

NORTH INDIAN WETLANDS



THIS region includes the wetlands on the Gangetic plains, together with the coastal and freshwater wetlands of Rajasthan and Gujarat. It supports more breeding Sarus Cranes (on shallow wetlands and associated agricultural land) and Indian Skimmers (on the vast system of rivers) than any other region, and the scattered lakes and reservoirs also provide habitat for non-breeding flocks of Sarus Crane and significant numbers of breeding and wintering Pallas's Fish-eagles. The 'central population' of Siberian Crane winters in the region, but has declined to near extinction in recent years. The swampy wetlands of northern India, particularly in Bihar, were once the stronghold for Pink-headed Duck, a species which may now be extinct, although it could possibly survive in the more inaccessible parts of its former range. The conservation of grassland birds on the Gangetic plains is covered in G02.

	Threatened species			Total
	CR	EN	VU	
●	1	—	3	4
✈	—	—	—	—
🐦 ¹	1	1	3	5
Total	2	1	6	9

Key: ● = breeding in this wetland region.

✈ = passage migrant.

🐦 = non-breeding visitor.

¹ The Conservation Dependent Dalmatian Pelican is also a non-breeding visitor to this region.

- **Key habitats** Freshwater wetlands on riverine plains, and associated agricultural land; coastal wetlands.
- **Countries and territories** **India** (Punjab, Haryana, Delhi, Rajasthan, Gujarat, Uttar Pradesh, Madhya Pradesh, Bihar); **Nepal**.

Keoladeo National Park in Rajasthan is one of the most actively protected wetlands in Asia, but even here maintenance of inflow during drought is often a major problem. PHOTO: OTTO PFISTER



