

Management Plan

of

Soor Sarovar Bird Sanctuary

Keetham, Agra

for

2020-21 to 2029-2030

(Part- I, II & III)

Prepared by

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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
ESZ	Eco-Sensitive Zone
FD	Forest Department
FG	Forest Guard
GPS	Global Positioning System
M & E	Monitoring and Evaluation
MFP	Minor Forest Produce
MIZ	Mutual Impact Zone
MOV	Means of Verification
NGO	Non Governmental Organisation
NH	National Highway
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
SSBS	Soor Sarovar 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

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The Executive Summary

Soor Sarovar Bird Sanctuary is located on Agra-Delhi highway at approximately 20 km from Agra. 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 Soor Sarovar 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 Soor Sarovar 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 2020-21 to 2029-30 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 SSBS 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. 3 non overlapping zones have been designated for achieving various objectives. The plans for all the zones and the theme plans on protection, fire, habitat management etc have been included here.

SSBS is also an emerging ecotourism hotspot in this region. There is a big opportunity for convergence of development, conservation and tourism. Chapter 7 on ecotourism, interpretation and conservation education evaluates the tourism and interpretation infrastructure and the interface issues. An exclusive tourism zone has 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 SSBS.

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 impact of fire and weed, impacts of tourism and limits of tourism is 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 Eco-sensitive Zone gives salient information about Eco-sensitive Zone of Soor Sarovar Bird Sanctuary.

Chapter 12 on budget tells the resource requirement to execute the plan. A plan support of Rs 1357.15 lakh will be required during plan period for fully implementing the plan. 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.

Introduction

The last management plan of the Soor Sarovar Bird Sanctuary was prepared for 2010-11 to 2019-20. This plan period is ending on 31st March 2020. It is necessary to prepare a management plan for each PA for its scientific management and to get central financial assistance under various centrally sponsored schemes. Therefore, this plan has been written for the next 10 years i.e. for 2020-21 to 2029-30.

Before writing the plan the area has been observed thoroughly. For data and information, secondary sources were also relied upon. The publications related to SSBS 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 also consulted through one-to-one dialogue. The history of past management was shared by the managers who worked in this area previously.

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.

Management Plan

2020-21 to 2029-2030

Part- I

The protected Area : Existing Situation

Soor Sarovar Bird Sanctuary

Keetham, Agra

Chapter 1

Introduction to the Area

1. Introduction

Soor Sarovar Bird Sanctuary (SSBS), Keetham, Agra is a small but important bird sanctuary in the state of Uttar Pradesh. It comprises of an artificial fresh water 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 764/14-3-49/90 dated 27.03.1991 by the Government of Uttar Pradesh (UP). According to the schedule to the notification the SSBS includes an area of 403.09 ha. The notification under section 21 of the Wildlife (Protection) Act, 1972 was issued vide notification number 349/2A dated 26-05-1997 by the Collector / District Magistrate, Agra. The notification under section 25 of the Wildlife (Protection) Act, 1972 was issued on 30-03-2008 by the Collector / District Magistrate, Agra.

Unique for scenic beauty, religio-cultural heritage and rich assemblage of fauna and flora, it has been named after Soordas - the great poet of Hindi literature, who was born blind – whose place of birth is said to be within the boundary of this sanctuary.

A huge lake surrounded by dense and luxuriant vegetation of semi evergreen and deciduous forests is a rare experience and picturesque sight in the urban area of the semi-arid part of the country. The total area under the administrative control of SSBS is 7.99 km² out of which notified bird sanctuary area is 4.03 km² and Soordas reserve forest block including government land area is 3.96 km². Thus the core zone is 3.96 km², buffer zone is 3.55 km² and tourism zone is 0.48 km².

Though the boundaries of the sanctuary are within the district of Agra, the river Yamuna in the northern side makes the boundary of the sanctuary as well as the inter-district boundary between Agra and Mathura.

1.1 Location, constitution and the extent

Soor Sarovar Bird Sanctuary lies between N27° 14' 4" and N27° 31' 51" and longitude E77° 49' 38" and E77° 52' 40". The Sanctuary falls administratively in the Agra revenue district of Uttar Pradesh State.

For administrative purpose SSBS consists of only one range.

Area:

Notified Sanctuary Area	– 403.09 ha.
Soordas reserve forest block	– 380.40 ha.
Government land	– 15.547
Total Area under control	– 799.037 ha.

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	Soor Sarovar Bird Sanctuary	1.Soor Sarovar 2. Tourism	7.99 -

1.2 Approach and Access

SSBS is about 20 km from the Agra district headquarters, about 180 km from Delhi and about 60 km from Bharatpur. The entrance to the sanctuary is located on Agra-Delhi National Highway number 2.

The sanctuary is accessible by roads, railways and air.

By Air: The nearest airport is at Agra (30 km). Delhi airport is at 200 km approximately.

By Rail: Nearest important railway stations are Agra (30 km) and Delhi (200 km).

By bus: Agra is well connected by bus from the nearby important cities like Delhi, Jaipur, Bharatpur, Gwalior etc.

1.3 Statement of significance

Soor Sarovar Bird Sanctuary includes a lake called Keetham lake encapsuled by the surrounding dry deciduous forest. It is the only representation of its biogeographic province (Punjab plains) in the protected area network of State of U.P.

The artificial lake flanked by the river Yamuna on its northern periphery produces a mosaic of ecological niches resulting in diversity of flora and fauna in this sanctuary. The area, declared as a PA, gives shelter to more than 165 spp of birds during some or the other part of the year. Of the 42 species of family Anatidae from the Indian subcontinent, 15 species have been reported from SSBS.

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).

Every year it provides shelter to more than 25000 birds during winter. Most of the common waterfowl of north India is found in the sanctuary, namely Rosy pelicans, Northern Pintail *Anas acuta*, Wigeon *A. Penelope* Common Pochard *Aythya ferina*, Gadwal *Anas strepera*, Northern Shoveller *A. clypeata* Spotbilled duck *A. poecilorhyancha*, Pied avocet, Rudy shelduck, Felamingo, Graylag goose, Lesser whistling teal and Comb duck *Sarkidiornis melanotos* etc.

During summer, when water becomes the limiting factor for most of the surrounding wetlands as they dry completely, the Keetham lake becomes the favored habitat of Comb duck *Sarkidiornis melanotos*, Spotbilled duck *A. poecilorhyancha*, Lesser whistling teal *Dendrocygna javanica*; Storks –Painted *Mycteria leucocephala*, Openbill *Anastomus oscitans*, Black-necked *Ephippiorhynchus asiaticus*; Herons – Grey *Ardea cinerea*, Purple *A. purpurea* and Night *Nycticorax*; Egrets – Large, Medium, Little and Cattle; Cormorants – Great *Phalacrocorax carbo*, Indian Shag *P. fuscicollis* and Little *P. niger*; and Darter *Anhinga rufa*. It also supports the Sarus crane *Grus antigone* population of this area during this period.

A huge heronry of colonial nesting birds develops every year in this bird sanctuary, whose presence has been recorded since 1990. In the year 2018 more than 4000 nests were counted. The nesting activity by 14 heronry species (4 types of Egrets, 3 types of Cormorants, 3 types of Herons, Openbill Stork, Darter, White Ibis and Spoonbill) makes it a unique PA of the Uttar Pradesh. Besides this, resident ducks like Comb duck *Sarkidiornis melanotos*, Spotbilled duck *A. poecilorhyancha*, Lesser whistling teal *Dendrocygna javanica* many other woodland birds also nest in this area. Every year the Sanctuary supports a family of endangered Black-necked Stork *Ephippiorhynchus asiaticus*.

The sanctuary is also last home to many native species of flora and fauna as the landscape is agriculture dominated and the *Prosopis juliflora* dominated forest outside the PA is under

severe anthropogenic pressure whose intensity is only increasing year-after-year. 299 species of plants, including 20 aquatic plants, belonging to 77 families were reported in a rapid survey from the sanctuary.

Among the mammals, the sanctuary is the only protected area providing refuge to Nilgai *Boselaphus tragocamelus*, Jackal *Canis aureus*, Hog deer *Axis porcinus*, Hyena *Hyena hyena*, Porcupine *Hystrix indica* etc. in this area. Among the reptiles 7 species of turtles and 15 species of snakes are reported in this sanctuary. The uncommon Yellow monitor lizard *Varanus flavescens* and the Desert or Agra Monitor lizard *Varanus griesus* can also be spotted in this PA.

Floristically, 299 species from 77 families including 22 aquatic plants have been reported in a rapid survey.

The SSBS is also an emerging nature tourism destination for people visiting the cultural city of Taj Mahal. It's recognition as an important centre for nature is establishing fast.

In addition to the birth place of Soordas, there are many places of religious importance around the sanctuary. Therefore, it is also very important for religious tourism.

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 manmade wetland based PA in an increasingly urban landscape.

1.4 Declaration of Eco-sensitive Zone (ESZ)

Eco-sensitive Zone of Soor Sarovar Bird Sanctuary has been notified vide notification no. 3319 Date 10.10.2019 of Ministry of Forest Environment & Climate Change, Government of India The Eco-sensitive zone shall be to an extent of one km uniform around the boundary of Soor Sarovar Bird Sanctuary and the area of the Eco-sensitive Zone is 10.20 sq.km. The notification of Eco-sensitive Zone is given in appendix no-3.

Chapter 2

Background information and attributes

2.1 Boundaries

The Soor Sarovar Bird Sanctuary is located in an increasingly urban landscape. Though, at present most of the surrounding land use is agriculture dominated, the pull-effect generated by the Tajmahal and other cultural attraction of Agra and the magnetic charm of the Lord Krishna's birth place in Mathura is bound to shift the land use in the vicinity of the sanctuary by the end of this plan. It is situated at the boundary of the Agra and Mathura districts, the river Yamuna being the natural boundary. So, there may be 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.

The boundary in the north-west, west, south-west, south and south-east directions are sure to witness rapid construction activities due to connectivity with Agra-Delhi National Highway.

It is clear from the above that the SSBS shares a long boundary, approximately 20 kilometer in length, with the agricultural fields of the farmers. This long boundary, shared with the villagers, poses challenges for achieving the long term objectives of SSBS.

Some of the problems having origin in the boundary are extraction of water from the lake for irrigation, use of lake by the cattle of the villagers, conversion of land for colonisation, deposition of insecticide, fertilizer into the wetland etc.

Ecological Boundary

Though the administrative boundary of the sanctuary is defined the ecological boundary extends far and wide. The river Yamuna flowing along the northern boundary functions as a complementary perennial wetland for this sanctuary. Though it is the natural boundary from pillar number 44 to 51, the river has not been included in the sanctuary notification.

The eastern side of the sanctuary is connected to the Runakta forest block, which is under the control of Social Forestry Division, Agra River Yamuna is the natural boundary of this forest block also. Given the fact that the Punjab plains biotic province has less representation in the

PAN and the habitat being indistinguishable from that of the SSBS, this forest block is the ecological boundary for birds in this direction. Adding this area and the adjoining stretch of Yamuna to the SSBS will enhance the habitat suitability functions of SSBS for all taxa in general.

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

Therefore, there is a need to find out as to what are the wetlands that act as satellite wetlands to this PA. Also upto how far the birds disperse for feeding during night. There is a need to research this aspect of bird dispersal. Eco-sensitive Zone of Soor Sarovar Bird Sanctuary has been notified vide notification no. 3319 Date 10.10.2019 of Ministry of Forest Environment & Climate Change, Government of India The Eco-sensitive zone shall be to an extent of one km uniform around the boundary of Soor Sarovar Bird Sanctuary and the area of the Eco-sensitive Zone is 10.20 sq.km.

Internal Boundary

SSBS is one management unit. It is made up of just one range. This range is further divided into 1 section and 3 beats – the smallest unit of administration in SSBS.

There is no settlement inside the boundary of SSBS. However, the notified boundary of the sanctuary contains forest land leased to various agencies. Such areas are shown in the map. The purpose for which the leases were given should be examined and the areas should be brought back under the control of the Sanctuary management.

