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MISSION REPORT / RAPPORT DE MISSION

Keoladeo National Park (India) (340) / Parc national Keoladeo (Inde) (340)

10-16 March, 2008 / 10-16 mars, 2008

This mission report should be read in conjunction with Document:
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☐ WHC-07/31.COM/7B.Add

REPORT ON THE UNESCO-IUCN MISSION TO KEOLADEO NATIONAL PARK, INDIA
FROM 10 TO 16 March, 2008



Keoladeo National Park, 12 March 2008

A drying pool with wintering Bar-headed Geese, migrant sandpipers
and potentially breeding egrets

Ram Boojh (UNESCO)
Marc Patry (UNESCO World Heritage Centre)
Mike Smart (IUCN)

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EXECUTIVE SUMMARY AND LIST OF RECOMMENDATIONS

The state of conservation of the Keoladeo National Park (KNP) was reviewed by the World Heritage Committee in 2004, and 2005 (Decision 29 COM 7B.8). A World Heritage mission visited the Park from 29-30 March 2005, and recommended: (a) the release of a minimum of 350 MCft (million cubic feet) of water from the Ajan Dam; (b) the collection of data making it possible to monitor the changes in ecological character, notably the extent of wetland habitat and the numbers and diversity of wintering and nesting birds; and (c) finding of a solution to the problem of feral cattle grazing within the park. The situation was further reviewed by the Committee in 2006 (Decision 30 COM 7B. 13) and 2007 (Decision 31 COM 7B.17).

Following a report submitted by the State Party in January 2008, another mission visited the site in March 2008. This mission was advised that the desirable annual inflow of water was 550 rather than 350 MCft. It found that the situation had actually worsened since 2005, mainly because, after a good monsoon in 2005 which allowed adequate amounts of water to be released into the Park, the monsoons of 2006 and 2007 had failed almost completely in the Bharatpur area. As a result, there had been no little or no supply of water to feed wetland habitats in the Park in 2006 and 2007, resulting in low numbers of both breeding and wintering water birds; worse, these dry conditions had allowed the thorny scrub *Prosopis* to invade both wetland and grassland areas of the Park, rendering extensive areas of the Park inaccessible for birds and other wildlife, and crowding out indigenous vegetation.

In the meantime, the Government of Rajasthan State has decided upon (and found finance for) a series of remedial measures, involving both repairs to existing hydraulic structures and design of new structures which will provide fresh sources of water and protect the Park from future failures of the monsoon. Hydraulic structures around the Ajan Dam have been repaired, and a new water control structure and drain, linking the dam to the Park's wetland areas (the Chiksana Canal) have been excavated and are fully operational. A normal monsoon in June/July 2008 would provide enough organic water (i.e. water carrying fish, insects and vegetable matter) through this canal to fill the Park again. As a supplement in the case of another inadequate monsoon, a new supply of water is being tapped; this is the Govardhan Drain, which normally carries excess organic water to the Yamuna river; a diversion of water from this Drain will provide up to 350 MCft of the 550 MCft required annually. Engineering work on the diversion was to begin in March 2008, and it was hoped that the diversion would become operational in time for the 2008 monsoon. An additional source of water is the Dholpur-Bharatpur water supply project, to be completed in 2009; this project will supply drinking water to Bharatpur, but water from this source (310 MCft for the first four years, then 62.5 MCft per annum) has been earmarked for the Park; although this will be treated rather than organic water, it can be mixed with organic water to provide supplies for the Park.

The problem of invasive *Prosopis* scrub has been dealt with in an imaginative way, by enabling local villagers to remove the wood and to use it for firewood as wooden posts. This operation has had the additional benefit of improving relations – often strained in the past – between the park administration and local villages. While some feral domestic cattle still graze in the Park, this seems to be a less urgent issue than in the past.

The mission considers that the two most urgent threats to the conservation status of the Park are the deficit in water supplies, and the problem of invasive plant species. Its principal recommendations therefore address these topics: the first recommendation emphasizes the importance of water supply, commends the State Party and the Rajasthan authorities for planning and funding the water supply projects and requests them to inform the World Heritage Committee of progress; the second recommendation recognises the important effort in controlling *Prosopis* and calls on the relevant authorities to maintain this control in future, and also to control invasive water plants such as *Eichhornia* or *Paspalum* which may occur with the restoration of water supplies.

The mission also makes recommendations on three other issues. It welcomes the increasingly close relations between the KNP authorities and the local communities, and suggests that more formal structures be developed to allow local stakeholders to comment on and contribute to management of the Park. It echoes the previous mission's call for better monitoring, notably of water bird numbers,

and requests that data collected on this issue be fed into international overviews. Finally, the mission draws attention to the continuing influx of tourists and suggests that further investment on park infrastructure is necessary, while suggesting a linkage in marketing terms between this natural World Heritage site and neighbouring cultural sites such as the Taj Mahal.

BACKGROUND

Keoladeo National Park (KNP) became a natural property on the World Heritage list in 1985. It covers some 2,873 hectares near the City of Bharatpur in the State of Rajasthan. It is situated in the Indus-Ganges Monsoon Forest Biogeographical Province, and is basically a natural depression (or jheel), which receives water in the monsoon period (from June to September) through a series of artificial dams and bunds, notably the Ajan Dam or Ajan Bundh), a 3,270 hectare impoundment, about a kilometre from Keoladeo; the wetland area of the park covers about 1,100 hectares and is surrounded by an area of grasslands and scrub forest, which add to the diversity of the area.

It is particularly worthy of note that Keoladeo, the only World Heritage site in the State of Rajasthan, is situated in a group of four World Heritage sites, all situated within a circle of about 30 kms radius; the other three, in the neighbouring State of Uttar Pradesh, are cultural properties: the Red Fort at Agra, the Taj Mahal and Fatehpur Sikri, all monuments of the height of Mogul power; Keoladeo provides a fitting natural complement to these historic sites.

