists of only one range.

Details of Division, Range and Sections with areas are tabulated below:

Sl. No.	Division	Range	Section	Area km ²
1	National Chambal Sanctuary Project U.P. Agra	Saman Bird Sanctuary	Saman	5.26

1.2 Approach and Access

SBS is about 32 km from the Mainpuri district headquarters, about 150 km from Agra- the famous tourist city- and about 45 km from Etawah district headquarters. Mainpuri is the nearest town, which is 32 km away from SBS. The entrance to the sanctuary is located on Kisni – Karhal road. This road is connected to the roads to Mainpuri, Agra and Etawah.

The sanctuary is accessible by roads, railways and air.

By Air: The nearest airport is at Agra (approx. 150 km).

By Rail: Nearest important railway stations are Agra (150 km) and Etawah (45 km). These stations are well connected by train to metros and other cities of tourist interest.

By bus: Direct limited bus service from Mainpuri, Etawah and Agra is available.

1.3 Statement of significance

The sanctuary has been declared around a natural rainfed oxbow lake – a typical geographical feature of the Gangetic Plain biogeographic zone. According to the previous plan, a survey of birds in 1999 revealed the species of birds during some or the other part of the year.

It has been identified as an Important Bird Area (IBA) based on criteria A1 (threatened species), A4i (>1% of the biogeographic population) and A4iii (>20000 waterbirds) of Birdlife International.

This wetland based bird sanctuary also qualifies for being declared a Ramsar site, i.e. a wetland of international importance, as it meets the criteria 2 (wetland supports threatened ecological communities), 5 (wetland regularly supports 20000 or more waterbirds) and 6 (wetland regularly supports 1% of the individuals in a population of one species or subspecies).

In January 2001, waterfowl census revealed more than 1500 Common Teal *Anas crecca*, 6000 to 10000 Northern Pintail *Anas acuta*, 30000 Lesser Whistling Duck *Dendrocygna javanica* and 200 Great White Pelican *Pelecanus onocrotalus*. Many of these species occur in far greater numbers than their 1% biogeographical threshold determined by Wetland International (2006).

During summer, when most of the nearby wetlands dry completely the Saman *jheel* becomes a refuge of large number of Sarus cranes *Grus antigone*. 3 to 5 breeding pairs of Sarus crane are resident in the Sanctuary. In addition, there are 10-14 pairs of Sarus crane resident along the periphery of the sanctuary that are also dependent on the wetland of Saman for different length of the year.

Among the mammals, the sanctuary is only legal home to Nilgai *Boselaphus tragocamelus*, Jackal *Canis aureus*, Monitor lizard *Varanus bengalensis* etc. in this area.

The sanctuary is also last home to many native species of flora as the surrounding areas are completely dominated by agriculture whose intensity is only increasing year-after-year. Floristically, 154 species from 52 families including 17 aquatic plants, 9 semi aquatic plants and 128 terrestrial plants have been reported in a rapid survey conducted in this small Sanctuary in July, 2010.

The SBS can be an important nature tourism destination particularly for people of this area. It can also be developed into an important nature education centre.

As it is still unexplored by the scientific community, it harbors the potential of an excellent area for conducting research on new frontiers of ecology and for undertaking experiments on managing a small wetland based PA in an agrarian landscape.

Chapter 2

Background information and attributes

2.1 Boundaries

The Saman Bird Sanctuary is surrounded all around by the agriculture fields of the surrounding villages. Around 70% of the surrounding areas fall within the Mainpuri district only. The southern and south-western boundary of the sanctuary is co-terminus with the boundary of Etawah district. So, there is some problem arising out of change of administrative unit. These boundaries are marked on the map. On the ground the complete boundary is yet to be demarcated. It needs to be done.

As the Sanctuary has been declared around an ox-bow lake, the SBS shares a long boundary, approximately 15 kilometer in length, with the agricultural fields of the farmers. This long boundary, shared with the villagers, leads to some problems that hinder the achievement of the long term objectives of SBS.

Some of the problems having origin in the peculiar boundary are bunding of the fields leading to reduction in flow of the water to the lake, draining out the water after monsoon season, deposition of insecticide, fertilizer into the wetland. At the time of declaration of the sanctuary the neighbouring areas used to remain submered for a longer duration during a year. But, over the years because of the reduced availability of water, the farmers started breaking their hitherto fallow land for agriculture. This is leading to increased siltation in the wetland.

Ecological Boundary

SBS is not surrounded by any forest area or it is not separated from the adjoining fields by any permanent geographical feature. The catchment of the Saman lake covers a total area of about 150 sq km, out of which about 3.5 sq km is of perennial nature. (RAMSAR sites).

As SBS is a PA and hence has legal protection, it provides protection to the migratory birds during migratory period. There is a continuous movement of birds to- and from- this area to the neighbouring wetlands and agriculture fields for feeding.

Therefore, there is a need to find out as to what are the wetlands that act as satellite wetlands to the PA. Also upto how far the birds disperse for feeding during night. There is a need to research this aspect of bird dispersal to finalize the extent of ecological boundary of SBS.

Internal Boundary

SBS is one management unit. It is made up of just one range. This range is further divided into 1 section and 1 beat – the smallest unit of administration in SBS.

There is only one settlement inside the boundary of SBS. However, the notified boundary of the sanctuary contains private agricultural land. This private land is shown in the map. The owners of the private agricultural land attempt to drain out the water from their areas which results in overall loss of water in the lake.

2.2 Geology, Rock and Soil

The SBS is a part of Upper Gangetic Plain which is a very fertile land in general and devoid of rocks. The soil around the lake is sandy and there is *kanker* pan below the surface whose depth varies at different places in the sanctuary. The top soil of SBS is alkaline.

As the soil is sandy and loose, even a light rain dislodges the soil particles and increases the siltation in the lake.

The pH ranges from 8 to 11.

2.3 Terrain

The general terrain of the area is flat with central depression. The general slope of the tract is from North to South. The slope of the tract is very gentle thereby making the water-flow to the lake vulnerable to construction of bunds and dykes.

2.4 Climate

Being situated in the south-western part of upper Gangetic plain it has the typical climate of the Gangetic flood plains with hot windy summers (blowing of *loo*) and extremely cold winters. There are three distinct seasons viz. **Summer (March to June), Rainy or Monsoon (July to October) and Winter (November to February).**

2.4.1 Rainfall

This sanctuary is very close to semi-arid bio-geographic zone. Theoretically the average rainfall in the area is between approximately 500mm -900 mm. The area receives rainfall mainly in the months of July and August from South-west monsoon. Generally the period from October to June is considered as the dry season.

The rainfall data, obtained from the district meteorological office of the revenue department, of the 2001-2009 shows that the actual rainfall in the district headquarters just 35 km away from the SBS varies between 400mm and 1000mm. Not only the rainfall is very less, it is becoming very erratic also with decreasing number of rainy days.

The long spell of dry months makes the area vulnerable to fire during winter months. So during these months a fire protection strategy is to be designed and implemented.

The total number of birds present in the sanctuary is decreasing because of many reasons, the climate change being one of the most important reasons. There is a need to take up research on this aspect.

2.4.2 Temperature

The temperature varies between 4° Celsius in December - January and 48° Celsius in May-June.

2.4.3 Humidity

The average humidity is generally less round the year except during the months of July to September.

2.4.4 Wind Speed

Air is generally calm with an average wind velocity of 4 km per hour. During summer there is occasional storm.

2.5 Water sources

The size of the sanctuary is not so big to provide catchment function for any rivers or rivulets emerging out of the sanctuary. The lake inside the SBS is the only source of water for birds and other fauna resident in the sanctuary.

A. Perennial sources of water

The wetland of SBS can be divided into two parts. The main part is approximately 30 ha in size and in a year with good rainfall, water is retained up to the end of April when the reverse migration is almost near completion. A GPS trace of this area taken on December, 2010 and projected on Google Earth Map has been annexed.

B. Seasonal sources of water

The rest of the wetland is inundated with water with the onset of south-west monsoon and depending upon the rainfall it holds water till January to March. The areas dry up gradually starting from the periphery as well as from the Northern and North-western side.

The issues related to water in SBS

Earlier till the year 2000, as per the available records, part of the deeper portion used to be filled with water throughout the year. But, because of the low and decreasing availability of water the lake is now unable to hold water till April i.e. the end of migratory season. The lake dries up also because of siltation induced reduction in water holding capacity of the lake, draining out of the lake water and increased agriculture in the neighbourhood.

The main source of water to this sanctuary is the Saunj nallah which has a huge catchment. Both the sides of this nallah used to remain uncultivated till a few years ago. But now, they have been broken for agriculture and water is extracted from this nallah for irrigation.

Also, the Saunj wetland from which this nallah used to originate is disappearing in the absence of legal or other protection. All these have led to the less run-off to the lake of the SBS. Therefore, for a few months the lake is completely dry. It has affected the prey base and hence the total number of birds' arrival here has declined. Also, there is change in species composition. From the records it is known that part of the lake used to support large congregation of piscivorous birds such as cormorants, pelicans, egrets, herons, storks etc. There has been a decline in absolute number of ducks and geese coming to this sanctuary.

The number of Sarus Crane, which once used to visit this sanctuary in hundreds during April to June, after drying up of most of the wetlands in the surroundings, has crashed down now as the lake becomes completely dry during summer months.

Artificial sources of water

With the decrease in precipitation and run-off into the lake over the years, the management was forced to take actions to offset these impacts. Dykes were constructed in the dryer and shallower part of the lake to create depressions by lifting the silts deposited and to retain water in such depressions for longer durations. There have been positive outcomes of this initiative.

The supplementation from canal on the regular and planned basis is to be explored and arranged during the current plan-period.

There is an urgent need to initiate study on the hydrology of the lake within this plan period so as to take timely corrective action before the birds stop migrating to this lake. Otherwise the total bird-numbers will continue to decrease and within this plan period itself the migratory birds will be a history for this PA.

2.6. Range of wildlife, status, distribution and habitat

SBS has been declared a sanctuary primarily seeing its importance in conservation of birds. 187 species of birds belonging to 42 families have been reported from this sanctuary in a survey carried out in 1999. The bird sanctuary regularly attracts more than 50000 birds every year even now. The migratory birds are mainly water birds and they are concentrated mainly in the jheel. The resident birds take shelter in the neighbouring forests of Saman forest blocks. The lake is a typical representative wetland of the Gangetic plain with characteristic feature of drying out after every couple of years.

In addition to birds the sanctuary is also provides legal home for of some smaller mammals. Among the large mammals only Nilgais take shelter in the sanctuary.

2.6.1 Vegetation

2.6.1.1 The bio-geographic classification

Bio-geographic zone--- 7 Gangetic Plain

Biotic province-----07A Upper Gangetic Plain

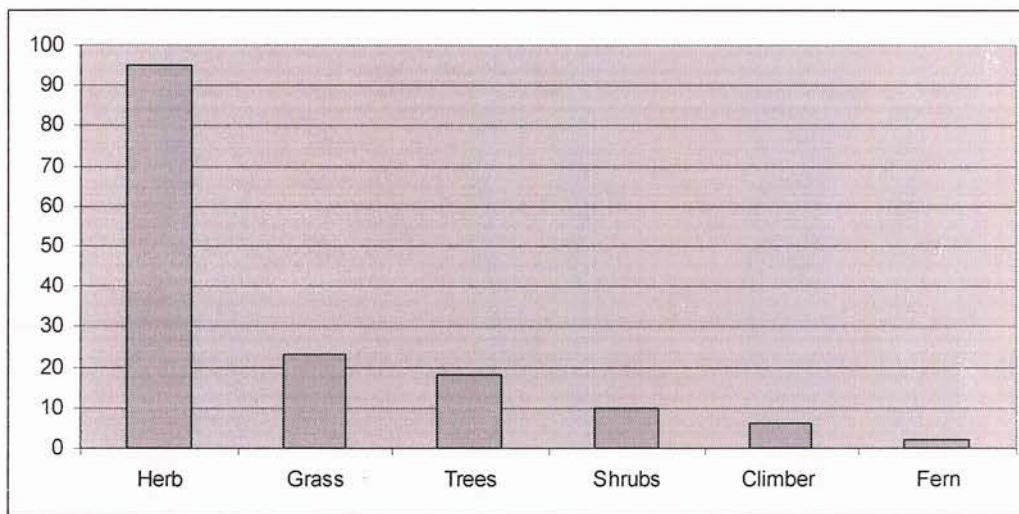
2.6.1.2 The forest types, cover and food for wild animals

According to the Champion and Seth classification of forest types, Patna Bird Sanctuary falls under forest type 5/E-1 i.e. Northern tropical dry deciduous forest. As the area of the sanctuary is small and approximately 75% of the area under wetland, the representative forest type is not present in the sanctuary. The wetland and the adjoining agricultural fields provide food for the birds.