2.2 Geology, Rock and Soil

The SSBS is on the banks of the river Yamuna. The terrestrial part of the sanctuary is ravinous. The top soil along the river Yamuna is sandy-loam. The sub-soil is also the same. In rest of the sanctuary the soil is predominantly alkaline with presence of *kanker* pan at variable depths. The soil moisture condition favours the tropical thorn forest. The area is not rocky.

2.3 Terrain

The SBSS has two distinct ecological units. The Keetham lake and peripheral comartments of Keetham forest block is one such unit. The depth of the lake increases from North-west to South-east direction. The forested area of Soordas forest block has ravinous terrain with characteristic gullies and deep ravines. The general gradient of the tract is from South to

North. 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 falls in semi-arid bio-geographic zone. Theoretically the average rainfall in the area is between approximately less than 800mm. The area receives rainfall mainly in the months of August and September from South-west monsoon. Generally the period from October to June is considered as the dry season.

The rainfall data, obtained from the sub divisional office of the revenue department, of the 2011-2019 shows that the actual average rainfall in the Kerawali tehsil headquarters 27 km away from the SSBS is less than 400mm. Not only the rainfall is very less, it is becoming very erratic also with decreasing number of rainy days thereby increasing the vulnerability of the forest to fire.

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

The onset of monsoon and the rainfall in the area is very important for initiation of heronry activity. A delayed monsoon has an adverse impact on the intensity of nesting activity.

2.4.2 Temperature

The temperature varies between 2° 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. Though the precipitation is less but these months are very humid.

2.4.4 Wind Speed

Air is generally calm with an average wind velocity of 4 km per hour. During summer there are frequent dust storms.

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 SSBS is the only source of water for waterbirds, for birds dependent on water and for other fauna resident in the sanctuary.

A. Perennial sources of water

2.5.1 Keetham Lake

This lake-cum-reservoir is the nerve centre around which the life revolves in Soor Sarovar Bird Sanctuary. Though initially planned for supplying water to the city of Agra, subsequently it was embanked to work as a reservoir. The Irrigation department of the Government of U.P. supplies water to the Mathura refinery by a bilateral agreement entered in 1981.

But from the beginning this lake has been an important staging and dispersal grounds for migratory birds during winter. The lake, having never faced a scarcity of water, has been an important factor for arrival of more than 25000 birds every year.

2.5.2 Yamuna river

As mentioned in para 2.1 the flowing water of this river is also a perennial source of water for the avian and other fauna of the sanctuary.

B. Seasonal sources of water

2.5.2 Pond and other temporary water storage points

A pond has been constructed in the year in the compartment 10 of Soordas forest block. This functions as waterhole mainly for the mammals in this part of the Sanctuary. Many large earthen bunds have also been constructed mainly for soil and moisture conservation. The borrow pits in the upstream part also store water for part of the year.

The issues related to water in SSBS

As mentioned in 2.5.1 the Keetham lake is now supplying water round the year to the Mathura refinery for their operations. As per the bilateral agreement between Irrigation

Department of U.P. and the Mathura refinery the irrigation department is required to ensure availability of water in the lake for uplifting it to the refinery. The irrigation department fills up the lake through a branch of the Agra Canal originating from the Okhla barrage on river Yamuna. This is done during post-monsoon period (Sep-Oct) when the water requirements of the farmers have been met. It has been observed that the lake is filled to the maximum possible level. In this process all the shorelines and the shallow areas of the lake also get submerged reducing the diversity of habitat. As this also happens to be the start of the winter migration season of the birds coming via central-asian and east-asian flyway to this part of the country, it has been observed that the arrival of birds is affected negatively. Thus, there is a conflict of objective between the irrigation department and the forest department.

The water from river Yamuna brought to this lake also carries with itself the water hyacinth which necessitates continuous de-weeding exercise on the part of the sanctuary management. A mechanical intervention in the inlet channel can be a more lasting solution.

The water of Yamuna at Okhla, which is sourced to this lake, also brings waste and sewage with itself.

2.6. Range of wildlife, status, distribution and habitat

SBSS has been declared a sanctuary primarily seeing its importance in conservation of birds. 165 species of birds belonging to 30 families have been reported from this sanctuary between 2011 and 2019. The bird sanctuary regularly attracts more than 25000 birds every year. The migratory birds are mainly water birds and they are concentrated mainly in the jheel. The resident birds take shelter in adjoining forests also.

In addition to birds the sanctuary is also provides legal home for large and small mammals, snakes, butterflies, turtles and other fauna.

2.6.1 Vegetation

2.6.1.1 The bio-geographic classification

Biogeography is the study of the distribution of species, organisms and ecosystems in geographic space and through geological time. According to biogeographic characteristics India has ten different biogeographic zones and 26 biotic provinces. SSBS is situated in Gangetic plain biogeographic zone (7) and in Upper Gangetic plain biotic province (7A)

Bio-geographic zone--- 7 Gangetic Plain

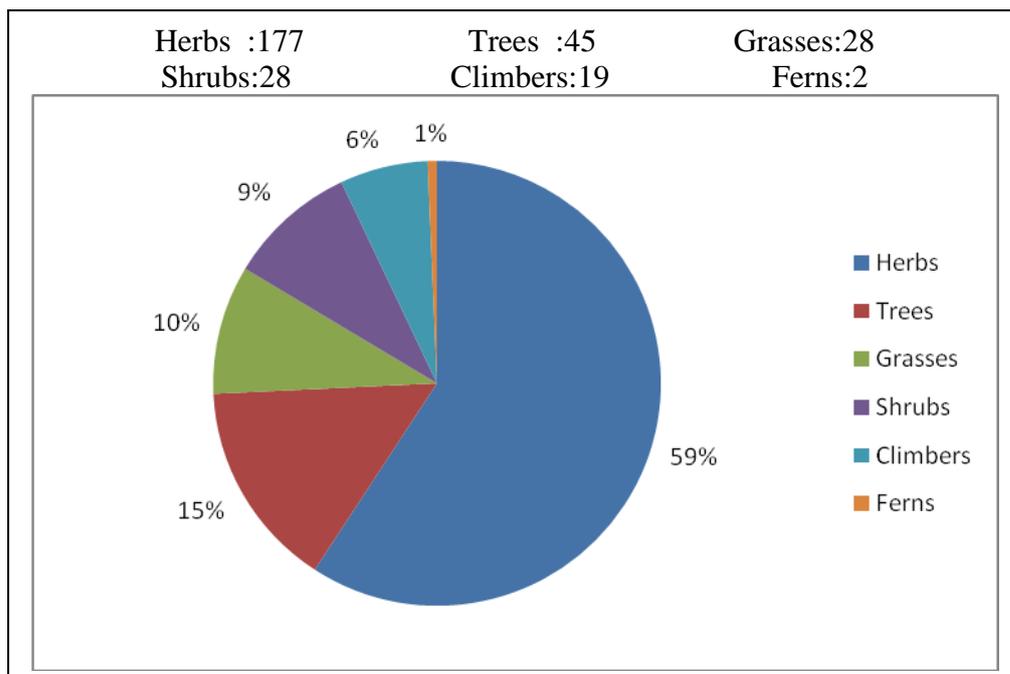
Biotic province-----07A Upper Gangetic Plain

2.6.1.2 The forest types, cover and food for wild animals

According to the Champion and Seth classification of forest types, Soor Sarovar Bird Sanctuary falls under forest type 5/E-1 i.e. Northern tropical dry deciduous forest. The wetland and the adjoining forests provide food for the birds.

In a rapid survey conducted in 2019-20, 299 plant species have been reported from the sanctuary. They belong to 225 genera of 77 families. List of terrestrial and aquatic plants found in SSBS is given in part – III of plan as appendix - 12

Classification of vegetation:



Family wise representation is as follows:

Largest families	
Poaceae	27
Asteraceae	26
Cyperaceae	16
Fabaceae	16
Euphorbiaceae	13
Acanthaceae	10
Amaranthaceae	9
Families represented by 1 plants	1
Aquatic plants	20

Plantation

Plantation on large scale has not been done during the last plan period. Plants of Ficus species and kanji have been planted on the bund along the western boundary and along the road sides of the sanctuary. Along the entrance also, some ornamental plants have been planted.

Invasive alien species

The entire lake was covered with Eichornia crassipes till 2004-05. From 2004-05 the Eichornia removal programme was launched and by 2006-07, the Eichornia was removed from the lake. During the last plan Lantana was also removed from limited areas. During 2008-09 and 2009-10 the Ipomea spp from the areas adjoining lake was also removed. 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 forested areas.
2. Parthenium hysterophorous	In the forested areas.

Invasive species: Aquatic

Species	Distribution
1. Ipomea spp.	Along the shorelines of the lake
2. Eichornia crassipes	In the lake

Endemism

The sanctuary is home to close to 300 species belonging to 77 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 fibre 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 2019-20, 20 aquatic species were found to be present in the sanctuary. They are:

<i>Azolla pinnata</i>	<i>Monochoria vaginalis</i>
<i>Carex sp.</i>	<i>Najas graminifolia</i>
<i>Ceratophyllum dimersum</i>	<i>Najas minor</i>
<i>Corchorus aestuans</i>	<i>Nelumbo nucifera</i>
<i>Cyperus alulatus</i>	<i>Nymphaea nouchali</i>
<i>Echinochloa crusgallii</i>	<i>Nymphoides cristata</i>
<i>Eichornia crassipes</i>	<i>Paspalum distichum</i>
<i>Eleocharis palustris</i>	<i>Polygonum glabrum</i>
<i>Lemna perpusilla</i>	<i>Potamogeton crispus</i>
<i>Limnophila indica</i>	<i>Spirodela polyrhiza</i>

Plants with medicinal values:

Out of 299 plants reported in the sanctuary, 146 are having medicinal properties.

The detailed list is given in the annexure.

Studies on vegetation communities and associations have not been done which will be done during this plan period.

2.6.2. Animals

As the name of the PA suggests, the sanctuary was declared to give focused protection to birds. Nevertheless, watching the precarious status of wildlife/biodiversity conservation in the areas outside the Protected Area Network, the function of the PAs in giving protection to all forms of life has gained importance worldwide. The Soor Sarovar Bird Sanctuary has also assumed significance in protecting life forms of this biotic province. The addition of the nearby forest blocks and the stretch of river Yamuna into the SBSS will only make the habitat viable particularly for mammals.

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 Hog deer, Spotted deer, Wild pig, Hyena, Nilgai, Monkey, Porcupine, Pangolin, Jackal, Fox, Hare, Mongoose, Squirrel and Jungle cat. The detail list is given in the annexure.

Though, the population of these animals is small it is still significant for conservation as the forest areas outside the PA have negligible population, particularly of Hog deer and spotted deer. List of mammals found in SSBS is given in appendix – 10. For the fresh and actual data study is needed which will be done during this plan period.

2.6.2.1.2 Avi-fauna

165 species of birds have been reported from the sanctuary. Of the 42 species of family Anatidae from the Indian subcontinent (Ali and Replay, 1987), 15 species have been reported from the sanctuary. Among these, the Comb duck *Sarkidiornis melanotos*, 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. The sanctuary always supports a family of Black-necked Stork which is on a decline in the State of U.P. Rosy Pelican *Pelecanus onocrotalus* and Lesser Flamingo *Phoenicopterus minor* are the regular winter visitors to the sanctuary. In 2018 about 1000 Great White Pelicans stayed in the sanctuary for more than a month. In 2018, more than 150 Greater and Lesser Flamingos were reported in the sanctuary till June.

Wetland-dependent globally threatened species found in SSBS		
Common name	Scientific name	Conservation status
Lesser Adjutant	<i>Leptoptilos javanicus</i>	Vulnerable
Greater Spotted Eagle	<i>Aquila clanga</i>	Vulnerable
Sarus Crane	<i>Grus antigone</i>	Vulnerable
Darter	<i>Anhinga melanogaster</i>	Near threatened
Painted Stork	<i>Mycteria leucocephala</i>	Near threatened
Black-necked Stork	<i>Ephippiorhynchus asiaticus</i>	Near threatened

Oriental White Ibis	<i>Threskiornis melanocephalus</i>	Near threatened
Lesser Flamingo	<i>Phoenicopterus minor</i>	Near threatened
Black-bellied Tern	<i>Sterna acuticauda</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. As per field information few species of snakes amphibians and fishes are found in SSBS. For actual data study and survey is required which will be done during this plan period.