Local tradition claims that Bharatpur was named after Bharat, the brother of Lord Rama of Ayodhya, whose brother Laxman was worshipped as the family deity by the rulers of the Matsya Kingdom in the 5th century B.C. The wetland had its origins sometime between 1726 and 1763, when the Ajan Dam was built by the then Maharaja, Suraj Mal. From about 1899, the site was developed into a duck-shooting reserve by Prince Harbhanji, who was at that time Administrator of Bharatpur, and in the early years of the 20th century received many parties of distinguished hunters whose duck bags were recorded on stone panels inside the area, which still survive today. The Maharajah of Bharatpur handed the site over to the State of Rajasthan in 1956. It is administered by the Forest Department of the State of Rajasthan, and receives large numbers of paying visitors, of the order of 100,000 per annum. It was notified first as a Bird Sanctuary, then as a Protected Forest in 1967. In 1981 it became one of India's first two Ramsar sites (though, as noted by the Secretary of the Ministry of Environment and Forests of the Government of India, it is currently included on the Ramsar "Montreux Record"), and in 1982 was upgraded to the status of a National Park; this change of status to National Park prohibited grazing and wood-cutting activities, previously carried out in the site by local people. As a result there has in the past been some friction between the local people and the Forest Department, with even some armed confrontations in the 1980s.

The original nomination document (prepared with the help of IUCN's experts following a site visit in February 1985, and using data collected among others by the Bombay Natural History Society and the famous ornithologist Dr Salim Ali) does not include a precise statement of Outstanding Universal Value (which was not required under the Operational Guidelines at that time), but justifies inclusion on the World Heritage List as a Natural Property under natural criterion (x) - originally criterion N (iv) – as a habitat of rare and endangered species, noting "The park is a wetland of international importance for migratory waterfowl. It is the wintering ground for the rare Siberian Crane and is habitat for large numbers of resident nesting birds." An impressive total of at least 360 species of birds has been recorded in the park, though no data on monitoring of bird diversity and abundance in recent years were made available to the mission.

It is clear that the principal interest of the site lies in its populations of water birds, which adapt to seasonal rainfall and flooding conditions. Immediately after the onset of the monsoon, the site is occupied by large breeding colonies of waterbirds from the Indo-Malayan Realm (essentially herons, storks, spoonbills and ibises) which breed in the trees and bushes of the reserve, feeding on the large fish that are carried into the reserve by the monsoon waters; the period when this breeding activity is completed (towards September-October) coincides with the arrival, from north of the Himalayas, of large numbers of water birds (ducks, geese and waders) from the Palaearctic Realm, which have bred in the far north (essentially Russia) and come to escape the cold northern winters in warmer latitudes; the following spring, when the waters have almost disappeared through evaporation, these

species return to their breeding grounds, and the whole cycle recommences with the next monsoon. In addition, the area provides nesting places for a wide variety of typical forest and scrub birds of the Indo-Malayan Realm.

Recent developments

This whole (largely man-made) site is dependent for survival on a regular supply of monsoon water. For the birds to feed and nest, open conditions are required, with control of invasive vegetation, both water plants and invasive forest species, either of which could cover the open ground with vegetation. Thus there is need for careful management of vegetation throughout the site.

For a period of at least ten to fifteen years, changes in the character of the site have been noted, most strikingly through a decrease in the numbers and variety of water birds, often an effective indicator of ecological change. The most obvious change was the decrease and eventual disappearance of the wintering groups of Siberian Crane *Grus leucogeranus*, Keoladeo's flagship species (though it should be noted that Sarus Crane *Grus antigone* still occurs in numbers and was observed by the mission). In the 1980s up to 40 individuals of the spectacular all-white Siberian Crane used to winter in the park; at that time, this was considered to represent practically the whole of the world population of this Critically Endangered species, which bred in northern central Russia, then migrated south through Afghanistan to winter in Keoladeo. Such a tiny world population of so spectacular a bird was clearly an appropriate candidate for active conservation measures. Since the 1980s however, the numbers at Keoladeo have continued to decrease, and no wild birds have been recorded there since 2002. Different reasons for this decrease have been adduced: on one hand the species migrates southward in autumn, then back northward in spring, through areas, notably in Afghanistan, where crane hunting is a tradition and where, in a troubled security situation, little positive conservation is possible; on the other hand, the decrease in grazing by buffaloes of the flora (notably the invasive *Paspalum*) at Bharatpur may have decreased available food resources for the cranes (though it can reasonably be argued that if food resources at Bharatpur had become inadequate for Siberian Cranes, they could easily have relocated to other wintering grounds in the immediate vicinity).

It seems unlikely that the Siberian Crane will ever return naturally to Bharatpur, but the story is not however entirely bleak: another very small group of half a dozen Siberian Cranes, from the same population that breeds in northern Central Russia, is now known to winter near the Caspian in northern Iran (and to migrate along the western Caspian, thus avoiding the overflight of Afghanistan). More important for the future of the species, a completely separate population, numbering several thousand individuals, which breeds in northeastern Russia and winters in China (notably at Poyang Lake) was discovered in the late 1980s.

While the loss of the flagship species has grabbed the headlines, other water birds have also suffered at Bharatpur, mainly because of the decrease in available water resources, caused by a series of failures of the monsoon in the Bharatpur area (see Appendix 2). This has limited not only the fish that constitute the main prey of the breeding storks and herons in summer, but also the wetland vegetation and invertebrates that constitute the main food for the wintering ducks, geese and waders.

