World Heritage Sites

Protected Areas and World Heritage

KEOLADEO NATIONAL PARK
INDIA

This former duck-hunting reserve of the Maharajas is India's major wintering area for large numbers of aquatic birds and one of India's main birdwatching sites. Some 370 species of birds from Afghanistan, Turkmenistan, China and Siberia, including the rare Siberian crane, have been recorded in the Park.

COUNTRY
India

NAME
Keoladeo National Park

NATURAL WORLD HERITAGE SITE
1985: Inscribed on the World Heritage List under Natural Criterion x.

STATEMENT OF OUTSTANDING UNIVERSAL VALUE [pending]

INTERNATIONAL DESIGNATION
1981: Designated a Wetland of International Importance under the Ramsar Convention (2,873 ha).

IUCN MANAGEMENT CATEGORY
II National Park

BIOGEOGRAPHICAL PROVINCE
Indus-Ganges Monsoon Forest (4.8.4)

GEOGRAPHICAL LOCATION
Situated in easternmost Rajasthan, the Park is 2 km south-east of Bharatpur, 50 km west of Agra and 176 south of Delhi at 27°07' to 27°12'N by 77°29' to 77°33'E.

DATES AND HISTORY OF ESTABLISHMENT
1850+: Established as the private duck shooting preserve of the Maharaja of Bharatpur;

1901: First deliberately flooded to create a hunting reserve;

1956: Designated the Keoladeo Ghana (Bharatpur) Bird Sanctuary by the Forestry Department;

1964: Last big shoot held but the Maharajah retained shooting rights until 1972;

1967: Designated a Protected Forest: 1972: Wildlife (Protection) Act prohibited shooting;

1981: Designated a Ramsar site; 1990; entered on the Montreux Record of wetland sites under stress;

1982: Established as Keoladeo Ghana National Park.

LAND TENURE
Rajasthan State Government. Managed by the Rajasthan Department of Forests.

AREA
2,873 ha

ALTITUDE
173-175m

PHYSICAL FEATURES
The area lies on the edge of the Gangetic plain near the margin of the Thar desert in a depression at the junction of the Gambhir and Banaganga rivers which regularly flooded twice a year, inundating the city of Bharatpur. In the mid 18th century a flood control weir, the Ajan Bundh, was built one kilometre south of the Park, to form a shallow lake, 3,270 ha in area, which was drawn on to flood the depression created by excavations for the bund. This was first done in 1901 to create a patchwork of marshes meticulously maintained by a system of canals, sluices and dykes. Normally, water from the Gambhir river was fed from the Ajan Bundh into the marshes twice a year from the floodwaters, first in mid-July soon after the onset of the monsoon, and secondly in late September or October when the Bundh was drained ready for cultivation in winter. The area is flooded to a depth of 1-2m throughout the monsoon between July and September, after which the water level drops. From February onwards the land begins to dry out until by June only a little water remains. For much of the year the wetland covers only a third of the Park. In the 1980s upstream diversions and deforestation began to dry up the supply from the Banaganga river and in 1991 a dam was built on the Ghambhir at Panchana, 90 km south. In 2004, the state government, under political pressure to retain the water for farmers in the valley downstream, reduced the annual water flow from the dam from 15 million m^3 to 510,000 m^3. Farmers also sometimes divert the released water for themselves. Recent natural and man-made droughts in 2004, 2006 and 2007 dried out the impoundments, enabling an invasion of weed trees, and many birds deserted the area. Soils are predominantly alluvial; some clay has formed as a result of the periodic inundations.

CLIMATE
This is a climate of hot summers and freezing winter cold. During 1988, the mean maximum temperatures ranged from 20.9°C in January to 47.8°C in May, while the mean temperature varied from 6.8°C in December to 26.5°C in June. The mean relative humidity varies from 62% in March to 83% in December. The mean annual precipitation is 662mm, with rain falling on an average of 36 days per year, mainly during the monsoon in July and August. But between 2004 and 2007, there was a long period of drought, broken only in 2005 and 2008.