2.6.2.2 The limiting factors

2.6.2.2.1 Availability of water

The issue related to availability of the excess water in the lake has been discussed in para 2.5.2. It excess level of water in the lake during the beginning of the migratory season becomes a limiting factor for the avi-fauna during this period. Efforts will be made to resolve this issue during this plan period.

2.6.2.2.2 Quality of water

The water to the lake comes from Yamuna at Okhla via a canal. This water is polluted and not suitable for many of the freshwater species. The effect of accumulation of harmful pollutants on the life forms dependent on lake water will be visible only in future. Study and survey on the impact of water quality on aquafauna and flora will be done during this plan period and accordingly corrective measures will be taken.

2.6.2.2.3 Pollution

Because of the expansion of the city of Agra along the NH-2, on which this sanctuary is also located, large scale urbanization is taking place along the Eastern, Western and Southern boundary of the sanctuary. It is expected that during the coming plan period residential colonies and commercial establishments will come up all around the sanctuary. This is likely to increase the pollution level around the sanctuary. Study on the impact of pollution on flora and fauna of SSBS will be done during this plan period.

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 SSBS. Study and survey will be done during this plan period.

Chapter 3

History of management and practices

3.1 General

The area within the declared boundary of the SSBS is grouped into 2 broad groups.

They are as follows:

The Keetham lake: There is a lake spread over an area of more than 200 ha inside the sanctuary. It is said that a part of the natural small lake was modified and extended into a big artificial lake decades ago to supply water to the Agra city in emergencies. It was managed for irrigating the adjoining agricultural fields and for commercial production of fishes. The fishery department used to do farming and selling of the fishes from the lake. Later on since 1981, water from the lake is piped by the Mathura refinery for refinery operations under a bilateral agreement with the irrigation department of the Government of Uttar Pradesh.

After the declaration of the sanctuary in 1991, the lake is managed by the Forest Department as a habitat for aquatic fauna and flora. The fishery activity has stopped but water of the lake is still being used by the Mathura refinery. The water for meeting this requirement is filled in the lake by the irrigation department.

Reserve forest: There are two forest blocks also inside the sanctuary. The Keetham Forest Block, having an area of 93.10 ha, is along the immediate periphery of the lake. The Soordas Forest Block, having an area of 380.40 ha, is in the Eastern side of the lake. These areas were under the administrative control of Agra Forest Division. According to the Working plan of Agra division, the above forest blocks are having degraded forest with *Prosopis juliflora* being the dominant species. The Soordas Forest Block was handed over to the NCS, Agra in 1997-98.

After the declaration of sanctuary the area was managed through annual plans in the initial years. 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):

Some of the important works proposed in the receding plan are as under:-

1. Development of habitat for birds: Under this, measures like management of water, construction of islands, construction of dykes and cleaning of lake are included.

2. Protection of birds: Patrolling, construction of watch tower, research work, strengthening of communication network, fire protection etc are the works proposed under this.
3. Development of tourism: Maintenance of roads, children's park, car park, nature interpretation centre, nature trail etc have been proposed under this head.
4. Other works like completion of settlement, publicity and extension, maintenance of residential facilities etc have also been proposed.

Summary of prescriptions of the Management Plan (2010-11 to 2019-20):

1. Conservation of biodiversity of the Upper Gangetic Plain, with all its ecological processes and functions and to protect the gene pool of the area.
2. Protection and to provide habitat function to all the rare, endangered and threatened flora and fauna.
3. Maintenance and restoration of 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.
4. Maintenance and restoration of catchment functions of the watershed which is source of numerous seasonal channels of water.
5. . Promotion and management of ecotourism in the area and to provide unique experience to elicit public support for conservation.
6. Promotion of research and monitoring programs in order to ensure management decisions based on sound scientific basis.
7. Strengthening of management effectiveness by adopting appropriate capacity building programs and by improvising amenities to the staff.
8. Eradication of Water Hyacinth, Ipomea and Water lily from the lake.
9. Strengthening the protection status by patrolling, creation of wire-mesh fencing and construction of watch towers & fire protection.
10. 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.
11. Publicity and extension.
12. Maintenance of facilities for the staff.

3.2 Timber operations including Bamboo and firewood harvest

The thorn forest does not have any valuable timber species. Therefore, timber has never been extracted from this area.

3.2.1 Firewood harvest and collection

In the past, before the declaration of the sanctuary people from the adjoining villages of Chauma Farah, Bhopla nagla, Runkta Singna, Singna Burj, Arsena,, Murli ka nagla, Reti ka nagla (all 500m-1km) , Morinda, Paupa Burj, Keetham, Raipura jat (all 1km-3km) were collecting fuelwood from the forest area. Villagers of Runakta and Arsena were doing it for commercial purpose and people from rest of the villages were collecting it for self consumption. This has been controlled to a large extent after the active management of the area started. With the increasing economic well being of the people the people are switching to the alternative sources of cooking. At present, firewood collection is not a problem here.

3.3 Non wood forest produces (NWFP) collection

Collection of NWFP is not reported from this area.

3.4 Leases

The details of leases given to government departments and to private bodies are as follows:

Sl no	Organisation	Area	
		Ha	Acre
1	Air force (Defence)	17	42.00
2	Fisheries	0.61	1.50
3	Mathura refinery 1st	5.26	13.00
4	Mathura refinery 2 nd	4.14	10.26
5	Horticulture department	33.01	81.50
6	Soor Smarak Mandal	10.10	25.00
Total		70.12	173.26

1. **The Surface to Air Guided Weapon (SAGW) unit** of the Indian air force was given 42 acre of land under emergency situation in 1966. The Government of U.P. ordered the transfer of this land by by order no. 8991/XIV-B-150(6)/65 dated 07.06.1971 prescribing certain conditions. One of the conditions was that the area would be handed over back to the forest department after the requirement is over. This direction of the State Government of U.P. was not complied with. Instead the

area has been given to the ADRDE of DRDO. Thus legally the occupation of the forest land is unauthorized.

The ADRDE conducts aerostat trials in this campus. The campus is protected by a boundary wall all around. This hinders the movement of mammals like Hog deer to the other side of the campus. The trial site is also close to the heronry of the Soor Sarovar Bird Sanctuary. The floating of a large size balloon over a prolonged period has adverse impact on the habitat use pattern of the birds. The experiment is also dangerous for the humans, both tourists as well as the staff of the forest department, as the accidental crash of the balloon may lead to loss of life and property. Necessary steps will be taken to get this land back to forest department during this plan period.

2. The fisheries department has stopped its activities inside the sanctuary. Their buildings in the campus are in a dilapidated condition. The area is to be handed over back to forest department formally. The aquarium building constructed by the fisheries department inside the leased area has been handed over to the sanctuary management in 2010. Necessary steps will be taken to get this land back to forest department during this plan period.

3. The leases to Mathura refinery are long term leases and they were given prior to the declaration of the sanctuary.

4. Horticulture department was given the land for developing orchard to arrest the advance of desert in 1954. On part of the leased land orchards were grown and approximately 25 % of the leased area is mainlined actively even now. Rest of the area has developed into forest. This is potential area for habitat development activities.

5. The land given to the Soor Smarak mandal was also for a limited period but the land has not been given back to the forest department. Therefore it is also a case of unauthorized occupation. Necessary steps will be taken to get this land back to forest department during this plan period.

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, pilgrimage management, tourism management etc were carried out between 2000-01 and 2009-10.

Agra Bear Rescue Facility (ABRF): To eradicate the problem of dancing bears in and around Agra, a rescue centre for Sloth bears was established on 15 acres of forest land in compartment 10 of the Soordas Forest Block of the Sanctuary in the year 1999-00. This area is closed from all the sides by a boundary wall. It is recognized rescue facility under Recognition of Zoo rules, 1992 of the Central Zoo Authority. Heavy human presence inside this campus has made this area of reduced used to the woodland birds.

Soor Kuti (Blind School)

A school for blind children exists on the land leased to the Soor Smarak Mandal. The entry to this school is through the sanctuary main gate. This campus is on the banks of river Yamuna. There is great clamour among the people of Agra to offer food to the blind children of Soor Kuti. Apart from individuals, the ever increasing numbers of local NGOs, Clubs and Societies etc also frequently want to offer food and other items to the blind children. This creates conflict situations for the sanctuary management. People coming in cars, buses and two-wheelers do not want to pay the entry fee to the sanctuary.

3.6 Forest Protection

3.6.1 Legal status

The sanctuary was notified under section 18 of the WPA, 1972 in 1991. Notification under section 25 has been published on 30.03.2008. The final notification of sanctuary under section 26 yet has to be declared.

3.6.2 Hunting

There is no record giving information about the hunting activities of the pre-sanctuary declaration years. Before the declaration of the sanctuary the fisheries department used to auction the fishes in the lake. After the declaration of the sanctuary it has been stopped completely.

3.6.3 Poaching and other illegal activities

3.6.3.1 Poaching

Sporadic incidences of poaching of birds were reported during initial years. But due to strict vigilance and stricter action against the poachers the number of incidence of poaching of birds and other wild animals fro the sanctuary is very few. However, as the birds keep on flocking to and fro to the adjoining river Yamuna and the nearby agricultural fields, the poaching is not ruled out from such areas. Hence the sanctuary as well as the adjoining areas requires continuous vigil. Effective measures will be taken to curb poaching completely.

3.6.3.2 Illegal cutting of trees

As this is the last patch of natural forest along the river Yamuna in Agra District towards the district Mathura the illegal cutting of trees by not only the adjoining

villagers but also by the villages situated quite far off was rampant till some time back. Some of the villagers used to cut the trees forcibly and take the trees away on tractors. Over the last plan-period there was continuous effort by the forest department to curb this practice. As a result, the number of cases of illicit felling has reduced to a large extent. However, here again there is continuous effort needed to keep the situation under check.

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

Fuelwood is the only NWFP being removed from the sanctuary. The details about it have been given in 3.2.1.

Illegal fishing in the lake is other threat that needs continuous vigil. Proximity to market, high value of the fishes and easy communication facility make the fishing and attractive illegal activity. The high fish load in the lake attracts fisherman to take this risk. Therefore, every night the patrolling in the lake is mandatory.

3.6.4 Livestock Grazing

Livestock from the adjoining villages graze in the bird sanctuary illegally. Some of the cattle are feral. The scale and extent is limited due to the legal action taken intermittently by the department. During peak of summer, when the availability of water is limited outside, the cattle from the nearby villages use the lake-water.

3.6.5 Wild Fires

There have been incidences of fires in the forest areas in the past. On the basis of the sources the incidences of fires can be grouped into two:-

1. Due to electric line – There are two electricity lines passing through the sanctuary. Through these lines the village Singna and the premises within the sanctuary are electrified. The line to Singna village is still on wooden poles. Over the years these poles have outlived their lives. So the fire in the past originated from the breaking of the pole and subsequent contact between the line and the tall grasses. This problem has been brought into the notice of the electricity department and is yet to be resolved. Efforts will be made to resolve this issue during this plan period.

2. Man-made fires – These incidences are purely accidental and occur because of ignorance of the villagers/passersby commuting through the sanctuary.

3.6.6 Insect attacks and pathological problems

No secondary data about this is available. Study and survey will be done during this plan period.

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 SSBS 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 leases to various departments/ organizations and the problems arising out of it have been described in para 3.4 above. However, the following departments of the government, operating inside and on the periphery of the sanctuary, have definite impacts of their activities on the sanctuary:

1. Irrigation department
2. Horticulture department

Problems connected with Irrigation department:

1. Regulation of level of water in the lake
2. Control of entry of water hyacinth through the inlet channel

Problems connected with Horticulture department:

1. Entry of vehicles through the sanctuary
2. Use of insecticide/pesticide in the farm

3.7. Tourism in Soor Sarovar 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

Soor Sarovar Bird Sanctuary has been a popular tourist destination for the people of Agra. Before the area was declared a sanctuary it was famous as Keetham lake and the people of Agra used to visit this place for outing. Later, after the declaration of the

area as a bird sanctuary it started attracting birdwatchers also. During the last plan period the sanctuary has been given a facelift by creating infrastructure such as nature trail, interpretation centre, renovation of park, paddle boat facility in limited area of lake etc for promotion of ecotourism.

