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RAMSAR SITES

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The two preceding issues of *Buceros* had given accounts on five of the presently six Ramsar Sites of India. This issue deals with the last remaining site, Keoladeo National Park, Rajasthan. Prior to the account on Keoladeo National Park, we give, in brief, the criteria for identifying wetlands of international importance based on fish fauna, as recommended by the 4th and 6th meetings (Montreux, Switzerland, 1990 and Brisbane, Australia, 1996) of the Conference of Contracting Parties to the Convention on Wetlands (Ramsar, Iran 1971). The first three criteria based on i) representative of unique wetlands, ii) plants and animals, and iii) waterfowl, have been discussed in *Buceros*, Vol. 2, No. 1.

The specific criteria based on fish fauna to consider a wetland to be internationally important are:

1. *It supports a significant proportion of indigenous fish subspecies, species or families, life-history stages, species interactions and/or populations that are representative of wetland benefits and/or values and thereby contributes to global biological diversity; or*
2. *It is an important source of food for fishes, spawning ground, nursery and/or migration path on which fish stocks, either within the wetland or elsewhere, depend.*

KEOLADEO NATIONAL PARK, BHARATPUR (RAJASTHAN)

Keoladeo National Park (KNP), formerly known as the Bharatpur Ghana Bird Sanctuary, is one of the most enchanting waterfowl refuges in the world. The Park is situated on the extreme western edge of the Gangetic

basin, a kilometre southeast of Bharatpur (27°13' N & 77°32' E) at an elevation of 174 m above msl. The Park was designated as a Ramsar site in 1981 and is also the only wetland in India to be designated as a World Heritage site. The wetland is a mosaic of *a) freshwater lakes and associated marshes (lacustrine) b) freshwater ponds (under 8 ha), marshes, swamps (palustrine), c) water-storage reservoirs, dams, and d) seasonally-flooded grassland, savanna, palm savanna.* (*Directory of Indian Wetlands 1993, WWF-India & AWB*). The habitat and wildlife of KNP is well documented, mainly from a decade long study (1980-1990) by the Bombay Natural History Society, and much of the information given in this write-up is based on this work. For more information, see Vijayan (1991).

History

The evolution of KNP is an example of man's ingenuity in modifying a natural ecosystem for his own gain, which has in due course benefited not only man himself, but also the wildlife of the surrounding areas. The use of artificial flooding in a natural depression, by impounding and controlling water levels, was the turning point in the emergence of the present day KNP. The main objective of the Maharaja of Bharatpur, some 250 years ago, was to create a refuge for game hunting, protection of the 'sacred' cow from hostile farmers, provision of grazing land for buffaloes and for protecting the town from deluges, which occurred frequently in those days. During the early years, KNP had the reputation of being a winter resort of wildfowl and a duck-shooting jheel.

After independence, the refuge was threatened by the demand to convert it into agricultural land. However, the Bombay Natural History Society (BNHS), through the efforts of Dr. Salim Ali, managed to impress upon the concerned authorities the need for declaring the refuge as a bird sanctuary, which was achieved in 1956. Subsequently, it was raised to the status of a National Park in 1980, which resulted (among other developments), in the stoppage of

grazing by livestock in the Park (see box). The Park's designation as a Ramsar Site (1981) and a World Heritage Site (1985) have given it the international recognition that it deserves.

Keoladeo National Park & Buffaloes

Buffaloes (and other livestock) were earlier an integral part of KNP. One of the purposes of setting up the refuge by the Maharaja of Bharatpur was to protect the 'sacred cow' by the creation of grazing lands - otherwise the animals would stray into crop fields and earn the ire of farmers.

However, after the upgradation of the Sanctuary into a National Park, grazing was stopped in 1982 after demands from conservationists. This step affected about 7000 heads of buffaloes and cows. Since the ban, feral cattle (a few hundred) account for the major part of the total herbivores of the Park, besides other wildlife like Nilgai, Sambhar and Cheetal.

