UNESCO – IUCN Enhancing Our Heritage Project :
Monitoring and Managing for Success in Natural World Heritage Sites

Initial Management Effectiveness Evaluation Report :
Keoladeo National Park, Bharatpur, India, July 2003



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PROJECT BACKGROUND

Enhancing Our Heritage: Managing and Monitoring for Success in Natural World Heritage Sites is an UNESCO – IUCN project funded by the United Nations Foundation. The four year project (2001-2004) is being implemented in ten world heritage sites located in Africa, South Asia and Latin America. The three project sites in South Asia are Keoladeo National Park, Bharatpur, Kaziranga National Park, Assam and the Royal Chitwan National Park, Nepal. The Wildlife Institute of India, Dehradun has been selected as a Regional Partner Institution to provide technical back stopping for project implementation in South Asia.

The principal objectives of the project are to promote the development of monitoring and evaluation systems and to facilitate adaptive management. Based on the lessons learnt, the project aims to enhance the periodic reporting process for the World Heritage Sites.

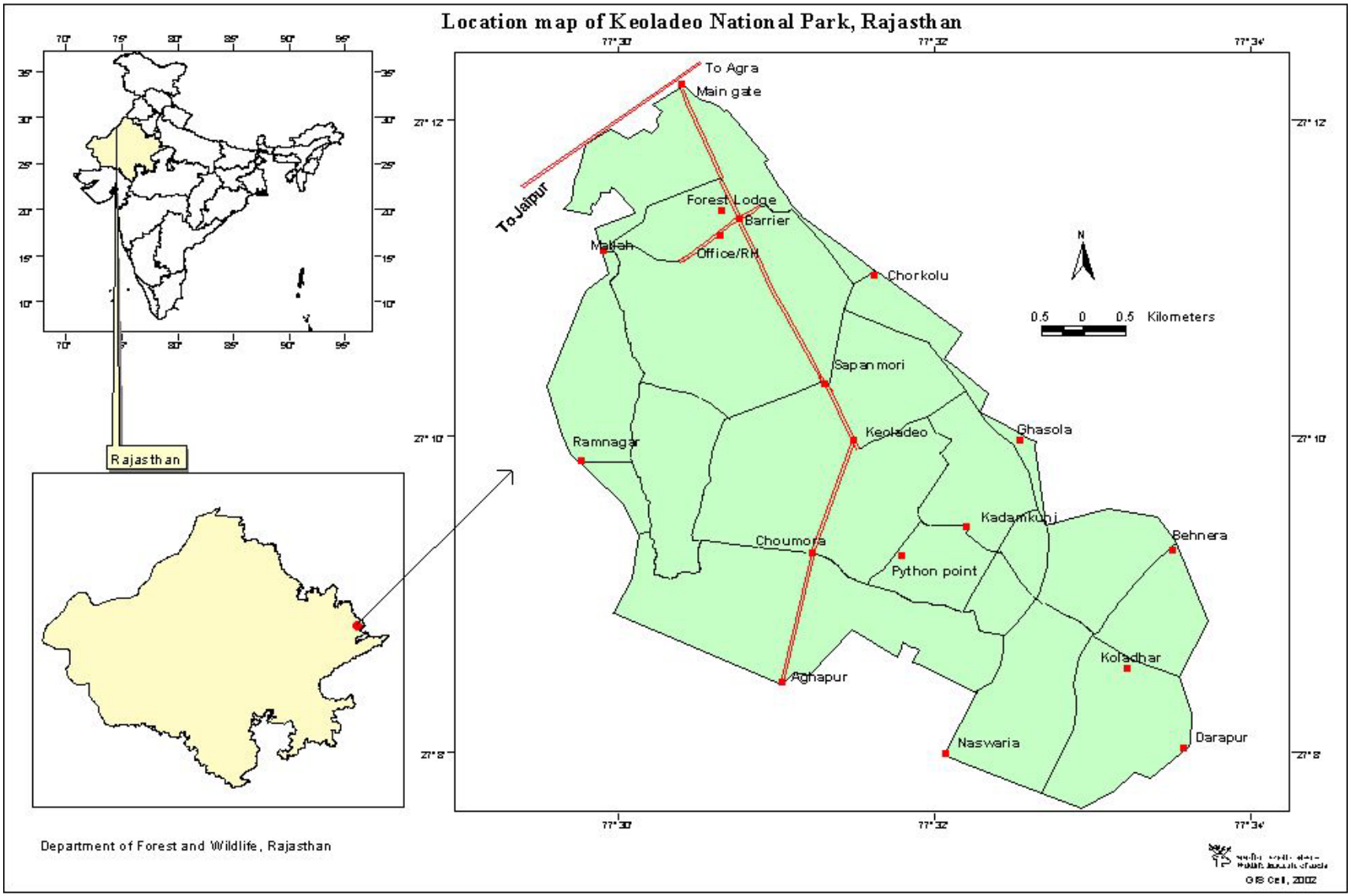
An initial management effectiveness evaluation as per the project methodology has been carried out in Keoladeo National Park in the year 2002 – 03 and the findings and recommendations are presented in this report. Along with this, a video capsule on the park profile and management effectiveness evaluation has also been prepared as part of the project activities in the Keoladeo National Park, Bharatpur.

1.0 INTRODUCTION

Keoladeo National Park ($27^{o}7'6"N - 27^{o}$ 12'2"N and $77^{o}29'5"$ E – 77 ^{o} 33'9"E) is a 29 km^2 area situated on the extreme western edge of the Gangetic basin that was once confluence of Rivers Gambhir and Banganga in Bharatpur district of the state of Rajasthan. It is constituted of a unique mosaic of habitats that include wetlands, woodlands, scrub forests, grasslands that supports an amazing diversity of both plant and animal species. Keoladeo National Park's flora consists of 375 species of angiosperms of which 90 species are wetland species. The fauna includes more than 350 species of birds, 27 species of mammals, 13 species of reptiles, 7 amphibians and 43 fishes. Macro invertebrates too abound in the park.

The unique mosaic of habitats includes physiognomic types of forest, woodland, scrub woodland, savanna woodland, tree savanna, low grasslands with scattered trees and scrub, plantations and wetland. This diversity of habitats supports the highest congregation of waterfowl in the region and is also home to many resident terrestrial and local migratory species. The wetlands of the park are host to the most spectacular heronry of the region. 15 species of birds nest here forming an extensive heronry from the month of July to September. As the park lies on the Central Asian Flyway of the Asia Pacific Global Migratory Flyway, it is a staging / wintering ground for a huge number of migratory waterfowl that breed in the Palearctic region. Keoladeo National Park has been the only wintering ground for the central population of the endangered Siberian Crane (*Grus leucogeranus*).

The park is unique in being bound by a stone - masonry wall and agricultural fields and villages in immediate surroundings, thus, lacking a buffer zone. The park is both a Ramsar Site as well as a World Heritage site. It has a long and unique history as it was once part of erstwhile state of Bharatpur and had been managed as a duck shooting reserve.


Location map of Keoladeo National Park, Rajasthan
To Agra
Main gate
To Jaipur
Forest Lodge
Barrier
Office/RH
Chorkolu
Sapanmori
Keoladeo
Ghasola
Ramnagar
Kadamkuhi
Behnera
Choumora
Python point
Aghapur
Koladhar
Nasvaria
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Rajasthan
Department of Forest and Wildlife, Rajasthan
GIS Cell, 2002

Major Historical Events in Keoladeo National Park

1726-1763	Ajan Bandh was constructed by Maharaja Suraj Mal, the then ruler of the princely state of Bharatpur on the river Gambhir.
1850-1899	The present area of natural depression inside the park was converted into a protected deer shooting site.
1899	Prince Harbhanji of Morvi state in Gujarat was appointed as an administrator for Bharatpur State. He was responsible for converting this depression into a duckshoot reserve by getting bandhs and dykes constructed in order to increase the water holding capacity of the area.
1901	The reserve area was flooded for the first time and a regular water distribution system was devised. The inundation resulted in production of a lot of aquatic vegetation, which attracted a very large number of migratory birds.
1902	The artificially created duckshoot reserve was formally inaugurated by the then Viceroy of India, Lord Curzon when a duck shoot was organised in his honour on 2nd December, 1902.
1919	Boundaries of the duck shooting reserve were clearly demarcated.
1925	The Forest Act of Bharatpur was passed, and the erstwhile Shikar department brought under the Forest Department.
1938	A shooting party headed by the then Viceroy of India, Lord Linlilthgow shot a maximum of 4,273 birds on 12th November as shown in shooting record inscribed on the pillar near Keoladeo temple.
1956	Keoladeo Ghana was notified as a Protected Area and a bird sanctuary. Hunting rights remained with the Maharaja of Bharatpur, his guests, and a few state guests till 1972.
1967	Keoladeo Ghana was declared as a Reserved Forest under the Rajasthan Forest Act, 1953.
1972	Ruler's hunting rights withdrawn.
1977-81	A masonry wall was constructed all around the park.
1981	Keoladeo Ghana was declared as a Ramsar site under the Convention on Wetlands of International Importance.
1981	Keoladeo Ghana Sanctuary was upgraded to a National Park. Cattle grazing inside the park was banned.
1985	The park was declared as World Heritage site under the World Heritage Convention.

