

# SAROVAR SAURABH

## ENVIS NEWSLETTER on Wetland Ecosystems

[www.wetlandsofindia.org](http://www.wetlandsofindia.org)

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Sálím Ali Centre  
for  
Ornithology and Natural History

### Editorial

The Sálím Ali Centre for Ornithology and Natural History (SACON) welcomes you to the inaugural issue of **SAROVAR SAURABH**, an ENVIS Newsletter on wetland ecosystems, sponsored by the Ministry of Environment and Forests, Govt. of India. The major goal of the Newsletter is to share information about wetlands with various users and, to highlight conservation issues of relevance to wetland community of professionals, managers, environmentalists and other stakeholders.

The newsletter is organized into six segments: Inventory of Wetlands, Use of modern spatial technological tools, Wetlands in Peril, Wetlands of International significance e.g. Ramsar Sites, Endangered Wetland Birds and Endangered / Endemic Wetland Plants and Website of the month. In addition to monthly compilation of news items on Wetland Ecosystem, it is an attempt towards establishing linkages with information users, carriers and providers from among government, academia, business and Non-Governmental Organizations including that with the ENVIS.

To make this effort worthwhile the editorial team of **SAROVAR SAURABH** seeks active participation of its readers in terms of providing information, news, views, photographs and articles on issues of wetland conservation.

We welcome your feedback on the Newsletter and its contents.

**V.S. Vijayan**  
Director

**S.N. Prasad**  
Senior Principal Scientist

### In This Issue

An Inventory of Indian Wetlands	2
Application of Modern Spatial Technological Tools	3
Wetlands in Peril - The Wular Lake	5
News Items	5
Endangered Wetland Birds	7
Endemic / Endangered Wetland Plants	8
Website of the Month	8



Common Kingfisher

## An Inventory of Indian Wetlands

### Inland Wetlands

According to the results of the wetland inventory prepared by Space Application Centre (SAC) in the year 1991-92 there were 27403 wetland units in the country occupying 7581871 ha area, out of which 23444 were inland wetlands, occupying 3558915 ha of the land cover.

Type-wise estimates of inland wetlands reported by the SAC are the following:

Wetland Category		Number	Area (ha)
<b>Inland Wetlands</b>			
Natural	Lakes/Ponds	4646	679530
	Ox-bow lakes	3197	151051
	Waterlogged (Seasonal)	4921	285744
	Playas	79	118519
	Swamp/Marsh	1814	197784
Man-made	Reservoirs	2208	1481987
	Tanks	5549	558344
	Waterlogged	892	77302
	Abandoned Quarries (water)	105	5774
	Ash pond/Cooling ponds	33	2881
Total Inland Wetlands		23444	3558915

### Coastal Wetlands

Coastal wetlands are among the most productive ecosystems in the world, comparable to tropical rain forests and coral reefs. They are the "nursery areas" for many fish and shellfish and are also important for keeping coastal waters clean. According to the inventory prepared by the Space Application Centre (SAC), out of a total of 27403 wetland units in the country covering 7581871 ha area, 3959 were coastal wetlands, occupying 4022956 ha of the land cover.

Wetland Category		Number	Area (ha)
<b>Coastal Wetlands</b>			
Natural	Estuaries	97	153966
	Lagoons	34	156403
	Creeks	241	19230
	Backwater	32	17075
	Tidal/Mudflat	663	2362056
	Sand/Beach/Spit/Bar	772	421019
	Coral Reefs	487	84137
	Rocky Coast	85	17686
	Mangroves	858	340055
	Salt Marsh/Marsh Veg	161	169840
Other Vegetation	117	139102	
Man-made	Salt pans	106	65496
	Aquaculture ponds	356	76891
Total Coastal Wetlands		3959	4022956
Total (Inland & Coastal) wetlands in India		27403	7581871

### Application of Modern Spatial Technological Tools

Modern spatial technological tools such as GIS together with Remote Sensing technology have proved effective as well as efficient in wetland conservation and management. Remote-sensing data have paved the way for an economic methodology for inventorying, monitoring and management of wetlands, because of the improved spatial, spectral and temporal resolution. Satellite data in association with the geographical information systems are now being used for identification, mapping, inventorying and monitoring of cropping pattern, crop production and condition; monitoring irrigation status and in the diagnosis of poorly performing irrigation patterns. This inventoried data provide valuable inputs for formulation of conservation and

management plans for development of land and water resources.