3.7.2 Tourist attractions

A huge lake, nature trails, interpretation center, wildlife movie screening, parks with interpretive facility, watch towers, canteen, Python point, paddle boat in lake etc are major attractions for tourists.

3.7.2.1 Nearby tourism facilities

This sanctuary is only 20 km from Agra city. Agra is famous worldwide for Tajmahal. Besides this there are many historic monuments in and around Agra. Mathura, 45 km away, is another center of tourist attraction. Keoladeo National Park at Bharatpur is also just 60 km away.

3.7.2.2 Tourist inflow

The details of tourist inflow to the sanctuary in the last 5 years are as follows:

No. of tourists/visitors, visiting the PA and facilities available for tourists

Year	Number of tourist		Total
	Indian	Foreigner	
2016-17	52263	578	52841
2017-18	52272	521	53793
2018-19	72209	754	72963
2019-20	62529	660	63189

Ecotourism activities centered round SSBS is yet to grow to its full potential.

3.7.3 Problems caused by tourism

- ✓ Littering of solid waste in the aquatic zone and along the motorable roads
- ✓ Disturbance caused by vehicles

3.8 Research, Monitoring and Training

3.8.1 Research and Monitoring

The status of research on different aspects of SSBS 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 List of reptiles, amphibians, fishes and 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 a register.

There is little involvement of scientific, educational and research organizations in this sanctuary. Comprehensive Study and survey will be during this plan period.

3.8.2 Training

The sanctuary offers excellent 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. Training Need Analysis (TNA) will be carried out during this plan period to evaluate the status of skill and knowledge of staff and accordingly training will be provided.

3.9 Wildlife Conservation Strategies and their evaluation

As stated earlier, the history of wildlife conservation 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 Existing Protection Network and PA boundary

The protection oriented approach has been the core of management strategies in this sanctuary. The number of staff deputed to the sanctuary has been increased to enhance level of protection in the sanctuary. Equipments such as motorcycles, binocular, camera, GPS etc have been purchased to give effectiveness to the management. Improvement in monitoring of protection activities has been effected. Watch towers have also been constructed.

However, its location in increasingly urban surroundings is posing newer challenges to the management. The inadequacy of resources – both manpower based and budget based – makes the task of protecting the sanctuary difficult. On the eastern, western & southern sides of sanctuary, boundary wall and chain link fencing is being constructed by Mathura Refinery, whereas northern side boundary wall will be constructed by NHAI. Construction of boundary wall and chain link fencing will be completed during this plan period. This on one hand it will improve the protection status substantially; on the other hand it will free the already scarce manpower resources for newly emerging jobs in the sanctuary.

3.9.2 Habitat Improvement

Under the habitat improvement works activities like eradication of Lantana, Eichhornia, removal of silt, creation of islands, construction of dyke etc have been undertaken and for further improvement these works will be continuous during this plan period.

3.9.3 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. The objective is to increase the ground foliage.

3.9.4 Increasing Awareness

During the last couple of years awareness camps, nature camps, seminar meetings etc organized by the SSBS 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.

3.9.5 Tourism Management

Facilities and infrastructure have been created with a view to give better experience to the visitors. As a result number of tourists visiting the PA has been increased. There is need of extensive ecological monitoring of tourism to address its ecological consequences on the PA. In future more activities need to be designed and newer attractions need to be developed.

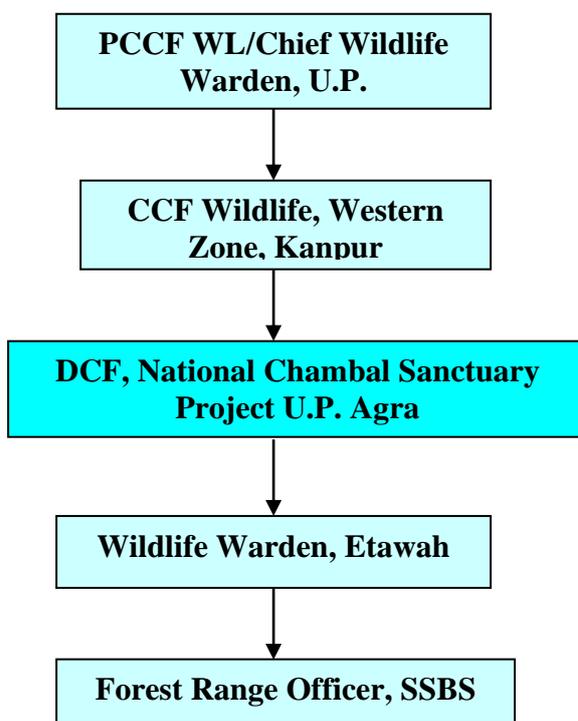
3.9.6 Research and Monitoring:

This is yet to start as stated previously and will be done during this plan period.

3.10. Administrative set up

3.10.1. Present set up of the Bird Sanctuary

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



NB: Information regarding the staff position designation wise is enclosed in the annexure.

3.11. Communication

3.11.1 Telecommunication and wireless

Wireless connection does not exist between range office and division office. There is a token wireless system within the range. Cell phone has been given to the FRO, WLW and the DCF, CCF and CWLW's offices are connected by landline also.

3.11.2 Roads

Roads are divided into two categories: Tarred Roads and Forest Roads.

3.11.2.1 Tarred Roads

1. Main road

Starting from the main gate this road circumvents the lake from 3 sides. All the tourist attractions can be accessed through this road. A branch of this road also leads to Soor Kuti.

3.11.2.2 Forest road

1. The list of net work of roads is enclosed in annexure.

Trek paths

Many small trek paths starting from main road have been constructed.

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 Construction activities

As stated earlier, the city of Agra is expanding along the Agra-Delhi NH-2 (National Highway-2). New colonies, schools, colleges, entertainment centres, clubs etc are developing just outside the boundary along the 3 sides of the sanctuary.

3.12.2 Incomplete settlement

Problems like implementation of habitat improvement works, enforcement works etc arise because the settlement of the rights under the WPA, 1972 is yet not complete. The management of level of water in the lake will also be sorted out once the settlement is complete.

3.12.3 Intensification of agriculture in the surrounding

The land just outside the sanctuary is under agriculture. The use of chemical insecticide, pesticide, fertilizer is increasing to achieve higher yield. These fields are also important feeding grounds for resident birds as well as for migratory birds.

3.12.4 Protection

With the porous boundary the protection of the sanctuary will always be an issue till complete boundary wall is constructed. The threat of fishing in the lake will always be there till that time. The incidents of death of animals on the NH-2 will also be stopped by construction of boundary wall.

3.12.5 Inadequate staff and protection infrastructure

The sanctioned strength of staff for the sanctuary is inadequate. With increasing anthropogenic pressure and a concurrent increase in the diversity of works for the field staff with minimal infrastructure, it is imperative to increase the post of field staff for the sanctuary.

Chapter 4

The protected areas and interface land use situation

4.1 The existing situation in the Eco-sensitive Zone

4.1.1 The existing situation in the Eco-sensitive Zone, its boundaries and Natural attributes:

The Soor Sarovar Bird Sanctuary has an interface with private agricultural fields. People up to a distance of 5-6 km from the sanctuary have dependence in variable degrees on the sanctuary for needs such as fuelwood, grazing, water and thus have a direct bearing on the sanctuary. At the landscape level this forms a network of wetland based PA's with Patna bird sanctuary, Etah, Saman Bird Sanctuary, Mainpuri, National Chambal Sanctuary, Etawah and Agra and Keoladeo National Park, Bharatpur (Rajasthan).

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

The sanctuary shares 75% of its boundary with private agricultural fields. Only the northern boundary is marked by natural feature in the form of river Yamuna. A part of the eastern boundary is common with Runakata forest block of Agra division.

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

There is no village inside the sanctuary. There are 7 villagers on the periphery of the sanctuary. They are:-

1. Runakata (Runakata and Nagla Murli)
2. Arsena
3. Chauma Farah
4. Raipura Ahir
5. Jugsena
6. Singna (Singna, Singna Burj, Nagla Reti, Nagla Bhopla)
7. Keetham

Runakata, on the eastern boundary, (Runakata and Nagla Murli) is the largest village in terms of population. On the western boundary, Singna including its hamlets is the largest village. The combined population of these villages is 23689. These villages are old villages and the villagers are the original inhabitants of this area.

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 low to 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. The average level of literacy is satisfactory Runakata holds the largest population of scheduled castes. The workforce is employed by the shoe industry.

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:

The conversion of agricultural land into commercial uses, such as development of residential colonies and markets, in Agra district will have impact on the bird sanctuary.

The intensification of agriculture in the surrounding will further impact the ecology of the lake.

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. Further, palatable crops in the immediate vicinity of lake lead to crop raiding incidences especially by the Nilgai, Wild pig and the Bar headed geese.

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 ESZ.

This area is not a remote area. It is only 20 km from the *district* headquarters and the villages around are well connected by road and communication network. There are many programmes of the government being executed by different agencies in the adjoining villages. The MNREGS is a good scheme that guarantees employment opportunities to the unemployed and non-skilled rural population. Consequently, there is no burden on the management of the sanctuary for planning the economic development of the people.

The non-existence of the any programme of linking people with the tourism activity has denied the local people from gaining economic benefits from the tourism activities centred on the SSBS.

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

Problems of collection of fuelwood from the eastern side (Near Runakata) of the SSBS can be linked to interplay of market forces. The *dhabas* in Runakata market are the buyers of the fuelwood from the forest. But this linkage is weakening slowly. There has been a sharp reduction in the people using forest produce for subsistence.

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

When all the issues mentioned in this chapter are analyzed, the problems faced by people, that is affecting the management of Soor Sarovar Bird Sanctuary and the area surrounding it, can be summarized as under:

- i. Regulation of the entry of cattle into the sanctuary by the management of the SSBS creates problems for the people.
- ii. Regulation of the entry of the villagers using the road passing through the sanctuary, while being necessary for the sanctuary, creates inconvenience for the people.
- iii. Crop depredation by the wildlife also has an impact on the people and the sanctuary itself.

Management Plan

2020-21 to 2029-2030

Part- II

Proposed Management

Soor Sarovar Bird Sanctuary

Keetham, Agra

Chapter 5

Vision, Objectives and Problems

5.1 The Vision

The vision of Soor Sarovar Bird Sanctuary is “the long term conservation of Soor Sarovar 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 derive benefits from the SSBS scientifically and sustainably in the decades to come. The cultural and religious values of SSBS 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 SSBS, by its inherent virtues, has multifaceted values for the mankind. In order to secure those identified values the objectives of management of SSBS are defined. The objectives are as follows:

- 5.2.1 Biodiversity:** To conserve the biodiversity of the Punjab 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 Watershed:** To maintain and restore the catchment functions of the watershed.
- 5.2.4 Tourism:** To promote and manage ecotourism in the area and to provide unique experience to elicit public support for conservation.
- 5.2.5 Research and monitoring:** To promote research and monitoring programs in order to ensure management decisions based on sound scientific knowledge.

5.2.6 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 Semi-arid bio-geographic zone are subject to a plethora of threats that vary widely in nature and intensity of their impacts on biodiversity. The threats fall into two broad categories: localized threats such as extraction of water, proliferation of weeds, hunting, livestock grazing etc., and landscape level threats such as area development projects, laying out of transmission lines, large drainage project, land reclamation projects, widening of 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 Punjab 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 SSBS are not covered under PA network.
2. Inadequate buffer area.
3. Inadequate protection infrastructure.
4. Ecologically unsound land use in the surrounds. Use of pesticides, insecticides and chemical fertilizers in the private fields.
5. Alteration in habitat conditions by invasion of exotics.
6. Inadequate budget.
7. Delayed flow of fund.
8. Inadequate awareness in the masses.