Keoladeo National Park (KNP) is a dynamic system that requires regular management interventions owing to its small size and wide habitat diversity. The management objectives of the park are:

1. To maintain the ecological seral stages of the ecosystem for avifaunal diversity in particular and others in general
2. To provide an enriching wilderness experience and visitor satisfaction through conservation education and wildlife interpretation programme
3. To provide site specific, ecofriendly package of measures to reduce dependence of local communities on protected area resources and to provide alternate livelihood options.

KNP has been man-managed for a long time and therefore requires regular interventions for maintaining its ecological characteristics and to arrest the ecological succession to control ingression of woodland / grassland into the wetland. These interventions are undertaken time and again in the form of control of invasive alien species both in terrestrial as well as in wetland areas. Control of water hyacinth has been done successfully in the past and that of *Prosopis juliflora* continues. It is a management practice to maintain different water levels in different wetland blocks to provide suitable habitat to wider diversity of migratory waterfowl.

1.1 How the Evaluation was Carried Out

A project planning and inception workshop was organized in November, 2001 for the two project sites in India *viz*. Keoladeo National Park and Kaziranga National Park in which present and past site managers, frontline staff, community representatives, civil society members and scientists participated along with Dr. Marc Hockings, Project Manager and Equilibrium Consultants Nigel Dudley and Sue Stolton. A site implementation team was also constituted.

Several smaller meetings and consultations were held during the course of evaluation besides a major stakeholder consultation. The year 2002 – 03 was a period of unprecedented drought and the initial assessment has recorded high levels of stress on biodiversity values of the site.

The core initial assessment team comprised of the following :

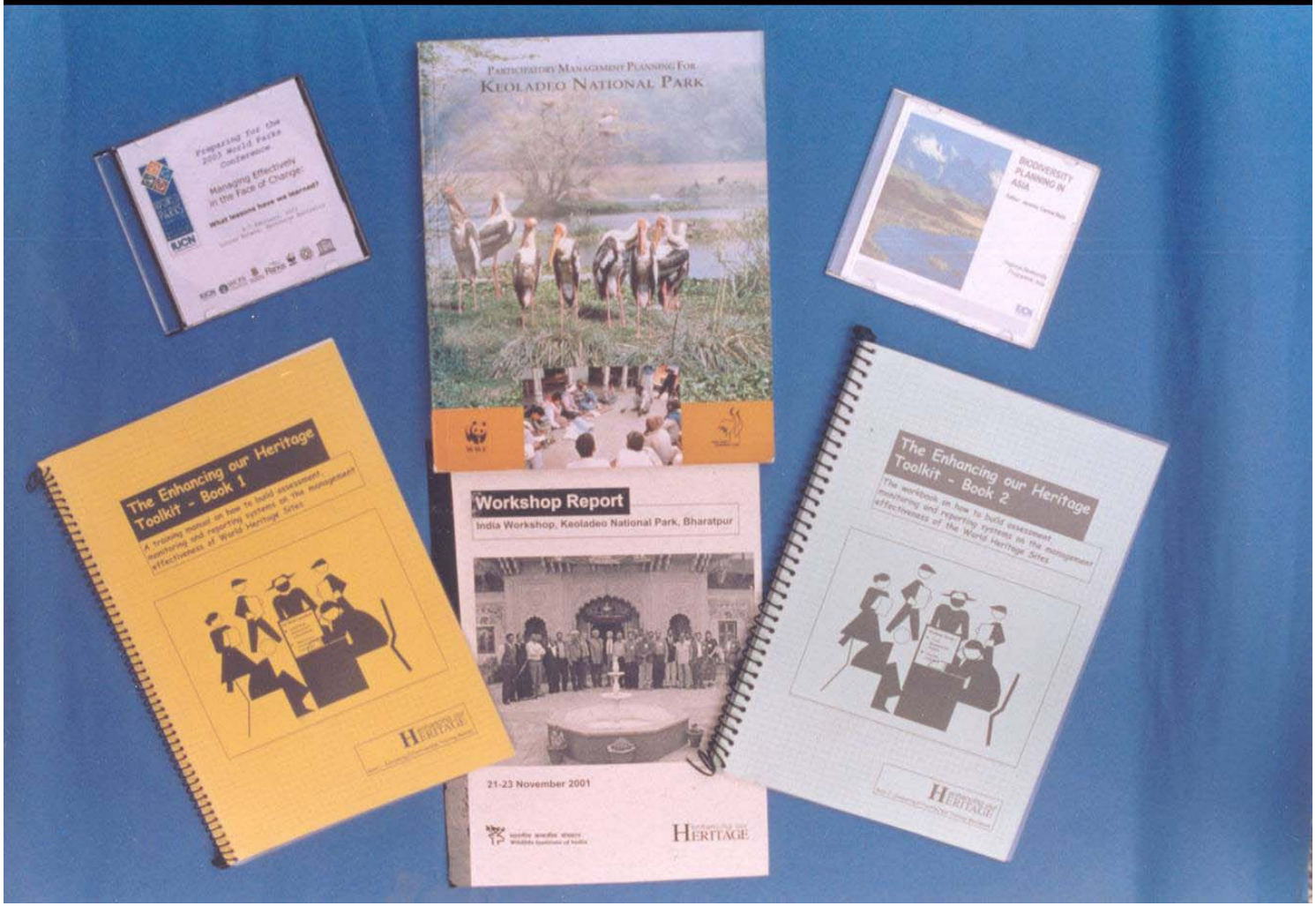
Past and Present Site Managers	:	Ms. Shruti Sharma
		Mr. B. Praveen
		Mr. K.C.A. Arun Prasad
WII Scientist and Coordinators	:	Dr. V.B. Mathur
		Mr. B.C. Choudhary
Civil Society Representative	:	Ms. Ritu Singh
WII UNESCO Project Leaders	:	Mr. S.K. Mukherjee
		Mr. V.B. Sawarkar
		Mr. S. Singsit

Notes on the layout of the Report

For each of the six elements and sub-sections of the evaluation *viz*. Context, Planning, Inputs, Process, Outputs and Outcomes the assessment follows the outline below:

- Summary of the Assessment
- Assessments of Gaps
- Management Recommendations
- Data Tables

Documents used for conducting initial assessment at Keoladeo National Park



2.0 CONTEXT REVIEW

2.1 Focal Management Targets

World Heritage Site Values

Keoladeo National Park is listed as a World Heritage Site based on criteria (iv). *This criteria includes habitats for maintaining the most diverse fauna and flora characteristic of the biographic province and ecosystems under consideration; for example, a tropical savannah should include a complete assemblage of co-evolved herbivores and plants; an island eocsystem should include habitats for maintaining endemic biota; a site containing wide-ranging species should be large enough to include the most critical habitats essential to ensure the survival of viable populations of those species; for an area containing migratory species, seasonal breeding and nesting sites, and migratory routes, wherever they are located, should be adequately protected; international conventions, e.g. the Convention of Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention), for ensuring the protection of habitats of migratory species of waterfowl, and other multi- and bilaterial agreements could provide this assurance.*

The Keoladeo National Park provides a home to over 350 species of birds out of which over 120 breed in the Park. The Park with its mosaic of habitats, ranging from marshes, woodlands, grasslands and scrublands supports an amazing diversity of plants and animals. A wintering site for many of the endangered species, some of which come from as far as Siberia and Central Asia. The Park has one of the world's most spectacular heronries, which harbour a large number of resident and migratory birds. The wintering population of the Siberian Cranes has suffered a severe decline in the last three decades and it now faces the threat of extinction on account of its persecution during its arduous migration and highly specialized feeding requirements.

Biodiversity Values

Since the site has been listed primarily for criteria (iv) there is a focus on ecological processes and biodiversity values in the Focal Management targets of this site. It is felt that since this wetland provides significant livelihood support to the local communities and therefore ecodevelopment and eco-tourism have to be included as additional attributes under "cultural/ social values"

Other Natural Values

The presence of 'Kadam' trees in the woodlands is an indication that this region was once part of extensive floodplains and that this was the site of confluence of the Rivers Gambhir and Banganga. The 'Kadam' (*Mitragyna parvifola*) is representative of climax community of swamp/ riverbed vegetation. This is perhaps the only natural wetland area in the Yammuna floodplains where naturally occurring trees of 'Kadam' remain. Keoladeo National Park also includes a 7km^2 grassland area which forms an important roosting site for the migratory Marsh Harriers. As it is a natural depression, in the years of excessive rainfall the wetlands of the park act as a reservoir for holding flood waters thus saving the town of Bharatpur and surrounding areas from inundation. It was for this very purpose the Dam- Ajan Bundh was constructed during the period 1726-1763, which also serves as a temporary water reservoir for the migratory species of waterfowl.

Cultural/ Social Values

The park serves as an important groundwater recharge site and thus plays an important role in the regional hydrology. As the water is held in the wetlands for a long period of time it maintains the water table and soil moisture. As the landuse of the surrounding areas is agriculture, the farmers benefit from it. It is also plays a role in climate amelioration, providing health benefits to people who visit the park every morning in very large numbers. As this is a wetland of international importance, eco-tourism is a focus for both the management and the local people whose livelihood depends on it. There are a huge number of people like the guides, rickshaw-pullers, hoteliers, who get employment because of the park. Further, many people get indirect benefits from animal husbandry.