The National Wetland Committee of the Ministry of Environment and Forests, Govt. of India took an initiative towards the use of spatial technology by recommending a nation-wide inventory of wetlands to be undertaken under the guidance of National Wetland Committee with the support of the Standing Committee on Bioresources (SC-B) of the National Natural Resource Management System (NNRMS) and MoE&F. The Space Application Center (SAC) Ahmedabad was identified as the nodal agency to coordinate the task. SAC in turn assigned the task to various State Remote Sensing Centres who mapped the wetlands for the very first time in India by visually interpreting IRS-LISS 1 False Color

Composites (FCCs). The states of Haryana, Himachal Pradesh, Sikkim, West Bengal, Goa, Punjab, Chandigarh, Delhi, Andaman & Nicobar, Lakshadweep, Dadra Nagar Haveli were mapped at 1:50,000 scale and the rest of the country at 1:250,000 scale. Thus the inventory covered only a small number of wetlands as the minimum mapping area was 56.25 ha and wetlands smaller than 56.25 ha could not be mapped. The data merely indicated the location of wetlands and the classification was only geomorphologic in nature and had no other factual conservation value.

It was only in the year 2000 that the SACON was entrusted by the MoE&F to undertake the crucial task of mapping the

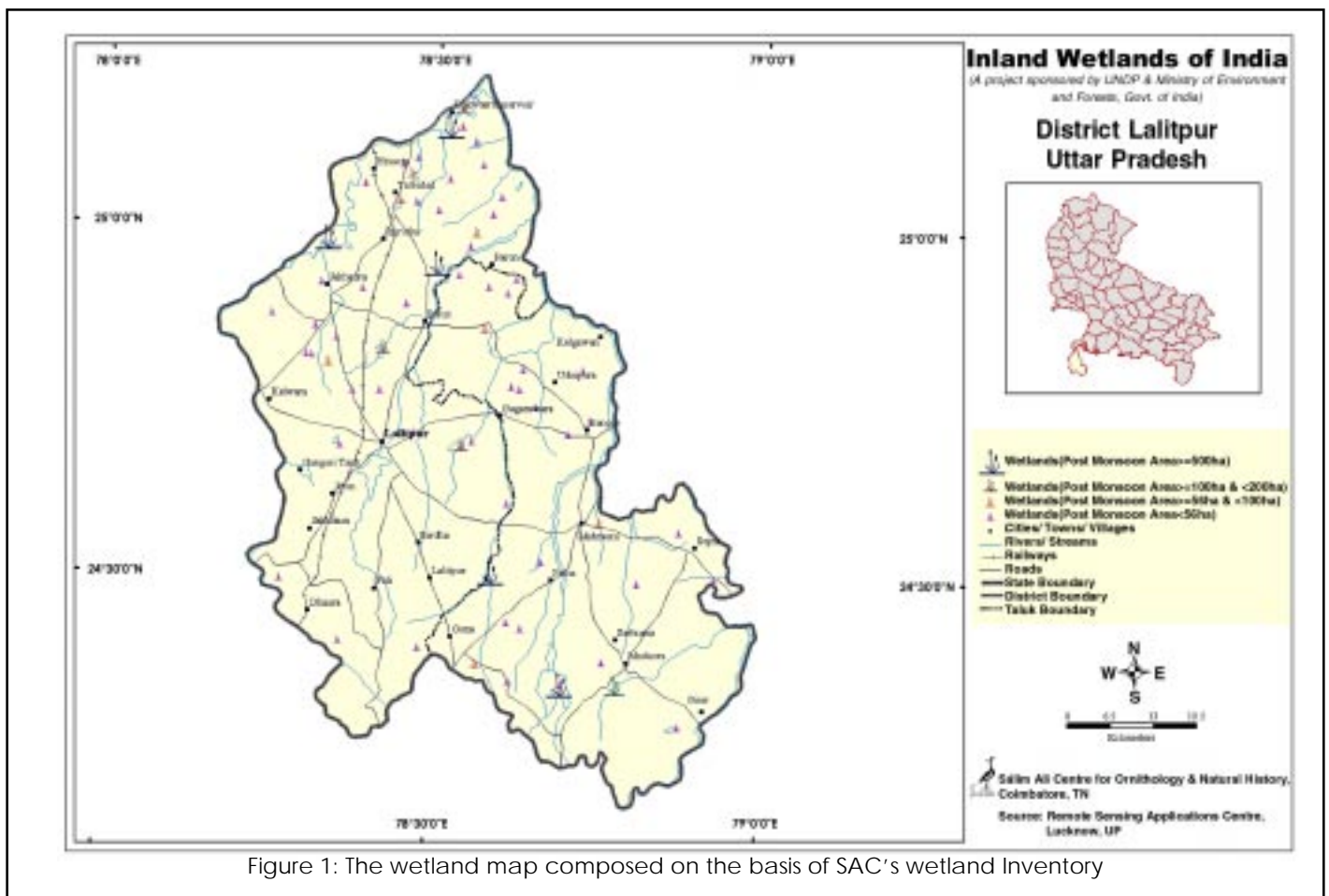


Figure 1: The wetland map composed on the basis of SAC's wetland Inventory

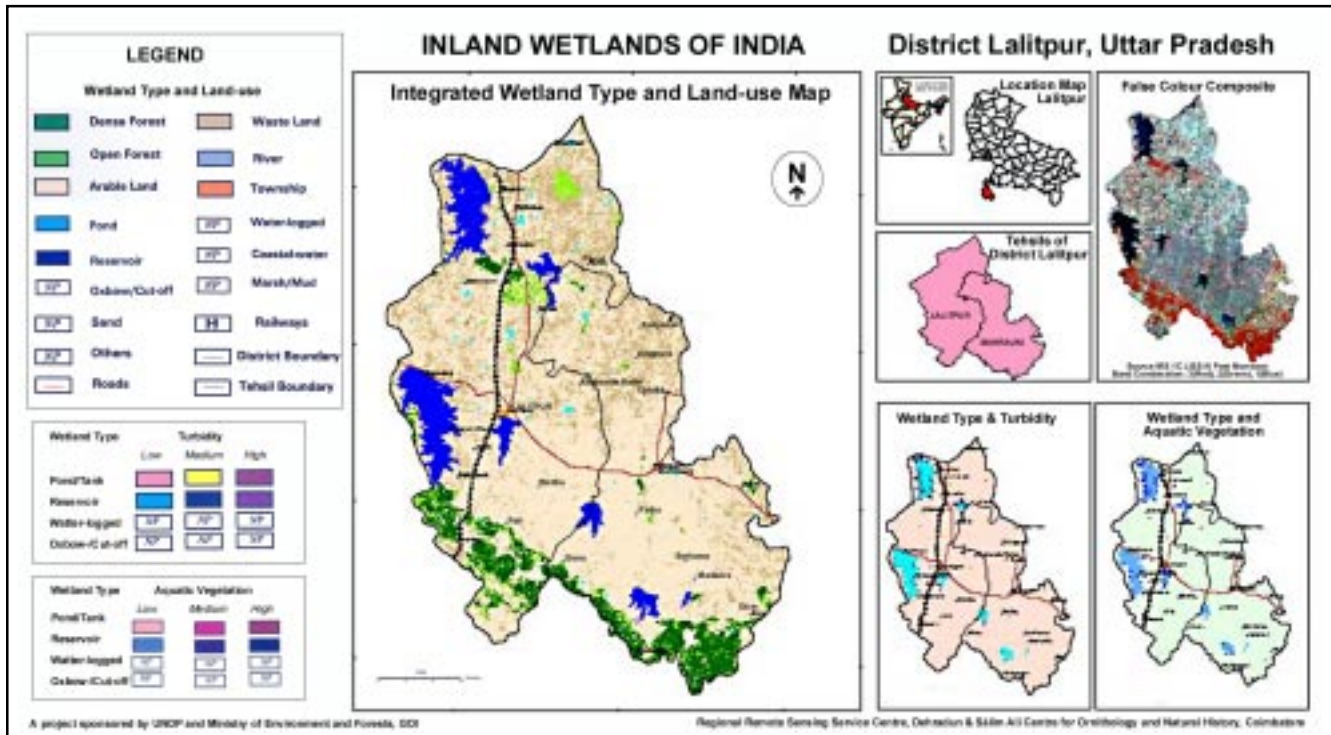


Figure 2: The wetland map composed using the satellite (IRS-1C LISS III) image

wetlands with an improved resolution and classifying them with the techniques of digital image processing.

