



Ashish Kothari has spent about 30 years as an environmental activist. His passion for nature was ignited in school-time birdwatching trips, where he was hooked by the beauty of birds, even if very confused by their identities.

In 1978–79, he helped form the environmental action group Kalpavriksh, and in the 1980s, was a key member of the Narmada Bachao Andolan. He co-ordinated India's National Biodiversity Strategy and Action Plan process, helped draft the National Wildlife Action Plan, and has urged the integration of conservation, livelihood, and development concerns.

Throughout this period, he has tried to continue using his binoculars, but remains confused by warblers, raptors, and other bird groups that simply don't match any bird identification books. This, he says, is why he did not make this book a field guide.

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ASHISH KOTHARI

Birds
in Our Lives



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Birds in Our Lives provides glimpses of the incredible diversity of India's birds: the ecosystems where different kinds of birds are found, the various ways – cultural and economic – in which birds have touched our lives, and gives a brief account of the history of ornithology in India. It stresses on the serious threats that bird habitats and populations face, and gives a sense of both the continued erosion of Indian birdlife, as well as the rapidly growing efforts to save it. Finally, it provides key pointers for what needs to be done if we want to save this precious natural heritage.

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BIRDS

IN

OUR LIVES

ASHISH KOTHARI

Illustrations by
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Preface and Acknowledgements

When I was small, not so long ago, my idea of a bird was restricted to the omnipresent sparrow, the raucous crow, the stodgy pigeon, and the occasional vulture. Pariah kites (eagles, we called them) sometimes encroached on my consciousness as they swooped to steal a sandwich I would be eating on my school lawns. That this handful of species was only a tiny fraction of the world of birds, was something that struck me much later in life.

I vividly remember my first visit to Bharatpur, that most wonderful of India's many bird havens, and the complete astonishment with which I observed the diversity of its avifauna. That trip hooked me for good, and birds have ever since been an impelling and refreshing part of my life. So when I was asked to write a book on them, I was happy to accept.

But I also did not want this to be just another pretty picture book, adorning the shelves of the leisure class. If I was going to indulge in some amount of forest destruction by using paper, I decided that I could justify it only by making this book a serious, heartfelt appeal. An appeal to save the wonderful birdlife of India, at present so gravely threatened.

Rajpal Singh

The Sarus crane *Grus antigone* has traditionally been a common feature of agricultural landscapes, usually protected or tolerated by the farmers.



Such a venture has to start with giving the readers a sense of the importance of birds in our lives. For me, conservation of birds stems primarily from an ethical standpoint, the view that they have as much a right to live on this earth as we do. But there are those who may not be moved by this position. Hence the chapters on birds in Indian culture and economy, which argue that these creatures are a

vital part of the material and psychological existence of our people.

Greatest stress, however, is on the chapters on bird decline and conservation. I have tried to include the latest information on these aspects to give a sense of both the continued slide of Indian birdlife, as well as the rapidly growing efforts to save it. Also included are some interesting and essential lists, including threatened birds of India, specially designated wetlands for conservation, sites considered important for bird conservation, and names of periodicals carrying material on birds.

A word on bird names. Over the last few years several new field guides have adopted new common names for Indian birds. I started writing this manuscript well before these name changes took place. I have updated the names, but also in many places retained the old names, not so much out of disrespect for the renaming process but because I'm convinced that most birders (especially amateur ones like myself) are still more comfortable calling *Dinopium benghalense* the Goldenbacked woodpecker,

rather than Black-rumped flameback! But, in any case, I've also provided the scientific name with the common one, at least the first time the bird appears in the book, so that readers with a more modern bent of mind can check what I'm referring to.

In writing this book I have scanned through a considerable pile of literature, all that was available to me. Relevant books and periodicals on wildlife in India, scattered research reports, newspaper articles – all of these have been combined with my own personal experiences of birdwatching over the last 25 years. I have borrowed freely and unashamedly from published literature, not only because I had to, but also because I do not believe that information should be shackled by the bounds of copyright. But it is also important to give credit where it is due, and I must thank all those authors whose works were used as reference. These are listed at the end of the book, and I apologize if by oversight any have been left out. More academically minded readers may please forgive me for not citing references at every relevant point of the text; I wanted to keep the text relatively light and unencumbered by heavy footnoting.