VEGETATION
The surrounding countryside is semi-arid plain where only the Park has much vegetation: the term *ghana* means thicket. Some 350 plant species have been recorded (Brar, 1996). The Park itself is a mosaic of tropical dry deciduous forest (1,100 ha), scrub woodland with dry grassland where forest has been degraded, shrub savanna and grass savanna. Swamps and impounded wetland cover about 1,000 ha. The forests, mostly in the northeast of the Park, are dominated by *kayim Mitragyna parvifolia*, *jamun Syzygium cuminii* and *babul Acacia nilotica*. *Neem Azadirachta inidca*, probably introduced, is occasional. The open woodland is mostly *A. nilotica* and *A. leucophloea* with a small amount of *kandi Prosopis spicigera* and *ber Zizyphus mauritiana*. Scrublands are dominated by zizphus and *kair Capparis sepiaria*. *Piloo Salvadora oleoides* and *S. persica* are virtually the only woody plants found in areas of saline soil. Khus grass *Vetiveria zizanioides* and *Desmostachya bipinnata* formerly harvested by villagers are spreading. The aquatic vegetation includes 96 species of submerged and emergent plants and is a valuable source of food for waterfowl. However, the alien water hyacinth *Eichhornia crassipes* and the aquatic knotgrass *Paspalum distichum,* a perennial amphibious grass, proliferated, filling in waterways and impoundments (Brar, 1996). Recent droughts and reduction in the water supply killed them off but have permitted the expansion of shrubby woodland of the useful but equally invasive fast growing *vilayati babul* or mesquite *Prosopis juliflora*. Saxena (1975) lists the Park's flora.

FAUNA
29 species of mammals were recorded by Brar in 1996. Large predators such as leopard *Panthera pardus* were deliberately exterminated by 1964, and during long droughts water-dependent species disperse. Primates include rhesus macaque *Macaca mulatta* and northern plains gray langur *Semnopithecus entellus*. Small carnivores include Bengal fox *Vulpes bengalensis*, jackal *Canis aureus*, striped hyena *Hyaena hyaena*, smooth-coated otter *Lutrogale perspicillata* (VU: about 30), Indian grey mongoose *Herpestes edwardsi*, common palm civet *Paradoxurus hermaphroditus*, small

Indian civet *Viverricula indica*, fishing cat *Prionailurus viverrinus* (EN), leopard cat *P. bengalensis* and jungle cat *Felis chaus* (Haque & Vijayan, 1988). Ungulates include wild boar *Sus scrofa* (200-250), blackbuck *Antilope cervicapra* (30), chital *Axis axis* (230-260), sambar *Rusa unicolor* (VU: 20), hog deer *Axis porcinus* (EN), nilgai *Boselaphus tragocamelus* (160-180) and domestic water buffalo *Bubalus bubalis* and feral cattle (950-1,000). Other mammals include Indian crested porcupine *Hystrix indica* and Indian hare *Lepus nigricollis*. The 1988 census figures are cited (Vijayan, 1989).

Until the recent droughts the Park's location in the Gangetic Plain made it an unrivalled breeding site for waterbirds and a renowned heronry. During the monsoon an estimated 65 million fish-fry are carried by floods into the impoundments every year, providing the food base for the large numbers of wading and fish-eating birds: herons, storks and cormorants and wintering migrant ducks (Milne, 1997). Some 375 bird species have been recorded, a third being migrant and overwintering. It has a unique assemblage of wetland species, and some 15 species of Ciconiformes nest in the heronry. The commonest of these are gadwall *Anas strepera*, shoveler *A. clypeata*, spotbill *A. poecilorhyncha*, common teal, *A. crecca*, lesser whistling duck, *Dendrocygna javanica,* tufted duck *Aythya fuligula*, comb duck *Sarkidiornis melanotos*, cotton pygmy-goose *Nettapus coromandelianus*, great cormorant *Phalacrocorax carbo*, little cormorant *P.niger*, Indian shag *P. fuscicollis*, ruff *Philomachus pugnax,* probably the most abundant wader, painted stork *Mycteria leucocephala*, white spoonbill *Platalea leucorodia*, Asian open-billed stork *Anastomus oscitans*, black-headed ibis *Threskiornis melanocephalus*, oriental darter *Anhinga melanogaster*, common sandpiper *Tringa hypoleucos*, wood sandpiper *T. glareola* and green sandpiper *T. ochropus*. Demoiselle crane *Anthropoides virgo* and Sarus crane *Grus antigone* (VU) with its spectacular courtship dance, are also found here. The Park was the last known wintering ground in India of the western population of Siberian crane *Grus leucogeranus* (CR). Despite reaching a total of 41 birds during the winter of 1984-85 (ICBP, 1985) numbers steadily decreased and in the winter of 1993/94, none were observed (K. Rao pers. comm., 1995). In 1996, four birds wintered in the Park, and in 1997 two adults and a young bird were seen (Milne, 1997). There is only one other known western population, at Feredunkenar in Iran. However, a thriving eastern population of some 1,350 cranes has been discovered wintering in Poyang Lake Nature Reserve, Jiangxi, China.