The removal of the primary consumer (buffaloes) from the wetland system was not without its impacts. One of these was the subsequent excessive growth of a perennial grass, *Paspalum distichum*, which caused several changes in the aquatic habitat, affecting many bird species. Experiments were conducted to control the overabundance of this grass by methods such as bulldozing, controlled burning, harvesting etc., but the problem still persists. The solution now suggested by scientists is controlled grazing by buffaloes, which is not without controversy, can create management problems, and has legal ramifications.

General description of KNP

The total area of the Park is 29 km². The terrain is flat with a gentle slope towards the centre forming a depression, which forms the main submersible area (c. 8.5 km² - now reduced to 7.5 km² according to a study) of the Park. This submersible area has been divided into various unequal compartments by means of dykes. Thick alluvium dominates the area. Patches of saline soil are common in terrestrial areas. The boundary of the Park is demarcated by a masonry wall and the Park is surrounded by about 18 villages.

The main source of water to the Park is the Ajan Bund reservoir, which receives water from the rivers Banganga and Gambhir. Several earthen bunds and sluice gates help to contain and regulate the water levels in the Park. The water gradually dries up during May-June, leaving only small pools in the deeper areas.

The climate of the area is subtropical, characterised by distinct summer, monsoon and winter seasons. The rainy season is from late June till October, averaging 662 mm. January is the coldest month, with mean minimum temperature of 6°C. Showers may also occur in winter. Summer sets in mid March, and maximum temperatures average 45°C (June).

The vegetation of the Park can be divided into two major habitats - wetland and terrestrial. The forest vegetation, a relic of dry deciduous forest, is a mosaic of scrub, grassland and woodland. It has xerophytic and semi-xerophytic species consisting predominantly of *Acacia nilotica*, *Prosopis cineraria*, *Salvadora oleoides* and *Capparis decidua* communities. *Mitragyna parvifolia* occurs in patches. The grass cover is dominated by *Vetiveria zizanioides*, *Demostachya bipinnata* and *Cynodon dactylon*.

In the wetland area, the grass *Paspalum distichum* is dominant and widespread. Sedges such as *Scirpus tuberosus* and *Cyperus rotundus* occupy the border areas. The aquatic species include *Nymphaea nouchali*, *N. stellata*,

Nelumbium, *Lemna*, *Azolla* and *Ipomoea aquatica*. Submerged plants such as *Hydrilla*, *Najas*, *Vallisneria*, *Ceratophyllum* and *Potamogeton* are also present. The exotic weed *Eichhornia crassipes* is kept under check annually by manual removal.

Wildlife

Birds: Of its wildlife, the Park is best known for its birdlife. Ornithologically, the Park is significant because of its strategic location as a staging ground for migratory waterfowl, its multitude of birds, especially during winter, and as the breeding grounds for many bird species. It is extremely important as it is the only regular wintering area in India for the endangered Siberian Crane (see box). The major groups of birds represented in the aquatic area, in order of abundance, are Anatidae, Rallidae, Phalacrocoracidae and Ciconiidae.

The Siberian Crane in Bharatpur

The Siberian Crane *Grus leucogeranus* is a highly endangered crane of the world. There are three populations of this species: the western, presently of 8-14 birds, that winters in Iran, the eastern, of about 3000 birds that winters in China, and the central, of 3 birds that winters in India. KNP is the only known wintering ground for the central population of the Siberian Cranes, which arrive in November and leave around the end of February.

The numbers of cranes visiting the Park have shown an alarming decline over the decades. During 1964-65, about 200 birds were recorded at KNP. Population declined with the passing years: 76 in 1969-70, 61 in 1975-76, 33 in 1980-81, 37 in 1985-

86, 10 in 1990-91 and 5 during 1992-93. The birds did not come to Bharatpur during 1993-94 and 1994-95, but were present again during 1995-96 (4 birds) and 1996-97 (3 birds). Besides the decline in numbers, the conditions in the Park are said to have become unsuitable for the crane due to the excessive spread and growth of the grass *Paspalum distichum* after the ban on grazing by buffaloes.