The objective of the project was not only to map the wetlands of select states but also to prioritize them for a network of protected areas.

SACON in conjunction with Regional Remote Sensing Service Centres of Department of Space, Govt. of India developed a methodology to process the IRS satellite's LISS III sensor data that involved classifying the land cover into various classes of interest. A pilot project on the wetland of Keoladeo National Park, Bharatpur was carried out to standardize the same.

Classification scheme proposed by Gopal (1994) on Indian wetlands for the Indian subcontinent is a mix of hydrological and biological factors. However, from a practical conservation planning perspective, the immediate need of the hour was to produce a reasonably detailed classification

based on a mix of habitats and aquatic vegetation. The merits of such a classification lie mainly in its utility to both managers and academicians. Such a scheme is possible with an extensive and state of the art spatial technology and a carefully chosen field information and data. The current sensor resolution, of course, permits aquatic vegetation classification at species assemblage level, not at species level. It was decided to classify the landcover into six broad classes, namely forest, arable land, wasteland, wetland, roads and major settlements. Wetlands were further classified into oxbow lakes, ponds, reservoirs and waterlogged area. For classification, band 4 of the IRS 1C LISS III sensor image data was density sliced in order to separate water bodies. The threshold values for water bodies were obtained interactively. A bit map for water bodies was generated in the process which was used further in classifying turbidity patterns and aquatic vegetation. Although the density slicing of Band 4 gives