In a rapid survey conducted in July, 2010, 154 species have been reported from the sanctuary. They belong to 116 genera of 51 families. (Babu and Kumar, 2010)

Classification of vegetation:

Herbs :95 Trees :18 Grasses:23
 Shrubs:10 Climbers:6 Ferns:2



Familywise representation is as follows:

Poaceae	23
Cyperaceae	14
Asteraceae	10
Fabaceae	8
Euphorbiaceae	8
Family With 1 sp.	29
Family With 2 sp.	7
Family With 3 sp.	3
Family With 4 sp.	3
Family With 5 sp.	3
Family With 6 sp.	2

Plantation

No plantation has not been done during the last plan period.

Invasive alien species

Before the last plan period, water chestnut used to be a major weed along with water lily. During the last plan period, cultivation of water chestnut has been limited to a great extent and Water lily has been removed from the selected portions. Presently, the extent of weed is limited. The prominent weeds present in the sanctuary are as follows:

Invasive species: Terrestrial

Species	Distribution
1. Lantana camara	In the fringe areas.
2. Parthenium hysterophorous	In the fringe areas.
3. Prosopis juliflora	In the dry areas.

Invasive species: Aquatic

Species	Distribution
1. Eichhornia crassipes	In the lake
2. Ipomea aquatica	In the lake

Endemism

Though the sanctuary is home to more than 150 species belonging to 51 families, endemism has not been reported.

2.6.1.3 Species and communities of conservation importance; key areas of floristic importance

Aquatic plants: Being a sanctuary for conservation of avian fauna the presence of aquatic plants is very important as they are feed of many of the migratory waterfowl which are predominantly vegetarian. Aquatic plants are easily digestible by birds as they are low in fiber content. They are palatable and non-toxic. They are good source of protein, fat carbohydrates, vitamins and mineral nutrients also. In the rapid assessment of vegetation conducted in July, 2010, 17 aquatic and 9 semi-aquatic species were found to be present in the sanctuary. They are:

Aquatic Plants	
<i>Azolla pinnata</i>	<i>Nymphaea nouchali</i>
<i>Carex sp.</i>	<i>Echinochloa crusgallii</i>
<i>Scirpus articulatus</i>	<i>Paspalum distichum</i>
<i>Hydrilla verticillata</i>	<i>Eichhornia crassipes</i>
<i>Lemna perpusilla</i>	<i>Limnophila indica</i>
<i>Spirodela polyrhiza</i>	<i>Corchorus aestuans</i>
<i>Marselia quadrita</i>	<i>Trapa natans var. bispinosa</i>
<i>Monochoria vaginalis</i>	<i>Utricularia sp.</i>
<i>Nelumbo nucifera</i>	
Semi-aquatic plants	
<i>Ipomoea aquatica</i>	<i>Polygonum hydropiper</i>
<i>Cyperus alopecuroides</i>	<i>Bacopa monnieri</i>
<i>Aeschynomene indica</i>	<i>Typha angustata</i>
<i>Smithia sensitiva</i>	<i>Pouzoliz pentandra</i>
<i>Polygonum barbatum</i>	

Plants with medicinal values:

Out of 154 plants reported in the sanctuary, 98 are having medicinal properties. The detailed list is given in the annexure.

Studies on vegetation communities and associations have not been done.

2.6.2. Animals

Being a bird sanctuary, that too only 526 ha in size, animals are not the focus of this sanctuary though declaration of a sanctuary does provide protection to all the life forms present within its boundary.

2.6.2.1 Vertebrates, their status, distribution, and habitats, habitat quality, quantity and key areas.

2.6.2.1.1 Mammals

No focused study has been done so far but going by the field information the mammals present in the sanctuary are Nilgai, Jackal, Hare, Mongoose and Squirrel.

2.6.2.1.2 Avi-fauna

187 species of birds have been reported from the sanctuary in a survey carried out in 1999 (Management plan of Saman Bird Sanctuary, 1999). Of the 42 species of family Anatidae from the Indian subcontinent (Ali and Replay, 1987), 18 species have been reported from the sanctuary. Among these, the Comb duck *Sarkidiornis melanotos*, Cotton Pygmy-Goose *Nettapus coromandelianus*, Lesser Whistling Duck *Dendrocygna javanica* and Spot-billed Duck *Anas poecilorhyncha* are the resident species.

Anatidae is the most abundant among all the families recorded. Lesser Whistling Duck *Dendrocygna javanica* is the most numerous. This was followed by Northern Pintail *Anas acuta*, Common Pochard *Aythya ferna*, Gadwall *Anas strepera*; Northern Shoveller *A. clypeata* and Gargney *A. querquedula* etc.

The sanctuary always supports a family of Black-necked Stork which is on a decline in the State of U.P.

In January, 2001 waterfowl census revealed more than 1500 Common Teal, 6000 to 10000 Northern Pintail, 30000 Lesser Whistling Duck and 200 Great White Pelican.

Over the years, the relative proportion of different species has changed. The number of Coot *Fulica atra*, Cormorants *Phalacrocorax spp*, Darter *Anhinga melanogaster*, Eurasian Spoonbill *Platalea leucorodia* etc has decreased. 3-5 Great White Pelicans *Pelecanus onocrotalus* were seen during 2009 winter. Lesser Flamingo *Phoenicopterus minor* has not been spotted in the sanctuary in the recent years.

3-5 breeding pairs of Sarus Crane *Grus antigone* are always there in the sanctuary. 10-12 pairs of Sarus, residing in the immediate vicinity all around are also dependent on this bird sanctuary. During the peak summer groups of Sarus seen use the sanctuary for foraging.

Wetland-dependent globally threatened species found in SBS		
Common name	Scientific name	Conservation status
Greater Spotted Eagle	<i>Aquila clanga</i>	Vulnerable
Sarus Crane	<i>Grus antigone</i>	Vulnerable
Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>	Near threatened

2.6.2.1.3 Reptiles, Amphibians, Fishes

No study has been carried out to find out the number, distribution and habitat of such species.

2.6.2.2 The limiting factors

2.6.2.2.1 Availability of water

The catchment of the Saman lake covers a total area of about 150 sq km, out of which about 3.5 sq km is of perennial nature. The average depth of the waterbody is 1 meter and the maximum depth during monsoon is 2 meter. While in summer most of the lake is down to 0.5 meter. Endowed with a reasonable large catchment, the availability of water in the lake has been decreasing over the years. This is mainly because of two reasons: one, the reduction in the normal rainfall in the area and two, the stoppage of natural surface flow in the agricultural fields.

2.6.2.2.2 Garbage

The tourism is yet to take off in this sanctuary. So the littering caused by tourists is not present in this sanctuary.

2.6.2.2.3 Noise pollution

Presently, noise pollution is not a problem as the sanctuary is in the rural area. There are little signs of urbanization. Fortunately, there is no place of worship too inside the sanctuary.

2.6.2.3 Invertebrates, Status and Distribution

No attempt has been made so far to ascertain the status of many lower animal groups mainly invertebrates and many insect groups. Such survey in future will further throw light on the faunal wealth of SBS.

Chapter 3

History of management and present practices

3.1 General

About 100 years ago, Saman *jheel*, along with Lakh-Bahosi in nearby Farrukhabad district, and other *jheels* formed an important habitat for the Siberian Crane *Grus leucogeranus*. The great ornithologist A.O. Hume saw the Siberian Cranes in many *jheels* in Etawah and Mainpuri districts between 1858 and 1867. Saman could have been one of the important sites, although Hume did not mention it by name. The name "Tuman" *jheel* (26°46' N and 79°02' E) is referred by Wilkinshaw, where W.E. Brooks shot three Siberian Cranes in February 1871. It appears that Tuman is none other than Saman *jheel* (Rahmani and Arora, 1992).

Saman Bird Sanctuary does not have a long history of conservation. As stated in Chapter 2, this area, being a huge natural rainfed oxbow lake in a thinly populated landscape with little agricultural activities in the immediate neighbourhood, used to attract lakhs of birds for decades. There were similar waterlogged areas forming a network of wetland in a radius of 15 km. All these areas used to be the hunting ground for the landlords and local people. Fishing *pattas* were also awarded to the villagers. The colourful birds were trapped and sent to market in Calcutta and were even exported. The lake was also used for cultivation of Water chestnut.

After it was declared a Bird Sanctuary in 1990, the sanctuary has been brought under the administrative purview of Wildlife Preservation Organisation, U.P. The trapping of birds and awarding of *pattas* for fishing have been prohibited in the sanctuary.

Initially the area was managed through annual plans. The first management plan of the sanctuary was written for 2000-01 to 2009-10.

Summary of prescriptions of the Management Plan (2000-01 to 2009-10):

1. Management of water: Segmenting the lake in 3 parts and maintaining different depths in the three parts was proposed. One sluice gate was also proposed for this purpose.
2. Construction of island was proposed and accordingly islands were constructed in both the parts of the lake.
3. Construction of dykes.
4. Eradication of Water Hyacinth and other aquatic weeds from the lake.

5. Strengthening the protection status by patrolling, creation of wire-mesh fencing around the lake was proposed.
6. Fire protection
7. Development of tourism infrastructure such as maintenance of road and children's park, extension and strengthening of parking for vehicles so that the vehicles are not taken near the lake, development of bird interpretation centre, plantation of ornamental flowering plants along the entrance road etc.
8. Completion of settlement under WPA, 1972 and demarcation of boundary.
9. Publicity and extension.
10. Maintenance of facilities for the staff.
11. Construction of entry gate was proposed and constructed.
12. Construction of watch tower was proposed and constructed.

3.2 Timber operations including Bamboo and firewood harvest

As there is no timber species found in the notified area harvesting of timber is out of question from this area. Bamboo too is not found in the sanctuary. Historically also, there is no record of timber being found in the notified area.

3.2.1 Firewood harvest and collection

In the past, before the declaration of the sanctuary people from the adjoining villages of Saman, Bhagyanagar, Hindupur and Kudarriya were collecting dead and fallen branches of scattered *Prosopis juliflora* trees for self consumption. At present, there is hardly any firewood left for sustained collection. However, some of the women from these villages collect *Ipomeas pp* for use as fuelwood. The intensity of fuelwood collection is low.

3.3 Non wood forest produces (NWFP) collection

It has been reported in the literature that Singhara *Trapa bispinosa* was being cultivated and collected by the villagers. Subsequently this practice has also minimized. Pattas for cultivation of Singhara were awarded by the revenue department on the notified land but this too has been stopped. Grass is the only MWFP that is still being collected at low intensity by the people when the lake becomes dry.

3.4 Leases

There is no lease inside the sanctuary. However there are private landholdings inside the sanctuary. As the settlement of the rights is still going on it creates problems for the management, particularly when some habitat improvement activity involves the private land. The acquisition proceedings as per the provisions of Wildlife Act, 1972 are underway.

3.5 Other programs and activities

Protection was the main activity of the management till the beginning of the first plan period i.e.2000-01. Subsequently other activities like improvement of habitat, fire protection, removal of water hyacinth, desiltation etc were taken up between 2000-01 and 2009-10. Awareness generation activities were also taken up in a big way during this period.

3.6 Forest Protection

3.6.1 Legal status

Having been declared a sanctuary under section 18 of the WPA, 1972 in 1990, the settlement process is yet to be completed. Notification under section 21 has been published in 1997. Since the notified area consists of 841.66 acre of private land, the rights have to be settled before final notification of the sanctuary. The acquisition of land under the Land Acquisition Act, 1894 will require large sum of money.

