OBJECTIVES AND METHODS OF THE INDIAN IBA PROGRAMME

Photo courtesy: Ravi Sankaran

People's involvement in conservation is essential to the protection of species that are generally found outside protected areas.

AIMS OF THE INVENTORY

The IBA Programme aims to identify, document and advocate the protection and management of a network of sites that are important for the long-term viability of naturally occurring bird populations across the geographic range of those bird species for which a site-based approach is appropriate.

The main aim of the Indian IBA Inventory is to document and protect a network of sites which covers all the habitats and species. Given that birds are good indicators of overall biological diversity, most IBAs will also be important for other animals and plants, particularly those which are under great threat.

This Inventory is intended to provide comprehensive information on IBAs and species and to be used as an advocacy tool for site and species conservation to enable informed decisions.

The following are the key areas where the IBA Inventory would be useful:

- Help identify high biodiversity areas

- To form a sound basis for the development of national conservation strategies, including protected areas programme

- Contribute to the development of national conservation strategies, highlight sites which are threatened or inadequately protected

- Help build regional and national networks of ornithologists and conservationists

- Help identify future priorities for birds and biodiversity conservation action

- Provide decision makers with high quality biodiversity information for sustainable land and resource use

- Assist governments in the implementation of international agreements such as the Convention on Biological Diversity

- Provide material for education and training

- Help build national and regional networks of ornithologists and conservationists through Indian Bird Conservation Network

- Influence regional migratory bird agreements

- Help the National Biodiversity Strategy and Action Plan

Site based approach

The IBA programme is a site-based approach, which identifies sites of international importance for the conservation of birds and other biodiversity and collates and disseminates key information.

Birds are one of the best researched taxa in India and a fairly reliable indicator of biodiversity loss. Given that birds are good indicators of overall biological diversity, most IBAs will also be important for other animals and plants. A significant proportion of bird (and other animal and plant species) can be effectively conserved by the protection of key sites, either as official protected areas (national parks and sanctuaries) with necessary and appropriate management, and / or through the promotion of sustainable land-use practices.

Using birds to set conservation priorities

India is the seventh largest country in the world and comes in top ten mega biodiversity centres. Although India has a good protected area system, they are not distributed uniformly across the states or across the biogeographic zones of the country. Some zones are well protected than the others (Rodgers and Panwar 1988). Moreover, there are very few areas that are protected on the basis of birds conservation. Through the IBA program, we have identified 465 sites using standardized, internationally agreed criteria. These sites are of international significance for the conservation of birds at the global, regional and national levels. The IBA inventory process has considered including major existing protected areas, provided they qualify IBA criteria. Many non-protected areas that are large enough to support viable population(s) of threatened bird species are also included.

Seventy-nine Indian bird species are globally threatened with extinction, of these 9 are listed as Critical, 10 species as Endangered, 57 are Vulnerable, 2 are Conservation Dependent and 1 is Data Deficient. A further 52 are classified as Near Threatened (BirdLife International 2001). Many other supposedly common species are also rapidly declining and are in urgent need of conservation action.

The IBA approach is not the only answer to bird conservation but undoubtedly it is one of the important steps for long-term conservation of birds. For some bird species which are thinly and widely distributed, the IBA approach may not be appropriate, such as the Greater Spotted Eagle *Aquila clanga*, Lesser Florican *Sypheotides indica*, Great Indian Bustard *Ardeotis nigriceps*, and Sarus Crane *Grus antigone*. The IBA approach is appropriate for those birds that are restricted to particular habitat(s) or found in large congregations (e.g. waterbirds). For example, different pheasants are restricted to different forest types and hence protecting those forest types would ensure long-term survival of pheasants. Other examples are harrier (*Circus* spp.) congregation at the Valavadar National Park, Gujarat or sea birds of the Pittie Island, or waterbirds congregation at the Chilka Lake and Keoladeo National Park.

The IBAs should form part of a wider, integrated approach to conservation that includes sites, species and habitat protection (Tucker and Heath 1994). The IBAs follow common global criteria which is a common global conservation currency. In the IBA process, information on site is generated through local organizations and ornithologists working in their respective areas, which builds institutional capacity and sets an effective bird conservation agenda. This means the IBAs could be a practical and significant tool for bird conservation.

Hunting is still a major problem despite strict legislations in India.

Photo: Hira Punjabi

Birds of short grass plains and fallow land, such as the Sociable Lapwing *Vanellus gregarius* have suffered massive decline due to habitat deterioration.

Photo: Marten Van Dijil

All the natural areas are important for conservation, but some need more urgent attention than others. We have prioritized some of the sites on the basis of threatened species (Red Data Book species), restricted range species (RRS) and congregations. We have also identified many sites on the basis of those RDB species that are widely distributed in the country, such as the Sarus Crane, the Lesser Florican, the Great Indian Bustard, and the Spot-billed Pelican *Pelecanus philippensis* fully knowing that we cannot protect all the agricultural fields or wetlands where these birds are found. Imaginative conservation strategies are required to protect these species through the cooperation of local communities.