Emerging issue

1. Increasing construction and area development activities may destroy biodiversity.
2. Ecotourism.
3. Inadequate baseline information about species and their distribution.
4. Demographic factors e.g. population growth and changing cropping patterns.
5. Macroeconomic policies e.g. undervaluation of ecological services.
6. Governance.
7. Poverty and unemployment.

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

The problems are:

1. Management of optimum water regime in the lake.
2. Inadequate protection infrastructure.
3. Inadequate buffer.
4. Land use in the surrounds. Change in agricultural pattern and conversion of agricultural land for non-agricultural purposes.
5. Invasion of exotics detrimental for birds.
6. Inadequate and untimely flow of funds.
7. Inadequate staff.
8. Inadequate awareness in the people and other stakeholders.

5.3.3 Objective 3: To maintain and restore the catchment functions of the watershed which is source of numerous seasonal channels of water.

The problems are –

1. Inadequate fund for watershed management.
2. Inadequate awareness leading to degradation of watersheds.
3. Inadequate information about the condition of watersheds.

5.3.4 Objective 4: To promote and manage ecotourism in the area and to provide unique experience to elicit public support for conservation.

The problems are –

1. Inadequate manpower.
2. Inadequate resources.
3. Inadequate promotional initiatives for the SSBS.
4. Inadequate awareness.
5. Inadequate interpretation facilities.
6. Inadequate research on carrying capacity.
7. Inadequate co-ordination among the government departments and non governmental organization having presence in the sanctuary.

5.3.5 Objective 5: 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. Inadequate co-ordination with scientific, research and educational institutions.
2. Inadequate trained manpower.
3. Inadequate budget.

5.3.6 Objective 6: 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. Inadequate resources for providing amenities.
2. Inadequate training of the frontline staff.
3. Inadequate training infrastructure.
4. Inadequate manpower. Excess burden on the existing manpower.

Chapter 6 The Strategies

6.1 Boundaries

The vision and objectives of SSBS, 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.

The present external and internal boundaries are shown in the map annexed. The total area under different zones equals 799.037 ha. The map annexed shows the present zones of management.

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

The zones are:

6.1.1 The core zone

This zone will consist of the lake and the adjoining compartments forming riparian areas.

The total area of the zone is 397.64 ha. The details of the zone are as follows:

Forest block / Area	Compartment	Area in Ha.	Management category
Keetham	1	4.40	Sanctuary
	2	5.20	Sanctuary
	3A, 3B	7.30	Sanctuary
	4A, 4B	7.70	Sanctuary
	5A, 5B, 5C	13.70	Sanctuary
	6A, 6B	9.80	Sanctuary
	7A, 7B, 7C, 7D, 7E	24.19	Sanctuary
Wetland & other government land	-	323.958	Sanctuary
Total		396.248	

All these areas fall within the boundary of Soor Sarovar Bird Sanctuary notified under Section 18 of the WPA, 1972.

6.1.2 The buffer zone

This zone will consist of the forested area on the eastern side of the core zone. The total area of the zone is 354.979 ha. The details of the zone are as follows:

Forest block / area	Compartment	Area in Ha.	Management category
Soordas	1A	17.10	Sanctuary
	1B	13.30	Sanctuary
	2 part	43.00	Sanctuary
	3 part	40.00	Sanctuary
	4	37.30	Sanctuary
	5	37.80	Sanctuary
	6	38.00	Sanctuary
	7	44.40	Sanctuary
	8	32.40	Sanctuary
	9 part	22.50	Sanctuary
	10 part	27.60	Sanctuary
Other government land		1.579	
Total		354.979	

Previously Soordas van block (reserve forest of section 20) was a part of Social Forestry Division, Agra and was handed over to NCS, Agra in 1997-98 by SF Division, Agra ie after notification of SSBS.

6.1.3 Tourism zone

The area of this zone is 47.81 ha. It includes area where some infrastructure related to tourism already exists. This also covers administrative areas where offices and other facilities are located.

Forest block / area	Compartment	Area in Ha.	Management category
Soordas	2 part (Children's Park)	1.00	Sanctuary
Soordas	2 part (Reception centre & gate)	0.50	Sanctuary
Soordas	3 part (Interpretation centre)	0.50	Sanctuary
Soordas	9 part (Soor kuti)	18.00	Sanctuary
Soordas	10 part (Soor kuti)	7.00	Sanctuary
Keetham	7A part (Fisheries campus)	0.61	Sanctuary
Keetham	8	20.20	Sanctuary
Total		47.81	

The map of the proposed zones is annexed.

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

6.1.4 Eco-sensitive Zone

Eco-sensitive Zone of Soor Sarovar Bird Sanctuary has been notified vide notification no. 3319 Date 10.10.2019 of Ministry of Forest Environment & Climate Change, Government of India The Eco-sensitive zone shall be to an extent of one km uniform around the boundary of Soor Sarovar Bird Sanctuary and the area of the Eco-sensitive Zone is 10.20 sq.km. The notification of Eco-sensitive Zone is given in appendix no-3.

Sl no	Zonation	Status of Area	Area in ha.	Remarks
1	Core zone	Sanctuary	396.248	No village inside.
2	Buffer zone	Reserve Foreset	354.979	No village inside.
3	Tourism zone	Sanctuary and Reserve Foreset	47.81	No village inside.
Grand total			799.037	
4	ESZ	Outside sanctuary	10.20 sq. km. (1020 ha.)	9 villages inside ESZ

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. SSBS has an inherent weakness of very small size.

Still, to achieve the contradicting objectives the area under Soor Sarovar Bird Sanctuary has been divided into zones. The boundaries of each zone have been shown in the map given in the appendices. All the recommended zones are exclusive.

6.2.1 Core zone

This is like sanctum sanctorum of the bird sanctuary ie the notified sanctuary area of SSBS . Entire lake area and the adjoining riparian areas have been brought under the core zone. It comprises the most critical areas in terms of habitat, biodiversity, ecological processes and functions. These are also important areas for different rare, endangered and threatened avi-fauna.

This zone also includes the area where heronry comes up every year.

During the past plan- period, apart from protection this area has been given major restorative inputs in the form of eradication of Water hyacinth, construction and maintenance of dyke and island, removal of other weeds from the riparian areas. The result of these actions led to the revival of Lake Ecosystem. There has been an increase in the total number of birds congregating during all months of the year. The decrease in size of the heronry was arrested and there has been an increase in the size of nesting colony as well as intensity of nesting expressed in terms of duration of nesting activity, number of nests, the number of clutches etc.

Under the previous plan a small part of the lake was excluded from the core zone. Boating for tourists was proposed in the excluded part of the lake. In this plan, the entire lake area has been included in core zone.

6.2.2 Buffer zone

This zone consists of areas adjoining the main body of lake and is used by the resident woodland birds and other animals. This zone includes the areas of Soordas Forest Block which was transferred to NCS in 1997-98. The terrain is plain as well as undulating with open patches and patches with mixed to pure vegetation. The areas leased to different lessees are part of this zone. There is a minimum guaranteed level of disturbance from such areas.

The area under this zone is where the management intervention in habitat will be made. This zone has been created 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 altered slightly.

6.2.4 Ecotourism zone

This zones consists of some part of notified area of SSBS as well as some part of reserve forest area of Soordas Van Block. The SSBS has traditionally been an important place for ecotourism for the people of this region. The Keetham lake has always been a great attraction even for people from Agra, Mathura, Aligarh, Etah, Firozabad etc.

This zone did exist in the previous plan also. The area proposed under this zone has nature trail, eco-parks, aquarium campus, canteen, interpretation centre, reception centre, watch towers, staff quarters and the range office.

One of the objectives of SBSS is to promote and manage ecotourism in the area. The aim of this zone is to integrate the development of ecotourism programs and infrastructure in the area with the management goal. All the ecotourism related activities will be confined to this zone only.

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 ecotourism to the local people and the economy strengthens the stake of the local people in the continuance of the PA. Through management of the ecotourism activities the above goals will be tried to be achieved. EDC will be revived. With the help of EDC and local people employment generation activities will be done during this plan period.

6.2.5 Eco-sensitive Zone

The extent of Eco-sensitive Zone of Soor Sarovar Bird Sanctuary is up to One km from the boundary of Soor Sarovar Bird Sanctuary and the area of Eco-sensitive Zone is 10.20 sq. km. (1020 ha.) There are 9 villages in the Eco-sensitive Zone. A separate Zonal Master Plan will be prepared in consultation with local people and all concerned State Departments for integrating the ecological and environmental considerations.

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 the biodiversity of the Punjab plains province of semi-arid bio-geographic zone.
2. To preserve the area as a unique ecosystem representative of the biodiversity and gene pool contained in Semi-arid bio-geographic zone.
3. To ensure a continuous support to large avi-fauna for scientific, economic, aesthetic, cultural and ecological values.
4. To protect and maintain all the ecological processes and functions of the SSBS 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 centre 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 neutralize the change in the ecosystem and 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. Establishment of CCTV cameras on different sensitive points of sanctuary with a control room in forest rest house campus of SSBS.
7. To lead research into identified areas.
8. 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.

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. Construction of boundary wall and chain link fencing will be completed as soon as possible during this plan period.

3.1 Availability of water: The optimum band between which the water-level should be maintained will be decided in consultation of Mathura refinery and Irrigation department as soon as possible during this plan period.

3.2 Desiltation: The siltation 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.

3.4 Construction and maintenance of dykes: To provide diverse ecological niches to class of birds like waders, dabbling ducks etc dykes will be constructed and those already existing will be maintained.

4.1 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.

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 etc. The details are given in Chapter 9.

Negative list of activities: Road construction, Boating for recreation, Construction of tourism infrastructure, Plantation of exotics, NTFP collection, Grazing.

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 SMC 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 wildlife.
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 Habitat improvement activities viz. ensuring the availability of water in this area, removal of weeds, replacement of *Prosopis juliflora* with fruiting trees etc. will be done.

2.1 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.

3.1 SMC works like construction of check dam, earthen dam etc will be undertaken.

4.1 Protection infrastructure in these areas also will be strengthened.

5.1 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 .
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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 SMC 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 fishing, 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 SSBS.

Major threats faced by the area are:

1. Fishing in the Keetham lake
2. Illegal collection of MFPs like grass, fuelwood etc.
3. Encroachment
4. Illicit felling of trees for local needs
5. Grazing
6. Trespass

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:** On the eastern, western & southern sides of sanctuary, boundary wall and chain link fencing is being constructed by Mathura Refinery, whereas northern side boundary wall will be constructed by NHAI. Construction of boundary wall and chain link fencing will be completed as soon as possible during this plan period.

Strategy:

The general strategy to enhance the protection level in SSBS 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 and utilized.

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

1.3 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, motor boat and manual boat etc., needed for protection will be provided. The *Chaukis*, watch towers, office buildings, staff quarters, roads (both *kuchha* and *pucca*) will be maintained. New structures will be constructed as and when need arises. One watch tower needs to be constructed in the Northern side facing river Yamuna to keep an eye on the infiltration from this side.

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 staff are going to each part of their jurisdiction. Binoculars, night vision equipments, thermal cameras, CCTV and drones will also be given during this plan period.

3.1 Completion of settlement of rights and construction of Boundary wall: Efforts will be made to complete the settlement proceedings during this plan period. The construction of boundary will be the thrust area for this plan.

Miscellaneous activities:

4.1 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.

4.2 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 SSBS. A mobile number will be published extensively for sharing of secret information. A strong system of rewards will be created.

4.3 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 Soordas forest block of Soor Sarovar Bird Sanctuary is very prone to incidences of forest fire. In the past incidences of fire have taken place in this forest block. In addition, the areas below the canteen and around python points are also vulnerable for fire. Any incidence of fire after the month of September adversely affects 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.

Reasons of fire in Soor Sarovar:

1. There is an electric line that passes through Soordas forest block. From the FRH, this line passes along the road/embankment to villages Singna and Chauma. In the stretch passing through forest, wooden poles are in use for carrying the transmission line. The condition of these poles is very bad. Years of decay leads to breaking of these poles. This results in incidences of fire. The wires are loose and hence a spark in the line leads to fire in the forest areas.
2. Fire caused by villagers/passersby/graziers. Throwing of butts of *bidis*, *cigarettes* etc unknowingly on the forest floor. These are accidental fires and caused due to ignorance.