Since the settlement is not complete, the management of the sanctuary over areas under private ownership creates problem for the management. At the time of declaration of the sanctuary all these areas were water logged for most of the year. There was no attempt to do agriculture on these lands. But, over the years the farmers now want to cultivate these areas by draining out the water accumulated during the monsoon season. The water availability in the lake has reduced because of this reason also.

3.6.2 Hunting

In earlier days, the local big landlords are reported to engage in hunting in all these areas. People also used to do fishing in the lake during the initial years of declaration of the sanctuary. But now it is completely stopped inside the notified area.

3.6.3 Poaching and other illegal activities

3.6.3.1 Poaching

Sporadic incidences of poaching of birds were reported during 1994-95 to 1998-99. Subsequently, poaching of birds inside the sanctuary is not reported. However, poaching of birds is reported from the adjoining wetlands which are not part of the Protected Area Network.

The offence information for SBS during 2000-2010 may indicate that poaching of birds inside the sanctuary is not a threat here but threat of poaching of birds by communities on the periphery always exists. Therefore, the protection related activities need to be continued at a higher scale during this plan also.

3.6.3.2 Illegal cutting of trees

This is not an issue in SBS.

3.6.3.3 Illegal removal of NWP, encashment and other illegal activities.

The previous practice of cultivation of water chestnut has been stopped to a large extent. As there is not much of fuelwood available inside the sanctuary there is little pressure of adjoining population on SBS for fuelwood.

3.6.4 Livestock Grazing

According to the previous management plan (2000-01 to 2009-10) grazing during summer season is a problem in the outer portion of the lake.

3.6.5 Wild Fires

There are large areas under dry grass during summer months, which is a potential fire hazard. However, no major incident of fire has been reported from the sanctuary as extra vigil is maintained during the fire season. The grass along the pathways is removed and fire-watchers are deployed at strategic points during the fire season. The same strategy needs to be continued during this plan also.

3.6.6 Insect attacks and pathological problems

No secondary data about this is available.

3.6.7 Wildlife health

No outbreak of any disease has been reported from the sanctuary so far. However, after the outbreak of Avian influenza in some parts of the country a programme to monitor the incidence of avian influenza was launched by the State Government. BNHS has been given the responsibility of monitoring the presence of this disease. In the process, samples have been taken from SBS also during 2008-2010 and sent for diagnosis. No instance of this disease has been reported so far.

3.6.8 Inter agency Programmes and Problems

The area under the declared boundary is managed only by the sanctuary management. So, there is no conflict with other agencies or departments. However, the following departments of the government, operating outside the sanctuary, have definite impacts of their activities on the sanctuary:

1. Agriculture department
2. Irrigation department
3. Soil conservation department

3.7 Tourism in Saman Bird Sanctuary

Tourism in protected areas are now called Ecotourism which is a new concept in tourism, originally sparked off by the idea of making harmonious co-existence with nature a reality once again. As defined by the Ecotourism Society, it is the responsible travel to natural areas, which conserves the environment and sustains the well being of local people. Today, ecotourism is one of the fastest-growing segments of the tourism industry. Its potential for growth is virtually unlimited. The International Ecotourism Society (TIES) defines ecotourism as: *“responsible travel that conserves the environment and sustains the well - being of local people”*. Clearly, at a time when traditional conservation through enforced protection of natural areas was being questioned for its effectiveness and social impacts, strategies such as ecotourism offered considerable potential for integrating conservation with development.

3.7.1 Evolution of tourism

Tourism in SBS is yet to take off. This is mainly because of its location (not on direct railhead or on major road) in a remote area. SBS attracts thousands of migratory birds during winter, it has the potential of developing into an attractive tourism destination. But because of the inherent limitations, developing tourism in the coming years will remain a challenge.

3.7.2. Tourist attractions

The entire district of Mainpuri is full of many small and large wetlands. It is also a district where large flocks of Sarus Crane can be seen. The cultivation of paddy and wheat also supports diverse birds. As it is located in a remote corner of the district Mainpuri, the disturbance due to urbanization is not a factor here so far. Therefore, the sanctuary offers experience of watching birds in truly rural setting. Birding in a hardcore rural India is the one and only tourist attraction.

3.7.2.1. Nearby tourism facilities

The district Etawah, at a distance of 45 km, offers an opportunity of visiting the National Chambal Sanctuary to see the rare Gharial, Mugger, Dolphin, Turtles and other aquatic life-forms.

3.7.2.2. Tourist inflow

The entry to the sanctuary is open from all sides. Therefore, there is no record of tourist arrivals in the sanctuary. Still, being the only nature-tourism-destination in this region, people – particularly the school children do visit the sanctuary.

3.7.3 Problems caused by tourism

It is not an issue at present.

3.8 Research, Monitoring and Training

3.8.1 Research and Monitoring

The status of research on different aspects of SBS is not satisfactory. In fact, it is yet to begin on a serious note. There have been a few studies on topics of interest to the researcher but they are not of relevance to the management. Even the assessment of biodiversity of the sanctuary is yet to be done. Check Lists of reptiles, amphibians, fishes and other invertebrates are yet to be prepared.

Similarly, there is no protocol for monitoring in the sanctuary. During the last few years, number and species of birds seen on different dates is recorded in register. There is little involvement of scientific, educational and research organizations in this sanctuary.

3.8.2 Training

The sanctuary offers opportunities for on-the-job training to the field staff. There is no formal mechanism to impart such trainings and to assess its effectiveness. A training schedule for the field staff has to be prescribed and followed.

3.9 Wildlife Conservation Strategies and their evaluation

As stated earlier, the conservation history of the area is not known. There is no record of shooting of birds from the area before the enactment of WPA, 1972.

3.9.1 Strengthening the PA network

The presence of staff has been increased and is being maintained to enhance protection level in the sanctuary. Equipments such as motorcycles, binocular, camera, GPS etc have been purchased to give effectiveness to the management. Watch towers have also been constructed.

3.9.2 PA Boundary

Boundary of the sanctuary was demarcated and boundary pillars were fixed in some stretches to stop encroachment on the sanctuary land. The remaining stretch is yet to be demarcated.

3.9.3 Habitat Improvement

Under the habitat improvement works activities like eradication of Eichhornia, removal of silt, creation of islands, construction of dykes to segment the lake etc have been undertaken.

3.9.4 Reduction in Firewood Extraction

Earlier firewood collection from PA forests was quite high. During the last plan period there has been significant reduction in firewood extraction, collection of fodder and thatch grass.

3.9.5 Increasing Awareness

During the last couple of years awareness camps, nature camps, seminar, meetings etc organized by the SBS has helped increase awareness about the importance of conservation. Outreach programmes focused on school kids, villagers and other wings of government have been useful in imparting the message of nature conservation.

3.9.6 Research and Monitoring

Research on birds is yet to start as stated preciously.

3.10 Administrative set up

3.10.1 Present set up of the Bird Sanctuary

Saman Bird Sanctuary is a range under the administrative control of National Chambal Sanctuary Project Uttar Pradesh, Agra division.



Figure: Present administrative structure of Saman Bird Sanctuary

3.11 Communication

3.11.1 Telecommunication and wireless

Wireless connection does not exist between range office and division office. Cell phone has been given to the FRO, WLW and the DCF. DCF, CCF and CWW's offices are connected by landline also.

3.11.2 Roads

There is no road inside the sanctuary.

3.11.2.1 Tarred Roads

No tarred road exists inside the sanctuary.

3.11.2.2 Forest road

There is no forest road either. The dykes constructed during the last plan period serve as walkway within the sanctuary.

Trek paths

The dykes constructed to segment the lake are used as trek paths.

The detail position of the infrastructure in Ranges, Sections and Stations, and staff, wireless stations, and weapons of the Ranges, Sections and staff are given in annexure.

3.12 Summary of threats to wildlife

3.12.1 Change in the ecology of the lake

As stated earlier, water availability in the lake has been decreasing over the years. This is in terms of area under the water during post-monsoon months. According to the ocular estimation of the field staff, the larger areas of the lake are drying up at a faster pace. The submerged areas on 29.12.2010 were recorded using a GPS and plotted on the map. The map is annexed for reference.

It has resulted in the changed the plant community structure in the lake. As a result, the peak number of birds arriving in the sanctuary has reduced during the last plan period. Supply of water to the lake from the Saunj nallah, which is a major source of natural runoff to the lake, has also reduced.

3.12.2 Incomplete settlement

Problems like encroachment, cultivation of Singhara, implementation of habitat improvement works, enforcement works etc arise because the settlement of the rights under the WPA, 1972 is yet not complete. There is one village inside the notified boundary, though the villagers have moved out of the sanctuary.

3.12.3 Intensification of agriculture in the surrounding / catchment degradation

Over the years, the land around the sanctuary, which remained fallow for many decades, has been brought under agriculture. This has reduced the natural flow of water to the lake. The increasing use of insecticide and pesticide in the fields has also increased the organic load in the lake. All these have resulted in reduced number of birds in the lake during winter.

3.12.4 Inadequate staff and protection infrastructure

The staff sanctioned for this PA is inadequate in number and skill. With the increasing responsibility of protection, reporting, managing tourism etc, the protection status of the sanctuary needs to be enhanced.

3.12.5 Human-wildlife conflict

Crop depredation by Nilgais and birds: As SBS is the only PA in this area, most of the Nilgais, when chased away from the agricultural fields, take shelter in SBS. As their number is growing rapidly it is likely to become a problem for the management during the present plan period.

Chapter 4

The protected areas and interface land use situation

4.1. The existing situation in the zone of influence

4.1.1. The existing situation in the zone of influence, its boundaries and Natural attributes:

The Saman Bird Sanctuary has an interface with private land holdings. Major use of such lands is for agriculture. Also, there are vast stretches of *usar* land in the vicinity which are lying fallow. Around the bird sanctuary, there are scattered forest blocks also. The activities of people upto 2 km from the sanctuary have a bearing on the sanctuary. The landholdings are small in size and the productivity of the land is poor. At the landscape level this forms a network of wetland based PA's with Patna Bird Sanctuary, Etah, National Chambal Sanctuary, Etawah and Agra and Lakh Bahosi Bird Sanctuary, Kannuj.

Apart from wetlands under PA network, the districts of Etah, Etawah, Kannuj, Mainpuri, Kashiramnagar, Aligarh etc have many small natural wetlands. SBS is an important link in the network of these wetlands.

4.1.2. Village inside and outside the PA, settlement history, ethnic identity, traditional customs, relationship between distinct group of people, relationship with forests

According to the revenue records, there is only one village inside the sanctuary. Presently, the residents of this village have moved out to the neighbouring areas.

There are more than 20000 people living in the villages within 5 km of the Saman Bird Sanctuary. These villages are old villages. Some of these people used to collect MFP in the form of fish, Singhara, grass, reeds etc. But these activities have stopped.

The Hindupur village is on the immediate boundary of the sanctuary. People for *Bahelia* – a traditional bird-hunting community live in this village. Because of sheer proximity and easy availability of birds, these people used to hunt birds earlier. Similarly, some of the villagers of Saman village also used to indulge in supplying killed birds to the customers. These practices have almost come to an end now.

4.1.3. The state of people's economy, vocations, land use, use of forest and non-forest based natural resources by people and seasonal pattern

The people residing around the protected area can be broadly placed into medium income group category. They are marginal agriculturalists and off-farm employee as semi-urban workers. Majority of scheduled caste people are poor agriculturists with small scale land holding and largely unskilled workers. The rest of fringe area dwellers are small scale farmers engaged in market oriented agriculture. As stated earlier, people are not dependent on the forest resources for living.

4.1.4. Implication of land use and resource dependency for the conservation of protected Area:

A brief account of land use and resource dependency and its implication for the conservation of PA is as follows:

- i.* The use of insecticide and pesticide in the agricultural fields will have adverse impact on the SBS.
- ii.* The intensification of agriculture in the surrounding will further impact the ecology of the lake.
- iii.* The growth of local city and the market will lead to increased construction activity in the neighbouring areas. The utility of area as a bird habitat will decrease. This will be a threat particularly along the Saman-Kisni road.