The impact of people is seen on all the habitats of India, so much so that many habitats and bird species that depend on them are becoming severely threatened. Most of the bird species are facing severe threats such as loss or alteration of habitat, poaching, persecution including trapping and egg collection for food and also for commercial purposes. Deforestation disturbs the forest birds such as the Forest Owlet *Heteroglaux blewitti*, hornbills, laughingthrushes, babblers, parrotbills, warblers, flowerpeckers, woodpeckers, barbets etc. Plantation or excess grazing by

livestock disturbs grassland species such as the White-browed Bushchat *Saxicola macrorhyncha*, the Great Indian Bustard and the Lesser Florican.

Presently, 19 wetlands in India are listed under the Ramsar Convention, but through the IBA programme, we have identified 112 sites that qualify the Ramsar Congregation criteria. These sites are also important for many threatened species such as the Spot-billed Pelican, Dalmatian Pelican *Pelecanus crispus*, Oriental Stork *Ciconia boyciana*, White-headed Duck *Oxyura leucocephala*, Marbled Teal *Marmaronetta angustirostris*, Baer's Pochard *Aythya baeri* and Spoon-billed Sandpiper *Eurynorhynchus pygmeus* (= *Calidris pygmea)*.

One of the main threats for some of the species is their trade nationally and internationally for commercial as well as livelihood (Ahmed 1997, 2002). According to the Convention on International Trade on Endangered Species of Wild Flora and Fauna (CITES), trade in some species, listed in the CITES appendices (Imperial Eagle *Aquila heliaca*, Green Avadavat *Amandava formosa* and Yellow Weaver *Ploceus megarhynchus*), is banned or regulated depending on the level of threat. Species that are morphologically similar, but not themselves threatened but may be confused with endangered ones, are also listed. We have identified IBA sites where these species could find protection from illegal trappers.

Strong national and international laws against bird trade have helped heavily traded species such as the Green Munia *Amandava Formosa*.

Photo: Gerhard Hofmann/BirdLife

Many globally threatened and restricted range species are declining because of alien species introduced in their habitat. For example, domestic goats were introduced in the Narcondam Island that have greatly impacted the regeneration of vegetation and thus the nesting sites of the Endangered Narcondam Hornbill *Aceros narcondami*. Another example is the Nicobar Bulbul *Hypsipetes nicobariensis* that is suffering from competition from the introduced Red-whiskered Bulbul *Pycnonotus jacosus whistleri* (R. Sankaran, *pers. comm.* 1998). Attempts were made to identify sites where Nicobar Bulbul will have long-term future without the danger of being wiped out by hybridization.

Species

The IBA programme not only covers the 79 globally threatened birds in India (comprising of Critically Endangered, Vulnerable and Data Deficient and Conservation Dependent species) but also covers species that are endemic or have restricted ranges, congregatory birds and assemblages of species that are typical to a habitat or biome.

Habitats

As the IBA programme covers a wide array of bird species, it also ranges across various habitats such as wetlands, islands, coastal areas, deserts, forests, grasslands and agricultural ecosystems.

Geographic range

The BNHS had organized 15 regional workshops to identify IBAs for every state and union territory of India. With the exception of Daman and Diu and Chandigarh, IBAs have been identified for all the states and union territories of India.

Limitations of the IBA approach

l The IBA approach only works for those species for which a site-based approach is appropriate. Bird species with highly dispersed or nomadic distributions may not be protected through this approach. Some bird species are not well protected by the IBA approach (such as large raptors, cranes and bustards, which are nomadic species dispersed at low densities across wide areas).

l For others, the IBAs might be only appropriate across some of their ranges or for parts of their life cycles, (e.g. colonial nesting species that disperse extensively during the non-breeding season) (Barnes 1998).

l Any strategy for the long-term protection of biotic diversity should encompass evolutionary and biogeographic considerations. The IBA programme attempts to take this into account by selecting a network of sites that were spread through most habitats and in different areas of the species distributions. However sub-specific variation was not taken into account. Any future assessment should attempt to include sites where different morphs and subspecies (particularly endemic and restricted range subspecies) are located (Barnes 1998).

l The IBA programme is just one approach to bird conservation. It is not the whole or the only answer. The IBA criteria are fairly stringent and many sites that are of undoubted local, provincial and national importance fail to qualify as IBAs. This does not mean that they are not important for conservation; on the contrary these sites often fulfill vital conservation roles at local levles. ***It must be emphasized here that sites not designated as IBAs are not dispensable and their role in a wider land-use conservation strategy may be as vitally important as that of any IBA*** (Barnes 1998).