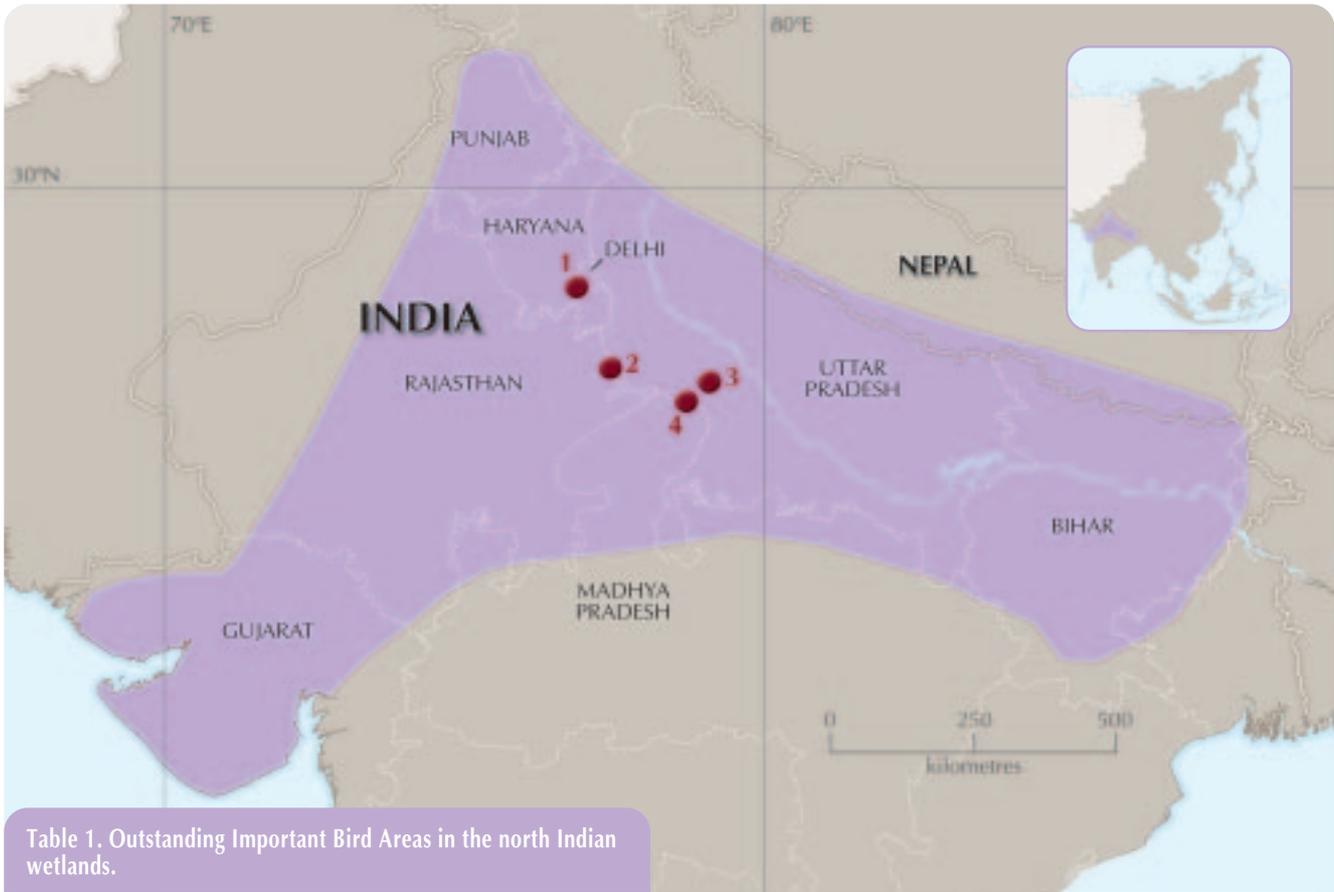


Table 1. Outstanding Important Bird Areas in the north Indian wetlands.

IBA name	Status	Territory	Threatened species
1 Sultanpur NP	PA	Haryana	Breeding Sarus Cranes, wintering Dalmatian Pelican
2 Keoladeo NP	PA ^{R,WH}	Rajasthan	The main wintering site for the tiny central population of Siberian Crane, also breeding Pallas's Fish-eagle and Sarus Crane
3 Etawah-Mainpuri wetlands	—	Uttar Pradesh	Large concentration of Sarus Crane
4 National Chambal WS	PA	Uttar Pradesh; Madhya Pradesh	A large Indian Skimmer population breeds in this riverine reserve, also Pallas's Fish-eagle and Sarus Crane

Several of the waterbirds of this region also occur in IBAs listed for G02 (Dudwa NP, Chitwan NP, Kosi Tappu WR and Royal Sukla Phanta WR) and G03 (Harike Lake WS). Note that more IBAs in this region will be included in the *Important Bird Areas in Asia*, due to be published in early 2004.

Key IBA name: NP = National Park; WS = Wildlife Sanctuary.

Status: PA = IBA is a protected area; (PA) = IBA partially protected; — = unprotected; R = IBA is wholly or partially a Ramsar Site (see pp.31–32); WH = IBA is wholly or partially a World Heritage Site (see p.34). White-rumped, Indian and/or Slender-billed Vultures of region G03 have (or had) populations in several IBAs in this region.

OUTSTANDING IBAs FOR THREATENED BIRDS (see Table 1)

Four IBAs have been selected, covering important breeding sites of Pallas's Fish-eagle, Sarus Crane and Indian Skimmer, as well as wintering Dalmatian Pelican and Siberian Crane. More sites of value to these birds will be documented during BirdLife's ongoing IBA Project.

CURRENT STATUS OF HABITATS AND THREATENED SPECIES

The vast Gangetic plains are densely populated and utilised throughout. The natural wetlands there have been greatly modified by drainage, irrigation and encroachment for agriculture and development over many centuries. Despite these changes, some extensive, rich wetlands remain, and this region is remarkable for the degree to which wildlife is able to coexist with man in wetland and agricultural areas, linked to the Hindu philosophical tradition. The region also includes extensive coastal wetlands in Gujarat, and freshwater lakes and reservoirs in Gujarat and Rajasthan,

vitaly important for both wildlife and man in these arid states. Huge numbers of waterbirds occur, including several threatened species, but significant recent declines are linked to wetland drainage, unsustainable exploitation for fuel and fodder, increased agricultural intensification and use of agrochemicals, human disturbance and hunting. Many of the major tributaries flowing into the Ganges have been dammed for hydropower and irrigation schemes, which has created some new wetlands, but is negatively affecting the habitat of riverine birds. The global range of Pink-headed Duck was centred on this region, but it almost certainly became extinct during the twentieth century.