4.1.5. Forest/PA management practices and their implications for people

The sanctuary is managed as per the provisions of the WPA, 1972. It does not permit any kind of resource use by the villagers. The local people are yet to derive benefits out of tourism. The employment opportunities created by the operations in the sanctuary are limited. The ecological functions performed by the wetland are the real benefits to the people of the area.

Crop depredation, damage of properties, cattle and human casualties due to wild animals in the surrounds are insignificant. Palatable crops in the immediate vicinity of lake lead to crop raiding incidences especially by the Nilgai.

4.2. The Development Programmes and Conservation Issues

4.2.1 An evaluation of government and non-government agency programmes for development. Implications for the PA, people and the ZI.

This area is a remote area. It is 22 km from the *tehsil* headquarters. Led by MNREGS, there are many programmes of the government being executed by different agencies. Consequently, there is no burden on the management of the sanctuary for planning the economic development of the people.

The bunding in the agricultural fields to retain more and more water is also one of the activity taken up by the Soil conservation department. Also the government is supporting the farmers to convert hitherto fallow land into agricultural land. All such activities in the catchment of the lake will definitely have impact on the hydrology of the lake.

4.2.2 The interplay of market forces and their impact on the subsistence economy of the local people.

Problems of the SBS can not be linked to interplay of market forces. People in the zone of influence are not dependent for their livelihood on the SBS.

4.2.3. A summary of problems faced by people that affect the management of PA and ZI

As stated earlier, the notified boundary of the sanctuary includes private land. Under the provisions of the WPA, 1972 the settlement of the rights of the people has to be done. Because this is yet to be completed, the relationship between the affected people and the sanctuary management is not harmonious. This has also implications for management interventions. Therefore the settlement of rights needs to be given the topmost priority to earn the goodwill of the people thereby securing the future of this sanctuary.

Chapter 5

Vision, Objectives and Problems

5.1 The Vision

The vision of Saman Bird Sanctuary is “ the long term conservation of Saman Bird Sanctuary for posterity and the maintenance of the ecological processes and functions supported by it for the benefit of the nation and the humanity.”

In the long run the area is envisioned to be free from anthropogenic pressure. It is hoped that the communities will manage the SBS scientifically and sustainably in the decades to come. The cultural and religious values of SBS will lead to improved conservation status of the area in the future. It should emerge as the best PA for imparting conservation education to the tourists as well as to the masses.

5.2 Objectives of Management

The SBS, by its inherent virtues, has multifaceted values for the mankind. In order to secure those identified values the objectives of management of SBS are defined. The objectives are as follows:

- 5.2.1 Biodiversity:** To conserve the biodiversity of the Upper Gangetic Plain, with all its ecological processes and functions and to protect the gene pool of the area.
- 5.2.2 Endangered species:** To protect and to provide habitat function to all the rare, endangered and threatened flora and fauna.
- 5.2.3 Regional connectivity:** To maintain and restore the other wetlands of high ecological values in the region thereby regional connectivity of the area with other important biological areas in the landscape while ensuring a land use in the surroundings that is in consonance with this objective.
- 5.2.4 Watershed:** To maintain and restore the catchment functions of the watershed.

5.2.5 Tourism: To promote and manage ecotourism in the area and to provide unique experience to elicit public support for conservation.

5.2.6 Research and monitoring: To promote research and monitoring programs in order to ensure management decisions based on sound scientific knowledge.

5.2.7 Training: To strengthen management effectiveness by adopting appropriate capacity building programs and by improvising amenities to the staff.

5.3 Problems in Achieving Objectives

The remnant natural ecosystems located in human dominated landscape of the Upper Gangetic Plain are subject to a plethora of threats that vary widely in the nature and intensity of their impacts on biodiversity. The threats fall into two broad categories: localized threats such as bunding, extraction of water, draining out of water, proliferation of weeds, hunting, livestock grazing etc., and landscape level threats such as laying out of transmission lines, large drainage project, land reclamation projects, roads, large-scale agricultural expansion etc. All these threats either independently or synergistically influence biodiversity of any area. Very often, threats are intricately meshed together in complex and myriad ways making it a difficult challenge to tear apart their impacts.

The problems in achieving objectives mentioned in 5.2 are listed below.

5.3.1 Objective 1: To conserve the biodiversity of the Upper Gangetic Plain, with all its ecological processes and functions and to protect the gene pool of the area.

The problems are:

1. Inadequate area under PA coverage; high potential areas adjoining SBS are not covered under PA network.
2. Inadequate buffer area.
3. Problem of poaching along the migratory route.
4. Problem of poaching in the adjoining non-protected wetlands.
5. Inadequate protection infrastructure.

6. Ecologically unsound land use in the surrounds. Use of pesticides, insecticides and chemical fertilizers in the private fields.
7. Alteration in habitat conditions by invasion of exotics.
8. Inadequate budget
9. Delayed flow of fund.
10. Lack of awareness in the masses, the decision makers, politicians etc.

Emerging issue

1. Reduced availability of water in the lake may destroy biodiversity.
2. Inadequate baseline information about species and their distribution.
3. Demographic factors e.g. population growth and changing consumption patterns.
4. Macroeconomic policies e.g. undervaluation of ecological services.
5. Poverty.

5.3.2 Objective 2: To protect and to provide habitat function to all the rare, endangered and threatened flora and fauna.

The problems are:

1. Reduced availability of water.
2. Inadequate protection infrastructure.
3. Inadequate buffer.
4. Land use in the surrounds. The increased area under agriculture has resulted in reduced flow of water to the lake.
5. Invasion of exotics detrimental for birds.
6. Inadequate and untimely flow of funds.
7. Inadequate staff.
8. Lack of awareness in the people.

5.3.3 Objective 3: To maintain and restore the other wetlands of high ecological values in the region thereby regional connectivity of the area with other important biological areas in the landscape while ensuring a land use in the surroundings that is in consonance with this objective.

The problems are-

1. Legal issues in the form of inadequate protection to wetlands outside the PA network.
2. Status of wetlands in the adjoining areas.
3. Change in land use in the surrounds of sanctuary leading to loss of corridor value of these areas.
4. Encroachment on wetlands of the adjoining areas.
5. Inadequate knowledge about the use of migratory route of the birds.
6. Lack of awareness.

5.3.4 Objective 4: To maintain and restore the catchment functions of the watershed which is source of numerous seasonal channels of water.

The problems are –

1. Land use in the private agricultural fields and surroundings.
2. Inadequate fund for watershed management.
3. Lack of awareness leading to degradation of watersheds.
4. Lack of information about the condition of watersheds.
5. Contradictory objectives and policies of different departments of the government.

5.3.5 Objective 5: To promote and manage ecotourism in the area and to provide unique experience to elicit public support for conservation.

The problems are –

1. Lack of manpower.
2. Lack of resources.
3. No body or unified authority to coordinate the tourism activities outside the SBS.
4. Lack of awareness.
5. Poor interpretation facilities.
6. Lack of research on carrying capacity.
7. Poor condition of roads to this Sanctuary.

5.3.6 Objective 6: To promote research and monitoring programs in order to ensure management decisions based on sound scientific basis.

The problems in achieving the above objective are –

1. Lack of co-ordination with scientific, research and educational institutions.
2. Lack of trained manpower.
3. Lack of budget.

5.3.7 Objective 7: To strengthen management effectiveness by adopting appropriate capacity building programs and by improvising amenities to the staff.

The problems in achieving the above objective are –

1. Lack of resources for providing amenities.
2. Lack of training of the frontline staff.
3. Lack of training infrastructure.
4. Lack of manpower. Excess burden on the existing manpower.

Chapter 6 The Strategies

6.1 Boundaries

The vision and objectives of SBS, as mentioned in para 5.1 and 5.2 respectively, and the problems in achieving those objectives, as mentioned in para 5.3, reveal that some of the objectives are incompatible with one another.

As the settlement of the rights is still going on and the sanctuary is yet to be notified finally under section 26 of the WPA, 1972, the area notified as sanctuary under section 18 of the act is being taken for division into zones. The areas under different zones will be reviewed after the settlement of rights is completed. The present external and internal boundaries are shown in the map annexed. The total area under different zones equals 1315.75 acre or 526.3 ha.

For achieving the objectives, the entire area under consideration is divided into two different zones.

The zones are:

6.1.1 The core zone

This will primarily consist of areas under submergence for different durations in different months of the year. Secondly, all the government land that includes Gram Samaj land and Forest land, is included in this zone. The total area of the zone is 474.09 acre. The details of the zone are as follows:

Name of the area	Management category	Total area
1. Gram Samaj land	Sanctuary	69.70 acre
2. Gram Samaj land given to Wildlife Preservation Organisation by the District Magistrate	Sanctuary	39.34 acre
3. Forest land	Sanctuary	365.05 acre
Total		474.09 acre

All these areas fall within the boundary of Saman Bird Sanctuary notified under section 18 of the WPA, 1972.

6.1.2 The buffer zone

This zone will consist of area other than the government land. Most of these areas are on the periphery of the core zone. The total area of the zone is 841.66 acre. The detail of the zone is as follows:

Name of the area	Management category	Total area
Private land	Sanctuary	841.66 acre

6.1.3 Tourism zone

As the extent of tourism is negligible in SBS, it is possible to regulate tourism in a planned way. Keeping the small area of the sanctuary in mind, there is no need to create any exclusive zone for tourism. Only the paths and trails can be identified where tourism can be allowed.

Presently the dykes constructed and the paths leading to the watch towers will be allowed for tourists.

The interpretation facility/visitor center will be developed either in the range campus or in the Eco-park.

The map of the proposed zones is shown in the appendix.

The summary of the zonation is shown in the table below:

Sl no	Zonation	Status of Area	Area	Remarks
1	Core zone	Sanctuary	474.09 acre	No village inside.
2	Buffer zone	Sanctuary	841.66 acre	No village inside.
Grand total of the Saman Bird Sanctuary			1315.75 acre	

6.2 Zonation

The capability of a PA in supporting viable biological communities, ecological processes and functions is directly related to the size of PA. Further the managerial capability in maintaining the integrity of a PA is also directly related to the size of the PA. SBS has an inherent weakness of very small size.

Still, to achieve the contradicting objectives the area under Saman Bird Sanctuary has been divided into zones. The boundaries of each zone have been described and have been shown in Para 6.1. All the recommended zones are exclusive.

6.2.1 Core zone

Entire lake area has been brought under the core zone. This is like sanctum sanctorum for the area. It comprises the most important areas in terms of biodiversity, ecological processes and functions. These are also important areas for different rare, endangered and threatened avi-fauna.

During the past plan- period, these areas have been given some restorative inputs like removal of Eichhornia and Ipomea, apart from protection.

Under the previous plan the area under this zone was quantified approximately but they were not classified on the basis of ownership. In this plan, only the government land has been taken in core zone till the settlement gets completed.

6.2.2 Buffer zone

This zone consists of areas adjoining the main body of lake and is used as dispersal areas by the wintering water birds. These areas are also wetlands but they become dry much sooner than the areas under core zone. This zone buffers the core zone from the impacts of activities in the adjoining agricultural fields.

This zone is to meet the ecological needs of the water birds in the nearby dispersal areas and to ensure maintenance of PA values and to facilitate PA integrity with the satellite wetlands.

This zone existed in the preceding plan also. Its area has been quantified in this plan.

6.2.4 Tourism zone

No area has been designated under tourism zone in this plan. Only the dykes and trails to the watch towers are being opened for tourism.

One of the objectives of SBS is to promote and manage ecotourism in the area. The aim of this zone is to integrate the development of tourism programs and infrastructure in the area with the management goal. Other than birdwatching all the tourism related activities will be confined to areas outside the sanctuary.

To educate the tourist about conservation while providing them wilderness experience through PAs is one of the objectives behind creation of PAs. The direct economic benefit of the tourism to the local people and the economy strengthens the stake of the local people in the continuance of the PA.

Through management of the tourism activities the above goals will be tried to be achieved.