The IBAs:

l are places of international significance for the conservation of birds at the global, regional or sub-regional level,

l are practical tools for conservation,

l are chosen using standardised, agreed criteria applied with commonsense,

l must, wherever possible, be large enough to support self-sustaining populations of those species for which they are important,

l are places which can be defined and distinguished from surrounding areas, and which are feasible to conserve,

l where possible preferentially include, where appropriate, existing Protected Areas,

l are **not** appropriate for all bird species and, for some, are only appropriate in parts of their ranges,

l should form part of a wider, integrated approach to conservation that embraces sites, species and habitat protection

PROCESS OF IBA IDENTIFICATION AND SELECTION

Establishment of Indian Bird Conservation Network (IBCN)

To conserve the bird species and their habitat, the Bombay Natural History Society (BNHS) started the 'Important Bird Areas Programme (IBA)' in collaboration with the BirdLife International and the Royal Society for the Protection of Birds (RSPB). In India, numerous studies have been done on birds and their habitat but there was no common platform from where the information could be disseminated and pooled. In 1998, the BNHS organized a Strategy Planning workshop in Mumbai and invited key ornithologists of India to discuss the issue. It was decided to have a strong network of ornithologists and conservationists, and the Indian Bird Conservation Network (IBCN) came into existence with the following mission:

> "To promote conservation of birds and their habitats through development of a national network of individuals, organizations and the government."

The objectives of the IBCN are (a) research and monitoring, (b) conservation action, (c) network development, (d) awareness and education, (e) policy and advocacy, and (f) fund raising.

The IBCN is one of the leading membership networks of Indian organizations and individuals who collaborate to promote the conservation of birds in India and the conservation of biological diversity as a whole. At present the IBCN has more than 800 individual and 70 organizations as partners, supporting the bird conservation movement in India. Some of the partners are not ornithologists but working on different aspects of environment conservation.
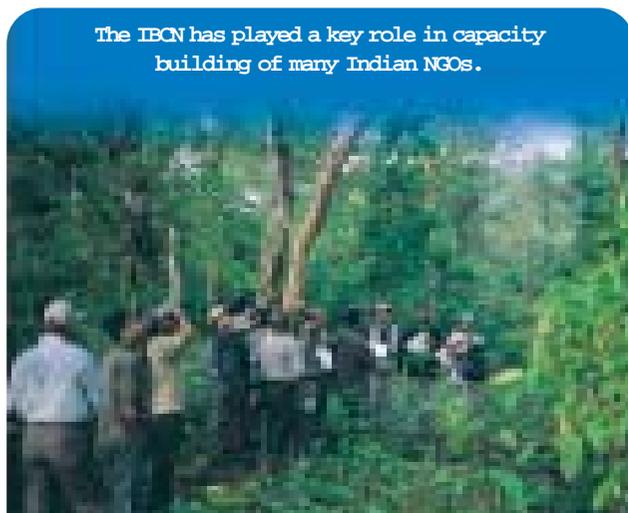
The IBCN has played a key role in capacity building of many Indian NGOs.

Photo: M. Zafar-ul Islam

The Network brings together diverse strengths and expertise focused on strategic conservation objectives. It provides assistance in such a way that encourages local communities to focus and combine efforts for greater impact. In this way, IBCN acts as a conductor, inspiring and directing a network of partners all helping to implement a larger strategy for concrete conservation outcomes in India.

The IBCN publishes a quarterly newsletter *MISTNET* that contains articles and information on bird species (threatened and common), IBAs along with their conservation issues, interventions and advocacy for the protection of biodiversity and habitats.

The IBCN website: www.ibcnetwork.org

SOURCES OF DATA

Literature Survey

The foundation of this project is the data on bird numbers and distribution generated through the numerous field surveys and research programmes carried out in India during the last few decades. Exhaustive literature surveys were undertaken and information was gathered from various sources including national and international environmental organizations, individuals, scientists, protected areas staff, natural history museums (including the Bombay Natural History Society, Tring Museum and British Museum of Natural History), research institutions, universities and publications. Unpublished material held by research and conservation organizations were also analysed during this study. A draft list of 3000 sites was drawn up at the end of this process. This list included records of vagrancy and historical occurrence of bird species so this had to be filtered out.

Red Data Book

The main source of information on threatened birds was the Red Data Book account prepared for the Asian threatened bird species (BirdLife International 2001).

Regional workshops and consultation

Researchers, ornithologists, local forest officials, bird enthusiasts and other individuals were consulted through workshops, meetings and correspondence to identify a list of IBAs throughout the country. Emphasis was given to the participation of governmental and non-governmental conservation bodies and academic institutions. Regional workshops were held in which contributions were made by a vast network of ornithologists, birdwatchers, personnel working for the forest departments, and conservation experts across India and the world. State coordinators of the Indian Bird Conservation Network have been involved in collating and assessing the data for each state in collaboration with the Bombay Natural History Society. The participants reviewed the draft list and added and deleted sites based on current information and possibility of occurrence of species at sites. The workshop participants had initially identified about 1,000 sites.

Identification of gaps

There was lack of information from several areas in India and for certain species. Sites could not be identified for some species and several states and districts. This was mainly due to lack of data from these areas.

Surveys for sites and species

Surveys were then commissioned and successfully executed for data deficient species and areas in several states like Meghalaya, Mizoram, Nagaland, Maharashtra, Kerala, Orissa, Bihar and Jharkhand.