acceptable results in most of the cases, it may sometime lead to confusions with non-water classes. One such class is the shadow due to terrain. Such anomalies were removed through stratified density slicing and contextual refinements.

Normalized Differential Vegetation Index (NDVI) that minimizes effect of shadow was also used for separation of water bodies, as it's known that wetlands fall in the lower NDVI zone compared to terrestrial vegetation. However, it is found that NDVI also exhibit confusing results in the presence of snow cover and barren land that have comparable NDVI values with that of water. Hence, an interactive integration of band 4 and NDVI was carried out to delineate water bodies from image data.

Sample map of the wetlands based on SAC's Wetland Inventory (Fig. 1) and, the wetland type and landuse map of Lalitpur district, UP (Fig. 2) produced from our project are given above.

### Wetlands in Peril - The Wular Lake

Situated about 40 km northwest of Srinagar and lying in the drainage basin of River Jhelum, Wular, is one of the numerous freshwater lakes, that the Vale of Kashmir is bestowed with.

The name 'Wular' - derived from a Sanskrit word meaning 'turbulent' - refer to the high waves one encounters when crossing the Lake in strong winds, itself speaks of its capacity. Besides absorbing Jhelum's turbulent flood waters, during monsoon, this huge lake attracts a variety of local as well as migratory waterfowl. It is the largest feeding ground of dabbling and diving ducks. Acknowledging its ecological and hydrological values, the Government of India designated the Wular as a Ramsar Site in 1990.