The World Heritage Centre has been informed of the degradation in ecological conditions at the Keoladeo World Heritage site, and has expressed its concern in the following manner:

- During 2004 the World Heritage Centre received "many reports about the threats facing Keoladeo National Park as a result of river water not being released to maintain the wetland ecosystem". A two day WH mission was as a result organised to Keoladeo in March 2005, and noted that the issue had attracted wide media attention in India.
- Based on the recommendations of this mission, the World Heritage Committee at its 29th meeting in 2005 in Decision 29 COM 7B.8 expressed serious concern over the current situation, recommending that the State Party (the Union Government of India) prevail upon the State Government of Rajasthan to ensure that the required quantity of water is released to the KNP from the Panchana Dam and that the necessary repairs be carried out to the Ghana Canal which carries water from the Ajan Dam to the Park. It further requested the state party to submit a comprehensive report to the WHC by February 2006.

At its 2006 meeting, the WH Committee, in Decision 30 COM 7B.13:

- (i) noted that the 2005 monsoon had improved the situation
- (ii) urged the State Party to implement long term measures for the water problem
- (iii) called on the international donor community to provide further financial and technical support
- (iv) and requested a further comprehensive report by February 2007.

In 2007, the WH Committee in Decision 31 COM 7B.17:

- (i) requested the State Party to invite a joint World Heritage/IUCN mission in 2008, to “assess the state of conservation, in particular, progress made in addressing water management and other recommendations made by the 2005 monitoring mission”
- (ii) and requested the State Party to provide the WH Centre by February 2008 “with a detailed report on the state of conservation of the property, and in particular on the progress made in resolving the water scarcity situation and indicating when the long-term measures being implemented will be completed, on controlling invasive species and furnishing time-series monitoring data on the species diversity and populations of water birds, for examination by the committee at its 32nd session in 2008”.

The Permanent Representative of India to UNESCO did indeed, under cover of a letter to the Director of the World Heritage Centre, dated 20 January 2008, submit a “State of Conservation report of Keoladeo National Park”. This report noted that:

- a WHC/IUCN mission was scheduled to visit the park in March 2008;
- that three schemes had been prepared by the State Government of Rajasthan to meet the water scarcity problem, viz: the Chiksana Canal Project; the Govardhan Canal Project; and the Dholpur-Bharatpur Chambal drinking water project;
- that invasion of *Prosopis juliflora* had posed a serious problem to the fragile ecosystem, but that the park management had taken up the challenge of motivating the villagers to uproot the trees; and
- that, while numbers of migratory birds visiting the park in the current year had definitely decreased because of water shortages, numbers of human visitors to the park and the revenue they generated had shown very little decline.

Programme of the Mission

The mission was received on 10 March in Delhi by the Secretary of the Ministry of Environment and Forests of the Government of India and by the Inspector General of Forests. On 11 March they visited the three World Heritage cultural properties in the vicinity (Fatehpur Sikri, the Red Fort and Agra and the Taj Mahal), so as to obtain an impression of the context in which Keoladeo fits, then moved to Bharatpur and spent the next two days in intensive visits to the Park and its surroundings and detailed discussions of the conservation status of the site with officials of the Rajasthan Forest Service, including the Director of the Park; an open public meeting was organised at the end of the visit, to enable the mission to hear the views of local people, and this meeting was also attended by the Collector of Bharatpur. On 14 March, they held discussions in Jaipur, the capital of Rajasthan, at the highest level with representatives of the Rajasthan State Government, including the Honourable Minister of Forests, the Member of Parliament (Lok Sabha) for Bharatpur, the Chief Secretary of the Government of Rajasthan, the Additional Chief Secretary for Social Infrastructure and Forests, and the Principal Secretary for Water Resources. On 15 March they returned to Delhi, and had final debriefing meetings with the Head of the UNESCO office in Delhi and the Inspector General of Forests.

Full details of the members of the mission, of the programme, and of the persons met are given in the Appendix.

Findings of the mission

The property's outstanding universal value is based on the presence of a great diversity and abundance of birdlife. This outstanding universal value is threatened by three major challenges:

- (a) Water supply (both quantity and quality)
- (b) Invasive vegetation (*Prosopis*, *Eichhornia*, *Paspalum*)
- (c) Inappropriate use of the property by neighbouring villages.

Of the above, the most serious by far are water supply and the current extremely rapid invasion of *Prosopis*.

a. Water supply

The Bharatpur area is situated in the catchment of Yamuna river (and ultimately, via the Yamuna, in the Ganges catchment); it is located in a low area at the confluence of two natural rivers, the Gambhir and the Banaganga, flowing northeast to join the Yamuna. Historically it may have once been much wetter (the Banaganga has been dry for the last fifteen years, and it may be recalled that the WH site of Fatehpur Sikri is built on a hill overlooking what was once a lake). Water from the Gambhir and Banaganga supplies the Ajan Bundh at the time of the monsoon in June; after a short period during which silt is deposited in the bundh, water is released both for the park and for agricultural purposes in the neighbourhood.

Some 550 million cubic feet (MCft.) of water is required each June/July to fill the 1,100 hectares of lakes and pools in the park, which will have dried out almost completely since the inflows of the previous year. However in the last few years, the annual monsoon has failed on several occasions, hence no water has been available, whether for the park or for agriculture. According to figures supplied by the Government of Rajasthan Water Resources Department, supplies of water to the Park had been below the required total for the last ten years, but the situation became even more serious from 2004; rainfall in the Bharatpur area was 32% below average in 2004, 4% above average in 2005, 33% below average in 2006, and 34% below average in 2007; as a result, only 18 MCft feet was supplied to the park in 2004, 480 MCft in 2005 and none at all in 2006 and 2007. As a result, there was little or no breeding of storks and herons in 2004, 2006 and 2007, but there was normal breeding in 2005 – the last “good” year; conditions for wintering water birds in each of the following winters obviously reflected the water situation from the previous summer’s monsoon.

It should be emphasized that failure of the monsoon is not a novel feature in the area. Documents provided by the Water Resources Department show the input to the park over a 30 year period from 1975-76 to 2005-06 (see Appendix 2); in fifteen of these years input exceeded 450 MCft, but in the other fifteen (and more especially since 1997), amounts varied considerably, though only in two years (1986-87 and 2004-05) was the inflow less than 100 MCft, and in 1986-87 some water was “left over” from the good monsoon of previous years. It is hence clear that, while the low inflows of 2004 to 2007 were not unprecedented, there have rarely been failed monsoons in three years out of four.