Capacity building training workshops

Some areas remained unexplored largely due to the lack of skilled manpower to execute the surveys. The Indian Bird Conservation Network conducted several training workshops in bird census techniques. A manual on bird census was developed and distributed.

Final prioritized IBAs

After detailed analyses and consultations with experts, 465 sites have been confirmed as IBAs. There could be another 60-70 sites that qualify the IBA criteria but we do not have adequate information. Perhaps at a later stage, when we are able to get more information, additional IBA inventory would be prepared.

The IBA sites are identified on the basis of bird numbers and species complements that they hold, and are selected such that taken together they form a network throughout the species biogeographic distribution. This network may be considered as a minimum essential to ensure the survival of threatened species across their ranges, should there occur a net loss of remaining habitat elsewhere through human or other modification. Therefore, the consequences of the loss of any one of these sites may be disproportionately large. The continued ecological integrity of these sites will be decisive in maintaining and conserving birds for which a site based approach is appropriate. Legal protection, management and monitoring of these crucial sites will be important targets for action and, many but not all bird species may be effectively conserved by these means. Patterns of bird distribution are such that, in most cases it is possible to select sites that support many species (Heath and Evans 2000).

Circulation of site accounts

The site accounts were circulated to experts for comments and updating the information, and their names as key contributors were included in the site accounts.

CATEGORIES AND CRITERIA TO IDENTIFY IMPORTANT BIRD AREAS

The following categories and criteria are the standard guidelines for the identification of IBAs. These guidelines were used with scientific backup and with common sense. A site must meet at least one of the criteria described below (BirdLife International, undated).

(A1) Globally Threatened species

> The site regularly holds significant numbers of a globally threatened species, or other species of global conservation concern.

This category refers to species classified as globally threatened with extinction, Vulnerable, Conservation Dependent or Data Deficient according to the new IUCN criteria for threatened status. The site qualifies if it is known, estimated or thought to hold a population of a species as categorized to this new IUCN criteria. Population-size thresholds for globally threatened species are set regionally, as appropriate, to help in site selection.

The word 'regular' and 'significant' in the criterion definition are intended to exclude instances of vagrancy, marginal occurrence, ancient historical records etc. 'Regularly' includes seasonal presence (and at longer intervals, if suitable conditions themselves only occur at extended intervals, e.g. temporary wetlands such as Chhari Dhand in Kutch district of Gujarat). However, sites that have the potential to hold threatened species, following habitat restoration work or re-introductions may also be considered, for instance, grasslands sites for the Lesser Florican and/or the Great Indian Bustard. Near Threatened (NT) species can also be included in this category as defined and listed by BirdLife International (2001).

(A2) Restricted Range Species

> The site is known or thought to hold a significant component of the restricted-range species whose breeding distributions define an Endemic Bird Area (EBA) or Secondary Area (SA).

A Restricted Ranges bird species is a landbird which has had, throughout historical times (i.e. post 1800 AD, in the period since ornithological recording began), a total global breeding range estimated at below 50,000 sq. km. Species with historical ranges estimated to be above this threshold, but which have been reduced to below 50,000 sq. km by habitat loss or other pressures, were not covered because the EBA project seeks to locate natural areas of endemism for birds, which are also likely to be important for other unique animals and plants (although it is recognized that many species' ranges may have been severely altered by human impact prior to 1800 AD). Restricted range landbirds which have become extinct since 1800 AD were included in the analysis, because they have helped to identify areas which have concentrations of such taxa (Stattersfield *et al.* 1998).

Seabirds were excluded from the analysis because their distributions are determined by different factors to those which affect landbirds and other terrestrial taxa, and they are therefore considered to be best treated as a separate group for conservation purpose (Stattersfield *et al.* 1998).

An **Endemic Bird Area (EBA)** is defined as an area which encompasses the over-lapping breeding ranges of restricted-range bird species, such that the complete range of two or more restricted-range species are entirely included within the boundary of the EBA. This does not necessarily mean that the complete ranges of all of an EBA's restricted-range species are entirely included within the boundary of that single EBA, as some species may be shared between EBAs (Stattersfield *et al*. 1998).

Endemic Bird Areas relevant to India:

1. Western Ghats (EBA 123)
2. Andaman Islands (EBA 125)
3. Nicobar Islands (EBA 126)
4. Western Himalayas (EBA 128)
5. Eastern Himalayas (EBA 130)
6. Assam Plains (EBA 131)
7. Southern Tibet (EBA 133) (Though the area primarily lies in Tibet, portions of it also extend into India)

   (For a list of EBAs see Appendix III)

A **Secondary Area** is an area which supports one or more restricted-range bird species, but does not qualify as an EBA because fewer that two species are entirely confined to it. Typically Secondary Areas include single restricted-range species which do not overlap in distribution with any other such species, and places where there are widely disjunct records of one or more restricted-range species (Stattersfield *et al*. 1998). For example, Taloda IBA is considered as a Secondary Area as it has only Forest Owlet as restricted-range species.