6.3 Zone plan

To achieve the objectives of different zones, separate zone plans are prescribed. The zone plan of tourism zone is given in chapter 8.

6.3.1 The core zone

The objectives of core zone are:

1. To protect one of the biodiversity of the Upper Gangetic plain.
2. To preserve the area as a unique ecosystem representative of the biodiversity and gene pool contained in Gangetic plain bio-geographic zone.
3. To ensure a continuous support to large avi-fauna for scientific, economic, aesthetic and ecological values.
4. To protect and maintain all the ecological processes and functions of the SBS ecosystem.
5. To protect and maintain habitat of all the rare, endangered and threatened flora and fauna.
6. To provide opportunity for conducting research to fill the knowledge gaps, for advancement of science and to enhance management effectiveness.
7. To serve as reference centres for ecological functions and processes.

Strategy:

The strategies to achieve above objectives are:

1. To improve the legal protection to the area.
2. To keep these areas as inviolate areas. No human activity will be allowed in this area. The area will be kept disturbance free.
3. To take restorative steps to improve the habitat attributes of the area. Activities like soil and moisture conservation and weed eradication will be taken up in this area.
4. To ensure a land use in the surroundings that is compatible with the conservation goals of this area.
5. To improve the availability of resources so that resources are not a constraint in taking appropriate administrative decisions aimed at improving the conservation status.
6. To lead research into identified areas.
7. Better inter-department coordination mechanism.

Activities:

1.1 Final notification of the Sanctuary: Steps will be taken to ensure that the final notification of the Sanctuary under the WPA, 1972 is issued by the State Government during this plan-period. The entire Saman Bird Sanctuary is covered in the Sanctuary.

2.1 Improved protection: The area will be made free of all kinds of anthropogenic pressure. Special attention will be given to control poaching, illicit felling, fuelwood collection, illegal fishing, grazing of cattle and use of lake by cattle for drinking water. The details are available in the Protection theme plan.

3.1 Availability of water: Alternate sources of water will be arranged. The current status needs intervention on this front. Arrangements will be made to fill the lake with water by supplying water from the nearby canal.

3.2 Desiltation: The silatation of the lake is a continuous process. Therefore the removal of silt on continuous basis is necessary. The details are given in the theme plan on Wetland management.

3.3 Weed eradication: Invasion of the lake by weeds is a constant threat. The lake area will be monitored for extent of weeds and remedial steps will be taken in a planned manner every year. They will be eradicated in a planned manner. The details are given in the concerned theme plan.

4.1 Private agricultural field management: The peripheral farm owners will be convinced to adopt ecologically sustainable farm practices like use of bio-fertilizers and bio-pesticides.

5.1 Fund mobilization: The State and Central governments, the other donor agencies will be approached for adequate and timely release of funds.

6.1 Research: The research areas will be identified in consultation with research institutions like AMU, WII, ICF etc. The details are given in Chapter 9.

Negative list of activities: Road construction, Boating for recreation, Tourism infrastructure, Plantation of exotics, NTFP collection, Grazing and Singhara cultivation.

Monitoring :

1. Restored part of the wetland will be monitored intensively for species composition, weeds, soil deposition etc.
2. Monitoring of de-weeded area will be done by regularly visiting the area and studying the extent of weed re-emergence.
3. Record of desiltation works will be maintained and the effectiveness will be monitored through measuring the level of silt in the lake.

The monitoring of the key features of this zone will be done as per the detailed plan in chapter 9.

6.3.2 Buffer zone

Special objectives of this zone are:

1. To maintain the connectivity of the core area with the adjoining habitats on the landscape.
2. To ensure availability of the adequate habitat for meeting the biological requirements of the birds.
3. To facilitate the wildlife use of the area and to enhance its value for the birds in the adjoining dispersal areas.
4. To protect the catchments and watersheds of the core areas.
5. To provide opportunity for research on the use of such areas by the birds and on other topics.

Strategy

The prescribed areas under this zone are managed under respective plans.

Specifically the strategy will be on the following lines:

1. To enhance the legal status of the area.
2. To take restorative steps to undo the damage done previously.
3. To check the land use in the vicinity so as to ensure that they are compatible with the objectives of this zone.
4. To undertake soil and moisture conservation works.
5. To enhance level of protection in this area.
6. To lead research into the desired areas.

Activities:

- 1.1 Final notification under WPA, 1972 will be issued during this plan-period. Boundary will be demarcated on the ground.
- 2.1 Habitat improvement activities viz. ensuring the availability of water in this area, removal of weeds etc. will be done.
- 3.1 The peripheral farm owners will be convinced to adopt ecologically sustainable farm practices like use of bio-fertilizers and bio-pesticides. Change in agriculture pattern will also be attempted in the adjoining areas.
- 4.1 Works like removing the silt deposited annually, checking the soil erosion in the farmer's field etc. will be undertaken.
- 5.1 Protection infrastructure in these areas also will be strengthened.
- 6.1 Yearly survey of flora and fauna in the zone through sample plots to know about the distribution and population status of species of plant and animals including birds. The details are given in the chapter 9.

Negative list of activities: Road construction, Plantation of exotics, Controlled pre-burning, NTFP collection, Grazing and Singhara cultivation.

Monitoring

1. The record of weed removed area will be maintained. The boundaries of such areas will be shown clearly on the maps. The survey of the area will be done on regular basis to ascertain the status of the weed in the area.
2. The details of desiltation works will be kept. The area will be shown on the map. The sediment load of this area will be monitored.
3. Sample plots for flora and fauna will be laid. The floral diversity will be recorded.

6.4 Theme plans

There are certain issues and objectives that are common to more than one zone. Such activities are planned in theme plans or azonal plans.

6.4.1 Protection plan

This plan covers protection from illegal activities like poaching, hunting, illicit felling, encroachment etc. Protection from fire is dealt in a separate theme plan.

Objective:

The objective of this plan is to protect the flora and fauna in all forms, non-living entities including land, water, soil and all other things found inside the limits of SBS.

Major threats faced by the area are:

1. Hunting of birds
2. Illegal collection of MFPs like grass, tuber of lotus, Ipomea etc.
3. Encroachment
4. Illicit felling of trees for local needs.

Problems in achieving the above objective are:

1. Related to manpower: lack of adequate and trained manpower.
2. Related to infrastructure: Vehicle, night-vision equipments, modern gadgets to keep an eye on the entire area from a control room, weapons and ammunition for them.
3. Related to boundary: The boundary is not clear.

Strategy:

The general strategy to enhance the protection level in SBS will be to identify the vulnerable areas for different kinds of threats and take preventive steps to avoid the illegal activities in coordination with the adjoining forest divisions and local revenue and police administration. Also, more manpower will be deployed for protection related jobs round the clock. Continuous attempts to generate awareness will be made.

The activities will be:

1.1 Deployment of manpower: Provisions for additional manpower for protection related jobs will be made in the budget. They will be employed on daily basis. Services of professional security agencies will also be explored.

1.2 Winter patrolling: Additional manpower will be deployed on daily basis during November to March for giving protection to migratory birds.

1.3 Creation of additional post of field level staff: The sanctioned strength will be revised as per the prescriptions made in Chapter 10.

1.4 Change in transfer policy: It will be ensured that the staff on transfer from SBS is not relieved till the replacement is received in his place.

1.5 Trainings: Training, both for improvement of skill and for improving the motivation level of the field staff.

2.1. Vehicles, weapons and ammunition and other equipments such as binoculars, night vision, boat etc. needed for protection will be provided. The *Chaukis*, watch towers, office buildings, staff quarters will be maintained. New *Chaukis* will be constructed as and when need arises.

2.2 Modern equipments: The beat guard, section officers and the Range Officer will be provided with the GPS enabled mobile phones or 3G mobile phones. This will help in tracking the daily patrolling of the field staff effectively. This will also ensure that the staves are going to each part of their jurisdiction. The present system of verification by diaries is not effective. Binoculars and night vision equipments will also be given.

3.1. Boundary demarcation: The demarcation of boundary will be the thrust area for this plan. Help of revenue officials will be taken.

4. Miscellaneous activities:

Crime dossier of habituated criminals: The details of the persons involved in killing of birds in and around the sanctuary will be maintained in a database. Their whereabouts will be taken every month and a report sought to this effect from the concerned staff.

Information network: A strong and effective informer network will be put in place. The network will be built around the retired forest staff living in the vicinity of SBS. A mobile number will be published extensively for sharing of secret information. A strong system of rewards will be created.

Awareness campaigns: Massive awareness campaign will be launched using variety of mediums like print and electronic media, pamphlets, meeting with villagers etc.

6.4.2 Fire plan

The Saman Bird Sanctuary is not very prone to incidences of forest fire. In the past sporadic incidents of fire have taken place. Any incidence of fire after the month of September will adversely affect the congregation of birds. Therefore, there is a need to have a separate theme plan for fire.

The **objective** of this plan will be –

1. Total prevention of unnatural fires
2. Quick detection of fires
3. Quick suppression of fires.

Generally all forest fires are caused by human beings. The **reasons** as to why they set fires to the forest can be the following:

1. To promote fresh shoots of grass for their cattle.
2. To take revenge on the forest staff.
3. Throwing of butts of *bidis*, *cigarettes* etc unknowingly on the forest floor.

Strategy

1. Preventive strategy
2. Corrective strategy

Extent of the applicability of this plan: This plan will be applicable to all the zones of the Saman Bird Sanctuary.

Under preventive strategy the following activities will be undertaken:

1. The firewatchers will be engaged during November to June. They will be posted to the temporary fire stations.
2. The equipment to beat the fires will be purchased and maintained.
3. Funds will be arranged in time and in adequate amount from the State and Central Governments.
4. A very intensive awareness campaign will be launched.
5. Direct meeting in all the villages on the fringes will be organized once before the start of the season and secondly during the season.
6. *No control pre burning will be practiced in the Bird Sanctuary.*

Corrective strategy:

1. Earliest detection of fire: Watch towers will be used for detecting the fire at the earliest.
2. As soon as the fire incident comes to the notice, all the staff will rush to the spot and control the fire either by beating it out or by limiting its spread.
3. Watch towers will be maintained for this purpose.
4. Contact will be maintained with the Fire departments, particularly during fire season.

6.4.3 Habitat management plan

Wetlands are areas of continuous change. As a result of interplay of environmental factors, the development paradigm of that time, the lack of resources to enforce the laws, the ignorance about the degree of harmful effects of some of the activities allowed historically, the commissions and omissions of management etc. the ecological parameters of any wetland are under a state of continuous change. If allowed beyond a limit these changes start acting against the objectives of management. Therefore, it is imperative for the management of SBS to keep a close eye on the habitat parameters and take corrective steps as and when required.

Objective:

The objective of this plan will be to restore the attributes of the habitat by taking restorative and corrective steps.

Extent of the applicability of this plan: This plan will be applicable to all the zones of the SBS.

Strategy:

Strategy will be to identify the areas where the degradation has happened and is happening even now and the factor the reasons for degradation. Appropriate reason based approach will be adopted.

In this plan the following aspect of habitat of the zones will be considered:

1. Wetland management
2. Weed management

6.4.3.1 Wetland management

Availability of water in the lake: The net water reaching and remaining in the Saman lake has decreased over the years. There are many reasons for it. As, barring a small patch, the lake becomes completely dry almost every year now, the availability of fish, snails and other biotic elements of food of the birds has reduced whereas the load of floral biomass has increased in the lake. It led to decrease in the diversity of fish spp in the lake. Many of the indigenous varieties disappeared over the years. This has also adversely affected the gross number of water birds visiting this lake during winter.

Objective: The objective of this plan will be to restore the availability of the water in the lake.

Problems in achieving the above objective are:

1. Interdepartmental co-ordination: The water can be brought from the nearby canal but the canal is controlled by the irrigation department.
2. Place of action lies outside the jurisdiction of the sanctuary management.

Strategy: The strategy will be to arrange water from the nearby canal to the lake and to remove other bottlenecks in the way of holding water in the lake for longer duration.