During 1992-93, two Siberian Crane chicks, reared in captivity, were released at Bharatpur. It was hoped that these birds would follow the wild Siberian Cranes that come in winter and add to the population of wild birds. If successful, more and more birds could be reared for the same purpose. However, the chicks did not mix or migrate back with the wild birds and were taken back into captivity. During January 1994, four additional chicks were released with the earlier two birds. The experiment ended in a failure again, as no wild Siberian Cranes arrived that winter and the released birds either disappeared or died after some time. Four more birds were introduced during 1996-97. According to latest reports (August 1997), one of the birds was found dead, two others have wandered to areas outside the Park, and only one bird still remains in the Park. Thus, the future of the central population of the Siberian Crane appears to be again in jeopardy.

Mammals: Five larger herbivores, Sambhar *Cervus unicolor*, Cheetal *Axis axis*, Nilgai *Boselaphus tragocamelus*, Blackbuck *Antelope*

cervicapra and Wildboar *Sus scrofa*, and six species of carnivores, Jackal *Canis aureus*, Striped Hyena *Hyaena hyaena*, Jungle Cat *Felis chaus*, Fishing Cat *Felis viverrina*, Toddy Cat *Paradoxurus hermaphroditus*, Smooth Indian Otter *Lutra perspicillata* and also the large rodent, Porcupine *Hystrix indica* occur in the Park.

Reptiles & Amphibians: In all, 28 species of reptiles including seven species of turtles, eight species of lizards and 13 species of snakes have been recorded from KNP. Bharatpur is well known for its pythons, and there are regular areas where they can be seen easily, which are named Python Points by the Forest Department. Seven species of amphibians belonging to three families, namely Bufonidae, Microhylidae and Ranidae occur. The Bullfrog *Rana tigrina* (= *Hoplobatrachus tigerinus*) and Skipper *R. cyanophlyctis* Frog (= *Euphlyctis cyanophlyctis*) are common in the wetland area.

Fish: The fish fauna of the Park consists of 43 species belonging to 8 orders, 16 families and 31 genera. Of the 43 species, only six species, *Channa punctatus*, *C. striatus*, *C. marulinus*, *Heteropneustes fossilis*, *Clarias batrachus* and *Colisa fasciata* are local and breed inside the Park. The other species enter the Park largely as fry along with the waters from the Ajan bund during the monsoon.

Pollution: The BNHS study found concentrations of heavy metals such as lead, zinc and copper in the tissues of fish. Thirteen species of dead birds, including seven species of piscivorous birds, recorded high levels of lead, zinc and copper. Pesticide residues (dieldrin) in the brain tissues of the Sarus Crane *Grus antigone*, Ring Dove *Streptopelia decaocto* and Blue Rock Pigeon *Columba livia* showed aldrin poisoning. Eggs of eight species of piscivorous birds showed contamination by organochlorine compounds such as DDT, BHC, endosulfan, dieldrin, heptachlor and heptachlor epoxide.

Socio-economics: The economy of the

vilmostly agriculture based, except for those employed in the Park and the nearby factories. Buffaloes are the main source of income for a few families. The major source of fuel is dungcake, the absence of which leads to the collection of wood and puts a strain on the Park's ecosystem.

Tourism: KNP, due to its vicinity to Delhi and Agra (besides its birdlife), attracts about 90,000 visitors each year, and about 30% of these are foreigners. Studies had been undertaken by the BNHS to document the impacts of tourism on the Sanctuary and its wildlife, and also the economic benefits to the locals and to the Park.