CONSERVATION ISSUES AND STRATEGIC SOLUTIONS (summarised in Table 3)

Habitat loss and degradation

■ CONVERSION TO AGRICULTURE

Rapid human population growth over recent decades has caused intense competition for land and aquatic resources, and large-scale conversion of wetlands to agriculture. Water is diverted from rivers to supply irrigation projects, causing

The 'central population' of Siberian Crane winters in this region, but has declined to near extinction in recent decades.

PHOTO: JACOB WIJKEMA



Table 2. Threatened birds of the north Indian wetlands.

Species		Distribution and population
Dalmatian Pelican <i>Pelecanus crispus</i>	CD	Small numbers of non-breeding birds regular in Gujarat and near Delhi
Spot-billed Pelican <i>Pelecanus philippensis</i>	VU	Small numbers of non-breeding birds on the larger wetlands
Lesser Adjutant <i>Leptoptilos javanicus</i>	VU	Rare visitor, occasionally breeds
Greater Adjutant <i>Leptoptilos dubius</i>	EN	Rare non-breeding visitor
Pink-headed Duck <i>Rhodonessa caryophyllacea</i>	EX? CR	This region was historically a stronghold, but the species is now presumed extinct
Baer's Pochard <i>Aythya baeri</i>	VU	Small numbers of non-breeding birds regular in Nepal
Pallas's Fish-eagle <i>Haliaeetus leucoryphus</i>	VU	A significant but declining breeding population, augmented in winter by non-breeding birds
Siberian Crane <i>Grus leucogeranus</i>	CR	Tiny numbers visit Rajasthan in winter
Sarus Crane <i>Grus antigone</i>	VU	This region supports a high proportion of the global population
Indian Skimmer <i>Rynchops albicollis</i>	VU	A large population breeds along major rivers, but may be in decline

Other threatened waterbirds recorded from this region as rare (or possibly extinct) visitors are: White-headed Duck *Oxyura leucocephala*, Lesser White-fronted Goose *Anser erythropus*, Baikal Teal *Anas formosa* and Marbled Teal *Marmaronetta angustirostris*. In addition to the waterbirds, Greater Spotted Eagle *Aquila clanga* (VU; see F01) and Imperial Eagle *A. heliaca* (VU; see G01) occur in winter.

● = region estimated to support >90% of global breeding population, ● = 50-90%, ○ = 10-50%; = region estimated to support <10% of global non-breeding population; EX? = probably extinct

rivers and associated wetlands to become shallower and more vulnerable to desiccation and drainage. Wetland margins are increasingly being cultivated, including riverbanks and islands. There have been major changes in cropping patterns, including intensification of cultivation of sugarcane in Uttar Pradesh and soybean in Madhya Pradesh. As a result, the number of extensive wetlands with populations of large waterbirds has declined. Moreover, shortage of wetlands during the dry season forces waterbirds to gather in dense concentrations which are highly vulnerable to drought, hunting or other localised threats. In some areas, Sarus Cranes are forced to feed in fields, causing major economic losses and antagonism between farmers and birds.

This loss of natural wetlands needs to be stopped, with the remaining fragments protected as a network of community reserves. Small patches of non-cultivable marshland should be managed for wildlife within agricultural landscapes. Forms of agriculture beneficial to threatened birds should be encouraged, notably wet rice cultivation (used by breeding Sarus Cranes). State and national governments should develop appropriate regulations and policies for wetland conservation, and the

Indian Ministry of Rural Development should modify their current land classification to remove wetlands from the 'wasteland' category. Environmental awareness programmes, stressing the traditional relationships between man and wildlife and the role of wetlands in maintaining water quality and commercial fish stocks, will help minimise further wetland conversion and promote the protection of Sarus Crane nest sites in agricultural areas.

■ **INCREASED CULTIVATION OF WATER CHESTNUT**

Water chestnut *Trapa* is an aquatic plant which produces edible fruit, and is an important crop in northern India. It forms extensive surface mats that reduce wetland productivity and inhibit feeding by waterbirds. The cultivation of water chestnut has recently increased in this region, devaluing many wetlands as waterbird sites. It is planted during the Sarus Crane breeding season, causing disturbance and egg loss, and is harvested in winter, preventing non-breeding waterbirds from using the wetlands. In addition, large amounts of pesticide are sprayed directly into the wetlands to protect the crop (see below). The cultivation of water chestnut should be strictly

Indian Skimmer colonies are vulnerable to changes in river flow caused by dams and irrigation projects.