Activities:

- 1.1 Construction of a dedicated water channel to the lake from the canal:** The District Magistrate, Mainpuri will be requested to facilitate this activity in consultation with the irrigation department.
- 1.2 Enhancement of flow of rain water to the lake:** The nallahs culminating in the Saman wetland have become choked with silt over the years. They will be cleaned regularly to facilitate the flow of water to the lake.
- 1.3 Change in crop selection:** The landholders of adjoining land will be motivated to switch from cultivation of Paddy to some other crop needing less water during the monsoon. This will augment the availability of water for the lake.
- 1.4 Removal of silt:** The water holding capacity of the lake has also reduced over the years due to deposition of silt brought during rains. Even the deeper portion of the lake, where boating used to take place previously, has become shallow. Silt will be removed in such a manner that the gradual gentle slope towards the centre of the lake is maintained. This is necessary to maintain the ecological niches needed by different species of birds. Silt removed will be thrown out of the sanctuary limit so that the impact remains for a couple of years. Specific desilting plan should be prepared and got approved prior to execution of the work.
- 1.5 Construction of dykes:** The dykes constructed so far have been shown in the map annexed. There is no need of constructing dykes in the central part on the sanctuary now. The dykes should be constructed only in the outer periphery. The height of dyke should not be more than a meter as they can have the impact of fragmentation of habitat.

Monitoring and evaluation

The relative abundance of native varieties of fishes in the lake will be monitored. The faunal diversity of lake will be monitored. The result of above activities on the availability of water in the lake and its impact on the population of birds will be monitored. The deposition of silt will also be measured.

6.4.3.2 Weed management

The species of weed and their broad distribution has been given in para 2.6.1.2.

During the last year many exotic species have become naturalized in the sanctuary and have threatened the existence of indigenous species. Weeds degenerate the quality of habitat in many ways.

Most common are

Species	Distribution
1. Lantana camara	In the terrestrial part of the SBS.
2. Ipomea aquatica	In the lake.
3. Water Chestnut	In the lake.
4. Prosopis juliflora	In the terrestrial part of the SBS.
5. Parthenium spp.	In the terrestrial part of the SBS.

Objective of this plan will be to limit the expanse and impact of weeds in SBS.

Strategy will be to monitor the coverage of these species and to undertake weed management operations.

Activities:

1.1 Lantana eradication : The tourism zone is infested with lantana. The entire area will be cleared of Lantana. For this the stem of Lantana will be cut 4 cm below the surface. The cut stem will be kept upside down to hasten the process of drying. All the dry litter will be collected and burnt at a common point. Uprooting will be done in the month of February-March. The same area will be visited next year for repeat operations.

1.2 Eradication of other terrestrial weeds: New shoots of Prosopis will not be allowed to establish. Parthenium will also be uprooted from the entire area. No other new exotic will not be allowed to establish.

No chemical and bio-control method should be adopted for above purposes unless the method has been tested and approved by the competent authority/body.

Monitoring and evaluation

The extent of area under Lantana, Prosopis and Parthenium and the use of the area by the fauna after uprooting will be monitored. The efficacy of method of uprooting of these weeds will also be monitored.

Chapter 7 Ecotourism, Interpretation and Conservation education

7.1 Introduction

The IUCN defines ecotourism as **“Environmentally responsible travel and visitation to relatively undisturbed natural areas in order to enjoy an appreciate nature, that promotes conservation, has low visitor impact and provides for beneficially active socio-economic involvement of local people.”**

In the face of increasing global population, the demands on all kinds of natural resources are increasing leaps and bounds. In the 19th and 20th century, demands of existing human beings were the first charge on the natural resources. But come 21st century and the wheel of development appears to have taken a full circle. The classical theory of demand and supply has started showing its limits. The increased input of man, material and money is no longer producing the increased output according the classical theory of productivity. The production function has become more complex and the latest term that has been added in it, is not mathematically unique to all kinds of situations. At this point of time it is clear much more than it ever was that the nature also has its limits.

Ecotourism and conservation education have emerged as the most potent tool to convert the people for ever in favour of conservation. The Government of India, while recognizing the importance of ecotourism, has also set the limit upto which it can go. The National Wildlife Action Plan, 2002-2016 states that **“Regulated, low impact tourism has the potential to be a vital conservation tool as it helps win public support for wildlife conservation. However, the mushrooming of tourist visitation and tourist facilities has led to over use, disturbance and serious management problems for PA managers. In case of any conflict between tourism and conservation interest of PA, the paradigm for decision must be that tourism exists for the parks and not parks for tourism and that tourism demands must be subservient to and in consonance with the conservation interests of PA and wildlife.”**

SBS has not been historically an important tourism destination. However, it has a huge potential for spreading the conservation awareness particularly for the people of this part of the State of Uttar Pradesh and improve its conservation status.

7.1.1 Goal

The goal of management of SBS is “to promote and manage ecotourism in the area and to provide unique experience to elicit public support for conservation.”

7.2 Objectives of Ecotourism

The special objectives of ecotourism in Saman Bird Sanctuary are as follows:

1. To create public awareness and to elicit public support for conservation of birds, biodiversity and local cultural resources.
2. To provide unique experience to the visitors.
3. To enhance protection status/support base of SBS using ecotourism as a direct tool.
4. To generate resources necessary for taking steps for long term conservation of the area.
5. To provide livelihood to local people through ecotourism.
6. To have an integrated plan for regulated development of tourism in the region.
7. To generate more and more stakeholders in the SBS and stimulating private conservation efforts.
8. To develop effective interpretive facilities for SBS.
9. To develop nature education centers to meet its purpose.

7.2.1 Inventory and evaluation of existing facilities and ecotourism products

(A) Facilities

Residential facilities

There is skeletal facility at the Saman range office for visitors. Mainpuri is the nearest place where a decent and safe accommodation is available to the tourists.

Interpretation facilities

There is no Nature Interpretation Centre (NIC) in the sanctuary. It has not been developed properly.

Nature trails

Many dykes of varying lengths exist in the SBS. They also serve the purpose of trails. A walk along the trails provides closer look of the flora and fauna.

Park for children

There is an eco-park having enough space for the kids to play.

Watch towers

There are three watch towers that can also be used by tourists to get a better view of the birds.

Visitor centre/ Nature education center

It does not exist.

Center for showing local handicrafts, art and culture

It does not exist.

(B) Tourism products

Tourism products are yet to develop.

Other outreach programmes:

1. Outreach programme for villagers: The programme generally includes slide shows, film shows, *gosthis* and talks by resource persons. It is followed by a documentary film on conservation of natural habitats.

2. Outreach Programmes in Educational Institutions: Generally conducted in the education institutions like schools and colleges adjacent to SBS with focus on PA values and the need of biodiversity conservation. Along with the students, teachers also use to attend the programme. Brochures, leaflets, stickers, name slips etc. on Sanctuary values are supplied to students.

3. Programmes on special occasions

Wildlife Week Celebrations (1st to 8th of October every year), The Environment Day (June 5th), World Forestry Day (March 21st), Wetland Day (Feb 2nd) & World Water Day (March 22).

4. Nature camps: Nature camps for school kids are organized. School kids are brought to the sanctuary and made to spend the night over there. During the stay they are taught about the importance of conservation.

7.3 Issues / Problems

The problems in achieving the objectives are:

Related to tourism

1. Lack of connectivity: The road connection to the SBS is very poor. The last stretch of road from Mainpuri to Saman-katra is extremely bad. This has been the single most important factor for tourism not picking up in SBS.
2. The district headquarter of Mainpuri is not connected to metros by superfast trains or National Highways.
3. Lack of publicity: There is a need to promote this PA among the people interested in nature tourism.

Related to interpretation

1. No interpretation facility: The common visitors do not have anything for them in the absence of interpretation facility.
2. Poor publication: Only one set of leaflet was observed during the visit.
3. Poor signage: The display along the road side from Mainpuri is almost negligible.
4. No guide facility: In the absence of tourism related activity, guides are also not available.

Related to local community

There is no benefit to the local people from tourism in this area as tourism is yet to start.

Related to government policy

1. The tourism generates revenue. But the entire money gets deposited as revenue. There is need of a policy decision from the government regarding ploughing back at least some part of the revenue. This can be used on local people, on improving conservation and on maintaining infrastructure.
2. The tourism department of the Govt. of U.P. is yet to popularize this site in the tourism industry.

7.4 The Strategies

7.4.1 Infrastructure development

An exclusive tourism area will be developed having all the facilities for ecotourism, interpretation etc. A comprehensive long term plan will be prepared to guide the development of infrastructure in the future, both by the government department and the private entrepreneurs.

7.4.2 Activities

1. The interpretation centre will be constructed and the interiors will be designed and executed with the help of professionals. The displays will be based on themes.
2. Signage, wayside displays will be erected. They should match with the surrounding and they will not be too many.
3. Guides from the local youth will be trained and it will be mandatory to take a guide on local tours.
4. The government order will be issued to plough back gate collection to the SBS.
5. Resource will be mobilized from State and Central governments for promoting tourism.
6. Tourism products such as home stays, guided exposure to birds, conservation talks etc. will be developed.
7. Binoculars, Spotting scope Night vision equipments will be purchased for tourists.
8. Saman Bird Sanctuary Festival will be organized to attract tour operators, members of tourism industry, hoteliers, guides, ornithologists, media, and visitors. This one-day event will be organized between Jan 15 to Feb 15 every year.
9. Quality extension materials will be published for distribution free of cost to the visitors, media, members of tourism industry etc.
10. Road shows will be organized in Mainpuri, Etawah, Agra, Delhi and other places.

7.4.3 Regulations, Monitoring and evaluation

Regulations: The visitor behavior will be regulated as per the provisions of the law.

Monitoring and evaluation: The acceptable limits of change will be determined and the impact of tourism will be monitored. The socio-economic benefit of tourism will be monitored.

Chapter 8 Ecodevelopment

8.1 Introduction

Ecodevelopment is a strategy which "aims to conserve biodiversity by addressing both the impact of local people on the protected areas and the impact of the protected areas on local people."

Ecodevelopment as a tool to improve conservation status of any Protected Area has gained importance in the last decade. Many a times the market imposes its forces and makes subsistence and market driven economy indistinguishable. Ecodevelopment is seen as a sight specific conservation friendly package of measures for environmentally compatible development. Social and economic acceptability are integral to such a package that leads to conservation of biodiversity.

Ecodevelopment in SBS

During the World Bank Forestry Project (1998-2002) eco-development as strategy was tried in many PAs including the Saman Bird Sanctuary.

Major objective of the eco-development activity was to build capabilities in the people, who were dependent on PAs for subsistence, to enable them to earn their livelihood from activities not dependent on resources of the PA.

Under the project 4 EDCs, Bhagyanagar, Gulabpur, Kudarariaya and Hindupur were constituted on the basis of proximity to the PA. Works like installation of handpumps, laying of brick-road, bunding etc were taken as entry-point activities. There was no activity subsequently.

Assessment of the EDC programme

As stated in Chapter 3 and Chapter 4, the people around the SBS are not dependent on SBS for subsistence. Agriculture is the main activity in this region. Therefore, the participation of the villagers in the eco-development programme was not active. There was no imminent need for them to support eco-development activities. Thus, the program was not successful.

In the above background a redesigned ecocodevelopment plan is proposed with the following objectives:

8.2 Objectives:

- 1 To maintain biological diversity, productivity and integrity of SBS.
- 2 To minimize negative impacts of people on the PA and vice-versa.
- 3 To increase the collaboration of local people in conservation effort.

8.3 Specific Issues

Following issues were identified to be dealt with in this plan:

- 1. Settlements of rights not complete:** To achieve the above objectives, this is the biggest bottleneck.
- 2. Low growth of tourism:** The level of tourism is non-descript and hence the visible benefit to the local people from the existence of Bird Sanctuary is negligible.
- 3. Mechanism for compensation:** There is need for more effective mechanism for dealing with the man-animal conflict on the periphery of the bird sanctuary for the damages caused by the wild animal to their crop.