Studies Undertaken at KNP

The Bombay Natural History Society initiated a Research Project known as the Keoladeo National Park Ecology Study at Bharatpur (1980-1990). The main objective of the project was to collect data essential for evolving a comprehensive management programme for the Park. The data presented in the final report of the decade long study (Vijayan 1991) constitutes one of the major contributions to the understanding of wetland ecology in a tropical man-made wetland. It was for the first time ever that such a large scale ecosystem level study was attempted in India. Investigations covered the following multidisciplinary aspects of the ecosystem: meteorology, primary productivity, vegetation, studies on invertebrates, fish, amphibians, reptiles, birds and mammals. Heavy metal contamination and pesticide pollution to the ecosystem and wildlife was also studied. The socio-economics of the surrounding villages was studied during the tenure of the project, which was followed by two other studies (Anonymous 1994a, 1994b, 1996 and WWF 1996).

Publications: The KNP is probably the most studied of all wildlife sanctuaries in India. Many theses, reports, papers, books and booklets have been published on the Sanctuary. Given below is a selected list of publications that have emanated from the Park.

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ERS, NEWS & ANNOUNCEMENTS

- * **Salim Ali International Award for Nature and Nature Conservation:** Mr. Zafar Futehally is the first recipient of the Salim Ali International Award for Nature Conservation, which was awarded to him in November 1996. He is the founder and editor of the *Newsletter for Birdwatchers*. He had also served as the Honorary Secretary of the BNHS between 1963 and 1974.
- * **Bird Link Society (BLS):** A Society, with objectives similar to the Tiger Link, the Bird Link Society (BLS) was formed by Bikram Grewal in January 1997. Its objectives are broadly to act as a dynamic forum to save birds and their habitats, assist ecodevelopment around bird sanctuaries, research, and to pro-

mote education and disseminate information regarding birds and their habitats. For more details contact: *Bikram Grewal, 101/4, Kaushalya Park, Hauz Khas, New Delhi 110 016.*

The Wildfowl & Wetlands Trust: The Wildfowl & Wetlands Trust (WWT) became 50 years old in November 1996. The WWT was founded by the late painter and naturalist Sir Peter Scott in November 1946 on the River Severn at Slimbridge. His aim was to establish 'a centre for the scientific study, public display and conservation of the wildfowl of

the world'. By 1996, the WWT had eight UK-based Centres with work going on to establish another in the heart of London. The WWT has decided to change with the times, and has revised its objectives to '*WWT - working to save wetlands for wildlife and people*'

* **National workshop on new economic policy, opportunities and challenges for sustainable development of fisheries and conservation of aquatic resources, Bhopal, 6-7 Sept 1997.**

Organised by the Oriental Research Foundation, E-1/106 Arera colony, Bhopal 462016.

* **Asian Wetlands Conference: Theme: Wetlands for Sustainable Development, New Delhi, India, 29-31 January 1998.**

Organised by the Indian Environmental Society (U-112, Vidhata House, Vikas Marg, Shakarpur, New Delhi 110092. E-mail: iesenro@del2.vsnl.net.in) jointly with the Science and Environmental Education Society.

The conference will discuss the past, present and future of wetlands in Asian countries and shall cover a very wide range of topics concerned with all kinds of wetlands, their conservation and management.

* **World Birdwatch 97:** The third World

Birdwatch event to raise awareness of the need for conservation of birds and their habitats will be held on 4-5 October 1997. World Birdwatch was earlier conducted in 1993 & 1995. Birdlife International is co-ordinating the event.

The Bombay Natural History Society is the co-ordinator for the World Birdwatch event in India. The forms for the event were received in September and were sent to various organisations in different states of the country.

Groups all over the world will be organising public events centred around birds, and drawing attention to the threats that birds are facing. This year over 250 organisations in nearly 100 countries have registered for the event. The event will draw attention to the plight of the 1,111 bird species that are threatened with extinction (this is nearly 11% of the world's birds). The focus of the event will briefly be:

To highlight the threats facing birds in one's country; list out birds that need protection; identify and highlight the local and international bird groups that work and/or can influence protection to birds and their habitats; and find a way of balancing the needs of people and birds to secure the future of these globally threatened birds

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With Regards