Secondary Areas in India:

1. Eastern Andhra Pradesh (SA: 071)
2. Southern Deccan plateau (SA: 072)
3. Indus plains (SA: 074)
4. Central Indian Forests (SA: 075)
5. North Myanmar lowlands (mainly in Myanmar but also includes lowlands of India) (SA: 079)

   (For a list of SAs see Appendix III)

(A3) Biome-Restricted Assemblages

> The site is known or thought to hold a significant component of the group of species whose distributions are largely or wholly confined to one biome.

A biome may be defined as a major regional ecological community characterised by distinctive life forms and principal plant species (Crosby 1997). No system of global biome classification has been found which can be adequately used as a basis for generating bird species lists. Therefore, it is necessary that we should have a regional approach, which may result in inter-regional differences but may be comparable at the overall scale at which biome divisions are recognised.

This category applies to groups of species with largely shared distributions of greater that 50,000 sq. km, which occur mostly or wholly within all or part of a particular biome and are, therefore, of global importance.

The major biomes in India as classified by BirdLife International

Biome 05: Eurasian High Montane (Alpine and Tibetan)

Biome 07: Sino-Himalayan Temperate Forest

Biome 08: Sino-Himalayan Subtropical Forest

Biome 09: Indochinese Tropical Moist Forests

Biome 10: Indian Peninsula Tropical Moist Forest

Biome 11: Indo-Malayan Tropical Dry Zone

Biome 12: Indo-Gangetic Plains

Biome 13: Saharo-Sindian Desert

(For a list of biome-wise distribution of bird species that qualify this criteria for each biome please see Appendix IV)

(A4) Congregations

This category applies to those species that congregate at sensitive sites when breeding or wintering, or while on passage. The term 'water-bird' is used here in the same sense as the Ramsar Convention uses 'waterfowl' and covers the list of families more precisely defined by Wetlands International (Rose and Scott 1994). Congregatory non-waterbird species (A4ii) include both terrestrial species and families of seabird such as Procellaridae, Hydrobatidae, Pelecanididae, Phaethontidae, Sulidae, and Fregatidae.

The Congregatary category has four subdivisions

(A4i) Site known or thought to hold, on a regular basis, ≥ 1% of a biogeographic population of a congregatory waterbird species. For the thresholds of this criterion, relevant flyway populations are combined to produce biogeographic population estimates.

(A4ii) Site known or thought to hold, on a regular basis, ≥ 1% of the global population of a congregatory seabird or terrestrial species. This category covers non-water bird or terrestrial birds or sea birds.

(A4iii) Site known or thought to hold, on a regular basis, ≥ 20,000 waterbirds or ≥ 10,000 pairs of seabirds of one or more species. Use of this criterion is discouraged where data quality permits A4i and A4ii to be used.

(A4iv) Site known or thought to be a 'bottleneck site' where at least 20,000 storks (*Ciconiidae*), raptors (*Accipitriformes* and *Falconiformes*) or cranes (*Gruidae*) pass regularly during spring or autumn migration.

Categories of criteria for site selection under the Ramsar Convention (adopted at the Conference of the Parties, 7 May 1999)

1. Representative, rare, or unique example of a natural or near-natural wetland type found within the appropriate biogeographic region.
2. Supports vulnerable, endangered, or critically endangered species or threatened ecological communities.
3. Supports populations of plant and/or animal species important for maintaining the biological diversity of a particular biogeographic region.
4. Supports plant and/or animal species at a critical stage in their life cycles, or provides refuge during adverse conditions.
5. Regularly supports 20,000 or more waterbirds.
6. Regularly supports 1% of the individuals in a population of one species or subspecies of waterbird.

Criteria A4i and A4iii identify wetlands of international importance (Ramsar Sites), being similar to Ramsar criteria 5 and 6 respectively in the Box.

'Water bird' as 'seabird'

The term 'waterbird' is used in the same sense as that used for 'waterfowl', seabird and water-dependent birds under the Ramsar Convention

'Biogeographic population'

'Biogeographic' is used in the sense of a zoogeographic realm, e.g. the Palearctic, which are large geographical regions in which the organisms present tend to be different from those of other realms. Thus such regions are characterized largely through the shared distribution patterns of many species. All 'populations' of a given species that are resident or migratory through this region are combined to form the

''biogeographic population'. We do not have sufficient flyway population information at the moment, but through the IBA programme we may be able to get good information in future.

1% thresholds and applying the criteria

1% threshold figures have been defined for all congregatory waterbird species, including species for which no thresholds are currently recognized under the Ramsar Convention. Wetlands International has collaborated in generating numeric thresholds from range estimates and from unpublished population data.

There is a logical inconsistency between criterion A4i for waterbirds (1% or more of the biogeographic population) and criterion A4ii for seabirds (1% or more of global population of seabirds). It was felt, however, that the alternative of using 1% of the global population for waterbirds would, as well as be departing from the criteria used under the Ramsar Convention, with insufficient biological justification, since relatively well defined, discrete flyway populations can be distinguished within Asia for many migratory waterbird species. Taking 1% of global population would over-emphasis waterbirds endemic to Asia, since many widely distributed species may rarely occur at congregations exceeding 1% of the global population, over much of their range (Wetlands International 2002).