8.4 Broad strategies

The strategies to deal with above issues are the following:

- 1. Settlement of right:** This will remove the pressure of people whose land is notified under sanctuary.
- 2.1 Development of capabilities in the people:** The young, educated but unemployed people will be imparted training so that they may get gainful employment on sustainable basis.
- 2.2 Linking the development of the villages with tourism:** Efforts will be made to obtain necessary permissions from the competent authority for using part of the revenue generated from tourism for development of local peripheral villages.
- 2.3 Expediting the economic well being of the people:** The idea is to reduce the dependence of the people, particularly those whose land is notified under sanctuary, on agriculture so that there is no attempt of the owners of waterlogged fields to drain out the water from the sanctuary.

3. Awareness generation: It will be a significant strategy to disseminate the knowledge about the adverse impacts of various activities. The opportunity costs of the SBS will also be explained.

4. Linking the development of the villages with tourism: Necessary permissions will be obtained for using part of the revenue generated from tourism for development of local peripheral villages.

5. Compensation mechanism for crop damages: Effective strategy will be designed and implemented for this purpose.

6. Private agricultural field management: The peripheral farm owners will be convinced to adopt ecologically sustainable farm practices like use of bio-fertilizers and bio-pesticides.

8.5 Activities

1. Regular meeting of villagers will be organized.
2. Health camp for human beings and for cattle will be organized every year.
3. Field trip of the villagers to Bharatpur, Corbett, Ranthambhore etc will be organized to show them the good practices in involvement of the people.
4. Vocational training programmes, such as guide and naturalist training, will be organized.
5. Government of U.P. will be approached for issuing GO allowing ploughing back of tourism-revenue to undertake various sanctuary development activities including ecodevelopment activity in villages within 5 km from the sanctuary.
6. Compensation scheme for crop damage will be implemented.
7. Villagers will be encouraged to sell handicraft items near the sanctuary to the tourists so that they may get benefit from the tourism.

8.6 Monitoring and Evaluation

The impact of ecodevelopment activities will be monitored through records of training programmes, camps, field trips etc. The number of tourists and the amount of waste generated by them will be monitored through the records on labour engaged in cleaning. The increase in income levels will be monitored. The satisfaction of tourists will be monitored through surveys.

Chapter 9

Research, Monitoring and Training

9.1 Research and Monitoring

Research and monitoring are among the weakest areas in wildlife management (Sawarkar, 1995). SBS is no exception to it. Despite the area being declared as a Bird sanctuary way back in 1990 emphasis on systematic research and monitoring has been lacking all these years. No recorded evidences of surveys exist.

As wildlife science and management is quite a new domain in India, the need for research on advancement of science is well accepted. But still more important is to have research that provides information, knowledge and techniques that can be used to enhance the quality of management and it provides appropriate response to management issues.

Research has suffered due to lack of policy, clarity of objectives, priorities and therefore uncertain backing and inadequate funding support (Sawarkar, 1995). For the first time, National Wildlife Action Plan (2002-2016) lays down policy and objectives of Wildlife research in India.

As a small Wetland-PA in agriculture dominated landscape the SBS offers tremendous opportunities for research in the field of ecology. Saman Bird Sanctuary provides excellent opportunities for research on bird behaviour, movement, migration, habitat utilization, breeding, limnology, water chemistry, hydrology etc.

9.1.1 Objective

The objective of the plan is

- ✓ to promote research and monitoring programs in order to ensure management decisions based on sound scientific knowledge,
- ✓ to enhance benchmark knowledge,
- ✓ to enhance ecological integrity and
- ✓ to increase public awareness and people's participation.

9.1.2 Strategy

The strategy will be to finalize a 10 year research plan for SBS in consultation with the scientific institutions through a research advisory committee set up to guide the selection of research topics. The priority areas of research identified by various research institutes and organizations will be referred and an attempt will be made to synchronize the priority topics so that the research gets done on priority basis. Active involvement of Centre of Wildlife, Aligarh Muslim University, Bombay Natural History Society(BNHS), Wildlife Institute of India(WII), Salim Ali Centre for Ornithology and Natural History(SACON), Coimbatore, International Crane Foundation(ICF) etc will be sought. Financial support to the research activity will be provided from the annual plan.

9.1.3 Activities

9.1.3.1 Identification of areas of research

The topics/themes selected for research will be guided by two principles: It should be oriented towards filling the information gap in meeting the objectives of management. Secondly, the management intervention experiments based research will be given priority.

The probable areas of research can be divided into two broad groups:

(A) Research based on collection of information by staff in their day to day activity:

Some of the priority research areas are:

1. Distribution and spread of invasive species and their impact on the arrival and staging pattern of birds. (Long term study)

(B) Research by dedicated researchers

Some of the priority areas of research are:

1. Research on migration, feeding areas and movement of birds.
2. Study on the hydrology of the wetland.

3. Study on impact of the land use (agricultural practices) on the hydrology/ecology of the lake/SBS.
4. Scientific surveys of plants, birds, fishes, anurans, insects, invertebrates lesser animals and life forms etc.
5. Impact of exotic species.
6. Study on impact of management practices on vegetation dynamics.
7. Identification of wetlands acting as satellite wetlands for birds wintering in SBS.
8. Socio-economic effect of the Sanctuary.

9.1.3.2 Other activities

1. Permanent experimental plots will be laid out in all the sections to study the long term change in vegetation, communities and association.
2. A small field laboratory will be set up in the office building. It will have basic scientific equipments like microscope, preservative, refrigerator etc.
3. A research committee will be constituted for SBS to deal with the research related matters.

9.2 Monitoring

Monitoring is very important to capture any significant ecological change in the ecosystem as quickly as possible. The cost of having a more sensitive system is very high. But for the wildlife managers capturing the broad changes will suffice. Later a detailed study can be launched.

Monitoring is also important to observe the effectiveness of management interventions and to make modifications in the strategy.

Following activities will be taken up to meet the objectives:

1. Creation of a library. A library will be created to have all the necessary reprints on SBS. A computer with internet connection will also be installed.
2. Monitoring of urbanization in the nearest areas on the Bird sanctuary.
3. Monitoring of weed eradication will be done.

4. Monitoring of fire control measure suggested in theme plan on fire.
5. Monitoring of avian flu.
6. Monitoring of tourism related activities, the impacts and the extent of benefit.
7. Daily monitoring of migratory birds during winter.
8. Mid-winter waterfowl census in association with department of wildlife, AMU.
9. Monthly monitoring of lake water quality.

9.3 Training

Training is indispensable at all levels. It does not mean only the upgradation of technical skills. The objective of training is to keep the employee updated about the latest trends and happenings and also to uplift their morale. So training designed towards personality development will also be organized.

The guiding principle behind training is to post technically sound officers and staff in SBS.

The following approach will be adopted as far as training is concerned:

9.3.1 On-the-job training

The working in the field gives rare opportunity to have a hands-on experience of the things taught in theory.

Following training will be organized for the field staff:

1. Training on legal issues.
2. Training on how to conduct investigation in an offence.
3. Training on how to collect evidence from the scene of crime.
4. Training on survey and demarcation.
5. Training on use of equipments like GPS.
6. Training on collection of data.
7. Training on monitoring of health of wild animals.
8. Training on identification of plants.

These trainings will be of maximum one week duration. Place and faculty will be decided before the training.

9.3.2 Formal training courses

There are many training courses run by educational and research institutions in the field of wildlife.

1. The ACF will be sent for diploma training to WII.
2. All the Range Officers and Deputy ROs will be sent for “certificate course” in WII.
3. Competence based training will be organized in FTI, Kanpur for foresters and guards.
4. Staff will be sent for Personality development training to professional institutes.

9.3.3 Establishing a Learning Center

The need of a learning center can not be debated. A fully equipped learning center focused on “management of wetlands” should be established in Saman that will be used to provide training to all the employees of the state. The focus of this learning centre should be on Sarus crane. **As the district Manipuri is home to more than 30% of the Sarus crane population of the State of U.P., this bird sanctuary should be developed as nodal point for Sarus related research and monitoring. The learning center should be developed as a training/resource place on Sarus- the state bird.** One of the existing buildings can be upgraded for this purpose. It will also have library facility.

The learning center will be developed to impart training on following:

1. Good example of habitat management for Sarus Crane.
2. Monitoring of Sarus crane
3. Monitoring of vegetation in a wetland.
4. Local handicraft promotion and tourism.
5. Impact of tourism on agrarian economy.
6. Management of wetlands.
7. Monitoring of birds.

Chapter 10

Organisation and Administration

10.1 Objectives

In the light of overall objective of improving management effectiveness of SBS, the specific objectives are:

1. To have suitable administrative structure for SBS.
2. To have efficient administration in place.
3. Human resource development.
4. Development and maintenance of infrastructure facilities.
5. Providing amenities to the staff.

10.2 Strategy

The strategy to achieve above objectives will be

1. Reassessment of the requirement of staff and creation of new posts of field staff,
2. Re-organisation of administrative structure and
3. Creation of amenities for the staff.

The existing control and command structure of the SBS has been shown in para 3.10. A careful analysis of the situation and to achieve above objectives the following activities are proposed:

1. Creation of new beats and sections

According to the last plan the position of beat and section is as follows:

Section	Beat	Area	Headquarter
1.Saman	1. Saman I	1.Part of Saman Bird Sanctuary	Saman Bird Sanctuary, Saman
	2. Saman II	2.Part of Saman Bird Sanctuary	

In the present plan, it is suggested that the number of sections and beats should not be increased.

If there is increase in tourism related activity during this plan period additional manpower will be needed for the same.

2. Sanction of new posts

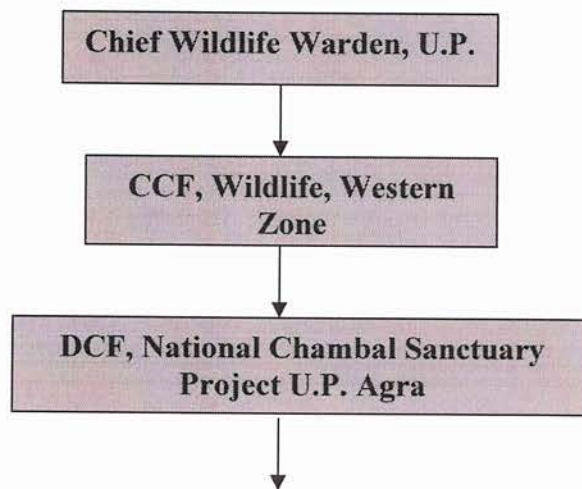
The present position of staff posted in the SBS is given in annexure. Over the years the profile of job of each of these posts has changed. The increased level of threat combined with newer activities like ecotourism, ecodevelopment, publicity and extension, research, monitoring etc has necessitated a reassessment of the requirement of the staff. The following posts are proposed for the SBS:

1. Range Forest Officer (RFO)	-	1
2. Deputy Ranger/ Forester	-	2 (1 each for section and office)
3. Forest Guard (FG)	-	4 (2 for each beat)
4. Watchman	-	1(Range Office and eco-tourism infrastructure)
5. Mali	-	1 (For eco-park & eco-tourism infrastructure)
6. Research assistant	-	1
7. Driver	-	1
8. Orderly/Field Assistant	-	1
9. Sweeper	-	1

3. Re-organisation of the administrative structure

1. The RFO is reporting to ACF who sits at Etawah. This arrangement has been created by an administrative order of the Conservator of Forests, Wildlife, Lucknow. This is creating unnecessary delay in the administrative and financial matters. Hence, to make the administration efficient and quick, this arrangement is proposed to be dismantled. The RFO will report to the DCF directly.

The proposed organization structure is shown below:



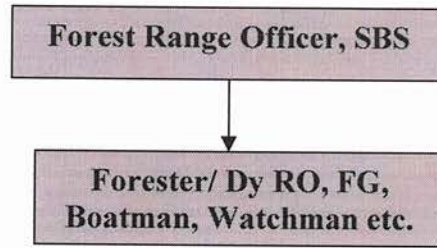


Fig: Proposed organization structure of Saman Bird Sanctuary

2. Some of the responsibilities and duties of each higher level will be given to the immediate lower level to enlarge his job description.
3. Similarly, some new responsibilities will be added to the presently existing responsibilities to enrich the job profile of sub-ordinate staff.
4. The amenities for the staff will be created as per requirement and it will be maintained regularly.