At the public meeting held in Bharatpur, several local people suggested that the reason for the lack of water supplies in recent years was that water had been diverted for other uses upstream of the Ajan Dam. This argument was firmly refuted by officials of the Rajasthan Water Resources Department, who said that the problem was simply lack of rainfall; there had been no water to divert.

It is not only the quantity, but also the quality of water which is important. Films and pictures taken in years of good water supply make it clear that “organic” water is required, i.e. water carrying adequate numbers of fish, fish fry, seeds and insects, so that food for water birds and other fauna of the National Park may be available. Some of the pictures from earlier years show herons, egrets and storks consuming enormous fish, which must have been carried into the Park on the floodwater, then grown up in the wetlands of the park.

b. Invasive vegetation

In the dry conditions of the last four years, the Keoladeo National Park has been invaded by thorny bushes and small trees of *Prosopis juliflora*, a species of Central and South American origin, sometimes called "mesquite" or "Vilayati babul". It is a tree which grows very rapidly in dry desert areas, and is often used in India in an attempt to stabilize soils in forestry; its wood can be used for charcoal and firewood. At Keoladeo, *Prosopis* has rapidly developed into thick impenetrable clumps, both in open grassland and in dried out pools, and is extremely troublesome to eradicate. The invasion has been extremely rapid, so that large areas were covered by the plant. If an area is cleared and reflooded before new seedlings establish themselves, the seed-bank will be destroyed, providing an effective control measure. However, if not flooded within a year, seeds will germinate and seedlings may then survive temporary flooding and re-establish a dense *Prosopis* scrub.

In the past, there have been problems with two other invasive water plants, Common Water Hyacinth *Eichhornia crassipes* and *Paspalum*. *Eichhornia*, a native of the Amazon basin is a well-known aquatic plant pest the world over, covering lakes and pools entirely, impeding water flow, blocking sunlight from reaching native plants, and causing oxygen shortages and hence fish deaths. As for *Paspalum*, it used to be found at Keoladeo in wet winters and was in the past controlled by grazing by villagers' buffaloes; when grazing ceased, it expanded greatly in the wetter areas. In the current absence of water, neither *Eichhornia* nor *Paspalum* present problems, but when water supplies are restored control measures will need to be designed and implemented.

c. Interactions with neighbouring villages

The change of status from Protected Forest to National Park in the 1980s meant that access by villagers was no longer allowed; since the villagers had formally been able to allow their buffaloes to graze in the protected area this caused resentment and even armed conflict at that time. As a result there have been problems with incursion across the boundary wall and release into the park of old domestic cattle which cannot be controlled for religious reasons. This conflict had occurred despite the fact that the National Park provides employment for many local people, as park staff, guides and rickshaw drivers, while the many tourists use the facilities of the nearby town of Bharatpur, thus providing further employment.

Management responses to the above challenges:

a) Water supply

Faced with the immediate lack of water inflow from the monsoon in the last two years, park staff have dug small bore wells and water is being pumped into the pools as a stop gap measure, providing a minimum of water for wintering and migrant birds, and a least some spectacle for visiting tourists.

In the long run, it is fervently hoped that the 2008 monsoon will provide adequate water to restore the former situation; thus water from the Panchana Dam will be transferred, as in previous years, to the Ajan Bundh and supplied to the Park. In the meantime, a number of measures have been taken by the Government of Rajasthan to improve transmission of water from the Ajan Dam (where the earthworks and channels had over the years become seriously degraded) to the Park. The mission was informed by senior Government representatives in Jaipur that the following measures had been taken in the immediate vicinity, but outside the park: repair of Sevla head and gates (cost Rs. 26 lacs = 2,600,000 rupees); remodelling Pichuna Canal to increase carrying capacity (cost RS. 37 lacs = 3,700,000 rupees); repair of gate system of Ajan Dam (cost Rs. 20 lacs); remodelling of Dacan channel.

A major new development inside the park, seen by the mission, is the construction of facilities to transfer water from the Chiksana Channel to the park. The Chiksana Channel used to flow past the southeast corner of the park; a new water control structure has been built on the Chiksana Channel which will henceforth allow water to flow through a new channel 3.6 kms long into the park, providing some 50 MCFt per annum. This project is fully operational and only awaits rain from the coming monsoon.

A much more long-term solution to water problems is also under construction, in case the monsoon should fail yet again. This is the Govardhan Drain project which aims to transfer water from an existing drain some 16 kms north of the Park into the Park. At present the Govardhan drain carries excess water to the Yamuna; the water carried is "organic", and has no other use since it would cause flooding in agricultural areas; it flows entirely inside the State of Rajasthan, so there is no possibility of conflicts with neighbouring states such as Uttar Pradesh or Haryana. A pumping station and buried pipeline are to be installed a point near Santru village to Keoladeo, and would deliver 300 to 350 MCFt per annum for the park. The mission was informed that funding of Rs 56.22 crores (= 562 million rupees) is already available for this work from the State, and when the mission visited the Santru area with engineers from the Water Resources Department, work was about to begin. It is planned that the work will be completed in time for diversion of water from the 2008 monsoon.

Another long term supply of water for the park will be available through a separate Rajasthan Public Health Engineering Department project, whose object is to bring drinking water to the city of Bharatpur. The project will transfer water from Dholpur to Bharatpur and is expected to be completed in 2009, after some delays caused by contractual problems; for the first four years 310 MCFt of water will be available to the Park, and after that 62.5 MCFt per annum. Since this water is drinking water, it will not however be "organic" and will not carry fish or other organic material into the park.