Many wetlands provide habitat for threatened species such as the Lesser White-fronted Goose.

Photo: Marten Van Dijl

A4iii and A4iv criteria are applied at the site level only, not to individual species.

The A4iv criterion embraces sites over which flying migrants concentrate, e.g. at narrow sea-crossings, along mountain ranges or through mountain passes. Conservation of the land beneath may be necessary to protect the site and its birds from threats such as shooting and the construction of lethal obstacles such as power-lines and high radio-masts. Also included under A4iv are migratory stop-over sites and nocturnal roosts which may not hold 20,000 or more storks, raptors or cranes at any one time but which, nevertheless, do hold such numbers over a relatively short period due to the rapid turnover of birds on passage (e.g. roosting sites of Amur Falcon *Falco amurensis*).

How do the IBA criteria relate to the identification of Ramsar sites under the Ramsar Convention

The Ramsar (or Wetlands) Convention defines a wetland as "an area of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed 6m" (Article 1). Article 2.1 of the Convention also states that "the boundaries of each wetland may incorporate riparian and coastal zones adjacent to the wetlands, and islands or bodies of marine water deeper than 6 m at low tide lying within the wetlands, especially where these have importance as waterfowl habitat".

Some of the Ramsar sites which are also IBAs have half a million waterbirds.

Photo: Hira Punjabi
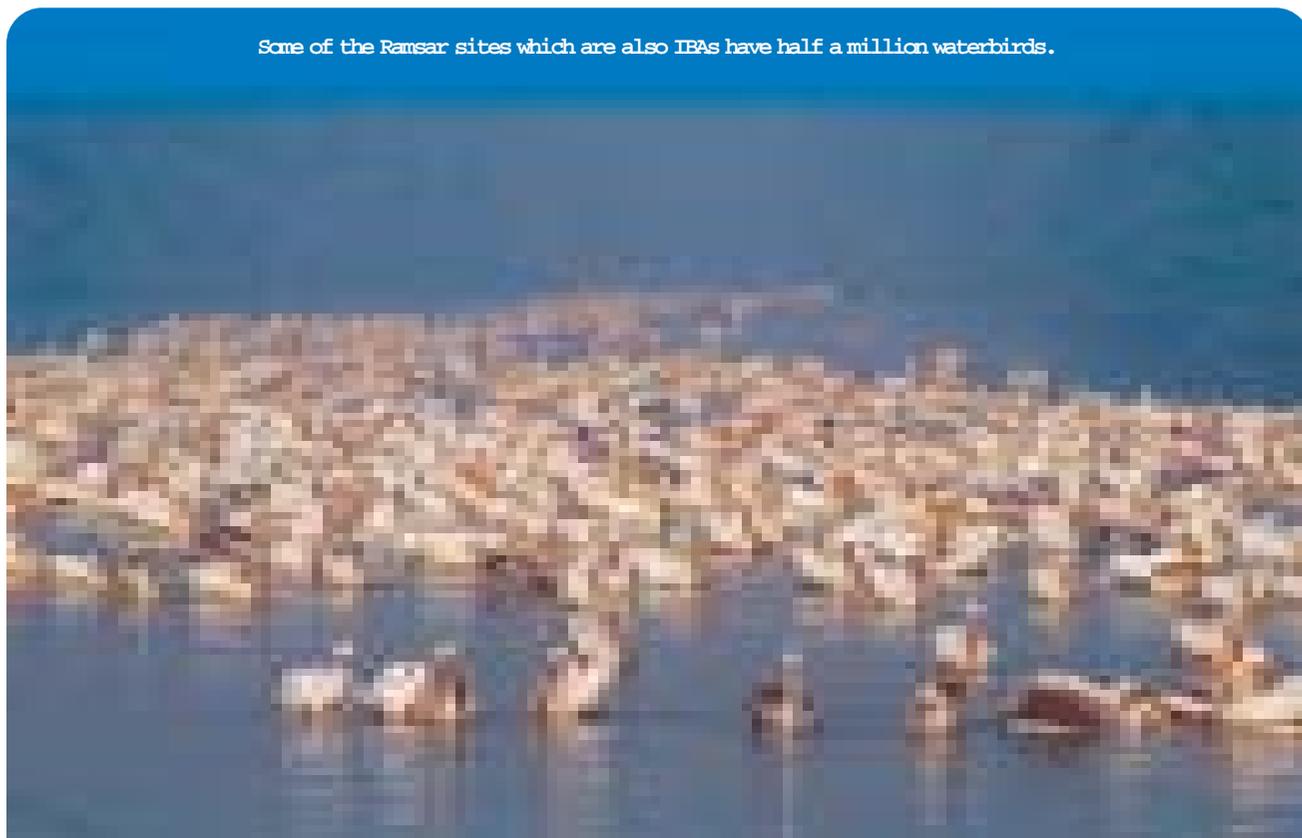
The criteria for identifying wetlands of international importance under the Ramsar Convention, as adopted at the Conference of the Parties on 7 May 1999, fall into eight categories. There is a strong relationship between the Ramsar categories for waterbirds and the IBA criteria. The IBA criteria A1, A4i and A4iii which are equivalent to Ramsar criteria 2, 5 and 6 were used for identifying IBAs. It has been used for both non-breeding populations of waterbirds and for breeding concentrations of some congregatory species. Ideally, average (preferably five years) of seasonal peak numbers should be used to assess whether the 1% threshold is met, but this was not possible for most sites as we do not have five year data.