GAPS

- Considering the dynamic nature of this wetland site an in-depth understanding of various processes and interrelationships is required.
- Quantification and economic valuation of the tangible and intangible benefits of the Keoladeo ecosystem is lacking.
- System of regular monitoring of wetland parameters is not in place.
- Little understanding of the hydrological functions and role of Keoladeo wetland in the regional water regime.

RECOMMENDATIONS

- Undertake scientific studies to fill in the above gaps within a three period.
- Implement monitoring protocols in collaboration with scientific community within a one year period.

Focal Management Targets Data Sheet

	Focal Management Targets	World Heritage Values	Additional Attributes	Information on status
	Wetland Management	Staging and wintering ground for birds of Palearctic region. Wintering ground of the central population of Siberian Cranes. Along the Central Asian Flyway of the Asia Pacific Global Migratory flyway. Breeding habitat for 15 heronry species.	Provides for food for waterfowl and heronry species	Very Good
Biodiversity Values	Heronry	15 species of resident and local migratory species form the heronry.		Very Good
	Maintaining ecological seral stages of the habitat	42 species of Raptors, 9 species of Owl, Migratory waterfowl.	Resident terrestrial birds, mammals, reptiles,	Very Good
Other natural values	Last remnant wetland in the Yamuna floodplains	Representative species of *Mitragyan parviflora* 'Kadam' trees of the climax community of swamp/ river bed vegetation.		Very Good
	Last natural grassland of 7 km^2. In the Yamuna floodplains	Marsh harrier roosting site.		Very Good

	Focal Management Targets	**World Heritage Values**	**Additional Attributes**	**Information on status**
	Flood control		In flood years the wetland is a flood control reservoir for the town and the surrounding villages.	Very good
Cultural / Social values	Ecotourism		Local livelihood options ✓ Tourist guides ✓ Rickshaw-pullers ✓ Hoteliers	Good
	Ecodevelopment to provide alternate livelihood options		Additional income from animal husbandary.	Fair
	Regional Hydrology		Good agricultural yields.	Poor
	Climate Amelioration		Health benefits for many morning walkers from the town. Enhanced agri & animal husbandry production.	Poor
	Historical infrastructure within the national park		Some structures of traditional Rajasthani architecture.	Very good

2.2 Identifying Stresses and Threats

Current Threats

There are several threats to this World Heritage Site. It is a small and dynamic wetland system which makes it vulnerable to environmental factors. These threats are:

1. *Recurring drought, lessening catchment area inflows and erratic release of water*: As the prime management objective is to maintain ecological seral stage of the ecosystem, maintenance of water levels in the wetlands is most important. With erratic rainfall and decreasing inflows from the catchment this becomes difficult to ensure this. As the water levels remain low over a period of time, the woodland start to ingress in the wetland areas resulting in shrinking of the wetland area thereby threatening the ecological characteristics of the area.
2. *Invasive species*: There are three main invasive species in the park. Water hyacinth (*Eichorrnia crassipes)* invades the wetland areas. Due to management intervention the spread of this species is presently in check. *Papalum disticum* is present a few of the wetland blocks. Its thick mat prevents regeneration and utilization of other aquatic plant species by avi-fauna. During periods of drought *Prosopis juliflora* vigorously spreads and reduces the wetland area. These invasive species are a threat to the natural species composition of both the wetland and the woodland/ grassland areas of the park.
3. *Contamination of water with pesticides, fertilizers etc.*: The inflow of high levels of pesticides and fertilizers from the adjoining agricultural fields in the park area influences the plant productivity which affects the ecological succession processes. Higher levels of pesticides in the water get bio-magnified through the food chain and adversely effect the birds and other faunal species.
4. *Fire*: Occurrences of man induced fire affect the breeding of terrestrial birds. Recurring fire in the grassland changes the species composition and leads to habitat loss.

5. *Sedimentation*: Increasing sedimentation directly affects the water holding capacity of the wetland. The land-use practices in the catchment area are enhancing the sedimentation load in this wetland. It is causing further ingression of woodland into wetland and resulting loss of wetland habitat.
6. *Competition for resources*: The competition for biomass between wild herbivores and domestic as well as feral livestock within the park is increasing.
7. *Tourism*: Keoladeo National Park being easily approachable is well-visited. The huge number of tourists cause a lot of disturbance to the wild animals and birds during certain times of the year.
8. *Catchment area degradation*: Inappropriate and incompatible landuse practices particularly mining and excessive groundwater withdrawal in catchment area are leading to its degradation. This affects the overall availability of water inside the park.

Potential Threats

These are threats that are impending and may not be currently taking place.

1. *Increasing unregulated tourism*: Presently the tourism is being regulated by the park management. But if the number of visitors increase beyond the carrying capacity adverse impacts are bound to occur.
2. *Increasing biotic pressure*: The park management presently is able to meet atleast partially the biomass requirements of the adjoining local communities. With rise in human and livestock population the gap between demand and supply would increase.

GAPS

- Effective control of all invasive species
- Inadequate information on sedimentation rates and pesticide load
- Lack of land-use policy and action plan
- Inadequate data on visitor carrying capacity

RECOMMENDATIONS

- Ensure that data gaps on sedimentation rates and pesticide contamination are plugged within a two year period.
- Ensure that all appropriate techniques for management of invasive species are employed by the park management.
- Gather all relevant data for determining visitor attitude, behaviour and carrying capacity within a two year period.

Identifying Stresses and Threats Worksheet

Threats to World Heritage Values	Key threat-related factor to be assessed	Focal Management Target affected	Attributes for consideration in status measurement
Current Threats	Stress: water; recurrent droughts, lessening catchment area inflows, timely release	All FMT	Alteration in habitats Invasion of woodland in wetland
	Source: Erratic rainfall Socio- political situation	All FMT	
	Stress: Invasive species Change in seral stages Loss of aquatic habitat	All FMT	Habitat loss Change in species composition Loss of endemic taxa
	Source: Seed in flow with water Traditional practice of putting cattle inside the park	All FMT	Extent of area infested with seed invasion/weed Extent of biomass removal by park cattle
	Stress: Contamination of water with pesticides, fertilizers, etc. Maintaining seral stages of the habitat, effect heronry	All FMT	Breeding biology of heronry species Biomagnification Eutrophication
	Source: Agricultural practices Landuse pattern	All FMT	
	Stress: Fire, Maintaining seral stages of the habitat	All FMT	Breeding of terrestrial birds Change in species composition Habitat loss
	Source: Intentional man-made fire	All FMT	

Threats to World Heritage Values	Key threat-related factor to be assessed	Focal Management Target affected	Attributes for consideration in status measurement
	Stress: Sedimentation Maintaining seral stages of the habitat	All FMT	Water holding capacity of wetlands reduces Alteration and changes in seral stages
	Source: Faulty landuse practice in catchment area Socio-economic condition	All FMT	
	Stress: Competition for resources. Wetland management	All FMT	Resources available for wild ungulates Loss of endemic taxa Change in species composition
	Source: Invasive alien species	All FMT	
	Stress: Tourism	All FMT	Disturbance to wildlife Noise pollution Vandalism and Littering the park
	Source: Very high number of visitors	All FMT	
Potential Threats	Increasing unregulated tourism	All FMT	Litter Noise pollution Vandalism
	Increasing biotic pressure	All FMT	Loss of wetland area and relative species Change in species composition Loss of endemic taxa Disturbance to wildlife Noise pollution Vandalism and Litter

2.3 Engagement of Stakeholders/ Partners in Management

Keoladeo National Park though being a small site yet has a very large interface with the village communities. Being a very important visitor destination a number of stakeholders have a direct interest in park management.

Villagers

Traditionally, the villages around the park were involved animal husbandry. The park provided for the fodder requirements and also the grazing ground for the domestic buffalo population. When the area was designated as a 'National Park', grazing was banned under the legal provisions and thus villagers came in conflict with the management. As it is imperative for maintenance of ecological characteristics of the area, PA management extracts extra biomass from the wetland that in turn meets the fodder requirement of the villagers. The villagers thus form an important group of stakeholders who help with the management of the WH Site.

Guides and Rickshaw-Pullers

This group of stakeholders is actively involved with management of visitors and their movement within the park. The rickshaw-pullers have been trained by the PA management in the art of communication and bird identification, which is a unique feature of this park. This group is thus heavily dependent on the park for their livelihood support. During off-season, they also volunteer for habitat management activities. At present, this group is fairly organized at their own level. There is an opportunity to involve them further with the management of the area.

Tourism Industry and Tourists

The tourism sector is well organized and sustains the economy of the Bharatpur town as a whole. A large number of people get employment in this sector and are actively involved in ecotourism activities.

Scientific Research Organizations

Scientific research organizations have played and continue to play an important part in study of various aspects of wetland ecology and management. There is however a lag phase and also some gaps in implementation of recommendations.

NGOs

NGOs have played an important role in conservation education and building of trust with the local people. NGOs also volunteer assistance in habitat management activities.

Other Government Departments

Regular interaction with other government departments particularly the Irrigation Department and the District Administration is required as this is a man-modified and man-managed park. The wetland cycle and consequently the ecological characteristics of the park depends on timely release of adequate quantities of water from the Dam (by the Irrigation Department) situated near the park on which the park depends for its supply of water. The interaction with other government departments is rather limited at present and can be further improved.