As far as water quality is concerned, normal monsoon water carried by the Chiksana Canal, or the Govardhan Drain should provide water of the required quality; water from the Dholpur-Bharatpur drinking water supply will obviously not have this organic character but will nevertheless be valuable for topping up existing supplies. There is at present one very deep water pool inside the park where water has been conserved over the drought years in order to provide a reservoir of fish and other fauna and flora which may survive there from one monsoon to the next; in the last few months a second deep pool of this type has been excavated as a further resource of this kind. This second pool was almost complete during the mission's visit.

(b) Invasive vegetation

In the framework of a national rural employment programme, the he Park Director and his staff have undertaken a massive effort, in collaboration with local villagers, to clear the offending areas of *Prosopis*. In the last eleven months teams of villagers have been offered the opportunity to work in the Park, uprooting the *Prosopis* and taking it away, free of charge, for their own use, as fuelwood or as fence posts. After a slow start, inhabitants from villages all round the edge of the park have engaged enthusiastically in this activity and about 10 square kilometres of the eleven affected had been cleared at the time of the mission's visit. The clearing and burning of brush was continuing during the mission's visit, and the enthusiasm of the villagers was plain to see. This clearing of *Prosopis* should be a one-time effort, since if the invaded areas are flooded in summer 2008 this will prevent any recolonisation by the plant which cannot survive in inundated sites, though a permanent control effort will be required.

As noted above, neither *Eichhornia* nor *Paspalum* present a problem under present dry conditions, but they could return with renewed flooding and appropriate strategies for their control need to be developed, preferably in the framework of the Management Plan which is currently being updated.

c) Interactions with neighbouring villages

The frictions of previous years appear to have decreased considerably, in no small measure because of the imaginative proposal to allow local villagers to clear the *Prosopis*, and the benefit they accrued by obtaining free use of the wood collected. Since this wood-clearing is a one-off operation, it will be important to maintain this good will, perhaps through measures to control *Eichhornia* and *Paspalum*.

The long boundary wall round the circumference of the park and which was falling in some places into a dilapidated state, is being repaired and raised to a height of 8.5 feet (though the work is not yet complete). This should reduce human trespass, and prevent incursions of feral cattle and the movement of nuisance park animals into neighbouring lands; some feral cattle continue to graze within the reserve and though this does not appear for the moment to be a major problem, more thought needs to be given to its resolution.

The mission's conclusions and observations

(a) Water supply

The lack of water in recent years is clearly caused by the failure of the monsoon, and is a matter outside human control. It seems reasonable to assume, despite the threat of climate change, that more usual conditions will return in the near future, in which case water supplies will become available again. In the meantime, the mission was most impressed by the remedial measures taken, and by measures in their final planning stages, to guarantee the "normal" supply channels: repair of existing structures and excavation of the new Chiksana Channel.

The mission was in addition extremely impressed by the serious way the authorities at all levels have approached the question of guaranteeing the long-term supply of water of suitable quality to the site. The question has been fully considered at the highest level, an imaginative solution via the Govardhan Drain has been developed, finance provided and the engineering work is currently under way. The mission very much hopes that the work can be completed in time for the new channel to be operational during the 2008 monsoon, in which case the breeding and wintering water birds should return rapidly. It will be important for the State Party and the Government of Rajasthan to keep the World Heritage Centre informed of the progress of this work, preferably in time for a message to be given to the World Heritage Committee at its ³2nd meeting in July 2008. Failure to complete this project in time may be cause for serious concern in regards to State Party commitment to the property.

As a further safeguard, the Rajasthan authorities have taken the imaginative precaution of providing yet another supply of water through the Dholpur-Bharatpur drinking water supply project. From 2009, when the pipeline is working, water (admittedly treated water which will not have the desired organic load) will be available in large quantities for the first four years and as a top up after that.

If a normal monsoon occurs in 2008 and following years, this (given the improvements and repairs already made to the Ajan Bundh and the excavation of the Chiksana Canal) should be enough to overcome the water deficit. Not content with this source of organic water, however, the Rajasthan authorities are in the process of providing an additional and completely new source of organic water through the Govardhan diversion. These two sources (the repaired original and the new source) should provide more than enough organic water to restore the outstanding universal value; nevertheless a third source of water is planned from 2009 via the Dholpur drinking water project; while the Dholpur water will be treated drinking water and will not therefore provide any organic input, it can, when mixed with organic water from the other two sources, provide a valuable contribution to water quantity.

In the absence of detailed data on fluctuations in water bird numbers over the years, which are severely affected by availability of water (see below), it is difficult for the mission to make a precise assessment of the current situation at the Park. Nevertheless it is clear that the conditions which originally justified the outstanding universal value of the park have been seriously compromised in recent years, and that unless water supply and bird numbers improve, the site should be considered for danger listing.

(b) Invasive vegetation

The mission is confident that the current problem of invasive *Prosopis* is close to a solution. Most of the offending scrub has already been removed, and it should not grow again so densely, as long as one of the sources of water supply mentioned above proves effective in 2008. If for one reason or another the water supply fails again in 2008, it will be important to ensure that any re-growth is rooted out in winter 2008-09, and that long term monitoring of its growth is carried out to prevent any recurrence on the scale of the last few years.

At present, neither *Eichhornia* nor *Paspalum* present a problem, but in the event of water supplies returning to normal in summer 2008, they could cause difficulties. It will be important for the new

Management Plan to have solutions ready in advance, wherever possible involving input from, and participation by, local people.

(c) Interactions with neighbouring villages

The mission fully understands that Indian legislation on National Parks precludes use and exploitation of such parks by local people. It much appreciates the sensitive way in which the Director and park staff have involved local people in the removal of *Prosopis*. Their engagement of local communities in management activities is a positive step in improving relations between the park and its neighbours. The mission suggests, given the history of the park, that similar imaginative solutions be sought to maintain the interest and support of local people; this should help to overcome the ongoing problems of trespassers in the park and release of unwanted aged cattle which may become feral.