Strategy

1. Preventive strategy
2. Corrective strategy

Under preventive strategy the following activities will be undertaken:

1. Timely cutting of fire lines: The fire lines in the SSBS are shown in the map annexed. A width of maximum 3 meter will be cleaned before the fire season to stop the accidental fire from spreading. They will be cut before the onset of fire season.
2. The firewatchers will be engaged during November to June. They will be posted to the temporary fire stations.
4. The equipment to beat the fires will be purchased and maintained.
5. Funds will be arranged in time and in adequate amount from the State and Central Governments.

6. A very intensive awareness campaign will be launched.
7. Direct meeting in all the villages on the fringes will be organized once before the start of the season and secondly during the season.
8. No control pre burning will be practiced in the Bird Sanctuary.
9. Efforts will be made for the sifting of transmission line passing through the forest block to alternate route and replacement of wooden poles by the electricity department.

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 SSBS 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 SSBS except the tourism zone.

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
3. Unique and special habitats

6.4.3.1 Wetland management plan

Keetham lake: The problem of excess water in the lake has already been discussed. The higher level of water necessitates taking appropriate measures. The lake is supplied water by Agra canal that sources water from river Yamuna at Okhla. This water brings high load of pollutants and weeds with itself.

Objective: The objective of this plan will be to maintain the Keetham lake as an ideal habitat for waterfowls.

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. Unfinished settlement of the sanctuary.
3. Deposition of silt in the lake.

Strategy: The strategy will be to complete the settlement of the sanctuary so as to have effective control over the lake. This will also ensure better co-ordination with other stakeholders. The external factors leading to habitat degradation will be removed concurrently. Lake will also be segmented to meet habitat requirement of different class of birds.

Activities:

1.1 Creation of an interdepartmental committee: A core team of sanctuary management, irrigation department and Mathura refinery will be constituted to sort out co-ordination issues.

2.1 Completion of settlement: Steps will be taken to complete the settlement of the sanctuary during this plan period.

3.1 Removal of silt: The water holding capacity of the lake has also reduced over the years due to deposition of silt brought during rains as well as brought through canal. As a result the shallow areas have reduced. Silt will be removed from such areas which are present along the western periphery of the lake. This exercise will be repeated as per the requirement. This is necessary to maintain the ecological niches needed by different species of birds. Specific desilting plan should be prepared and got approved prior to execution of the work.

3.2 Deepening of lake: Even the deeper portion of the lake has reduced water storage capacity due to years of accumulation of silt. This is the reason behind filling up of the lake to a very high level. So the portion of the lake in front of the pumping station of the Mathura refinery will be deepened. Other parts of the lake will not be deepened. Such deepening should only be undertaken after carrying out an impact assessment study and taking specific approval from the Chief Wildlife Warden.

3.3 Construction and maintenance of islands: In the previous plan period many islands have been constructed in the lake. These islands will be maintained in the subsequent years. Two large islands will be constructed in the deeper part of the lake (in front of pumping station) to provide resting place to the divers.

Tourists would never be taken by boats since the wetland is too small and the birds would get disturbed. Continued disturbance of such kind may force the birds to leave the wetland permanently. The water-body would be completely out of bounds for the tourists.

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 level 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 plan

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

During the last years 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	Terrestrial
2. Ipomea carnea	Aquatic
3. Eichhornia crassipes	Aquatic
4. Parthenium	Terrestrial

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

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

Activities:

1.1 Control of Eichhornia: Though the lake has been cleaned during the last plan of Water hyacinth, it still is brought to the lake whenever the water is supplemented into the lake by the canal. Therefore, this exercise of removing needs to be done intermittently during this plan also till there is any permanent solution to this problem.

1.2 Lantana/Parthenium eradication: The buffer 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. Parthenium will also be uprooted before its flowering in Feb-March.

1.3 Silviculture operations in Prosopis area : Punning and thinning of Prosopis will be carried out in 50 ha area, taking 10 ha per annum. This will help the tree grow at a faster pace. The availability of tall and strong trees is likely to promote the nesting of larger bird like Painted Stork in the sanctuary.

1.4 Habitat enrichment: 100 culms of Bamboo are proposed to be planted during this plan. They need to be protected at least for 3-4 years.

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.

6.4.4.3 Plan for management of special and unique habitats

Special habitats are biological in nature whereas unique habitats are geomorphic in origin. They provide special functions not provided by successional stages and special habitats.

Dying, dead and down trees form integral components of forest ecosystems. They not only serve as critical microhabitats for many species, but also they are large reservoirs of organic matter and hence play a pivotal role in nutrient cycling. There are organisms ranging from flying squirrels and owls to large number of invertebrates, fungi, lichens, mosses vascular plants which need dead wood for their survival in any forested ecosystem.

In SSBS, the forest area offers opportunities for special habitat. The area has old growth trees where the dead woods are in plenty. A large number of fauna across many taxa use the dead wood in SSBS. In view of the above facts, a separate plan is given.

Objective

The objective is to identify and protect all the special and unique habitats.

Activities

1. The baseline data about the use of the special habitat by different species of birds will be prepared. Also, the probable areas of unique habitats will be identified and a record

will be maintained in the range. The potential risks to such habitats will be found and protection measures designed for it.

2. The fallen logs and dead woods are preferred by adjoining villagers as fuel wood. The people as well as the staff will be sensitized about importance of such habitats. Some of such areas will be used as centers of learning for the staff. They will be shown use and importance of such areas in the field.

3. **Heronry:** The nesting colonies of the water birds that represent spatial and temporal clumping of nests are popularly referred to as heronries. SSBS is unique in this sense that a large heronry develops every year in the core zone (Compt. Keetham 7) of the sanctuary. According to Rahmani (Book on RAMSAR sites), more than 2000 nests were there in 1990.

The Cattle Egret, Little Egret, Intermediate Egret, Large Egret, Indian Pond Heron, Black-crowned Night Heron, Grey Heron, Purple Heron, Darter, Great Cormorant, Little Cormorant, Indian Cormorant, Black-headed Ibis, Eurasian Spoonbill, Asian Openbill are the most abundant nesting species.

It has been observed that the nest building and repair activity starts during May and nesting activity continues till September- October. It has also been observed that the geographical spread of the heronry site has been increasing every year. The abundance of food and forage, the absence of any sort of disturbance, availability of trees with wide and strong canopies overhanging in water or present on islands are some of the factors facilitating the establishment of heronry. Almost all the nests are made on the *Prosopis juliflora* trees.

In assessment carried out during June, July, August and September, 2019 the following numbers were noted:

Sl no	Species	Estimated no of nests	Without eggs	With eggs	Sitting in nests	With Chicks
1	Cattle Egret	4298	69	326	357	3546
2	Egret spp.	2083	-	-	710	1373
3	Darter	463	-	-	-	463
4	Cormorant spp.	715	308	39	-	368
5	Purple Heron	69	-	-	-	69

6	Grey Heron	218	-	-	-	218
7	Night Heron	119	-	-	-	119
8	Openbill Stork	16	-	-	-	16
9	Spoonbill	69	-	-	-	69
10	Black-headed Ibis	446	30	43	-	373
	Total	8496	407	408	1067	6614

The above nests were counted manually using a boat on a periodic basis. The nests found on successive assessments were added.

In 2019, the heronry was spread over an area of 500mX200m in compt no. Keetham-7. Direct counting of all the nests would have caused disturbance to the birds. Therefore, an assessment of nests in a sample plot of 10mX10m was made. On an average 20 nests were found in such sample plots. Thus in 200mX100m , approximately 20000 nests can be said to be present. Cattle Egret, Egret spp, Black-headed Ibis, Cormorant spp., Grey heron are the species with maximum nesting activity in the heronry.

Monitoring and evaluation: The monitoring of mapping of such habitats will be done. Annually such habitats will be verified and change noticed in existence, extent and use will be recorded.

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.”**

SSBS has historically been an important tourism destination, particularly for the people of this part of the State of Uttar Pradesh. It throws a huge opportunity for spreading the conservation awareness and improves its conservation status.

7.1.1 Goal

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

7.2 Objectives of Ecotourism

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

1. To create public awareness and to elicit public support for conservation of birds in particular and biodiversity in general.
2. To provide unique experience to the visitors.
3. To enhance protection status/support base of SSBS using ecotourism as a direct tool.
4. To generate resources necessary for taking steps for long term conservation of the area.
5. To provide sustainable livelihood to the 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 SSBS and stimulating private conservation efforts.
8. To develop effective interpretive facilities in present interpretation centre incorporating LED screen display, interactive models and audio visual means etc.
9. To develop nature education centers to meet its purpose.

7.2.1 Inventory and evaluation of existing facilities and ecotourism products

The tourism in the sanctuary is growing rapidly over the last couple of years. The number of tourists to the sanctuary and the revenue generated out of tourism is given in the table below.

Year	Number of tourist		Total	Revenue (Rs. in Lakh)
	Indian	Foreigner		
2016-17	52263	578	52841	3133225.00
2017-18	52272	521	53793	3855270.00
2018-19	72209	754	72963	4260940.00

Though the Bird Sanctuary has been attracting increasing numbers of tourists over the last years, this number is very small in comparison to tourists visiting Agra.

(A) Facilities

Residential facilities

There are very good accommodation facilities, both run by government and by private, for the visitors in the nearby city of Agra. A Forest Rest House (FRH) inside the sanctuary is also available for tourists.

Interpretation facilities

There is a Nature Interpretation Centre (NIC) in the tourism zone of the sanctuary. The condition of this facility is not up to the mark. It has to be designed and developed thematically with more effective means of interaction.

Nature trails

Nature trails of varying lengths exist in the SSBS. They have been shown on the map. A walk along the trails provides closer look of the flora and fauna.

Park for children

There is a park having swings and enough space to play for the kids.

Watch towers

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

Reception centre

It has been constructed in the last plan period to give a glimpse of the sanctuary in a nutshell.

Nature education center

Movies on wildlife are screened for the visitors. Special talks are also arranged for the school children visiting the sanctuary.

Center for showing local handicrafts, art and culture

It does not exist.

(B) Tourism products

There is ample scope for designing products for tourists based on the day-to-day working of the staff. Such 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 SSBS with focus on PA values and the need of biodiversity conservation. Along with the students, teachers also used 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:

- 1. Lack of publicity:** Majority of the persons involved in tourism related activities are not aware about the tourist potential of SSBS. There is a need to promote this PA among the people interested in nature tourism. A well designed and well co-ordinated tourism plan for the city of Agra needs to be prepared and the bird sanctuary should be placed prominently in this plan.
- 2. Lack of quality interpretive facility**
- 3. Limited benefit to local community**
- 4. Related to government policy:** 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.

7.4 The Strategies

7.4.1 Identification of Zone

An exclusive tourism zone has been created. The zone houses all the facilities for ecotourism, interpretation etc. It is shown on the map.

7.4.2 Infrastructure development

The infrastructure related to tourism can be developed within the tourism zone only and they have to be compliant of the provisions of the Wildlife (Protection) Act, 1972, the directions/orders of Hon. Supreme Court of India and orders of the Central and State Government.

7.4.3 Activities

1. The interpretation centre will be upgraded with the help of professionals. The displays will be redesigned and placed based on themes. Open amphitheater will also be constructed.
2. Signage, wayside displays will be erected. They should match with the surrounding and they will not be too many.
3. Golf carts facility to the tourists from main gate to the lake area and Agra Bear Rescue Facility.
4. Development of a water interpretation area in confined area of lake near Shanta Ghat by erecting hoardings etc. on the lake sides and improvement of paddle boat facility to tourists.
5. Strengthening and development of camping site on ADRDE lease land.
6. Promotion of tourism in SSBS on different social media platform for example facebook, whatsapp, twitter & blogger, enclave
7. Guides from the local youth will be trained and it will be mandatory to take a guide on local tours.
8. Efforts will made for the government order to plough back gate collection to the SSBS.
9. Resource will be mobilized from State and Central governments for promoting eco-tourism.