Engagement of "Stakeholders" and "Partners in Management" Worksheet 1

Target/Management Objectives: FMT (Biodiversity Values)

	Factor	Villagers	Tourism Industry	Tourist	Guides/ Rickshaw pullers	NGOs	Scientific Research Organizations	Govt. Departments
Understanding Stakeholders	**Economic dependency**	Moderate	High	None	High	High	Low	Low
	Impacts (Negative Impacts on Environment)	Low	High	Moderate	Low	Low	Low	Low
	Impacts (Positive Contribution)	Moderate	Low	High (Ambassadors: conservation)	High	Low	Moderate	Moderate
	Willingness to engage	High (Both ways)	Stakeholder: High Park Mgmt: Low	Stakeholder: High Park Mgmt: High	High (Both ways)	High (Both ways)	High	High
	Political / Social Influence	High	High	Low	Moderate	High	Low	Moderate

	Factor	Villagers	Tourism Industry	Tourist	Guides/ Rickshaw pullers	NGOs	Scientific Research Organizations	Govt. Departments
	Organization of Stakeholders	Organized	Organized well	Partially organized	Organized	Organized (at individual level)	Organized	Organized
Assessment of Stake-holder Engagement	**What opportunities do stakeholders have to contribute to management?**	Habitat mgmt; Tourism mgmt – livelihood opportunities	Ecotourism promotion; Employment generation	Can help in all FMT	Tourism mgmt,; Habitat mgmt. Protection	Conservation education; Habitat mgmt.	Can contribute in all FMT	Dove-tailing of funds; Holistic approach
	What is the level of engagement of the stakeholder?	Fair	Low	Low	Moderate	Low	Moderate	Moderate
Summary	**Overall adequacy of stakeholder engagement** (Very good, Good, Fair, Poor)	**Fair**	**Poor**	**Fair**	**Good**	**Fair**	**Good**	**Good**

Engagement of "Stakeholders" and "Partners in Management" Worksheet 2

Target/Management Objective: Other Natural Values

	Factor	Villagers	Govt. Departments	Scientific Research Organizations	Non-Governmental Organizations
Understanding Stakeholders	**Economic dependency**	High	Low	Low	Low
	Impacts (Negative Impacts)	Moderate	Low	Low	Low
	Impacts (Positive Contribution)	Moderate	Moderate	Low	Low
	Willingness to engage	High	High	High	High
	Political / Social Influence	High	Moderate	Moderate	Moderate
	Organization of stakeholders	Organized	Organized	Organized	Organized at individual level
Assessment of Stakeholder Engagement	**What opportunities do stakeholders have to contribute to management?**	Better agricultural practices; soil and water conservation measures in watershed	Better landuse planning in watershed area	Disaster Mgmt. Plan; Mitigation Plan	Flood relief
	What is the level of engagement of the stakeholder?	Moderate	Moderate	Moderate	Moderate
Summary	**Overall adequacy of stakeholder engagement** (Very good, Good, Fair, Poor)	**Fair**	**Good**	**Good**	**Good**

Engagement of "Stakeholders" and "Partners in Management" Worksheet 3

Target/Management Objective: FMT (Social Values) Ecotourism/Historical Infrastructure

	Factor	Tourism Industry	Local Inhabitants; Including Guides/ Rickshaw Pullers	Govt. Department
Understanding Stakeholders	**Economic dependency**	High	High	Low
	Impacts (Negative Impacts)	Moderate	Moderate	Low
	Impacts (Positive Contribution)	Low	Moderate	Moderate
	Willingness to engage	High	High	High
	Political / Social Influence	Moderate	Low	Moderate
	Organization of stakeholders	Partly organized	Organized	Organized
Assessment of Stakeholder Engagement	**What opportunities do stakeholders have to contribute to management?**	Tourism management Conservation education	Historical infrastructure management Better conservation education	Tourism management Infrastructure management
	What is the level of engagement of the stakeholder?	Low	Moderate	Moderate
Summary	**Overall adequacy of stakeholder engagement** (Very good, Good, Fair, Poor)	**Fair**	**Good**	**Fair**

Engagement of "Stakeholders" and "Partners in Management" Worksheet 4

Target/Management Objective: Climate Amelioration and Hydrology

	Factor	Local Inhabitants/ Morning Walkers	Govt. Departements
Understanding Stakeholders	**Economic dependency**	Low	Low
	Impacts (Negative Impacts)	Low	Low
	Impacts (Positive Contribution)	Moderate	Moderate
	Willingness to engage	High	High
	Political / Social Influence	Low	Moderate
	Organization of stakeholders	Unorganized	Organized
Assessment of Stakeholdeer Engagement	**What opportunities do stakeholders have to contribute to management?**	Expanding the goodwill	Soil conservation Water conservation programme in watershed area Target fringe area programme Livelihood programmes
	What is the level of engagement of the stakeholder?	Low	Low
Summary	**Overall adequacy of stakeholder engagement** (Very good, Good, Fair, Poor)	**Fair**	**Good**

Stakeholder Engagement Summary Table

Focal Management Target / Management Objective	Villagers	Tourism Industry	Tourist	Guides/ Rickshaw Pullers	NGOs	Scientific Research Organizations	Govt. Deptt.	Local Inhabit-ants	Morning Walkers	Overall Stakeholders Engagement for Target/ Objective
Biodiversity Values	Fair	Poor	Fair	Good	Fair	Good	Good	X	X	Good
Other Natural Values	Fair	X	X	X	Fair	Good	Good	X	X	Fair
Social Value Ecotourism/ Historical Infrastructure	X	Fair	X	X	X	X	Fair	Good	X	Fair
Climate Amelioration and Hydrology	Fair	Poor	Fair	Good	Fair	Good	Good	Good	Fair	Fair
Overall enhancement of the stakeholder at the site	Fair	Poor	Fair	Good	Fair	Good	Good	Good	Fair	Fair

2.4 Review of National Context

India has enacted several legislations to deal with the conservation of biodiversity and management of wildlife and protected areas. The Indian Wildlife (Protection) Act was enacted in 1972 and has been amended by the Indian Parliament from time to time in response to the changing scenario of conservation at the field and country level. India has also enacted the Biodiversity Act in 2002 and has also formulated the National Wildlife Action Plan (2002-2016). India now has four categories of Protected Areas viz., National Park, Wildlife Sanctuary, Conservation Reserve and Community Reserve. The process of gazettment of National Parks and Wildlife Sanctuaries has been clearly outlined in the Wildlife (Protection) Act, 1972.

India now has a network of Protected Areas comprising 89 National Parks and 492 Wildlife Sanctuaries covering 4.71% of the geographical area of the country. India has also developed a "Biogeographical Classification of India" which provides a framework for establishment of Protected Areas on a biogeographically representative basis.

At the apex level, there is an Indian Board of Wildlife (IBWL) which is chaired by the Prime Minister of India and has adequate representation from Government Agencies and Civil Society representatives. Similarly, at the state level there are State Wildlife Advisory Boards which provide the necessary policy guidance on wildlife matters.

The Government of India as well as the State Governments are committed to conserve the rich biological heritage of the country. A country-wide effort is now on to involve stakeholders particularly local communities in the conservation and management of wildlife and protected areas in the country. Several non governmental and civil society institutions and individuals are now working together with the PA management and are also operating their own programmes for conservation of biodiversity.

GAPS

- The present legislation regarding national parks does not facilitate the "sharing of natural resources/ usufructs" with the local communities.
- There is a lack of harmony between policies and programmes of Tourism Department with those of Forest/ Wildlife Departments

RECOMMENDATIONS

- A concept paper on "Sharing of natural resources/ usufructs" from the wildlife protected areas with the local communities needs to be prepared keeping in mind the conservation imperatives and the needs and aspirations of the local communities.
- There is a need to initiate dialogue/ consultation with various government agencies particularly the Tourism Department to harmonise and reduce conflict between their respective policies and programmes.

Review of National Context: Data Sheet

Criteria	Strengths	Weaknesses
World Heritage Site and PA Legislations	Keoladeo NP is a duly gazetted PA under the provisions of the Indian Wildlife (Protection) Act, 1972. There are no rights and concessions available inside the park.	The present legislation regarding NP does not facilitate "sharing of natural resources" with the local community. However, the park does allow harvesting of limited fodder and thatch material as part of habitat management practice.
Conservation within broader government policy	There is a Ministry at the Federal Level, Dept. of Forest at the State level. The Government of India has enacted several legislations for protecting environment, forest and wildlife. Besides this, Ministry of Tourism has also formulated policy and guidelines for management of tourism in the country.	There is a genuine apprehension that the economic consideration of agencies like tourism may undermine conservation values.
International conservation convention treaties	KNP is also a Ramsar site, also India is a signatory to CBD, CITES & WH Convention	No or very meagre funding support is available under International Conventions and treaties to which India is a signatory.
Government Support	Government's commitment to KNP as WH site is strong. Recently the MoEF through WII and ATREE is formulating a proposal for four WH sites in India including KNP.	Despite the fact that funds can be raised from international donors for this site, the complicated financial procedures may hamper the reach of these funds to the site.
National PA agency and the WH site	The high profile of KNP ensures support for conservation from national and state level agencies.	