(d) Scientific research and monitoring

The Keoladeo National Park has already been the subject of many research projects on various aspects of its fauna (especially its birdlife), flora and biodiversity in general. However, no detailed long-term data on numbers of wintering birds or of breeding storks, herons and ibises were made available to the mission; it is clear that information on fluctuations in the numbers of these birds, like that collected by the Bombay Natural History Society for other sites in India, is an essential basic statistic for monitoring the health of the Park and of the bird populations which are the main manifestation of its outstanding universal value. Without this information it is difficult to assess the current situation at the Park

The mission understands that a new Management Plan is in preparation, and that this Plan will include prescriptions on research and monitoring, including surveys of the avifauna of neighbouring wetlands in order to define more accurately the importance of KNP relative to its neighbours. The mission understands that the Wildlife Institute of India is involved in these studies. The mission welcomes this approach, and suggests that the documentation thus collected should be used to produce a statement of the Outstanding Universal Value of the property, for submission to the World Heritage Committee; the mission proposes that the World Heritage Centre and IUCN should provide technical input to this process. The mission also encourages the KNP authorities to make ornithological data on the park and its neighbouring wetlands available to Wetlands International, thus contributing to international monitoring of bird populations and their numbers, and giving just recognition of the importance of KNP on a global scale.

(e) Tourism

The mission noted with satisfaction that the influx of tourists, and in particular of bird-watchers, to the park seems to have been maintained despite the adverse ecological conditions of recent years (though use of the hotel nearest the park seems to have decreased), and despite some unfavourable comment in the national and international ornithological press. (Thus, during the mission's visit an article in the Times of India on 15 March reported that the Park "may be dropped from the list of Unesco's world heritage sites following a visit by a team of the world organization"; in fact the mission had no direct contact with any journalist from the Times, and at no time made any suggestion of deletion from the WH list). A new visitor centre and lecture hall has recently been completed with support from the Swarovski optical instruments company.

The mission was convinced of the attraction of combining visits to the cultural and architectural glories in the neighbourhood with visits to a natural World Heritage site like Keoladeo. Nevertheless the mission noted that the facilities required to welcome and sustain such visitors need greater support: some features of the park (e.g the Keoladeo temple and the "Lover's Temple) need restoration and greater resources are needed for the infrastructure of the park, where buildings and vehicles would benefit from modernisation.

(f) General approach to environmental conservation

It was clear that there was widespread interest, goodwill and commitment towards park conservation among the various community, private sector, state and national level stakeholders. In the immediate neighbourhood of the park too, a number of new schemes to use natural resources (e.g. generation of

electricity through buffalo manure) are being developed. It would be desirable to capitalize on the interest and commitment of these stakeholders by giving them formal structures within which to interact with park management authorities, helping identify and make use of opportunities of mutual interest

Recommendations of the mission

Based on its visit and the above conclusions and observations, the mission makes the following recommendations:

(a) Water supply

An annual water supply of about 550 MCft is critical to maintain the basic ecological functioning of the wetland sector for the park, and in particular for the bird populations that breed and winter there. Following the poor monsoons over the last ten years and more especially in three of the last four years, this water is critically needed in 2008, not only to restore ecological functioning of the wetland areas, but also to consolidate gains from the *Prosopis* control effort. A normal monsoon in 2008 would, as in previous years, provide adequate water but a core component of an effective risk management strategy is the completion of the Govardhan Drain project by the end of June 2008.

The mission recommends that every effort be made to complete the Govardhan Drain diversion project on time, and that information on the advancement of the project be submitted to the World Heritage Committee, if possible in time for the Committee meeting in July 2008 and in any case by November 2008. The mission further recommends that information on progress with supplying water via the Dholpur-Bharatpur drinking water project be submitted to the WH Centre.

(b) Invasive vegetation

The *Prosopis* control programme carried out with the active involvement of local villagers has been successful in clearing, in the last year, almost the whole of the area invaded by this thorny invasive plant. While restoration of normal water supplies to the wetlands should prevent a recrudescence of this problem, a permanent monitoring and control programme is essential for the future. Similarly, once water supplies are restored it will be important to adopt and apply a strategy for control of possible invasions of aquatic weeds such as *Eichhornia* and *Paspalum*.

The mission recommends that the current *Prosopis* control measures be completed, and that the situation of this invasive plant be carefully monitored in future, together with monitoring of aquatic weeds such as *Eichhornia* and *Paspalum*. The mission further recommends that monitoring and eradication measures be included as an integral part of the new Management Plan, wherever possible involving local communities in such control measures.

(c) Interactions with neighbouring villages

In the early days of the park, there was severe friction, indeed conflict, between local communities and the park authorities. Involvement of local villagers in the programme to eradicate *Prosopis* has helped greatly to overcome such problems. Local communities should be encouraged to engage further in management activities of the park, and to take greater responsibilities in ensuring that boundaries are respected and that domestic cattle are not released.

The mission recommends that recent efforts to engage local communities in the management of the park be expanded; in particular that they continue their involvement in future measures to control *Prosopis* and other invasive plants (e.g. by collecting *Eichhornia* for fertiliser), and that they be given greater responsibility in ensuring respect of boundaries and in preventing release into the park of feral cattle.

(d) Scientific research and monitoring

Many scientific research and monitoring projects have been carried out over the years at KNP, by park personnel, by universities and by bodies such as the Bombay Natural History Society and the Wildlife Institute of India, and indeed such work continues.

The mission recommends that such research and monitoring be given even greater encouragement in future, and that the results should be incorporated as appropriate into the new Management Plan, into the development of a Statement of Outstanding Universal Value for the site (to which the World Heritage Centre could contribute), and into ornithological monitoring projects at international level, co-ordinated by Wetland International

(e) Tourism

The number of visitors to the park has been maintained despite the adverse ecological conditions, though the occupancy rate of the hotel inside the park has decreased. Yet there is potential to expand the attractions of the site by tourists, by improving facilities and by associating Keoladeo with cultural World Heritage properties in the vicinity,

The mission recommends that a public use planning exercise be carried out to ensure the park's appeal is not only maintained, but enhanced. This should involve recognition of the cultural values of the park (e.g. the "Lovers' Temple", and the original Keoladev Temple) and their valorisation, so as to enhance the quality of the visitor's experience; renewal of public use infrastructure such as hotels; improvement of the park's own infrastructure (buildings, vehicles); marketing in combination with other architectural attractions in the area.