Several resident species are threatened or near-threatened: Baer's pochard *Aythya baeri* (EN), lesser white-fronted goose *Anser erythropus* (VU), lesser adjutant *Leptoptilos javanicus* (VU), Dalmatian pelican *Pelecanus crispus* (VU), spot-billed pelican *Pelecanus philippensis*, white-rumped vulture *Gyps bengalensis* (CR), Indian vulture *Gyps indicus* (CR), cinereous vulture *Aegypius monachus*, Pallas's fish-eagle *Haliaeetus leucoryphus* (VU), greater spotted eagle *Aquila clanga* (VU), eastern imperial eagle *A. heliaca* (VU), greater spotted eagle *A. clanga* (VU), a new breeding record for the species in India (Prakash,1988a), red kite *Milvus milvus,* sociable lapwing *Vanellus gregarius* (CR), Indian skimmer *Rynchops albicollis* (VU), and white-browed bushchat *Saxicola macrorhynchus* (VU) (BLI, 2009). Among land birds are several other birds of prey including the osprey *Pandio haliaetus*, peregrine *Falco peregrinus*, short-toed eagle *Circaetus gallicus*, tawny eagle *Aquila rapax*, lesser spotted eagle *Aquila pomarina hastata* nested in 1986, the first nesting record for the species in India for some time (Prakash,1988b) and crested serpent-eagle *Spilornis cheela*. Grey hornbill *Tockus birostris* and white-tailed iora *Aegithina nigrolutea* are present. Other land birds included a varied assortment of warblers, babblers, bee-eaters, bulbuls, buntings, chats, partridges and quails. Checklists of birds recorded in the Park are given in Abdulali & Pandey, (1978) and Ali & Hussain (1982). The original nomination also listed, presumably as a vagrant, marbled teal *Marmaronetta angustirostris,*

There are 13 species of snakes, 5 lizards, 7 turtles and 7 amphibians (WWF-India, 2006). These include Indian python *Python molurus*, banded krait *Bungarus fasciatus*, green rat snake *Zaocys nigromarginatus* and water snakes, Indian flapshell, softshell and roofed turtles *Lissemys punctata, Nilssonia gangetica* (VU) and *Pangshura tecta,* crowned river turtle *Hardella thurjii* (VU), and Bengal monitor lizards *Varanus bengalensis* Some 50 species of fish have been identified (Kumar & Vijayan, 1988). Protozoa, zooplankton and macrobenthic oligochaeta, insects and molluscs have been studied, especially under drought conditions (Mahajan *et al*., 1981a, b & c). A discussion on the aquatic macro-invertebrates, terrestrial invertebrates, fish, herpetofauna, birds and mammals is given in Vijayan (1989).

CONSERVATION VALUE

The reserve remains one of the major wintering areas for large numbers of aquatic birds, including threatened species from Afghanistan, Turkmenistan, China and Siberia. The habitat is managed to conserve the high biodiversity. It lies within a WWF Global 200 Ecoregion and is a Ramsar wetland.

CULTURAL HERITAGE

The site is in a former centre of Mogul culture, 20 km west of the spectacular abandoned city of Fatehpur Sikri, 50 km from Agra and 176 km southwest of Delhi. It originated as the duck-shooting preserve of the Maharajas of Bharatpur.