3.0 PLANNING ASSESSMENT

3.1 Management Planning Assessment

List of planning documents for World Heritage Site :

Name of the plan	Year of preparation or most recent review	Level of approval of the plan (L, G, A, S/A, D)*	Year specified for the next review of the plan
Management Plan Keoladeo National Park, Bharatpur 2002- 2006	2002	G	2003 every two years subsequently

L= plan has force of law (usually has been approved by the Parliament or legal instrument)

G= plan has been approved at the government level but is not a legal instrument

A= plan has been approved at Head of Agency level

S/A= plan has been approved at a senior level within the Agency

D= plan is a draft and has not been formally approved.

Adequacy of Management Plan:

- Although the management objectives are clearly stated there is no section on "Desired Future Conditions" for the site. However, the PA managers do have a reasonably good understanding of it.
- Wetland dynamics is still not clearly understood and therefore management interventions are largely reactive in nature.
- Though stakeholders were not actively involved with plan preparation, PA managers have a good understanding of their needs and these have been addressed in the chapter on 'Ecodevelopment'.

- Although the plan lists research priorities and also states the areas that require regular monitoring , monitoring methodologies are not explicit and the monitoring protocols have not been stated.
- Budget lines are very clear but availability and timely allocation of funds cannot be always ensured.

NB: *In India's system of management planning, policy issues are generally not addressed in the management plan. Policies are developed at the federal & state level and within the ambit of these policies the management plan is prepared. Coordination with other line agencies/Dept is a major issue. At the district level there is a coordinating mechanism but forestry / wildlife issues do not find the desired importance. However, efforts are being made to improve and integrate the management plans in the regional planning process.*

GAPS

- Certain additional information on ecological parameters is needed to improve understanding and planning better management interventions.
- Appropriate system for mid course evaluation and monitoring is required.
- Stronger commitment for funds along with their timely release is needed.

RECOMMENDATIONS

- A section on "Desired Future Conditions" should be added during the management plan review process.
- Upfront stakeholder consultation should be ensured during the management plan review process.
- Inputs from the on-going research studies in the park should be taken into consideration during the management plan review process.

Adequacy of General Management Plan Data Sheet

Principle	Criteria	Assessment	Rating guidance (Very Good, Good, Fair, Poor)	Comments
Decision making framework	1. Plan establishes clear understanding of the desired future for the site (ie. describes the desired outcomes of management in terms that provides a guide to management and decision making by site managers)	**Fair**	VG – desired future is clearly and explicitly articulated as a decision making reference point G – desired future is clearly articulated F – desired future is not clearly articulated but is implied or can be inferred from plan objectives P – plan focuses more on present issues and actions and doesn't indicate a desired future for the site	Although the management objectives are clearly stated there is no section on "Desired Future Condition" for the site. Also there is no formal SWOT analysis done. The PA managers however have a good general understanding of SWOT.
	2. Plan provides sufficient guidance on the desired future for the site for it to act as a decision framework for addressing new issues and opportunities that arise during the life of the plan	**Fair**	VG – desired future is expressed in a way that provides clear guidance for addressing new issues and opportunities G – desired future is expressed in a way that focuses more on addressing current issues and opportunities F – desired future lacks clarity and does not provide an effective decision framework for the future P – plan focuses more on present issues and actions and doesn't indicate a desired future for the site	In order to clearly work out the desired future condition it is critical that a complete and comprehensive understanding of the wetland dynamics is achieved. There is need to synthesize available information on species habitat interaction and to plug in the gaps. The influence of land use changes around Keoladeo especially the role of satellite wetlands needs to be studied in greater detail.

Principle	Criteria	Assessment	Rating guidance (Very Good, Good, Fair, Poor)	Comments
	3. Plan provides for a process of monitoring, review and adjustment during the life of the plan.	**Fair**	VG – plan provides a clear, explicit and appropriate process for monitoring, review and adjustment G – provisions for monitoring, review and adjustment of the plan are present but are incomplete, unclear or inappropriate in some minor respects F – need for monitoring, review and adjustment is recognised but is not dealt with in any detail P – plan does not address the need for monitoring, review and adjustment	While approving the plan the Chief Wildlife Warden, Rajasthan has endorsed the need for conducting a review of the plan prescriptions on a periodic basis.
Planning context	1. Plan provides an adequate and appropriate policy environment for management of the World Heritage Area	**Not Applicable**	VG – Policy requirements for the site are identified and adequate and appropriate policies are established with clear linkages to the desired future for the site G – Policy requirements for the site are identified and policies are largely adequate and appropriate F – Policies in the plan are inadequate or incomplete in major respects P – Plan either doesn't establish policies for the area or the policies are inadequate or inappropriate in major respects	In India's system of management planning policy issues are not addressed in the management plan. Policies are developed at the federal & state level and within the ambit of these policies the management plan is developed.

Principle	Criteria	Assessment	Rating guidance (Very Good, Good, Fair, Poor)	Comments
	2. Plan is integrated /linked to other significant national/ regional/sectoral plans that influence management of the World Heritage Area	**Fair**	VG – Relevant national, regional and sectoral plans that affect the site are identified and specific provisions or mechanisms are included to provide for integration or linkage now and in the future G – Relevant national, regional and sectoral plans that affect the site are identified, their influence on the site is taken into account but there is little attempt at integration F – Some relevant national, regional and sectoral plans are identified but there is no attempt at integration P – No account is taken of other plans affecting the site	Coordination with other like agencies/Dept is a major issue. At the district level there is a coordinating mechanism but forestry / wildlife issues do not find the desired importance. However, efforts are being made to improve and integrate the management plans in the regional planning process.
Plan content	1. Plan is based on an adequate and relevant information base	**Good**	VG – The information base for the plan is adequate in scope and depth and is matched to the key decisions, policies and issues addressed in the plan G – The information base is adequate in scope and depth but may contain some irrelevant information (i.e. a broad compilation of data rather than matching information to the decisions, policies and issues addressed in the plan) F – The information base has inadequacies in scope or depth so that some issues, decisions or policies cannot be placed into context P – Very little information relevant to plan decisions is presented	There is no as such any "irrelevant" information in the plan, however, there is a scope to further increase the level of details required for understanding and managing the Wetland dynamics.

Principle	Criteria	Assessment	Rating guidance (Very Good, Good, Fair, Poor)	Comments
Plan content	2. Plan addresses the primary issues facing management of the World Heritage Area within the context of the desired future of the site	**Good**	VG – Plan identifies primary issues for the site and deals with them within the context of the desired future for the site (i.e. plan is outcome rather than issues driven) G – Plan identifies primary issues for the site but tends to deal with them in isolation or out of context of the desired future for the site F – Some significant issues for the site are not addressed in the plan or the issues are not adequately addressed P – Many significant issues are not addressed or are inadequately dealt with in the plan	Plan identifies main issue but as stated earlier the desired future conditions are assumed and not specifically stated.
	3. Objectives and actions specified in the plan represent an adequate and appropriate response to the issues	**Very Good**	VG – Objectives and actions are adequate and appropriate for all issues G – Objectives and actions are adequate and appropriate for most issues F – Objectives and actions are frequently inadequate or inappropriate P – Objectives and actions in the plan do not represent an adequate or appropriate response to the primary issues	Tourism, habitat restoration, and response to climate change are perhaps the main exceptions at the moment. Specific objectives have to be more clearly defined.

Principle	Criteria	Assessment	Rating guidance (Very Good, Good, Fair, Poor)	Comments
	4. Plan takes account of the needs and interests of local and indigenous people.	**Fair**	VG – Plan identifies the needs and interests of local and indigenous people and has taken these into account in decision making G – Plan identifies the needs and interests of local and indigenous people but it is not apparent that these have been into account in decision making F – There is limited attention given to the needs and interests of local and indigenous people and little account taken of these in decision making P – No apparent attention has been given to the needs and interests of local and indigenous people	Micro plans have been prepared for 11 villages in the park periphery however, these plans need to be revised and updated.
	5. Plan takes account of the needs and interests of stakeholders other than Government involved in the World Heritage Area	**Good**	VG – Plan identifies the needs and interests of other stakeholders and has taken these into account in decision making G – Plan identifies the needs and interests of other stakeholders but it is not apparent that these have been into account in decision making F – There is limited attention given to the needs and interests of other stakeholders and little account taken of these in decision making P – No apparent attention has been given to the needs and interests of other stakeholders	Keoladeo NP has been included as one of the 4 sites of the UNF-UNESCO project under which provisions have been made for meeting the needs of stakeholder.

Principle	Criteria	Assessment	Rating guidance (Very Good, Good, Fair, Poor)	Comments
Plan implementation	1. Plan provides adequate direction on management actions that should be undertaken in the World Heritage Area	**Good**	VG – Management actions specified in the plan can be clearly understood and provide a useful basis for developing works programs, budgets and other operational plans and programs G - Management actions specified in the plan can generally be clearly understood and provide an adequate basis for developing works programs, budgets and other operational plans and programs F – Management actions are sometimes unclear or lacking in specificity making it difficult to use the plan as a basis for developing works programs, budgets and other operational plans and programs P – Management actions are often unclear or lacking in specificity making it very difficult to use the plan as a basis for developing works programs, budgets and other operational plans and programs	The Plan provides adequate direction, and is used by PA management.
	2. Plan identifies the priorities amongst strategies and actions in a way that facilitates work programming and allocation of resources	**Very Good**	VG – Clear priorities are indicated within the plan in a way that supports work programming and allocation of resources G – Priorities are indicated but are sometimes unclear making their use for work programming and resource allocation more difficult F – Priorities are not clearly indicated but may be inferred P – There is no indication of priorities within the plan.	Plan provides strategies and prescriptions that facilitate the preparation of 'Annual Plan of Operation' and allocation of resources.