Approximately 40,000 people of neighboring 21 villages are directly or indirectly dependent on it. It is estimated that a revenue of over Rupees 2 crore is generated annually by means of fishery, willow plantation and extraction of Singhara (*Trapa natans*) and Nadroo (Nelumbo) from its waters. It is also used for navigation among the important towns of north Kashmir, namely Bandipora, Sopore, Sonawari and Baramulla. The lake, however, remains amongst the most poorly conserved Indian wetlands and currently is severely threatened by siltation and shrinkage in area. The statistics of the Department of Environment and Remote Sensing reveal that the lake with an area of 132.5 sq km in April 1988 has shrunk to merely 56.5 sq km; a loss of more than half of its area in just 4 years.

This shrinkage of area speaks of the extent of degradation its catchment has suffered and the same can be attributed to the mounting pressures of the burgeoning population which has taken their toll on the lake's ecosystem. Improper agricultural practices and deforestation in the catchment have resulted in discharge of pesticides, deposition of eroded sediments and eutrophication in the lake. In addition a number of effluents, enter this wetland from a large number of Army Camps located on the banks of its tributaries. Untreated sewage and human waste also go directly into various feeding tributaries throughout its catchment.

The conservation of this Ramsar site calls for a coordinated ecologically oriented approach involving the satellite water bodies of Hygam, Hokera, Manasbal, Dal Lake and Anchar, as all of them ultimately drain into this most picturesque lake of Kashmir.

#### References:

1. Inland Wetlands of India-Wetlands of J & K: A MoE&F project of SACON.
2. India's Wetlands, Mangroves and Coral Reefs- WWF India.

### Chilika lake now a death trap for migratory birds

Himtimes News

Chilika Lake (Orissa): Chilika Lake Bird Sanctuary is fast becoming a death trap for migratory birds. Located a few kilometers from Bhubaneswar city, the renowned sanctuary attracts hundreds of thousands of birds every year. This year more than 200,000 birds have fallen prey to illegal poaching. Bird lovers say poachers use chemicals to trap the birds.

"Poachers are killing birds rampantly. They use chemicals to kill them. Except in a few pockets, poaching is being done in every area. The birds are taken from here and then sold in big cities like Bhubaneswar and other areas," said Ram Behera, an anti-poaching activist.

Chilika is the largest brackish water lagoon on the eastern coast and also one of the largest wintering grounds for migratory waterfowl.

Birds arrive here every year from October to December from the higher latitudes of the Northern Hemisphere to escape the extreme cold conditions.

Most of them fly thousands of kilometers from places like Siberia. Along with common species such as Sandpiper, Wigeon, Pintail Duck and Gadwall, many rare species, namely Peregrine Falcon, Spotbilled Pelican, Pallas Fishing Eagle and Asian Dowitcher also inhabit these warm waters.

Though villagers and former poachers do extend some help under the "village bird protection" programme started in 1996, most of them back out due to lack of government support.

While most birds are sold for their meat, the rare species are bought by rich clients to be kept as pets. Birds like Peregrine Falcon fetch as high as \$ 5,000.

Monalisha Bhujbar, secretary of the Chilika Protection Programme, said it would be difficult to sustain anti-poaching activities without help from the federal government.

"They (poachers) make around 10,000 rupees. For us to wean them away, we need more incentives from the government. The government has to do something. We are after all a non-governmental organisation, we are promoting (anti-poaching). But we need more incentives from the government," said Bhujbar.

The lake sanctuary is one of the country's most sensitive bio-diversity hotspots and was designated as a Ramsar site or a wetland of international importance in 1981.

Unfortunately in recent years it has been facing consistent problems ranging from rising salinity levels and poaching to extensive fish farming, all of which have severely dented its delicate eco-system. While over 20 million winged visitors reached the sanctuary in 1999, the figures have fallen to just three million birds this year.