Overall the IBA criteria comply with the Ramsar criteria for birds. However, there is one difference: the IBA criteria A4i could be applied to congregations of waterbirds in grassland and marine habitats (not classifiable as wetland habitat under the Ramsar definition). Some of the congregatory sites especially 1% thresholds for some waterbirds may be met in grasslands areas (Ramsar Criterion-6), the Ramsar wetland definition excludes these sites from consideration under the Convention, therefore their eligibility for designation as Ramsar Sites has be considered on a case-by-case basis.

Ramsar sites in India

IBA Codes	Site Name	State	IBA criteria	Ramsar criteria
	Ashtamudi Lake*	Kerala		Criterion 5
IN-OR-01	Bhitarkanika Mangroves	Orissa	A1, A4i	Criteria 2 and 6
IN-MP-03	Bhoj Wetland	Madhya Pradesh	A1, A4i, A4iii	Criteria 2, 5 and 6
IN-OR-03	Chilika Lake	Orissa	A1, A4i, A4iii	Criteria 2, 5 and 6
IN-AS-14	Deepor Beel	Assam	A1, A4iii	Criteria 2 and 6
	East Calcutta Wetlands*	West Bengal		
IN-PB-01	Harike Wetlands	Punjab	A1, A4i, A4iii	Criteria 2, 5 and 6
IN-PB-02	Kanji lake	Punjab	A4i, A4iii	Criteria 5 and 6
IN-RJ-07	Keoladeo National Park	Rajasthan	A1, A4i, A4iii	Criteria 2, 5 and 6
IN-AP-04	Kolleru Lake	Andhra Pradesh	A1, A4i, A4iii	Criteria 2, 5 and 6
IN-MN-06	Loktak Lake	Manipur	A1,A4iii	Criteria 2 and 6
IN-TN-20	Point Climere Wildlife Sanctuary	Tamil Nadu	A1, A4i, A4iii	Criteria 2, 5 and 6
IN-HP-19	Pong Dam Lake	Himachal Pradesh	A1, A4i, A4iii	Criteria 2, 5 and 6
IN-PB-03	Ropar Lake	Punjab	A4iii	Criterion 6
IN-RJ-16	Sambhar Lake	Rajasthan	A1, A4i, A4iii	Criteria 2, 5 and 6
	Sasthamkotta Lake*	Tamil Nadu		
IN-JK-19	Tsomoriri	Jammu and Kashmir	A1	Criterion 2
IN-KR-23	Vembanad	Kerala	A4i, A4iii	Criteria 5 and 6
IN-JK-20	Wular Lake	Jammu and Kashmir	A1, A4iii	Criteria 2 and 6

*Not an IBA

GIS based mapping of the IBAs of India

Background

For any work targeted to serve the conservation needs, especially relating to field based targets, it is crucial to have quality maps, describing the location and its geographic ambience. The idea of preparing maps for the present work transcended beyond providing plain maps to actually producing accurate and meaningful graphic description of the site locations in the map form. It was targeted to serve as the additional source of contextual information that normally gets subdued in write-ups, but is crucial for the field workers, administrators and site managers for orientation and better management.

Another important concern for mapping was to lay foundation for a comprehensive GIS based digital database for all the IBA locations to serve current, as well as, all future mapping and spatial analyses needs for individual site or site clusters. In this age of information technology an extended target was to keep options open for future web based applications for better information sharing and conservation planning. All of these goals and many others required the mapping to be conducted in state of art GIS application. Hence for the current purpose all the GIS based database was generated on Environmental Systems Research Institute's ArcGIS software.

Providing GIS based maps for all identified 465 IBA sites was an uphill task. While some IBA sites fell within existing Protected Areas (national parks or sanctuaries) having proper administrative boundaries, many did not have well defined boundaries at all. Mapping of all the sites with boundary polygons therefore was shelved and it was decided to map only the representative point locations for the present representation.

Getting, even the point location correct on the ground, turned out to be a tedious process as the global geographic coordinates were not available for many location. In such cases the locations were assigned to the nearest available human settlement or place of common public interest, approximate locations of which, were available through public sources. This whole job was only possible with the painstaking efforts of the various contributors, diverse published and free data sources and the meticulous screening of the dedicated IBA team; as records gleaned from various sources had significant discrepancies.

Despite all efforts and checks applied the actual site locations shown on the maps are likely to be off or representing only a small part of the larger area covering hundreds of square kilometers. The readers therefore are requested to bring to notice any such discrepancies that escaped the scrutiny in the present work.