3.2 Design Assessment

Though it is a small area bound by a masonry wall on all sides, stress on biotic resources from the surrounding human settlements is high. The design of the PA is thus a strength as well as a weakness. The Keoladeo National Park is easily approachable as it is situated on the Jaipur-Agra Highway which forms part of the 'tourism golden triangle', owing to which it receives over 100,000 visitors every year. Small size and a good road network makes approach within the park easy and thus every part of the park is visited and therefore is influenced by tourism and other human activities. To manage the area it has been divided into three zones that are detailed in the management plan. These zones are:

i. **The Core Zone/ Bird Watching Zone:** the core zone consists of patches of wetlands, grasslands, woodland and scrubland. The zone comprises of whole of the park except the area demarcated as administrative cum tourist facility zone. The zone is managed for optimal ecological conditions.
ii. **Administrative cum tourist facility zone:** this zone consists of various offices, check posts, rest area, residential areas, rest house and the forest lodge.
iii. **Ecorestoration zone:** This zone consists of saline upland areas and also other areas invaded by *Prosopis juliflora* and *Lantana camara*. This zone overlaps with the core zone. These areas are to be restored to their original state by control of *Prosopis juliflora* and other weeds.

There are many satellite wetland areas that play a role in supporting the local migratory and the migratory species of birds. These areas have not been considered under any of the conventions viz., the WH convention and the Ramsar convention. The management plan too does not address this issue.

GAPS

- There is no mechanism to measure the effectiveness of the existing zonation system.
- Conservation compatible activities are presently inadequate in the satellite wetland areas.

RECOMMENDATIONS

- Undertake a review of the existing zonation system and implement appropriate zonation strategy to increase management effectiveness.
- Ensure the enhancement of conservation compatible activities in the satellite wetland areas by introducing the concept of co-management and by providing appropriate incentives to the local communities.

Design Assessment Data Sheet

Design aspect	Strengths of reserve design in relation to this aspect	Weaknesses of reserve design in relation to this aspect
A. Ecological integrity		
Key areas	Mosaic of habitats inside the NP helps in supporting high species diversity.	Refuge area/ satellite key resource are not in the WH site design.
Size	Small area has unique mosaic of habitats whose boundary is clearly defined.	Absence of buffer zone around the park makes PA vulnerable to all forms of biotic pressures.
External interactions	Presence of mosaic of habitat helps in limiting and controlling direct external interaction. Regulations & governance by allied departments helps in maintaining refuge areas.	Adjacent land use particularly subsistence agriculture, leads to increased dependency on the park resources mainly water and fodder often causing conflict.
Connectivity	Seeds of primary and secondary producers flow in with water inflow from watershed, particularly fish fry that sustain the heronry.	Seeds of certain weeds enter the same way.
B. Community well-being		
Key areas	Direct economic benefits through tourism, water and fodder availability.	There are no legal provisions for physical utilization of resources inside a NP.
Size	Small size provides easy accessibility for park managers to the villagers.	Occasionally crop damage by wild herbivores is high. Small size limits resource availability.
External interactions	Providing opportunities for multi cultural exchange due to influx of large number of foreign tourist.	Loss of cultural values.
Legal status	Stringent legal provisions provide high integrity to the park.	No resources sharing can be legally permitted within the NP.
C. Management factors		
Legal status	Legal status is clear which helps in better management.	No resource sharing possible.
Access points	Controlled few access points.	The large interface between PA & villages facilitates easy access at times by breaching of boundary wall.
Neighbours	The park has a well defined demarcation of boundary through a 5’ high stone masonry wall.	Deliberate breach of wall at many places to facilitate the entry of livestock defeats the purpose.

4.0 INPUT ASSESSMENT

4.1 Assessment of Management Needs

Staff Numbers

Senior-most Executive Officer managing the park is Deputy Chief Wildlife Warden stationed at Bharatpur. The other staff posted in the park are- Junior Research Officer 1, Wireless Operator 1, Forest Rangers 3, Foresters 6, Assistant Forester 2, Forest Guards 25, Drivers 5, Administrative staff 13; in addition the park employs about 60 people on daily wages for various purposes.

Staff Skills and Training and Amenities

The management plan lists themes identified for training; these include training in wildlife census techniques, wildlife health indicators, weapon training, legal aspects, monitoring methodology, interpretation skills, eco-restoration works, etc. The frontline staff in the park is largely untrained. Amenities provided to the staff are uniforms and patrolling kits etc.

Funds

Funds for management of the park are allotted by the State/ Central Government as per its priorities. The revenue collected in the park is deposited with the state treasury and therefore is not available for utilization at the site.

Budget and Allocation of Resources

Clear budget lines have been drawn in the management plan and estimates are annually submitted to the state government for allocation of funds. However the actual release of funds varies from year to year.

Equipment and Infrastructure

Equipment and infrastructure of the park includes 5 vehicles, fire arms, wireless network, boats, computers and generators. There is urgent requirement for fire fighting equipment, construction of watch towers/ machans etc.

GAPS

- Opportunities for systematic capacity building of the frontline staff are inadequate.
- Maintenance budgets for park infrastructure is inadequate.
- Mechanism for "ploughing back" of revenues generated from tourism is absent.
- There is always an uncertainty regarding the actual quantum of funds received by the park.

RECOMMENDATIONS

- Ensure that a comprehensive capacity building plan for the front line staff is put in place within a two-year period.
- Prepare a concept paper on "sharing of revenues" within a one year period.
- Organize study tours for the PA staff to other prominent wetlands in the country to enhance their skills and understanding.

Expenditure Budgets

	Estimated Budget 2002 – 03 (in Indian Rupees)	**Actual expenditure 2002 – 03 (in Indian Rupees)**
Administrative Cost	83.55 lakhs	80 lakhs
Habitat improvement	16.85 lakhs	35.50 lakhs
Protection	29.20 lakhs	17.00 lakhs
Tourism	51.30 lakhs	14.75 lakhs
Ecodevelpoment	13.10 lakhs	0.50 lakhs
Research & Monitoring	8.20 lakhs	0.50 lakhs

Keoladeo National Park, 2002 – 2003 NB : Indian Rupees one lakhs = US $ 2200
Revenue from Tourism : 44 lakhs

4.2 Rating System for Process Indicators

Though the management process are adequate for the ecological management of the WH site, infrastructure and better facilities are required for tourism management. The issues relating to law enforcement, resource management, sustainable production, management interventions, access and use of PA, economic benefits to local communities are being managed at effectiveness levels of more than 60% but the issues relating to tourism management have effectiveness levels of less than 35%, these need improvement.

Rating System for Process Indicators Worksheet

Issue	Criteria	Rating
1. Legislation	Problems with legislation or regulations are not a barrier to achieving management objectives	2
2. Law enforcement	Law enforcement capacity is excellent	3
3. Planning	An approved management plan exits and is being implemented	3
Additional Points	The planning process allows adequate opportunity for adjacent landholders and other stakeholder to influence the plan	+1
	There is an established schedule and process for □mplemen review of the management plan	+1
	Annual work programs and budgets are based on the provisions of the management plan	+1
4. Resource Inventory	Information concerning natural/cultural resources is sufficient to support most or all areas of planning and decision making.	3

5. Resource management	Requirements for active management of natural cultural resources are being fully or substantially addressed	3
6. Maintenance	Most equipment/facilities are regularly maintained	2
7. Neighbours	There is regular contact between managers and neighbours but limited coopeation on issues of mutual concern	2
Additional points	Programs to enhance local community welfare while conserving protected area resources are being implemented	+1
8. Economic benefits to local communities	There is a major flow of economic benefits to local communities from the existence of the protected area and a significant proportion of this derives from activities on the park (e.g. employment of locals, locally operated commercial tours etc.)	3
9. Communication	There is a planned communication program that is being used to build support for the protected area amongst relevant stakeholders but implementation is limited	2
10. Management systems	Problems with management systems partially constrain management effectiveness	1
Additional points	There is a structured process for developing and allocating annual budgets for the area There are adequate systems for financial management and control, record keeping and retrieval	+1 +1
11. Control over access /use for the Protected Area	Protection systems are moderately effective in controlling access or use of the reserve in accordance with designated objectives	2
12. Resident communities and/or traditional landowners	Resident communities and/or traditional owners directly contribute to decision making in some areas	2

Additional points	Programs to enhance local community welfare while conserving protected area resources are being □mplemented Where permitted, harvesting of natural resources by local people is undertaken in a sustainable manner	+1 +1
13. Visitor opportunities	Consideration has been given to the provision of visitor opportunities in terms of access to areas of the park or the diversity of available experiences. Policies and programs to enhance visitor opportunities have been implemented	2
14. Visitors	Visitor facilities and services are inadequate (either do not meet the needs of some visitor use is damaging resources)	1
15. Commercial tourism	There is contact between managers and tourism operators but this is largely confined to administrative or regulatory matters	1
16. Management intervention	Management interventions required to maintain protected area resources are known but are not being fully implemented	2
17. Control of land uses and activities	Mechanisms for controlling inappropriate land use and activities exist and are being effectively implemented	3
18. Sustainable production	Production activities in the area are being conducted in a wholly sustainable manner	3
19. Regional and national development	Production activities in the area are contributing significantly to national development	3