10. Tourism products such as home stays, night patrolling, guided exposure to birds, conservation talks etc. will be developed.
11. The religious value of the SSBS will be used for promoting tourism.
12. Binoculars, Spotting scope Night vision equipments will be purchased.
13. Soor Sarovar 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.
14. Quality extension materials will be published for distribution free of cost to the visitors, media, members of tourism industry etc.
15. Road shows will be organized in Agra, Aligarh, Delhi and other places.

7.4.4 Regulations, Monitoring and evaluation

Regulations: The visitor behavior will be regulated as per the provisions of the law. The activities of other departments will also be controlled by the instrument of 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 SSBS

During the World Bank Forestry Project (1998-2002) eco-development as a strategy was tried in many PAs including the Soor Sarovar 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 1 EDC, Arsena, was constituted in 2001-02 on the basis of proximity to the PA. Works like installation of handpump, laying of brick-road, digging of pond etc were taken as entry-point activities. There was no activity subsequently. EDC will be revived and its active participation in entry point activities etc. will be ascertained.

Assessment of the EDC programme

As stated in Chapter 3 and Chapter 4, the people around the SSBS are not dependent on SSBS for subsistence. Though agriculture is the main activity in this region, generally young members of the family are employed in various industries in Agra. Shoe/leather industry is one such industry that has given employment to huge number of rural youths. 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 SSBS.
- 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. Incomplete hard boundary: To achieve the above objectives, this is the biggest bottleneck. Remaining construction of boundary wall and chain link fencing will be completed as soon as possible during this plan period.

2. Low benefit of tourism: The level of tourism in the bird sanctuary has picked up in the last couple of years but the direct benefit to adjoining villagers is non-descript and hence the visible benefit to the local people from the existence of Bird Sanctuary is negligible. Also, even part of the revenue from tourism is not spent on the development of the adjoining villages.

8.4 Broad strategies

The strategies to deal with above issues are the following:

1. Strengthening boundary: Remaining construction of peripheral boundary wall will be completed as soon as possible to minimize adverse impact of sanctuary and people on each other. This will remove the negativity in the adjoining people.

2 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.

3 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.

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

5. 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. Remaining work of boundary wall and chain link fencing will be complicated on the eastern, western and northern boundary of SSBS.
2. 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.
3. Regular meeting of villagers will be organized to generate awareness about the benefits of PA.
4. Health camp for human beings and for cattle will be organized every year.
5. Field trip of the villagers to Bharatpur, Corbett, Ranthambhor etc will be organized to show them the good practices in involvement of the people.
6. Vocational training programmes, such as guide and naturalist training, will be organized.
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. Distribution of native fruit bearing plants and other agroforestry species to villagers and participants of different eco-awareness and eco-development activities.
9. To subsidize and/or promote agroforestry and agricultural practices which are important for maintain health of PA.

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). SSBS is no exception to it. Despite the area being declared as a Bird sanctuary way back in 1991 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 an artificial Wetland-PA in urban landscape the SSBS offers tremendous opportunities for research in the field of ecology. Soor Sarovar Bird Sanctuary provides excellent opportunities for research on bird behaviour, movement, migration, habitat utilization and management, breeding, limnology, water chemistry 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 and cultural 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 SSBS 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 for Wildlife, Aligarh Muslim University, Bombay Natural History Society(BNHS), Wildlife Institute of India, Salim Ali Centre for Ornithology and Natural History(SACON), Coimbatore, International Crane Foundation(ICF), Dayalbagh Educational Institute(DEI), Agra 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 and movement of birds through ringing.
2. Study on the hydrology of the wetland. Management of water in the lake will be the focus.
3. Scientific surveys and study of plants, birds, fishes amphibians, insects, invertebrates lesser animals and mammals etc. will be done during this plan period.
4. Impact of tourism on the SSBS and fixing the carrying capacity with respect to tourism.
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 SSBS and for resident species.
8. Socio-economic effect of the Sanctuary.
9. Research on feeding areas of birds.
10. Study, prioritization and formulation of disaster management plan of protected area etc.
11. Study on the impact of avian influenza, corona virus on avian fauna of the sanctuary and the surrounding areas, SOP for staff protection etc.
12. Study, management and redressal of man animal conflict.
13. Training Need Analysis (TNA) will be carried out to evaluate skill and knowledge of staff and on the basis of out come of TNA staff will be trained accordingly.

9.1.3.2 Other activities

1. Experiment of replacement of *Prosopis juliflora* : in selected areas of SSBS
 Objective: To increase the availability of fruiting trees which in turn will help the fruit-eating woodland birds.
 Method: Prosopis covers more than 80 % terrestrial area of the sanctuary. During this plan period, Prosopis will be removed manually from 5 ha on experimental basis. The uprooted biomass will be left on the floor of the forest. Other fruiting trees such as *Zizyphus* spp will be planted in place of Prosopis and the other native

species will be allowed to grow. The plot will be maintained for 3 years. The use of the area by avi-fauna and other animals will be monitored. The result will be monitored for next 3 years and if the experiment is found to be successful, this will be replicated in 30 ha during this plan period, taking 10 ha every year for treatment.

2. Permanent experimental plots will be laid out in all the beats to study the long term change in vegetation, communities and association particularly due to fire and grazing.
3. A small field laboratory will be set up in the office building. It will have basic scientific equipments like microscope, preservative, refrigerator etc.
4. A research committee will be constituted for SSBS 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 SSBS. A computer with internet connection will also be installed.
2. Monitoring of weed eradication will be done.
3. Monitoring of fire control measure suggested in theme plan on fire.
4. Monitoring of avian flu.
5. Monitoring of tourism related activities, the impacts and the extent of benefit.
6. Monthly or fortnightly monitoring of birds.
7. Mid-winter waterfowl census in association with Centre for Life Sciences, AMU and other institutes of Agra.

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 SSBS. Training Need Analysis (TNA) will be carried out to evaluate skill and knowledge of staff and on the basis of outcome of TNA staff will be trained accordingly.

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 ordinarily be of 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 bird sanctuary in urban landscape” should be established here that will be used to provide training to all the employees of the state. 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 tourism management.
2. Identification of ecological niches and their management.
3. Good example of integration of development and conservation.
4. Management of weeds, both aquatic and terrestrial.
5. Monitoring of birds.

Chapter 10

Organisation and Administration

10.1 Objectives

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

1. To have suitable administrative structure for SSBS.
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 SSBS 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.Soor Sarovar	1. Soordas 2. Keetham 3. Lake	1.Soordas forest block 2.Keetham forest block 3.Keetham lake	Soor Sarovar Bird Sanctuary, Keetham

In the present plan, it is suggested that the number of sections and beats should be increased in the light of addition of newer responsibilities and emergence of new threats, challenges and opportunities.

The proposed position of sections and beats is as follows:

Section	Beat	Area	Headquarter
1.Soor Sarovar	1.Soordas East	Soordas comp no 3,4,5,6,7,8,9,10	Soor Sarovar Bird Sanctuary, Keetham, Agra.
	2.Soordas West	Soordas comp no 1a,1b,2; Keetham comp no 3a, 3b, 4a, 4b, 5a, 5b, 5c, 6a, 6b, 7a, 7b, 7c, 7d	
	3. Wetland	Keetham comp no 1,2,8 and Keetham lake	
2.Tourism	1.Tourism	-	

With increasing tourism activity, a section and a beat for tourism are being proposed. 2 Forest guards are needed for issuing the entry ticket at the gate. As tourism has already reached to a significant level and it is growing fast, additional staff are needed for manning the entry checkpost.

2. Sanction of new posts

The present position of staff posted in the SSBS 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 SSBS:

S.No.	Post	Required no.
1	Range Forest Officer (RFO)	1
2	Deputy Ranger/ Forester	2 (1 for each section)
3	Forest Guard (FG)	7 (1 for each beat, 2 for checkpost)
4	Boatman	4 (2 for day and 2 for night)
5	Watchman	2 (FRH, Office, NIC, Reception centre)
6	Mali	3 (For eco-parks, NIC, FRH)
7	Research assistant	1
8	Driver	1
9	Orderly/Field Assistant	1
10	Sweeper	2

3. Re-organisation of the administrative structure: 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:

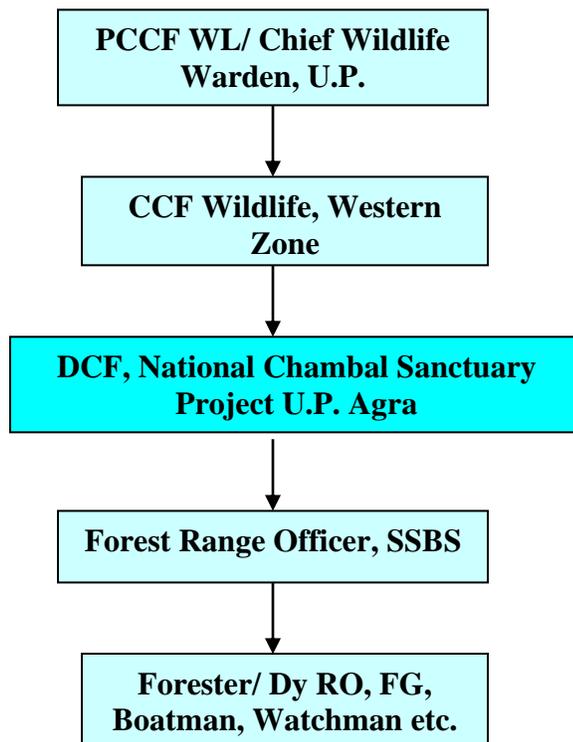


Fig: Proposed organization structure of Soor Sarovar Bird Sanctuary

3. Some of the responsibilities and duties of each higher level will be given to the immediate lower level to enlarge his job description.
4. Similarly, some new responsibilities will be added to the presently existing responsibilities to enrich the job profile of sub-ordinate staff.
5. 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 are suggested:

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

Eco-sensitive Zone

11.1 Declaration of Eco-sensitive Zone (ESZ)

Eco-sensitive Zone of Soor Sarovar Bird Sanctuary has been notified vide notification no. 3319 Date 10.10.2019 of Ministry of Forest Environment & Climate Change, Government of India. The Eco-sensitive zone shall be to an extent of one km uniform around the boundary of Soor Sarovar Bird Sanctuary and the area of the Eco-sensitive Zone is 10.20 sq.km. A copy of notification is given in the part – III plan as appendix – 3. Salient features of Eco-sensitive Zone is given below-

11.2 Extent and boundaries of Eco-sensitive Zone:

The Eco-sensitive Zone shall be to an extent of one kilometre uniform around the boundary of Soor Sarovar Bird Sanctuary (N 27°14' 4" and N 27°31' 52" and E 77°49' 38" and E 77°52' 40") situated in the Agra District of Uttar Pradesh and the area of the Eco-sensitive Zone is 10.20 square kilometres. (1020.00 ha.)