10.3 Staff amenities

To boost up the morale of the staff the following steps will be taken:

1. Improvement in housing facilities for the staff. Presently, the number of buildings is adequate. However, new buildings will be created if the need arises and old buildings will also be maintained.
2. Uniform will be provided as per the government order.
3. Washing allowance will be provided.
4. Extra incentive for working in the PA will be proposed and provided if sanctioned.
5. Medical facilities will be provided.
6. A system of rewards and prizes will be put in place.
7. Efforts will be made to provide GPS enabled cell phones or wireless or 3G phones to all the field staff.
8. Field gears like weapon, cartridge, GPS machine, boot, night vision equipment, binocular etc will be provided.
9. Efforts will be made to provide mosquito net, water bottle, umbrella, raincoat, woolen dress, socks etc.

Chapter 11

The Budget

The proposed management plan of SBS has suggested many activities for achieving the management goal. Adequate budget is a precondition to complete the activities. The execution of the plan depends on the successful mobilization of Fund.

The possible sources of fund could be

- “Integrated Development of Wildlife Habitat” scheme of Govt. of India.
- “National Wetland Conservation Programme” of Govt. of India.
- The multilateral donor agencies like World Bank, IDA, GEF, JICA, DFID, ODA, UNEP, ADB etc.
- The International and National NGOs like WWF, Wetland International, WTI etc.
- The bilateral donors like USFWS, USFS, Smithsonian Institution etc.
- The Govt. of U.P. through plan and non-plan budgetary support.
- The tourism department of the Govt. of India.
- District Rural Development Agency, Mainpuri.

The requirement of budget for implementing the provisions of the plan is given in the table next. The total size of the plan is Rs. 5280.05 lakh. Out of this Rs. 5000.00 lakh has been provided for settlement of rights. The projections are based on market price in 2009-10 and the prevailing wage rate of Rs.100/- per day. The amount proposed or the physical target for any activity can be changed depending upon the requirement. **There may be certain activities fitting in the broad strategy/category of plan but not mentioned in the budget. Inclusion of such activities is permitted when required.**

SI No	Chapter/Para	Activity	Quantity	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20
2	7.4.3	Construction and maintenance of interpretation centre	L.S.	25.00	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
3	7.4.3	Training of guides	L.S.	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
4	7.4.3	Purchase of binoculars, spotting scope.	L.S.	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
5	7.4.3	Maintenance of toilets and drinking water facilities for tourists	L.S.	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
6	7.4.3	Maintenance of eco-park	L.S.	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
VI Ecodevelopment													
1	8.5	Meeting with villagers	L.S.	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
2	8.5	Health camp	L.S.	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
3	8.5	Cattle check-up and vaccination camp	L.S.	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
4	8.5	Exposure trip for villagers	L.S.	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
5	8.5	Vocational training programme	L.S.	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
VII Research, Monitoring and Training													
1	9.1.3	Research	L.S.	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00	1.00
2	9.1.3	Setting up and maintenance of field laboratory	L.S.	1.00	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
3	9.2	Creation of library	L.S.	1.00	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
4	9.2	Purchase of computer and broadband	L.S.	0.50	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05	0.05
5	9.2	Monitoring of birds, weeds, tourism etc	L.S.	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
6	9.3	Training	L.S.	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
7	9.3	Establishment and maintenance of learning center	L.S.	0.50	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
8	9.3	Mid-winter waterfowl census	L.S.	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
VIII Organisation and Administration													
1	10.3	Patrolling kit for staff	L.S.	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25	0.25
2	10.3	Construction / Maintenance of buildings	L.S.	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50	0.50
3	10.3	Maintenance of drinking water facility for staff	L.S.	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10	0.10
4	10.3	Construction of boundary wall	300m	10.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Total				5068.81	24.36	23.36	23.36	23.36	23.36	23.36	23.36	23.36	23.36
Grand Total (2010-11 to 2019-20)				5280.05									

Glossary

Biological diversity The variety of life and its processes, including complexity of species, communities, gene pools, and ecological functions (Spotted owl EIS Team, USDA Forest Service 1993).

Den tree A standing live tree with cavity/cavities in branches or in the bole, in use or having potential for use by wildlife (Sawarkar 1991).

Down log Trunks and limbs of trees or fashioned/unfashioned logs in various stages of decomposition on the forest floor (Hoover and Wills 1984).

Guild A functional category used for combining species that overlap significantly in their utilization of a particular resource (French 1977).

Habitat component A simple part or a relatively complex entity regarded as a part, of an area or type of environment in which an organism or biological population normally lives or occurs (Thomas 1979).

Hot spots Specific small areas within a landscape exhibiting significantly higher levels of plant/animal diversity or unique composition of plants/animals (Sawarkar, 1995).

Indicator species A selected species presumed to indicate the welfare of other species or that which represents a specific habitat condition (Thomas 1979).

Interspersion The intermixing of plant species and plant communities that provides habitat for animals in a defined area (Thomas 1979).

Juxtaposition The act of arranging stands in space (Thomas 1979). Applies to all types of vegetation (Hoover & Wills 1984).

Key areas Areas that offer key habitat functions for a species such as breeding, fawning, roosting, nesting or those that have obligate species; biological or geomorphic in nature (Sawarkar, 1995).

Key species In order of priority, generally a small number of species identified as species of conservation importance and might include endangered, endemic, rare or threatened species of plants and animals (Sawarkar, 1995).

Keystone species Animals or plants which, by virtue of their presence or absence, alter the structure of a community (Krebs 1978).

Landscape Large ecological units which function as integrated bioregions, containing national parks, sanctuaries, all or some combination of legal and functional categories

of forests, village systems, lands under various ownership and landuse categories and wastelands (Holthausen, Sawarkar, Darden, 1991).

Limiting factor The environmental influence through which the toleration limit of an organism is first reached, which acts, therefore, as the immediate restriction in one or more of its functions or activities or in its geographic distribution (Hanson 1962).

Managed forests All categories of forests excluding protected areas managed for multiple use (Thomas 1979).

Management indicator Includes the following: endangered, threatened, **species** endemic or rare species on national listing; species with special habitat needs that might be influenced by management; a species whose population changes are believed to indicate effects of management or resource use pressures on other species of a major biological community, habitat structure, composition or condition, or water quality (Hoover and Wills 1984).

Mesic site Environmental situations characterised by moderate to moderately high moist conditions due to the presence of springs, seeps or attributable to edaphic character. Excludes riparian systems (Thomas 1979).

Micro habitat elements Small components of a habitat which by themselves seem insignificant but provide critical life history requirement of one or several species, and/or support ecological functions eg. snag, den, cave, etc. (see special and unique habitat) (Sawarkar 1995).

Obligate species Species-habitat relationship on account of which a species is almost completely dependent on a specific successional stage, community structure or composition for its existence (Thomas 1979).

Old growth A stand that is past full maturity and showing decadence; the last stage in forest succession (Thomas 1979).

Pinch period A season during which either food or water or both are minimal in their quantity, quality and distribution causing stress in animal populations. Generally the term addresses the welfare of herbivorous species (Dasmann 1964).

Prescribed burning Skilful application of fire to natural fuels under conditions of weather, fuel moisture, soil moisture etc. that allow confinement of fire to an predetermined area and produce the intensity of heat and rate of spread to accomplish planned benefits to one or more objectives of silviculture, wildlife management, grazing or hazard reduction (USDA Forest Service 1956).

Riparian Of, pertaining to, or situated on the banks of a stream body of water, or other perennial aquatic environments (Hoover and Wills 1984). The term is also further extended to include seasonal or ephemeral streams having characteristic bank vegetation (Thomas 1979).

Riparian zone/area An area identified by the presence of vegetation that requires free or unbound water or conditions more moist than normally found in the area (Minore and Smith 1971, Franklin and Dryness 1973).

Sensitive site A site vulnerable to rapid change in its biological attributes or physical character in the face of management activity or resource uses either due to its small size or due to species/communities on that site which are intolerant to change or are exacting in their habitat requirements, or fragile rock/soil formation (Sawarkar 1995).

Sensitive species A species intolerant to any alteration in its habitat, a species which is exacting in its habitat requirements and rapidly exhibits adverse impacts as a consequence to minor disturbance (Sawarkar 1995).

Snag A standing dead tree, whole or broken, at least 1.5 m in height where broken, with a minimum of 20 cm dbh, with or without limbs or bark (Sawarkar 1991).

Special habitat A habitat which has a special function not provided by plant communities and successional stages; includes riparian zones, snags, dead and down woody material and edges. Biological in nature; can be created or altered by management (Thomas 1979).

Species richness A measure or expression of the number of species of plants or animals present in an area; the more species present, the higher the degree of species richness (Thomas 1979).

Stand Plant communities, particularly of trees, sufficiently uniform in composition, constitution, age, spatial arrangement or condition to be distinguishable from adjacent communities; also, may delineate a silvicultural or management entity (Ford-Robertson 1971).

Stand condition The descriptive measurement of a stand by the criteria of composition, health, age, size, volume or spatial arrangement (Thomas 1979).

Stand distribution See Juxtaposition

Stand structure (See stand). The configuration of elements, parts, or constituents of a stand (Thomas 1979).

Succession stage A stage or recognizable condition of a plant community which occurs during its development from bare ground to climax e.g. grass-forb-shrub seedling-sapling/pole-young-mature-old growth (Thomas 1979).

Talus The accumulation of broken rocks that occurs at the base of cliffs or other steep slopes (Thomas 1979).

Unique habitats Wildlife habitats of special function not included within plant communities and successional stages or special habitats; geomorphic in nature e.g. cliffs, caves, overhangs, shelves, or ledges, talus, crevices (see also 'key areas').

Wildlife damage Problems such as crop raiding, livestock depredation, **problems** destruction, of property, injuries to people, man killing by wildlife.

Zone of influence The extent of area outside the legal PA boundaries over which wildlife damage problems of significance occur, excluding damage caused by itinerant elephant population not necessarily dependent on the PA and the extent of area settled by villages with people having a traditional PA based resource dependency, whichever is the greater area in extent. This is also considered as the buffer zone (Sawarkar 1995).

Abbreviations Used

ACF	Assistant Conservator of Forests
AMU	Aligarh Muslim University, Aligarh
BSI	Botanical Survey of India
CEE	Centre for Environmental Education, Ahmedabad
CWW	Chief Wildlife Warden
DCF	Deputy Conservator of Forests
EDP	Ecodevelopment Planning/Plan
FD	Forest Department
FG	Forest Guard
GPS	Global Positioning System
ICF	International Crane Foundation
M & E	Monitoring and Evaluation
MFP	Minor Forest Produce
MIZ	Mutual Impact Zone
MOV	Means of Verification
NGO	Non Governmental Organisation
NIC	Nature Interpretation Centre
NP	National Park
NTFP	Non Timber Forest Produce
NWP	Non Wood Forest Produce
OVI	Objectively Verifiable Indicator
PA	Protected Area
PAN	Protected Area Network
SBS	Saman Bird Sanctuary
RO/RFO	Range Officer / Range Forest Officer
TUZ	Traditional Use Zone
WII	Wildlife Institute of India, Dehra Dun
WPA	Wildlife (Protection) Act, 1972
WLS	Wildlife Sanctuary

References

Agnihotri, Priyanka, Husain, T., Maliya, S.D. (2008) Aquatic flora of some notified bird sanctuaries of Uttar Pradesh. *Indian Forester*, 1398-1401.

Badola, Ruchi, Bhardwaj, A.K., Mishra, B.K., Rathore, B.M.S. (2002) *Ecodevelopment Planning for Biodiversity Conservation – A Guideline*. Wildlife Institute of India, Dehradun.

Government of India. (2002) *The National Wildlife Action Plan*. Ministry of Environment and Forests, New Delhi.

Sawarkar, V.B. (2005). *A Guide for Planning Wildlife Management in Protected Areas and Managed Landscapes*. Natraj Publishers, Dehradun.

Sharma, V.K. (2000). *Management Plan of Saman Bird Sanctuary, 2000-01 to 2009-10*. Forest Department, Uttar Pradesh.