This volume would have been possible without the help of many friends and acquaintances, but it would have been a considerably impoverished version. The following people commented on the first draft: S.A. Husain, M.K. Ranjitsinh, Shekhar Singh, Ranjit Lal (who inspired some *joie de vivre!*), Pratibha Pande, Farhad Vania (who even justified a trip to Mumbai by getting me material!), Suresh C. Sharma, Kumar Ghorpade, and Angana Chatterjee. Thanks also to the anonymous reviewer to whom the publishers sent the manuscript. The following people, and many others, helped in my search for information and visuals: Bharat Bhushan, Robert Grubh, V.C. Ambedkar, Isaac Kehimkar, Asad Rahmani, Nikita Goshalia, Dilnavaz Variava, Savita, S.T. Baskaran, Jaya Menon, Bittu Sahgal, Sunjoy

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goes to members of Kalpavriksh and of the Environmental Studies Division of the Indian Institute of Public Administration, with whom I had many an enjoyable session of birdwatching. I must also acknowledge Suresh C. Sharma for convincing me that ornithology is not necessarily an elite pastime, and for providing some useful updates. Rashmibhai Mehta for showing us how life's challenges can be met with a smile. And Neema Pathak for egging me on to revive our birding

Clement Francis



Malabar whistling thrush *Myiophonus horsfieldii*

trips, and spend more time out in the field! Thanks go to Dev Bahadur, who smilingly did the awful chore of keying in my first manuscript. Little Krishna's sharp eyes and hushed exclamations, "Anna, *dodda pakshi*" helped me spot Malabar trogons and other lovely birds, near our farm in Sirsi where, fittingly, I did the final revisions on this manuscript. Sunita Rao helped in all of the above ways, and in others not so tangible... including building our house at Sirsi, from the porch of which alone I have recorded over 50 species. And finally, but certainly not the least, thanks to the wonderful people at Universities Press who readily accepted the manuscript and helped in so many ways to turn it into a book: Chandini Rao (who tragically passed away before its publication), Madhu Reddy, Priti Anand, and Prema Naraynen.

And there are those who contributed by just being around, and making me realize that material help is only a small part of writing a book: my mother and father, Smitu, Miloon, Karen, Gabriella, Bindia, Sultan, Sasha, Kublai, Chico, Sacchi, Scrabble, Gundu. Somewhere up there with the birds, I'm sure Mommy is smiling at my being able to finish something that I started when she was still alive.

A final word. This book talks about 'Indian birds', at times even about 'our birds'. Wild animals do not have nationalities, they do not belong to anyone but themselves. It is supreme arrogance for humans to assume ownership over the rest of nature. But if, in using this distorted terminology, I am able to evoke a sense of pride regarding what may be considered a national heritage, and can thereby help spread a more respectful attitude towards birds, I will be glad to accept the charge of succumbing to typical human arrogance.

Ashish Kothari
October 2006

Birds, Birds, Everywhere!



A traveller in India will encounter birds at almost every step. From the densest natural forests to the most congested concrete jungles, they are inevitably present, though of course in greatly varying concentrations. Indeed, India ranks amongst the top few nations in the diversity of species found. Of a total world estimate of 9005 species, the Indian subcontinent contains over 1265 (with India recording 1225). On 4 per cent of the world's land surface, therefore, we have 14 per cent of its species.

For those with a fondness for figures, here are some of the more interesting ones. Many species of birds have two or more distinct geographical races, or subspecies. Counting all of these, India's tally goes up to some 2095 species and subspecies. Of these, 1710 are resident (that is, they breed here and stay the year round), while 350 are migrant (mostly coming into India during winter, but some also in other seasons, and staying for a part of the year), and the status of some is unclear. There are also 176 endemic species, birds which are found only in the Indian subcontinent and nowhere else.



These figures, impressive though they may be, can never convey the incredible range of forms, colours, sizes, and shapes that birds in India exhibit. It is as if Nature was in one of her merriest, most creative of moods when creating the country's avifauna.

The diversity of India's birdlife reflects the diversity of its ecosystems. The range of biological, geographical, and climatic zones that India possesses is quite breathtaking: from the searing deserts of western India to the freezing peaks of the Himalaya, from the densest of evergreen rainforests in the Western Ghats to the sparsest of thorn scrubs in Rajasthan, from the sweet waters of thousands of rivers and lakes to the salty oceanic expanses off her coasts. And, of late, from the ever-growing scavenging



paradises such as urban garbage dumps to the equally fast-growing concretized city centres.