**State to take care of Saras**

Mohit Dubey  
Times News Network[ Friday, March 22, 2002]

LUCKNOW: The forest department, the UP government and the judiciary have joined hands to stave off the threat to the life of the Indian crane — Saras.

In a landmark move, a jointly signed undertaking was given to the Allahabad High Court by chief wildlife warden RL Singh and chief secretary AP Varma that all care would be taken to ensure free and lively habitat for the crane in regions like Orai, Etawah and Mainpuri.

The state government was reacting to a public interest litigation (PIL) in which it had been pleaded that owing to a soil reclamation project initiated by the Union agriculture ministry in parts of the Doab region, the habitat of the Indian crane, which is facing extinction, had been endangered.

The second phase of the Rs 1457 crore WB project, currently on in UP, is reported to be rendering a body blow to the habitat of Indian crane since it involved a large amount of draining of land.

The PIL was filed by the Wildlife Trust of India and NGOs like the Bombay Natural History Society and International Crane Fund, which had taken up the cause and had sent some representations to the Union environment ministry seeking its intervention in the matter.

Rajya Sabha member and erstwhile king of Jammu and Kashmir Dr Karan Singh had also taken up the cause. Out of 9,000 Indian cranes in India about 5,000 are in UP, out of which a sizable chunk of them comes from Etawah-Mainpuri belt.

Meanwhile, a Times News Network report from Allahabad added that the High Court bench of Chief Justice SK Sen and Justice V M Sahai directed the state government not to widen the nullah and drainage in the wetlands located in the districts.

The bench also asked the respective district magistrates and other respondents to do everthing to save the life of Saras.

The bench acted on a writ petition filed by the New Delhi based Wildlife Trust of India (WTI). The petitioner contended that Saras is a state bird and

only those species breeding south of Himalayas were resident in India.

These wetlands are home to more than 30 per cent of the world's total crane population, according to WII, the petitioner said. Hence he prayed that reclamation, conversion, draining out of any canal, passing through these wetlands should be stayed.

The petitioner also alleged that the irrigation department officials of all the three districts had leased out the wetland, causing irreparable damage to cranes.

**Dams, water resources & traditional water harvesting systems**

The Hindu, New Delhi, 2/8/03, 5

**Community network for saving wetlands**

Experts who studied inland wetlands in the country for the past three years during the process of identifying them have suggested extinction. The wetlands are fast disappearing from all over India and various factors, including land use, agricultural practices, irrigation, clay gathering, fishing and sewerage disposal among others, are responsible, it is being pointed out. The first of its kind in the country, the study by the Coimbatore based Sálím Ali Centre for Ornithology and Natural History (SACON), was carried out on major wetlands, representing the bio-diversity of a local area.

**Dams, water resources & traditional water harvesting systems**

The Tribune, New Delhi, 2/3/03, 2

**Pong Dam wetlands get global status**

The Pong Dam wetlands, one of the largest man made wetlands in northern India, and the Tso Morari wetlands in Jammu and Kashmir, have finally got the global arm of protection. They have been included in the Ramsar list of Ramsar Convention Bureau, Switzerland, along with nine others in the country. with the inclusion of these in the list, India now has 19 wetlands of international importance.

**UN Embarks on International Year of Freshwater 2003**

New York, December 12, 2002 (ENS)

Today, four out of every 10 people world-wide live in areas experiencing water scarcity. By 2025, as much as two thirds of the world's population - an estimated 5.5 billion people - may be living in countries that face a water shortage. To address this crucial issue, the United Nations General Assembly has declared 2003 the International Year of Freshwater.

The United Nations, governments and many non-governmental and private sector partners are planning a wide range of events and activities for the International Year of Freshwater, which is being jointly coordinated by the UN Department of Economic and Social Affairs and the UN Educational, Scientific and Cultural Organization (UNESCO).