Process Assessment Summary Table

Main Issues	Maximum score	Current score	Effectiveness (percentage)
Legislation	3	2	66.6%
Law enforcement	3	3	100%
Planning	6	6	100%
Resource inventory	3	2	66.6%
Resource management	3	3	100%
Maintenance	3	2	66.6%
Neighbours	5	3	60%
Economics benefits to local communities	3	3	100%
Communication	3	2	66.6%
Management system	6	3	50%
Control over access/use of the protected area	3	2	66.6%
Resident communities and/or traditional landowners	6	4	66.6%
Visitors opportunities	3	2	66.6%
Visitors	3	1	33.3%
Commercial tourism	3	1	33%
Management intervention	3	2	66.6%
Control of land uses and activities	3	3	100%
Sustainable production	3	3	100%
Regional and national development	3	3	100%

5.0 OUTPUT ASSESSMENT

5.1 Management Plan Implementation Assessment

Current System of Assessing Implementation of Management Plan

At present a formal system of assessing the implementation of management plan is not in place, however at the time of review of the management plan the extent of implementation in previous years will be taken into consideration. The management actions are grouped as follows:

- Vegetation management
- Water management
- Protection: general and fire protection
- Tourism management
- Ecodevelopment
- Monitoring and research

Of these, in the reporting period (i.e., 2002-2003), management focus has been on water management as the region was facing extreme drought conditions. Further, as the wetlands remained dry, there was invasion of *Prosopis juliflora* in the wetland areas. Most of the management interventions were focused on controlling these factors. Many of the ecodevelopment and research – monitoring activities could not be adequately implemented during this drought period. However, annual terrestrial animal census was carried out.

Management Interventions in Keoladeo National Park to combat unprecedented drought during 2002-2003

Summary Assessment of Current Management Plan Implementation

Criteria habitat management	Score action wise	Max score	Current score	%
Veg. Management (9 actions)	1, 2, 3, 4, 5, 6, 7, 8, 9 4, NR, NR, 4, 0, 3, NR, NR, NR	20	11	55%
Water management (10 actions)	NA, 4, 4, 4, 0, NR, NR, 4, 4, 4	28	24	85.68%
Protection General (14 actions) Fire protection (6 actions)	3, 2, 0, 4, 2, 4, 4, 4, 4, 0, 3, 3, 0, 0 4, 0, NR, NR, NR, 3	56	33	58.74%
Tourism facilities (22 actions)	NR, 4, NR, 0, NA, NR, NR, NR, 0, 0, 4, 4, 4, 3 0, NA, 0, NA, NA, 3, 4, 2	52	28	69.3%
Ecodevelopment (14 action)	0, 0, 3, 0, 0, 0, 0, 3, 0, 0, 0, 0, 0, 0	56	6	10.71%
Monitoring & Research (8 actions)	0, 0, 4, 0, 2, 0, 0	32	6	18.75%

Note:

Status	**Ranking**
Action has been completed	4
Action has made substantial Progress	3
Some work has commenced in all or some areas	2
Work is only reactive	1
Action not commenced	0
Not Required	NR
Not Applicable	NA

5.2 Work/ Site Output Indicators

Outputs in this section have been taken into consideration in relation to the actions as planned for the previous year according to the management plan. Though there is no formal system of reporting on the actions taken but these are evaluated at the time of review of management plan. For the purpose of assessing management effectiveness here the inputs have been taken from the PA manager. Some of the unplanned activities like deepening of the main canal, creation of additional water source etc. were carried out as it was a year of unprecedented drought.

Output Indicator Data Sheet

Parameter	Planned	Actual achievement	Remarks
Replacement of fallen trees by new sowing & planting for heronry management	80 Man-days of labour to be engaged for sowing	80 Man-days of labour employed	
Removal of *Prosopis juliflora*	Planned over the wetland area of 10 km^2	Completed over 7.5 km^2	*Prosopis juliflora* from canal bunds, path ways and grass lands were also removed
Deepening of main canal and secondary canal	Not planned		The activity was undertaken as it was drought year
Creation of water source	-do-	2 deep bore wells	-do-
Upkeeps of roads	20 km networks of roads	12 km of road repair has been undertaken	Only selected roads were taken up because of low tourist influx.
Raising & repairing of wall	100 cmt. of repair work	100 cmt. of repair work completed	

Purchase of wireless sets	Purchase of 11 fixed, 4 handsets to be planned	11 fixed, 4 handsets purchased	
Replacement of vehicle	1 transport unit to be replaced	1 transport unit purchased	
Translocation of feral/domestic cattle	400 cattle	1500 translocated	
Creation and upkeep of fire lines	Approx. 20 km planned	20 km achieved	
Black topping of road	Approx. 5 km planned	5 km completed	
Creations of nature trails	5 km planned	Not achieved	
Training and nature camps	3 nature camps, training for staff & locals	6 nature camps & staff training undertaken	
Publication for publicity	Resource material planned	Resource material distributed on specific events	
Promotion of non conventional energy recourses	10 units of biogas 25 LPG subsidised connection	5 units of biogas established 25 LPG subsidy distributed	
Development of village roads	8 km proposed	800 m completed	
Annual census	Planned	Successfully conducted	

6.0 OUTCOMES ASSESSMENT

6.1 Biodiversity Health Assessment

Focal management objective is to maintain the ecological characteristics of the PA as it is the mosaic of habitats that supports wide biodiversity. Many factors affect the ecological integrity of the park. These stresses have been enumerated in the section on "context review". It may be noted that though indicators have been identified and for most an acceptable range has been defined, it may require further study/ research for its scientific accuracy. Similarly, the monitoring indicators that are to be used for measurement need to be established in the park. Presently these are planned and are not being monitored except the heronry count.

The Monitoring plan template has been drawn extensively and is complete with regard to identification of monitoring parameters and the monitoring agency. The infrastructure and the system is not yet in place.

Biodiversity health as per the present assessment is shown to be poor. The assessment was carried out under conditions of severe drought and therefore it should not be taken as indicator of biodiversity health for normal rainfall years.

GAPS

- There is a lack of information on many ecological parameters used in this analysis
- Precise information on the acceptable range of variation/ acceptable state is currently unavailable
- Specific monitoring indicators and their measurement methods are not adequately understood

RECOMMENDATIONS

- Obtain inputs from scientific institutions / individuals for determining the acceptable range of variation/ acceptable state
- Setup mechanism for Long Term Ecological Monitoring (LTEM) for the Keoladeo wetland and adjoining catchment
- Repeat the biodiversity health assessment in 2003-2004 as the year 2002-2003 was characterized by unprecedented drought, which severely influenced the biodiversity values.

Biodiversity Health Outcomes Data Sheets

Focal Management Target: Heronry

	Key factor	**[Acceptable Range of Variation or Acceptable State (describe)]** **Indicators of key changes to the Focal Management Target**	**Monitoring Indicator Used for Measurement**	**Within its acceptable range of Variation? (y/n)**	**Restorable? (y/n)**	**Meets preferred status? (y/n)**	**Overall Biodiversity Health Rank**
Size	No. of species (their abundance level)	15 sp. & above	No. of species No of nest per species & nesting success (no. of chicks counted in October)	No (acute drought)	Y	N	Poor (chronic failure of monsoon)
Landscape	Monsoon stimulation for breeding of aquatic fauna and ani fauna	Good & timely monsoon	Meteorological data	N	Y	N	Poor
Condition	Availability of nesting habitat particularly *Accacia & Mitragyna*	Firm, green, well branched trees	Abundance of trees	Y	Y	Y	Good

Focal Management Target: Managements of wetlands & arresting ecological succession

	Key factor	[Acceptable Range of Variation or Acceptable State (describe)] Indicators of key changes to the Focal Management Target	Monitoring Indicator Used for Measurement	Within its acceptable range of Variation? (y/n)	Restorable? (y/n)	Meets preferred status? (y/n)	Overall Biodiversity Health Rank
Size	Area of wetland	10 km^2	Extent of wetland area	N	Y	N	Poor
	Species diversity		Species diversity abundance of water found species, abundance of terrestrial species	N	Y	N	Poor
Condition	Optimum water depth in all wetland blocks	45 – 150 cm	Water levels	N	Y	N	Poor
	Amount of residual biomass	To be defined	Physico chemical characteristics of water	Y	Y	Y	Good

	Key factor	[Acceptable Range of Variation or Acceptable State (describe)] Indicators of key changes to the Focal Management Target	Monitoring Indicator Used for Measurement	Within its acceptable range of Variation? (y/n)	Restorable? (y/n)	Meets preferred status? (y/n)	Overall Biodiversity Health Rank
	Succession due to fire	Existing vegetation type & spread	Species abundance & vegetation	Y	Y	Y	Good
	Healthy population of fish fry		No of piscivorous birds, no. of species	Y	Y	Y	Good
	Seed dispersal	Limited dispersal of seeds of a *A. nilotica & P. juliflora*	Sprouting of seeds	N	Y	N	Poor
Landscape Context	Extent of open water area	50% of wetland area	Species abundance	N	Y	N	Poor