While creating the GIS based database, preference was given to global free datasets from various sources. We have used freely available global datasets for national and international boundaries, place locations and names, digital elevation model and the landuse / landcover map with adequate modifications. The Administrative boundaries with approximate accuracy were originally taken from the free data server (http://www.cipotato.org/diva/data/DataServer.htm) and were updated using the census 2001 snapshots (http://www.undp.org.in/VRSE/Links/census.htm) to account for the 2001 redistribution of district boundaries and names. The place names and locations were taken from the free gazetteer (http://www.cipotato.org/diva/data/DataServer.htm) and were manually corrected for discrepancies. The high resolution Digital Elevation Model (DEM) data (http://edcsgs9.cr.usgs.gov/pub/data/srtm/Eurasia/) was interpolated for the missing values wherever possible. For larger gaps in the DEM data at higher resolution, where the interpolation resulted in unacceptable error, the courser resolution DEM (http://edcsgs9.cr.usgs.gov/pub/data/srtm/SRTM30/) was used. The global landcover class names (http://glcf.umiacs.umd.edu/data/landcover/index.shtml) as described in the original dataset were quite different from what is in practice among Indian field workers. Therefore, the class names were renamed / merged for the convenience of Indian users. The following match table provides the reference to the original class names:

Original Value	Original Class Name	New Value	New Class
0	Water (and Goode's interrupted space)	0	Water
1	Evergreen Needleleaf Forest	1	Coniferous Forest
2	Evergreen Broadleaf Forest	2	Evergreen Forest
3	Deciduous Needleleaf Forest	NA	Not Available
4	Deciduous Broadleaf Forest	4	Semi-Evergreen Forest
5	Mixed Forest	5	Mixed Forest
6	Woodland	6	Deciduous Forest
7	Wooded Grassland	7	Open Scrub Forest
8	Closed Shrubland	8	Tropical Thorn Forest
9	Open Shrubland	9	Grassland
10	Grassland	9	Grassland
11	Cropland	10	Cropland
12	Bare Ground	11	Non Forest
13	Urban and Built-up	11	Non Forest

The table below summarizes all the links for the free data sources used for preparation of the maps in the present work:

Sr.	Source	Data
1	http://www.undp.org.in/VRSE/Links/census.htm	District Boundaries, Names etc.
2	http://www.cipotato.org/diva/data/DataServer.htm	Admin. Boundaries, Gazetteer etc.
3	http://glcf.umiacs.umd.edu/data/landcover/index.shtml	Global Landcover
4	http://maps.jpl.nasa.gov/pix/ear0xuu2.tif	Global DEM
5	http://edcsgs9.cr.usgs.gov/pub/data/srtm/SRTM30/	Global DEM
5	http://edcsgs9.cr.usgs.gov/pub/data/srtm/Eurasia/	High Resolution DEM
6	http://www.maproom.psu.edu/cgi-bin/dcw/dcwarea.cgi?Asia	Rivers, Roads etc.

DATA PRESENTATION

India has 28 States and six Union Territories. All state account contains an overview of the status of the Important Bird Areas (IBAs) and their conservation, followed by a series of site accounts describing the IBAs in that particular state.

STATE ACCOUNTS

State overview
Human population
IBAs
Threatened bird species
Endemic Birds
Biomes
Threats and conservation issues
References

SITE ACCOUNTS

Header

All the site accounts have been written in a standard format, with a box header which gives basic information on a particular site, such as site name, site code, administrative region (state) name, district name, coordinates, ownership, area in hectares, ownership, altitude in metres, rainfall in millimeter, temperature in centigrade, biogeographic zone (of Rodgers and Panwar 1988) and habitats.

Below the header box, IBA Criteria and Protection Status (if protected, with date of establishment or not officially protected) are mentioned.

General description

This section gives information about the site, its location, topographical features, physical features, and overview of the main flora and fauna.

Avifauna

This section gives information about the key avifauna, and general information pertaining to the number of bird species recorded, if a checklist is available. This section also explains why the site has been selected an IBA and the criteria used.

The general description of avifauna, is followed by a table presenting data on all the globally threatened species that occur with English and scientific names of the species. This table also provides information on the IUCN category for each threatened bird.

Below the threatened and restricted range species table, a table of biome assemblages is given if the site is identified on the basis of biome criteria.

Other key Fauna

This section gives the list of the other fauna found in the site, which includes large and small mammals, and sometimes key species of herpetofauna are also mentioned.

Land use

This section describes the land use practices such as forestry, tourism, etc.

Threats and Conservation Issues

This section lists the key threats to the site, and to the biodiversity especially to birds. It also includes the research done on the site, regular monitoring, conservation and site management initiatives, awareness programmes towards biodiversity or on particular bird, and also the management plan, if any, of the site.

Key contributors

This section contains the name of the key persons who helped in collecting information on the sites or commented and/or some times wrote the site account.

Key references

A list of cited references is given

In order to make this Inventory user-friendly, state and site accounts are complete on their own, including key references.