**Sarus Cranes in Keoladeo National Park**



V.S. Vijayan

### Endangered Wetland Birds

Habitat degradation and loss of biodiversity have caused a decrease in the conservation value of several of the country's wetlands. Besides wetland destruction and pollution, hunting and poaching of waterfowl and animals have come up as a more direct threat. Several of the wetland dependent fauna in India are consequently diminishing. Some are even on the brink of extinction. The following 28 threatened wetland species have been identified in India as listed in Threatened Birds of Asia by BirdLife International 2001.

Species	Common Name	Status	Resident (R) / Migrant (M)
<i>Pelecanus crispus</i>	Dalmatian Pelican	CD	M
<i>Pelecanus philippensis</i>	Spot-billed Pelican	VU	R
<i>Ardea insignis</i>	White-bellied Heron	EN	R
<i>Ciconia boyciana</i>	Oriental Stork	EN	M
<i>Leptoptilos javanicus</i>	Lesser Adjutant	VU	R
<i>Leptoptilos dubius</i>	Greater Adjutant	EN	R
<i>Oxyura leucocephala</i>	White-headed Duck	EN	M
<i>Anser erythropus</i>	Lesser White-fronted Goose	VU	M
<i>Cairina scutulata</i>	White-winged Duck	EN	R
<i>Anas formosa</i>	Baikal Teal	VU	M
<i>Marmaronetta angustirostris</i>	Marbled Teal	VU	M
<i>Rhodonessa caryophyllacea</i>	Pink-headed Duck	CR	R
<i>Aythya baeri</i>	Baer's Pochard	VU	M
<i>Haliaeetus leucoryphus</i>	Pallas's Fish-eagle	VU	R
<i>Aquila clanga</i>	Greater Spotted Eagle	VU	R
<i>Grus leucogeranus</i>	Siberian Crane	CR	M
<i>Grus monacha</i>	Hooded Crane	VU	M
<i>Grus nigricollis</i>	Black-necked Crane	VU	M
<i>Grus antigone</i>	Sarus Crane	VU	R
<i>Rallina canningi</i>	Andaman Crake	DD	R
<i>Heliopais personata</i>	Masked Finfoot	VU	R
<i>Gallinago nemoricola</i>	Wood Snipe	VU	R
<i>Tringa guttifer</i>	Spotted Greenshank	EN	M
<i>Eurynorhynchus pygmeus</i>	Spoon-billed Sandpiper	VU	M
<i>Rynchops albicollis</i>	Indian Skimmer	VU	R
<i>Pellorneum palustre</i>	Marsh Babbler	VU	R
<i>Chrysomma altirostre</i>	Jerdon's Babbler	VU	R
<i>Paradoxornis flavirostris</i>	Black-breasted Parrotbill	VU	R

**Status:** CD=Conservation Dependent; CR=Critical; DD=Data Deficient; EN=Endangered; VU=Vulnerable



Siberian Crane

### Endemic/Endangered Wetland Plants

More than 100 wetland plant species have been identified as endemic but a few species extend to the neighbouring countries in the Indian subcontinent (C.D.K. Cook 1996. Aquatic and wetland plants of India, OUP). Following is the list containing some of them.