Biodiversity Health Summary for Keoladeo National Park

Focal Management Target	Size rating	Condition rating	Landscape context rating	Overall Biodiversity Health Rating
Heronry	Poor	Good	Poor	Poor
Management of wetland & ecological succession	Poor	Fair	Poor	Poor

Monitoring Plan Template

Focal Management Target	Indicator to be Measured	Key Factor / Biodiversity Health Category Informed	Methods to be Employed	Frequency	Timing	Who will Measure	Cost	Funding Source
Heronry	No. of species	Species abundance	Direct count	Monthly count from July through October	Any time of day	Park staff & volunteers	Included in administrative cost	State / Central Government
	Nesting success	Annual recruitment					-do-	-do-
	Meteorological data	Conditions suitable for nesting	Standard methodology	Everyday		Park administration & Researchers	-do-	-do-
	Abundance of trees	-do	Ocular observation for abundance of mounds	Once a year	Any time in July	Park staff	-do-	-do-
Terrestrial habitats	Extent of wetland area	Extent & stage of succession	Ocular estimation of vegetation	Once a year	Draw down phase	Park staff	-do-	-do-

Focal Management Target	Indicator to be Measured	Key Factor / Biodiversity Health Category Informed	Methods to be Employed	Frequency	Timing	Who will Measure	Cost	Funding Source
Management of wetlands arrest of ecological succession	Species diversity	Bio diversity	Various census & transect & water hole count in dry seasons	Once a year	Draw down phase	Park staff, external agencies	3 lakhs	State & central govt.
	Water levels	Mosaic of wetlands	Direct measurement	July – march	Park staff & researchers			-do-
	Physico chemical characteristics of water	Entrophication, productivity	Water analysis	Weekly from July to march	Any time	Researchers	2 lakhs	-do-
	Species abundance & regeneration	Recruitment	Vegetation mapping	Quarterly after monsoon	Any time	Park staff & external agency		-do-
	No of piscivorous birds, no of species	Healthy population of fish fry	Bird count	July – March every fort night	Any time	Park staff & volunteers		-do-
	Sprouting of seeds	Ecological seral stages	Random sampling	Once during July – August	Any time	Park staff& volunteers		-do-
	Species abundance of aquatic vegetation	Wetland type & diversity	Satellite imagery	September and May	Researchers	Park staff & volunteers	4 lakhs	-do-

6.2 Assessment of Threat Status

Current Threats

Stress and threats are those factors that adversely affect the ecological characteristics of the area and interfere with conservation of biodiversity. The identified stresses are

i. Shortage of water
ii. Availability of feed in the form of fish fry for the heronry species
iii. Contamination of water with pesticides etc.
iv. Disturbance from tourism
v. Invasive species
vi. Fire
vii. Sedimentation
viii. Competition among species

Potential Threats

Potential threats identified are:

i. Increasing unregulated tourism
ii. Increasing biotic pressure

These have been discussed in the section on “context review” and have been analysed in detail with reference to focal management targets and have been ranked along with their sources in the following section.

Ranking Stresses and Sources of Stresses data. SHEET 1
FMT: Heronry

	Stress1 Shortage of water		**Stress 2 Availability of Feed**		**Stress 3 Contamination of water**		**Stress 4 Disturbance from tourism**		**Overall threat to target rank**
Stress Rank	**Rank: Very High**		**Rank: Very High**		**Rank: High**		**Rank: Medium**		
Source of Stress	Source contribution Rank	Stress source rank	Source contribution rank	Stress source rank	Source contribution rank	Stress source rank	Source contribution rank	Stress source rank	
Source 1 Erratic Rainfall	Very High	Very High	Very High	Very High			Nil	Nil	Very High
Source 2 Timely availability of Water	Very High	Very High	Very High	Very High	nil	nil	Nil	Nil	Very High
Source 3 Agricultural practise land use pattern	Nil	Nil		Nil	Very High	Very High	Nil	Nil	Very High
Source 4 Aquatic weeds	Nil	Nil	Very High	Very High	Nil	Nil	Nil	Nil	Very High
Source 5 Increased tourist traffic and villagers coming in the park	Nil	Nil	Nil	Nil	Nil	Nil	Medium		Medium

Ranking Stress and Sources of Stresses Data Sheet SHEET:2

FMT : Management of Wetland & Arrest of Ecological Succession

	Stress 1. Water availability on time		**Stress 2 Invasive Species**		**Stress 3 Fire**		**Stress 4 Sedimentation**		**Stress 5 Competition for biotic resources**		**Overall rank**
	Rank: Very High		**Rank: Very High**		**Rank: Medium**		**Rank: Low**		**Rank: Medium**		
	Source contribution Ranking	Stress source rank	Source contribution Ranking	Stress source rank	Source contribution Ranking	Stress source rank	Source contribution Ranking	Stress source rank	Source contribution Ranking	Stress source rank	
Source 1 Erratic Rainfall	Very High	Very High									Very High
Source 2	Very High	Very High									Very High
Source 3 Interference with Water flow regime	Very High	Very High	High	High			High	Medium			Very High
Source 4 Seed dispersal			High	High					High	Medium	High
Source 5. Man Made Fires					Medium	Medium	Very High	Medium			Medium
Source 6 Illegal entry of cattle									Very High	High	High

Ranking Stress and Sources of Stresses Data Sheet. SHEET 3.

FMT: Ecotourism

	STRESS 1. Recurrent Drought		**Stress 2 Reduction in habitat**		**Stress 3 Travel externalities**		**Overall rank**
	Rank: Very High		**Rank: High**		**Rank: Very High**		
Source of Stress	Source contribution rank	Stress source rank					
Source 1 Erractic rainfall	Very High	Very High	Very High	Very High			Very High
Source 2 Sedimentation, Competition amongst species			Very High	Very High			Very High
Source 3 Regional, National, International events					Very High	Very High	Very High

Ranking Stress and Sources of Stresses Data Sheet. SHEET 4.

FMT: Ecodevelopment

	STRESS 1 **Competition for biotic resources**		**STRESS 2** **Lack of Funds**		**Overall rank**
	Rank: Very High		**Rank: High**		
Source 1. Requirement of fodder, fuel wood	Very High	Very High			Very High
Source 2. Absence of revenue sharing guidelines			High	High	High

Current Threat-to-Target Summary Table

Sources of Current Threats	**Heronry**	**Mgmt. of wetland and arrest of ecological succession**	**Ecotourism**	**Ecodevelopment**	**Overall Threat Rank to Targets and Site**
Erratic rainfall	Very high	Very high	Very high		Very high
Timely availability of water	Very high				Very high
Land use pattern in watershed area		Very high	Low		Medium
Aquatic weeds	High	Very high			Very high
Sedimentation, invasive species, competition amongst species	High	Very high	Medium		High
Regional, national and international events			Very high		Very high
Requirement of fodder and fuelwood				Very high	Very high
Absence of revenue sharing guidelines				Very high	Very high

Identification and Ranking of Potential Threats Worksheet

FMT: Heronry		**FMT: Habitat**		**FMT: Eco tourism**		**FMT: Eco Development**	
Potential threat	Rank	Potential threat	Rank	Potential threat	Rank	Potential threat	
Decreasing water supply	Very High	Catchment area degradation Increasing biotic pressure Medium	Very High Very High	Increasing, unregulated tourism	Medium	Lack of Funds	High

6.3 Achievement of Management Objectives

Achievement of Management Objectives Assessment : Data Sheet 1

Plan Objective: To maintain the ecological seral stages of this ecosystem, for avifaunal diversity in particular and other in general.

Plan Outcomes: (Not defined in plan) Biodiversity Conservation

Performance Assessment	Performance Indicators	Data and methods of collection.
Aquatic Habitat	Water quantity Water quality Wetland area & extent Heronry Waterfowl species richness	Direct measurement Water analysis Survey Heronry count, nest count, nesting success Waterfowl count
Terrestrial Habitat	Vegetation quantification and mapping Extent of area under different vegetation communities Population dynamics	Sample plots Vegetation mapping Census

Achievement of Management Objectives Assessment : Data Sheet 2

Plan objective: To provide an enriching wilderness experience and visitors satisfaction through conservation education and wildlife interpretation programes.

Plan outcomes: Enhanced recreational, educational & wilderness experience.

Performance Assessment	**Performance Indicator**	**Data and Methods of collection**
Opportunities provided and created to enhance recreational, educational and wilderness experience.	Satisfaction level of visitors	Interviews Question survey
Economic benefits to local community involved in Ecotourism	Income/ standard of living	-do-, Socio economic surveys
Education and awareness programmes	Number of school students participating in programmes Awareness level	Surveys

Achievement of Management Objectives Assessment : Data Sheet 3

Plan objectives: To provide site specific, eco friendly package of measures to reduce dependence of local communities on protected area resources and provide alternate livelihood option.

Plan outcomes: Reduced dependence.

Performance Assessment	**Performance Indicator**	**Data & methods of collection**
Dependency on park resources	Dependency level	Survey & Interviews.
Alternate livelihood option created	Options	-do-

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monitoring and managing for success in natural world heritage sites

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