(f) General approach to environmental conservation

There is widespread interest, goodwill and commitment towards the park among the various community, private sector, state and national level stakeholders.

The mission recommends that the park should capitalize on the interest and commitment of these stakeholders by establishing formal structures within which to interact with park management authorities, helping identify and make use of opportunities of mutual interest and, where appropriate, providing training for local people.

Appendix 1: Notes on programme and persons met

Members of the World Heritage Centre /IUCN mission team

Dr Ram BOOJHUNESCO office, Delhi

Mr Marc PATRY World Heritage Centre, UNESCO, Paris

Mr Mike SMART Consultant, IUCN, Gland, Switzerland

Detailed programme of the mission

Monday 10 March	Arrival of non-Indian mission members Briefing at UNESCO office, Delhi Meeting at Ministry of Environment and Forests, Government of India, with the Secretary and Inspector-General of Forests Travel by train and taxi to Agra and Fatehpur Sikri Overnight at Fatehpur Sikri
Tuesday 11 March	Visit Fatehpur Sikri, Taj Mahal, Red Fort at Agra Travel to Bharatpur Presentations on KNP by Rajasthan Forestry officials and Park Director Overnight at Bharatpur
Wednesday 12 March	Visit to KNP guided by Rajasthan Forestry officials and Park Director Public meeting in Swarowski auditorium for Park stakeholders Overnight in Bharatpur
Thursday 13 March	Visit to site of Govandhan Drain diversion, just outside Bharatpur Travel to Jaipur Dinner hosted by Rajasthan Forestry Department Overnight in Jaipur
Friday 14 March	Visit to Jal Mahal and Amber Fort, Jaipur Meeting with Principal Curator of Forests, Rajasthan Meeting with MP for Bharatpur who chairs Steering Committee on National Parks in Rajasthan Meeting with Chief Secretary, Additional Chief Secretary and Principal Secretary for Water Resources, Government of Rajasthan Meeting with Hon Minister for Forests, Government of Rajasthan Overnight in Jaipur
Saturday 15 March	Early flight Jaipur to Delhi Discussion with head of UNESCO office, Delhi Debriefing meeting with Inspector-General of Forests, Govt. of India Overnight Delhi
Sunday 16 March	Departure of non-Indian mission members

Persons met in the course of the mission

Member of Parliament (Lok Sabha)

Mr Vijayendra Pal SINGH

el : 91.11.23752787

Em ail: alka2605@yahoo.com

Government of India

Ministry of Environment and Forests

Paryavaran Bhawan

New Delhi – 110003

Mrs. Meena GUPTA
Secretary, MoEF
Tel: (Office) 91.11.24360721; (Residence) 91.11.26889546
Em ail: meena.gupta@nic.in

Dr R. B. LAL
Inspector-General of Forests (Wildlife)
Room No. 106, B-Block
Tel: (Office) 91.11.24360740; (Residence) 91.11.26171298
Email: igfwl-mef@nic.in

Mr Anmol KUMAR
Deputy Inspector-General of Forests (Wildlife)

Archaeological Survey of India
Dr D.N. DIMRI
Superintending Archaeologist
Agra Circle, Uttar Pradesh
22 The Mall, Agra 282001
Tel: (Office) 0562.2227261/222.7263; (Residence) 0562.222701
Email: asiagra@sancharnet.in

Dr. R. K. DIXIT
C.A. Taj Mahal
ASI Agra Circle

Eng Munazzar ALI
Conservation Assistant, Taj Mahal
ASI, Agra Circle
Tel: 0562.2230869/2330 98 ; (Mobile) 91.94121.58241
Em il : caasi_taj@yahoo.co.in

Wildlife Institute of India
Prof Vinod B. MATHUR
Dean, Faculty of Wildlife
Tel: (Office) 91.135.2640304; (Residence) 91.135. 2644625; (Mobile) 91.94120.54648
Email: ybn@wii.in

Government of Rajasthan

Ministry of Forests

Mr Pratap Singh SINGHVI
Hon Minister of Forests

Mr D. C. SAMANT
Chief Secretary to Government

Dr Parmesh CHANDRA
Additional Chief Secretary, Social Infrastructure and Forests
Secretariat, Jaipur 302005
Tel: 0141.2227063

Mr S.N. THANVI
Principal Secretary, Water Resources & Indira Gandhi Nahar Dept
Secretariat, Jaipur 302004
Tel: (Office) 91.141.2227112; (Residence) 91.141.2200577
Email: thanvisn@ias.nic.in

Engineers in charge of Govandhan Drain diversion project

Mr GHOSH
Principal Chief Conservator of Forests

Mr R. N. MEHROTRA
Principal Chief Conservator of Forests & Chief Wildlife Warden, Rajasthan
C-20, Hira Bagh, Jaipur 302004
Tel: (Office) 2227836; (Residence) 2570559
Email: rmehrotra@hotmail.com

Mr. S.K. SRIVASTAVA
Chief Conservator of Forests
Aravali Bhavan, Jhalana Institutional Area, Jaipur 302004
Tel: 0141.2710524

Mr Som SEKHOR
Conservator of Forests

Mr Sunayan SHARMA
Director, Keoladeo National Park
Bharatpur 321001
Tel: (Office) 05644.222777; (Residence) 05644.222824
Email: sunayan_knp@yahoo.co.in

Mr Abrar KHAN ("Bholu")
Principal ornithologist, Keoladeo National Park

Bharatpur stakeholders

Collector of Bharatpur
Mr Ravi KANT

WWE
Mr Satya Prakash MEHRA
Senior Project Officer
Bharatpur Field Office
Email: smehra@wwfindia.net