LOCAL HUMAN POPULATION

There are no local people living within the Park, but the city of Bharatpur is close by and the Park is closely surrounded by fifteen villages with a total population of 15,000. These people originally depended on the area for grazing cattle and buffalo, fodder, fuelwood, timber, thatch and rope materials and medicinal plants. They ceased to have any rights after the declaration of the National Park (Ramsar, 1996) and have turned to agriculture and tourism related work.

VISITORS AND VISITOR FACILITIES

Keoladeo is India's most famous birdwatching site. In 1984 it had 80,000 visitors, in 1996,125,000 (one third foreign) and in 2002,126,000. Foreigners in 2006 formed 45% of the visitors, despite the fall in numbers of birds (Chauwan, 2006). A large visitors' centre with lecture hall and interpretation program were completed in 2006 (WWF-India, 2006). Rickshaw tours, cycling and walking are popular and boats can be hired with guides knowledgeable about birds. Food and accommodation is available at Shanti Kutir Forest Lodge (64 beds), bookable through the Forest Department, and the more expensive ITDC Forest Lodge (36 beds), bookable through the Tourist Department. There are many hotels in the nearby city and access is good.

SCIENTIFIC RESEARCH AND FACILITIES

The Bombay Natural History Society has done considerable work in the area, including the ringing of birds for the last 60 years. The society intensified its operations in the 1980s and established a hydro-biological station to monitor the ecology of the wetland. Particular attention was given to changes in the vegetation following the ban on grazing. Water quality and quantity, air and birds are still monitored by the Bombay Natural History Society, also the vegetation and health of animals. The Park authorities are monitoring the bird populations. Limnological studies have been carried out by the Zoology Department of the University of Rajasthan, Jaipur. A documentary film *Indian Birds of the Monsoon* was produced by S. & B. Breeden in 1979-1980. The Park has more potential for education than other wetland sites in India, being relatively near to Agra, Delhi and Jaipur. A bibliography of papers produced during 1988 is given in Vijayan (1989). Between December 1992 and January 1995, a collaborative project between the Governments of India and Russia, the International Crane Foundation and Wild Bird Society of Japan was set up to save the Siberian crane. The project focused on releasing captive bred cranes into the wild, tracking migratory routes of common cranes, and building up the resident population in the Park. Studies of the observed impact on birds of pesticide use in surrounding areas and on heavy metal contamination of the dam water were made (Vijayan, 1989).

MANAGEMENT

The boundaries are clearly delineated by a 32 km-long, 2m-high stone wall, built 1977-81 and being repaired and heightened to 2.6m in 2008. Owing to the dense human settlement around the Park, there can be no buffer zone. The wall totally encloses the Park to prevent trespassing by humans and domestic livestock, but also bars local people from the use of certain temples and from collecting khus grass, fuelwood and forest products on which they had traditionally depended; it also excluded a population of some 2,500 buffalo and cattle which previously grazed there. However, the road from Bharatpur town bisecting the Park was relocated outside the boundaries which greatly reduced the disturbance by visitors. This intensifies during the winter when visitors come to see the cranes. The local people see this government-sponsored tourism as a cost imposed on them in their lost opportunities to use the area.

The management objective has been to allow the area to flood and dry out annually, rather than exist as a system of permanent marshes. Some 15 million cu.m of water for the wetlands was supplied from the shallow holding lake outside the boundaries, and the water levels were regulated to benefit waterfowl. If the wetland is in danger of drying out completely, water can be pumped from four