PHOTO: OTTO PFISTER

regulated, particularly at key wetlands for threatened birds, e.g. by establishing zones in large wetlands where its cultivation is prohibited.

■ WETLAND EXPLOITATION

The vegetation bordering wetlands provides vital feeding, shelter and nesting sites for many waterbirds, but it is commonly cut or burnt, for example to make thatch and other grass products. The tall trees used by Pallas's Fish-eagle, storks and other waterbirds as nest sites are sometimes felled for timber, fuel and fodder. Mud removal (for construction) and clearance of aquatic vegetation further reduce habitat availability, although moderate cutting or grazing of vegetation is essential to keep shallow wetlands from becoming overgrown. In general an ample border of natural vegetation, including tall trees, should be maintained around wetlands. Potential eyries for Pallas's Fish-eagle need to be protected from cutting and disturbance. The planting of nest trees or provision of artificial nesting platforms should be undertaken for this species, carefully sited to avoid disturbance and persecution.

■ DAMS AND IRRIGATION

Several factors affect the natural water supply to wetlands, particularly dams and irrigation projects. With so many demands on water, maintenance of inflow during drought is often a major problem, even at Keoladeo National Park, one of the most actively protected wetlands in Asia. Dams have been constructed for hydropower and irrigation schemes on many of the major tributaries of the Ganges. In some cases dam projects have created reservoirs or other wetlands (often by seepage from irrigation canals) that provide important new habitat for some waterbirds. However, although dams control flooding, they cause problems for Indian Skimmer and other sandbar-nesting birds because: (1) dams block sediment flow and cause intermittent sediment-poor flooding: the first starves sandbars of sediment while the second scours them away; (2) many dams store water during the wet season and release it in the dry season (when skimmers breed), a factor that reduces seasonal changes in water levels such that they may never drop sufficiently low to expose much sand; alternatively, insufficient water release during the dry season

may prevent both the formation of river islands and nesting by skimmers, or connect river islands with the bank allowing access by predators; (3) the control of flooding regimes is often not beneficial as it allows agricultural development on banks and islands, further reducing the area of bare sand available for nesting; (4) if the dam is used to generate electricity, sandbars may be flooded on a daily basis because of fluctuations in water release. The impact of dams on river flow is exacerbated by the widespread use of large pumps to remove water from rivers to irrigate the surrounding land.

Changes of water level in rivers and other wetlands, and the impact of these changes on threatened waterbird populations, need to be monitored. There may be a need to control drainage and irrigation activities, even some way upstream, if wetland sanctuaries are being negatively affected. When dams and irrigation projects create new wetlands, they should be managed to maximise their value for waterbirds. Given the impact that dam projects can have on Indian Skimmer and other sandbar-nesting birds, proposed new hydropower and irrigation schemes upstream of important nesting colonies should be carefully considered (including through environmental impact assessments). Where dams are already in place on rivers with important skimmer colonies, for example on the Chambal River, conservationists should work with the dam authorities to minimise the potential problems detailed above. It may also be possible to manage the colonies themselves to reduce the potential problems, e.g. by artificially maintaining the river sandbanks and islands, preventing agricultural encroachment into these habitats and developing methods to protect active nests from flooding.

■ SILTATION AND FLOODING

Dry-season flooding may destroy colonies of Indian Skimmers situated on low sandbanks. This can result from natural phenomena, but is exacerbated by deforestation. The excessive erosion of deforested headwaters may also lead to heavy siltation and deposition of sediment in wetlands. However, the incidence of flooding and silt deposition is greatly modified by the dams on many of the region's rivers (see above). Programmes of reforestation and forest conservation are required in the catchments of the

region's rivers (including in the Himalayas: see F04), possibly coupled with dredging of heavily silted wetlands.

■ **DEVELOPMENT (URBAN, INDUSTRIAL, ETC.)**

Wetland habitat is being lost because of the constant spread of villages and industry. The mining of banks and beds of wetlands and rivers for sand, gravel and stones causes disturbance, lowers food supply and reduces nesting habitat for birds. Intensive dredging regimes destroy river islands, contributing to the decline of the Indian Skimmer.