<i>Ammannia desertora</i>	·	<i>Fimbristylis woodrowii</i>
<i>Aponogeton crispus</i>	·	<i>Fuirena capitata</i>
<i>Aponogeton appendiculatus</i>	·	<i>Fuirena trilobites</i>
<i>Aponogeton natans</i>	·	<i>Fuirena tuwensis</i>
<i>Aponogeton satarensis</i>	·	<i>Fuirena wallichiana</i>
<i>Coelachne minuta</i>	·	<i>Fuirena swamyii</i>
<i>Coelachne perpusilla</i>	·	<i>Geissapsis tenella</i>
<i>Cryptocoryne tortuosa</i>	·	<i>Griffithella hookeriana</i>
<i>Cryptocoryne cognata</i>	·	<i>Heliotropium keralense</i>
<i>Cryptocoryne cognatoides</i>	·	<i>Hoppea dichotoma</i>
<i>Cryptocoryne consobrina</i>	·	<i>Hoppea fastigiata</i>
<i>Cryptocoryne retrospiralis</i>	·	<i>Hubbardia heptaneuron</i>
<i>Cryptocoryne spiralis</i>	·	<i>Hydrobryopsis sessilis</i>
<i>Cyanotis cucullata</i>	·	<i>Hygrophila balsamica</i>
<i>Cyathocline lutea</i>	·	<i>Hygrophila difformis</i>
<i>Cyathocline jaquemontii</i>	·	<i>Hygrophila heinei</i>
<i>Cyperus alulatus</i>	·	<i>Hygrophila pinnatifida</i>
<i>Cyperus platyphyllus</i>	·	<i>Hygrophila serpylla</i>
<i>Dalzellia zeylanica</i>	·	<i>Indotristicha ramosissima</i>
<i>Dopatrium lobelloides</i>	·	<i>Isachne bicolor</i>
<i>Eriocaulon breviscapum</i>	·	<i>Isachne elegans</i>
<i>Eriocaulon cuspidatum</i>	·	<i>Isachne meeboldii</i>
<i>Eriocaulon dalzellii</i>	·	<i>Ischaemum jayachandranii</i>
<i>Eriocaulon duthiei</i>	·	<i>Ischaemum molle</i>
<i>Eriocaulon fluviatile</i>	·	<i>Ischaemum nilagiricum</i>
<i>Eriocaulon fysonii</i>	·	<i>Ischaemum travancoreense</i>
<i>Eriocaulon heterolepis</i>	·	<i>Ischaemum vembanadense</i>
<i>Eriocaulon lanceolatum</i>	·	<i>Lagenandra meeboldii</i>
<i>Eriocaulon richardianum</i>	·	<i>Lagenandra nairii</i>
<i>Eriocaulon sivarajanii</i>	·	<i>Lagenandra ovata</i>
<i>Eriocaulon robusto-brownianum</i>	·	<i>Lagenandra toxicaria</i>
<i>Eriocaulon santapau</i>	·	<i>Limnophila polystachya</i>
<i>Eriocaulon sedgwickii</i>	·	<i>Limnopoia meeboldii</i>
<i>Eriocaulon stellulatum</i>	·	<i>Lindernia estaminodiosa</i>
<i>Eriocaulon tuberiferum</i>	·	<i>Lindernia manilaliana</i>
<i>Eriocaulon parviflorum</i>	·	<i>Lindernia minima</i>
<i>Farmeria indica</i>	·	<i>Lipocarpha raynaliana</i>
<i>Fimbristylis salbundia</i>	·	<i>Mariscus clarkei</i>
<i>Fimbristylis crystallina</i>	·	<i>Murdannia pauciflora</i>
<i>Fimbristylis dauciformis</i>	·	<i>Myriophyllum indicum</i>
<i>Fimbristylis hirsutifolia</i>	·	<i>Myriophyllum oliganthum</i>

### Website of the Month

[www.bnhs.org](http://www.bnhs.org)

The Bombay Natural History Society is today the largest non-government organisation (NGO) in the Indian subcontinent engaged in nature conservation research. In the 117 years of its existence, its commitment has been, and continues to be, the conservation of India's natural wealth, protection of the environment and sustainable use of natural resources for a balanced and healthy development for future generations.

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### **SAROVAR SAURABH ENVIS NEWSLETTER on Wetland Ecosystem**

#### Editors

Dr. V.S. Vijayan, *Director*  
Dr. S. Narendra Prasad  
Dr. (Mrs.) Lalitha Vijayan

#### ENVIS Team

Alok Kumar  
Anil K. Jamwal

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#### Address for Communication

SACON Field Station  
21, Ekta Vihar, Mohkampur  
Dehradun (U.A.) - 248005, India  
[wetlands@sancharnet.in](mailto:wetlands@sancharnet.in)