boreholes to ensure the survival of some aquatic flora and fauna until the monsoon. However, this is brackish and lacks the nutrients of living floodwaters. Two deep pools, one excavated for the purpose, also serve as natural wildlife reservoirs. The crisis created by the drying of out of the land which caused the birds to desert and the weed mesquite to flourish focussed national and international concern on the need for alternative sources of water from nearby canals (the Govardhan wastewater drain, the Chiksana canal and the Dholpur-Bharatpur drinking water project (Boojh *et al*., 2008). In 2005 this led to a campaign by the Tourism and Wildlife Society of India and others to take the dispute to the Supreme Court. Another campaign in early 2007, organised by an Eco-Development Committee, was a program of controlled deforestation. Villagers were co-opted to fell and systematically eradicate the weed trees and take the wood for themselves which greatly improved relations between the Park authorities and the surrounding people (Sebastian, 2007; Boojh *et al.,* 2008). It may lead to their helping in the control of aquatic invaders and to their eventual participation in management of the Park and in monitoring the birds. By 2008 most of the invading *Prosopis* had been cut by local communities for their own use but was beginning to re-sprout. The drain and drinking water projects were due for completion in 2009 (UNESCO, 2009).

MANAGEMENT CONSTRAINTS

The main present threats to the Park are the lack of water, beginning in the 1990s and much aggravated by recent droughts; and invasion by exotic species. On the creation of the National Park, the ban on the surrounding people, cattle and buffalo from use of the area was passed on outside advice without consulting the people or their knowledge of local conditions. Predictably, this led to a build up of local resentment, resulting in an attempted forced entry into the Park. Police opened fire and eight people were killed. Tensions remained high. The absence of grazing also caused management problems since vegetation, principally water hyacinth and aquatic knotgrass*,* became rampant. Since they were no longer grazed, these blocked the water channels and filled the impoundments, altering the habitat for many species. Attempts to control the invaders have been ineffectual to date, though drought has temporarily curbed them. As the land dried out, invasion by mesquite became serious, covering, by 2008, 40% of the site, but its control by communal effort has been a success. Although hundreds of old unwanted cattle are turned into the Park, competing with wildlife for valuable forage, the Rajasthan government rejected a proposal from the Bombay Natural History Society to legalise limited grazing, since this conflicted with the law (Earle, 1987), even though recycled nutrients from the large quantity of dung deposited by livestock probably supported considerable numbers of insects, and water buffalo grazing kept down invasive plants.

As a result of recent poor monsoons and drought, the World Heritage value of the Park's birdlife is threatened. Siberian crane, which formerly occurred throughout the entire Indo-Gangetic plains of India, has not been reported since 2002. Its absence has been attributed to hunting by nomadic tribes along the specie's 5,000 mile migration route from Siberia to Bharatpur (K. Rao, pers. comm., 1995) but also to the lack of suitable habitat. High levels of pollutants in Ajan Bundh in the late 1980s led to an increasing number of piscivorous birds seen dazed and unable to fly. Fewer birds were recorded in 1984 than in previous years and several birds were found dead outside the Park in 1988 and early 1989, possibly due to pesticide poisoning. At present, thorough systematic monitoring is necessary to establish the diversity and trends of the bird populations, but is not done. However, with the success of water diversions and good monsoons, their numbers should recover (IUCN, 2008; UNESCO 2009).

STAFF

In 1995, under the Deputy Chief Wildlife Warden there were clerks and an accountant, an assistant Forest Conservator, three forest officers and 20 forest guards,

BUDGET

In 1992-3 the Rajasthan State Government and the national Ministry of Environment & Forests spent about Rs.6.1 million (US$195,000) a year on development and maintenance, including salaries and wages. Tourism brought in about Rs.2.1 million (US$67,200) though the state government takes this for common use (Indian Birdfair Office, 2005). For 1994-95, a national grant to the State of Rajasthan for developing the Park was Rs.2.39 million (US$76,500). A sizeable amount was also spent by the State Government on the establishment, management and maintenance and development of facilities (K. Rao, pers. comm., 1995). In 2004 Swarovski & Co. contributed US$450,000 towards the visitor centre. In 2006-7, Rs.8,300,000 (US$180,000) were granted for the repair of the Ajan Bundh. In 2008, Rs.56,200,000 (US$1,130,000) were granted towards the cost of new water supply channels and UNESCO provided US$80,000 for the Enhancing our Heritage project on management effectiveness assessment (IUCN, 2008).

LOCAL ADDRESS

Deputy Chief Wildlife Warden, Keoladeo National Park, Bharatpur, Rajasthan

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The principal source for the above information was the original nomination for World Heritage status.

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