Excavation of sand for nearby lime and brick industries has caused siltation at several sites. These activities need to be controlled when they are damaging wetland habitat, especially inside protected areas.

■ **DISTURBANCE**

Wetlands are intensively used and disturbed by large numbers of fishermen and hunters, for transportation and by local people for bathing, etc. The large number of people and cattle visiting the fringes of wetlands increases the risk of eggs and chicks being trampled. Wetland reserves need to be patrolled to minimise disturbance in the more sensitive areas, particularly during the breeding season. Outside protected areas, human disturbance needs to be controlled at Pallas's Fish-eagle eyries, Indian Skimmer colonies and Sarus Crane nesting and roosting areas, possibly by designating these sites as local sanctuaries where human activities can be regulated (e.g. by guarding during the breeding season).

■ **POLLUTION/PESTICIDES**

Wetlands are affected by air- and water-borne industrial pollutants, agrochemical run-off (causing eutrophication) and municipal waste from adjacent towns, and diminishing

water supplies mean that many wetlands are less frequently flushed by pulses of clean water. Pesticides are used in the cultivation of water chestnut (see above) and other crops. Large waterbirds and raptors are usually predators or scavengers, and they are thus particularly vulnerable to build-up of toxic chemicals. The use of pesticides (such as dieldrin and aldrin) or fertilisers should be strictly controlled, especially in areas close to important wetlands, and traditional organic agricultural practices encouraged wherever possible.

■ **REDUCED FOOD SUPPLY**

Many wetlands suffer intensive uncontrolled fishing and this must reduce food supply for piscivorous species such as Pallas's Fish-eagle. Waterways are sometimes deliberately poisoned to kill fish for eating, destroying aquatic fauna including birds. A sustained recovery of fish stocks could be achieved by preventing fishing in parts of wetlands, and perhaps imposing fishing quotas, and fishing with chemicals and dynamite should be banned.

Protected areas coverage and management

■ **GAPS IN PROTECTED AREAS SYSTEM**

The region has many wetland reserves and sanctuaries, which provide some protection for the threatened waterbirds. However, given the dispersed distributions of species such as Pallas's Fish-eagle and Sarus Crane, protected areas alone cannot ensure their survival. To persist in this densely populated and intensively used region, these birds need conservation measures at the landscape level (e.g. control of water levels and promotion of sympathetic farming practices), together with a network of protected areas (including small, locally-managed Community Conservation

Table 3. Conservation issues and strategic solutions for birds of the north Indian wetlands.

Conservation issues	Strategic solutions
Habitat loss and degradation	
<ul style="list-style-type: none"> ■ CONVERSION TO AGRICULTURE ■ INCREASED CULTIVATION OF WATER CHESTNUT ■ WETLAND EXPLOITATION ■ DAMS AND IRRIGATION ■ SILTATION AND FLOODING ■ DEVELOPMENT (URBAN, INDUSTRIAL, ETC.) ■ DISTURBANCE ■ POLLUTION/PESTICIDES ■ REDUCED FOOD SUPPLY 	<ul style="list-style-type: none"> ➤ Maintain patches of wetland within agricultural landscapes ➤ Encourage wet rice cultivation to provide additional breeding habitat for Sarus Crane ➤ Develop government regulations and policies for wetland conservation, and remove wetlands from the 'wasteland' category in the current land classification ➤ Regulate the cultivation of water chestnut in important wetlands ➤ Plant nest trees or erect artificial nest platforms for Pallas's Fish-eagles ➤ Manage wetlands created by dams and irrigation to maximise their value for waterbirds ➤ Assess the environmental impact of proposed dam projects, especially on important rivers for threatened waterbirds ➤ Control flow regimes below dams to protect Indian Skimmer colonies ➤ Regulate human activities at key wetlands to minimise disturbance ➤ Limit use of agrochemicals, and encourage traditional organic farming methods ➤ Improve management of fish stocks, and ban fishing with chemicals
Protected areas coverage and management	
<ul style="list-style-type: none"> ■ GAPS IN PROTECTED AREAS SYSTEM ■ WEAKNESSES IN RESERVE MANAGEMENT 	<ul style="list-style-type: none"> ➤ Develop networks of small, locally managed community conservation areas to protect waterbird nest and roost sites ➤ Establish new protected areas for Indian Skimmer and Pallas's Fish-eagle, and review the design and management of National Chambal Sanctuary and other riverine reserves ➤ Manage wetland reserves to maximise their value for threatened waterbirds
Exploitation of birds	
<ul style="list-style-type: none"> ■ HUNTING AND PERSECUTION 	<ul style="list-style-type: none"> ➤ Improve enforcement of hunting laws, by patrolling protected wetlands and monitor the sale of waterbirds at markets in Bihar and elsewhere ➤ Minimise conflict between farmers and Sarus Cranes through education programmes and an award scheme
Gaps in knowledge	
<ul style="list-style-type: none"> ■ INADEQUATE DATA ON THREATENED BIRDS 	<ul style="list-style-type: none"> ➤ Conduct surveys to map Pallas's Fish-eagle eyries and Indian Skimmer colonies, and determine what measures are required for their protection ➤ Study dam management and river flow regimes to help determine what adjustments are required to protect Indian Skimmer colonies ➤ Search for Pink-headed Duck, principally in its former strongholds in Bihar