Former ruling family
Mr Rao Raja Raghjuraj SINGHI ("Kakaji")
Raghunath Niwas
Agra Road
Bharatpur
Tel: 91.5644.226323/231199/223523

Mr Raj SINGH
Hotel Bagh
Bharatpur

Lupin Human Welfare & Research Foundation
Mr Sita Ram GUPTA
Executive Director
Bharatpur 321 001

Ghana Keoladeo Natural History Society
Mr Malti PRAKASHAN

Villagers from communities neighbouring the KNP

UNESCO, Delhi

Ms. Minja YANG
Head of UNESCO Office

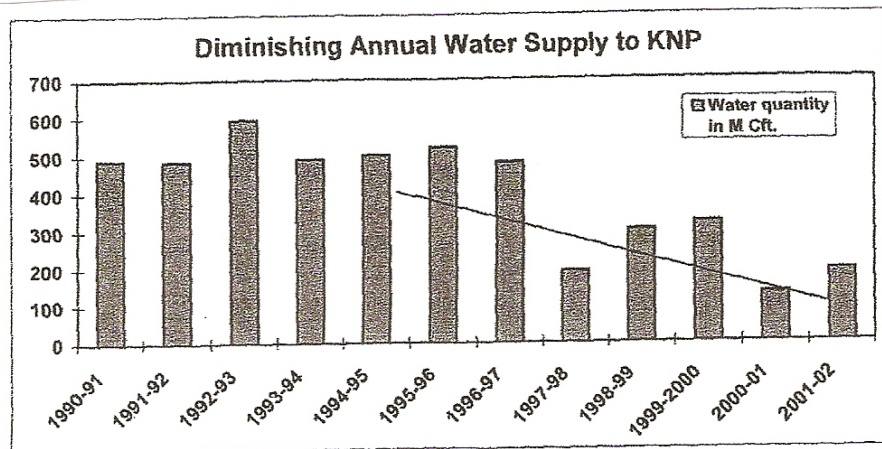
Ms. Nicole BOLOMEY

Appendix 2: data on water releases to KNP

The data below were supplied by the Department of Water Resources (formerly the Irrigation Department) of the State of Rajasthan

Water supply to Keoladeo National Park from Ajan Bund

S.No.	Year	Million cubic feet (m cft)
1	1975-76	515
2	1976-77	283
3	1977-78	514
4	1978-79	283
5	1979-80	285
6	1980-81	517
7	1981-82	517
8	1982-83	522
9	1983-84	514-525
10	1984-85	347
11	1985-86	345-837
12	1986-87	61.5
13	1987-88	141.345
14	1988-89	484.99
15	1989-90	197
16	1990-91	469.73
17	1991-92	469.74
18	1992-93	583.96
19	1993-94	474.73
20	1994-95	505.32
21	1995-96	516.68
22	1996-97	432.72
23	1997-98	180
24	1998-99	296.6
25	1999-2000	343.59
26	2000-01	142.175
27	2001-02	183.643
28	2002-03	
29	2003-04	288.74
30	2004-05	18
31	2005-06	480.9



Appendix 3: Photographs



Construction of a new deep pond to retain fish from one monsoon to the next.
Picture by Marc Patry.



The new water control structure connecting the Chiksana Canal to the Park.
Picture by Marc Patry.



Site of the water diversion from the Govandhan Drain
Picture by Marc Patry.



Prosopis invasion: early stages
Picture by Marc Patry.



Partly cleared Prosopis
Picture by Marc Patry.



Prosopis control
Picture by Marc Patry.



Discussion of Prosopis control with villagers
Picture by Marc Patry.

DATE	ON THE OCCASION OF THE VISIT OF	BAG	GUNS
1913 31 ST JAN	3 RD SHOOT HON'BLE MA MONTAGUE	2122	40
1913 8 TH FEB	4 TH SHOOT	405	13
1913 15 TH OCT	AJAN BUND H.H. MAHARAJ RANA DHOLPUR	935	17
1914 3 RD DEC	1 ST SHOOT H.E. VICEROY LORD HARDING	4062	49
1915 30 TH JAN	2 ND SHOOT H.H. MAHARAJA PATIALA	2433	38
1915 13 TH NOV	1 ST SHOOT H.E. VICEROY LORD HARDING	1715	30
1915 30 TH NOV	2 ND SHOOT H.H. MAHARAJ RANA DHOLPUR	942	13
1916 20 TH NOV	1 ST SHOOT H.E. VICEROY LORD CHELMSFORD	4206	50
1917 8 TH JAN	2 ND SHOOT HON'BLE SIR ELLIOT COLVIN A.G.G.	1805	24
1917 30 TH JAN	3 RD SHOOT H.H. MAHARAJA FARIDKOT	710	18
1918 12 TH JAN	1 ST SHOOT H.E. VICEROY LORD CHELMSFORD	2666	25
1918 23 RD FEB	2 ND SHOOT SECRETARY OF STATE RT. HON BLE MA MONTAGUE	1314	26
1918 30 TH NOV	1 ST SHOOT HON'BLE COL -	2411	33
1918 21 ST DEC	2 ND SHOOT H.H. MAHARAJ RANA DHOLPUR	1084	33
1919 27 TH DEC	1 ST SHOOT COL. BANNERMAN	3041	51
1920 31 ST JAN	2 ND SHOOT HIS HIGHNESS' SHOOT	2659	42
1920 1 ST FEB	3 RD SHOOT	1507	30

The panel commemorating historic duck shoots.
Picture by Marc Patry.



Sambhar Deer in the Park
Picture by Marc Patry.



Feral domestic cattle in the Park
Picture by Marc Patry.



The "Lover's Temple"
Picture by Marc Patry.



The original Keoladeo Temple which gave its name to the Park
Picture by Marc Patry.