11.3 The boundary description of Soor Sarovar Bird Sanctuary and its Eco-sensitive Zone:

- North** - Village Seengna and Partial cultivated lands of Nagla Reti, Nagla Akos Khadar
- South** - Village Aresena and Partial cultivated lands of Village Keetham, Nagla Murli and Murenda
- East** - Village Runkata, Reserve Forest of Soordas Forest Block
- West** - Village Nagla Bhupla, Chauma Farah & Partial cultivated lands of Village Seengna Khaas and Burj

11.4 The Geo-coordinates of Soor Sarovar Bird Sanctuary and its Eco-Sensitive Zone

Sl. No.	TABLE A: Geo-coordinates of Prominent Locations of Soor Sarovar Bird Sanctuary	Sl. No.	TABLE B: Geo-coordinates of Prominent Locations of Eco-Sensitive Zone
1	27° 14' 47.2" N 77° 51' 14.1" E	1	27° 14' 17.44" N 77° 51' 37.19" E
2	27° 15' 08.6" N 77° 51' 12.3" E	2	27° 15' 7.66" N 77° 51' 50.42" E
3	27° 15' 14.2" N 77° 51' 01.7" E	3	27° 15' 40.11" N 77° 51' 25.95" E
4	27° 15' 18.6" N 77° 51' 00.6" E	4	27° 15' 41.18" N 77° 50' 58.84" E
5	27° 15' 18.20" N 77° 50' 50.6" E	5	27° 16' 7.42" N 77° 50' 58.48" E
6	27° 15' 20.0" N 77° 50' 41.2" E	6	27° 16' 26.63" N 77° 50' 18.71" E
7	27° 15' 22.88" N 77° 50' 27.76" E	7	27° 16' 8.04" N 77° 49' 22.27" E
8	27° 15' 48.41" N 77° 50' 28.44" E	8	27° 15' 17.73" N 77° 49' 8.48" E
9	27° 15' 56.51" N 77° 50' 2.29" E	9	27° 14' 47.42" N 77° 49' 16.22" E
10	27° 15' 38.95" N 77° 49' 37.99" E	10	27° 14' 1.11" N 77° 49' 48.59" E
11	27° 15' 20.07" N 77° 49' 42.15" E	11	27° 13' 58.64" N 77° 50' 23.72" E
12	27° 15' 12.62" N 77° 49' 49.92" E		

13	27° 15' 1.41'' N 77° 50' 1.14'' E		
14	27° 14' 58.09'' N 77° 50' 1.31'' E		
15	27° 14' 53.78'' N 77° 49' 58.98'' E		
16	27° 14' 48.56'' N 77° 49' 54.01'' E		
17	27° 14' 34.94'' N 77° 49' 49.30'' E		
18	27° 14' 45.99'' N 77° 50' 18.09'' E		
19	27° 14' 39.89'' N 77° 50' 28.44'' E		
20	27° 14' 31.57'' N 77° 50' 23.64'' E		
21	27° 14' 28.40'' N 77° 50' 39.54'' E		
22	27° 14' 32.89'' N 77° 51' 3.24'' E		

11.5 The list of villages falling within the Eco-sensitive Zone:

Sl. No.	Village name	Geo-coordinates
1	Runakta	27°14' 09.00 N 77° 52' 25.40'' E
2	Nagla Murli	27°13' 49.40 N 77° 51' 03.30'' E
3	Arsaina	27°14' 11.20 N 77° 50' 14.50'' E
4	Chauma Frah	27°14' 57.10 N 77° 49' 54.50'' E
5	Nagla Bhupia	27°15' 11.10 N 77° 49' 42.00'' E
6	Seenga Khas	27°15' 59.90 N 77° 49' 27.50'' E
7	Nagla Reti	27°16' 07.30 N 77°49' 44.60'' E
8	Seenga Burg	27°16' 12.60 N 77° 49' 28.30'' E
9	Grrri Nahchala	27°15' 25.70 N 77° 52' 19.60'' E

11.6 Zonal Master Plan for the Eco-sensitive Zone:

(1) The State Government shall, for the purpose of the Eco-sensitive Zone prepare, a Zonal Master Plan, within a period of two years from the date of publication of this notification in the Official Gazette, in consultation with local people and adhering to the stipulations given in this and the said plan shall be approved by the Competent Authority in the State Government .

(2) The Zonal Master Plan for the Eco-sensitive Zone shall be prepared by the State Government in such manner as is specified in this notification and also in consonance with the relevant Central and State laws and the guidelines issued by the Central Government, if any.

(3) The Zonal Master Plan shall be prepared in consultation with the following State Departments, for integrating the ecological and environmental considerations into the said Plan, namely:-

- (i) Environment;
- (ii) Forest and Wildlife;
- (iii) Agriculture;
- (iv) Revenue;
- (v) Urban Development;
- (vi) Tourism;
- (vii) Rural Development;
- (viii) Irrigation and Flood Control;
- (ix) Municipal;
- (x) Panchayati Raj; and
- (xi) Public Works Department.

11.7 Prohibited, Regulated and Promoted Activities: All activities in the Eco sensitive Zone shall be governed by the provisions of the Environment Act and the rules made there under including the Coastal Regulation Zone, 2011 and the Environmental Impact Assessment Notification, 2006 and other applicable laws including the Forest (Conservation) Act, 1980 (69 of 1980), the Indian Forest Act, 1927 (16

of 1927), the Wildlife (Protection) Act 1972 (53 of 1972), and amendments made thereto and be regulated in the manner specified in the Table below, namely:-

11.7.1 Prohibited Activities

Sl. No.	Activity	Remarks
1	Commercial mining, stone quarrying (a) and crushing units.	All new and existing mining (minor and major minerals), stone quarrying and crushing units are prohibited with immediate effect, except for meeting the domestic needs of bona fide local residents including digging of earth for construction or repair of houses and for manufacture of country tiles or bricks for housing and for personal consumption;
		The mining operations shall be carried out in of T.N. Godavarman Thirumulpad Vs. UOI in W.P.(C) No.202 of 1995 and dated the 21st April, 2014 in the matter of Goa Foundation Vs. UOI in W.P.(C) No.435 of 2012. accordance with the order of the Hon'ble Supreme Court dated the 4th August, 2006 in the matter
2	Setting of industries causing pollution (Water, Air, Soil, Noise, etc.).	New industries and expansion of existing polluting industries in the Eco-Sensitive Zone shall not be permitted:
		Provided that non-polluting industries shall be allowed within Eco-Sensitive Zone as per classification of Industries in the guidelines issued by the Central Pollution Control Board in February, 2016, unless otherwise specified in this notification and in addition the non-polluting cottage industries shall be promoted.
3	Establishment of major hydro-electric project.	Prohibited (except as otherwise provided) as per the applicable laws.
4	Use or production or processing of any hazardous substances.	Prohibited (except as otherwise provided) as per the applicable laws.
5	Discharge of untreated effluents in natural water bodies or land area.	Prohibited (except as otherwise provided) as per the applicable laws.
6	Setting up of new saw mills.	New or expansion of existing saw mills shall not be permitted within the Eco-sensitive Zone.
7	Setting up of brick kilns.	Prohibited (except as otherwise provided) as per the applicable laws.
8	Commercial use of firewood.	Prohibited (except as otherwise provided) as per the applicable laws.

11.7.2 Regulated Activities

Sl. No.	Activity	Remarks
9	Commercial establishment of hotels and resorts.	No new commercial hotels and resorts shall be permitted within one kilometer of the boundary of the protected area or upto the extent of Eco-Sensitive Zone, whichever is nearer, except for small temporary structures for eco-tourism activities:
		Provided that, beyond one kilometer from the boundary of the protected area or upto the extent of Eco-sensitive Zone whichever is nearer, all new tourist activities or expansion of existing activities shall be in conformity with the Tourism Master Plan and guidelines as applicable.
10	Construction activities.	(a) New commercial construction of any kind shall not be permitted within one kilometer from the boundary of the protected area or upto extent of the Eco-Sensitive Zone,

		whichever is nearer:
		Provided that, local people shall be permitted to undertake construction in their land for their use including the activities listed in sub-paragraph (1) of paragraph 3 as per building bye-laws to meet the residential needs of the local residents.
		Provided further that the construction activity related to small scale industries not causing pollution shall be regulated and kept at the minimum, with the prior permission from the competent authority as per applicable rules and regulations, if any.
		(b) Beyond one kilometer it shall be regulated as per the Zonal Master Plan.
11	Discharge of treated waste water or effluents in natural water bodies or land area.	The discharge of treated waste water or effluents shall be avoided to enter into the water bodies and efforts shall be made for recycle and reuse of treated waste water. Otherwise the discharge of treated waste water or effluent shall be regulated as per the applicable laws.
12	Air and vehicular pollution.	Regulated as per the applicable laws.
13	Undertaking other activities related to tourism like flying over the Eco-sensitive Zone area by hot air balloon, helicopter, drones, microlites, etc.	Regulated as per the applicable laws.
14	Establishment of large-scale commercial livestock and poultry farms by firms, corporate and companies.	Regulated (except otherwise provided) as per the applicable laws except for meeting local needs.
15	Use of polythene bags.	Regulated as per the applicable laws.
16	Introduction of exotic species.	Regulated as per the applicable laws.
17	Commercial extraction of surface and ground water.	Regulated as per the applicable laws.
18	Felling of trees.	(a) There shall be no felling of trees in the forest or Government or revenue or private lands without prior permission of the competent authority in the State Government.
		(b) The felling of trees shall be regulated in accordance with the provisions of the concerned Central or State Act and the rules made thereunder.
19	Erection of electrical and communication towers and laying of cables and other infrastructures.	Regulated under applicable laws (underground cabling may be promoted).
20	Widening and strengthening of existing roads and construction of new roads.	Taking measures of mitigation as per the applicable laws, rules and regulation and available guidelines.
21	Fencing of existing premises of hotels and lodges.	Regulated as per the applicable laws.
22	Movement of vehicular traffic at night.	Regulated for commercial purpose under applicable laws.
23	Commercial sign boards and hoardings.	Regulated as per the applicable laws.
24	Small scale non polluting industries.	Non polluting industries as per classification of industries issued by the Central Pollution Control Board in February, 2016 and non-hazardous, small-scale and service industry, agriculture, floriculture, horticulture or agro-based industry producing products from indigenous materials from the Eco-sensitive Zone shall be permitted by the competent authority.

25	Collection of Forest produce or Non-Timber Forest produce.	Regulated as per the applicable laws.
26	Protection of hill slopes and river banks.	Regulated as per the applicable laws.
27	Ongoing agriculture and horticulture practices by local communities along dairies, dairy farming, aquaculture and fisheries.	Permitted as per the applicable laws for use of locals.
28	Solid waste management.	Regulated as per the applicable laws.
29	Eco-tourism.	Regulated as per the applicable laws.
30	Infrastructure including civic amenities.	Taking measures of mitigation as per the applicable laws, rules and regulations available guidelines.

11.7.3 Promoted Activities

Sl. No.	Activity	Remarks
31	Rain water harvesting.	Shall be actively promoted.
32	Organic farming.	Shall be actively promoted.
33	Adoption of green technology for all activities.	Shall be actively promoted.
34	Cottage industries including village artisans, etc.	Shall be actively promoted.
35	Use of renewable energy and fuels.	Bio-gas, solar light etc. shall be actively promoted.
36	Agro-Forestry.	Shall be actively promoted.
37	Plantation of Horticulture and Herbals.	Shall be actively promoted.
38	Restoration of degraded land/ forests/habitat.	Shall be actively promoted.
39	Use of eco-friendly transport.	Shall be actively promoted.
40	Skill Development.	Shall be actively promoted.
41	Environmental awareness.	Shall be actively promoted.

11.8 Monitoring Committee : The Central Government hereby constitutes a Monitoring Committee, for effective monitoring of the Eco-sensitive Zone, which shall comprise of the following, namely:-

(i)	District Magistrate, Agra	Chairman, ex officio
(ii)	Superintendent of Police/Senior Superintendent of Police, Agra	Member
(iii)	One representative of a Non Governmental Organization (NGO) working in the field of environment (including heritage conservation)to be nominated by the State Government	Member
(iv)	One expert in Ecology	Member
(v)	One expert in Biodiversity	Member
(vi)	Executive Engineer Public Work Department, Agra	Member
(vii)	Executive Engineer of Irrigation Department, Agra	Member
(viii)	District Agriculture Officer, Agra	Member
(ix)	Wildlife Warden, Etawah	Member
(x)	Regional Officer, Uttar Pradesh Pollution Control Board, District Agra	Member
(xi)	Deputy Conservator of Forests, National Chambal Sanctuary Project, Agra	Member-Secretary.

The tenure of the Monitoring Committee shall be for a period of three years or till the re-constitution of the new Committee by the State Government, and the subsequent Monitoring Committee shall be constituted by the State Government.

Chapter 12

The Budget

The proposed management plan of SSBS 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” (IDWH) scheme of Govt. of India.
- “National Plan for Conservation of Aquatic Ecosystem” Scheme of Govt. of India.
- CAMPA
- The International and National NGOs like WWF, Wetland International, WTI etc.
- The Govt. of U.P. through plan and non-plan budgetary support.
- The tourism department of the Govt. of Uttar Pradesh.
- District Rural Development Agency, Agra
- One District One Tourism Programme of U.P. Government.

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.1357.15 lakh. The projections are based on market price in 2019-20 and the prevailing wage rate of Rs.175/- 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.**

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).

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