Areas, a new category of reserve created by a 2002 amendment to the Indian Wildlife Protection Act) to protect some of the most important nesting, roosting and feeding sites. This region is the last stronghold of Indian Skimmer, as well as being important for Pallas's Fish-eagle, and the protection of their habitats is therefore a high priority; new riverine reserves should be established in areas with important populations, for example along the Ganges River in Uttar Pradesh and Bihar. The design and management of existing reserves which include riverine habitats (and skimmer colonies), such as National Chambal Sanctuary, should be reviewed to ensure that they confer the maximum protection to the species (by minimising disturbance and the chances of flooding or drying out).

■ WEAKNESSES IN RESERVE MANAGEMENT

Some wetland reserves are inappropriately managed. At Keoladeo National Park the spread of aquatic vegetation after grazing control caused a drastic reduction in the amount of open water and hence in the reserve's suitability for some waterbird species. In most wetland reserves, vegetation (e.g. *Paspalum distichum*, *Vetiveria zizanioides*, etc.) needs to be cleared periodically and moderate grazing encouraged. In Gujarat and Uttar Pradesh, some lakebeds require digging or dredging in the dry season to ensure suitable depths for pelicans, overgrazing should be controlled, and encroaching *Prosopis juliflora* annually removed. The educational potential of Keoladeo National Park has not been fully realised; it is ideally situated near major population centres, and visited by large numbers of tourists, so efforts should be made to provide as much information as possible regarding conservation.

Exploitation of birds

■ HUNTING AND PERSECUTION

Ducks are hunted with shotguns or nets in northern India,

either for food or sport, and in some regions storks are also targeted. Even the Sarus Crane, once immune from persecution because of traditional beliefs, is increasingly affected by the removal of its nests or eggs by rice farmers who consider it an agricultural pest. Efforts are needed to control hunting, including by patrolling wetland protected areas and intercepting illegal hunters, and by monitoring and controlling the sale of waterbirds as food in markets, particularly in Bihar and other areas where large-scale hunting is a problem. Measures are required to minimise conflicts between Sarus Cranes and local people, including setting aside small areas of uncultivated wetland and grassland for nesting (see above), and education programmes stressing the threatened status of this species and the traditional relationship between cranes and man. An award scheme to recognise as 'Sarus Protectors' those farmers who have provided suitable habitat on their land has proved successful in maintaining the traditional religious links between farmers and cranes, and in increasing the participation of local people in crane conservation; this approach should be used more widely.

Gaps in knowledge

■ INADEQUATE DATA ON THREATENED BIRDS

Surveys are required to identify key feeding and roosting areas for Sarus Crane, and along rivers to locate Pallas's Fish-eagle eyries and Indian Skimmer colonies, and to determine what measures are required for the protection of these sites. The effects of dams and irrigation schemes on the flow regimes in the regions' rivers should be studied to determine how to prevent flooding of active Indian Skimmer colonies. Although it is probably extinct, searches should be made for Pink-headed Duck, principally in its former strongholds in Bihar, including analysis of satellite images to locate potentially suitable areas of seasonally flooded swamps on riverine floodplains.

This region is the global stronghold for Sarus Crane, but it is being affected by changing agricultural practices and the loss of natural wetlands.



PHOTO: TIM LOSEBY