The zoogeography of birds

The knowledge that different animals inhabit different ecosystems, sometimes exclusively, is ancient. For example, the earliest known Tamil Sangam literature (dating at least to the middle of the first millennia, but possibly much earlier) records five ecological zones and the animals characteristic of each: woodlands, hills, rivers, the seacoast, and deserts. Today we recognize many further ecosystemic divisions and are able to pinpoint in greater detail the birds that prefer each.

Of late there has been considerable interest in developing what in scientific jargon is called the zoogeography of Indian birds. Zoogeography, simply defined, is the study of the distributional patterns of animals. Way back in 1858, Philip Lutley Sclater divided the world into six zoogeographic regions, on the basis of his study of birds. This classification, subsequently developed and popularized by Alfred R. Wallace, is still followed today. The regions are: the Afrotropical region (Sub-Saharan Africa), the Nearctic region (North America), the Neotropical region (South America) the Australian region (Australia and the island groups to its north), the Palaeartic region (Europe, northern and western Asia, and northern Africa), and the Oriental or Indo-Malayan region (Indian subcontinent and Southeast Asia). To these were later added the Antarctic region (Antarctica and Sub-Antarctica), and the Oceanian region (Islands of the South Pacific westward through New Guinea).

India falls almost entirely in the Oriental region. Consequently, its avifauna is also predominantly Oriental, with about 62 per cent of its 176 endemic species of birds belonging to the Indo-Chinese sub-region.

The Himalayan belt forms the only part of India which is not in the Oriental region; it is in the Palaeartic. Naturally, then, it should be expected to have at least some avifauna characteristic of this latter region. Indeed, about 17 per cent of the endemic species in the subcontinent are Palaeartic. These are birds of the nuthatch, creeper, titmice, finch, thrush, warbler, and other families, most of them found at varying levels on the Himalayan slopes. What is of particular interest is the fact that the influence of the Palaeartic region on India's bird fauna has not spread much beyond the Himalaya. Apparently the only Palaeartic bird which has developed resident subspecies south of the Himalaya

is the Smallbilled mountain thrush *Zoothera dauma*, called the Nilgiri thrush in southern India.

The distribution of birds in India is dependent on several natural factors: climate, altitude, temperature, availability of food and nesting sites, major geographical features, and others. To these must now be added the human factor: the extent of disturbance and/or protection given to birds and bird habitats by the human species. Variations in bird composition and abundance are a result of this complex interplay of natural and human-made factors, each ecosystem harbouring its own unique set of birds.

Birds in natural habitats

In India, the major natural habitats for birds are dry forests, grasslands, deserts, moist forests, freshwater and saltwater wetlands, and mountain areas.¹

DRY FORESTS

The most common forests of India are of the dry deciduous and tropical thorn types, spread over much of western India, the Deccan Plateau, and the northern plains. These are areas with low rainfall (250 to 1100 mm) and high temperatures (mean 25°C, highest above 45°C), and are characterized by dry, sparse vegetation which turns green during the rains and is almost completely leafless in summer. These two types are, strictly speaking, distinct: dry deciduous forests tend to have more trees and a relatively closed vegetation, while thorn forests usually have short, open scrub or even grassy plains. But I have clubbed them together, since over large parts of

¹ This classification of habitats is not strictly scientific nor completely comprehensive, but is being used to simplify and illustrate a complex reality, while not distorting this reality. The choice of birds for each habitat is subjective, but not inaccurate.



Ashish Kohari

Amongst the most commonly spread vegetation types in India, dry forests have their own unique composition, and their often sparse look should not be mistaken as a sign of degradation.

India they tend to merge into one other, and share a great deal of avifauna between them.

For the bird enthusiast, the most rewarding thing about dry deciduous and thorn forests is the ease with which birds can be sighted and observed, due to the open vegetation. This is particularly so near waterpoints, which are few and far flung.

There are several hundred species which inhabit or visit these forests. A few come to mind immediately. There are the babblers – the Jungle *Turdoides striatus*, the Large grey *T. malcolmi*, and the Common *T. caudatus* – the last one ironically far less seen than the first two, but all of them fully justifying their name by an almost constant, noisy chatter. Incidentally, the Jungle babbler's habit of roaming around in flocks has earned it two contrasting nicknames: seven sisters in English, seven brothers (*sat bhai*) in Hindi! Then there are several members of the dove and pigeon clan – the Ring dove *Streptopelia decaocto*, the Little brown dove *S. senegalensis*, the

Blue rock pigeon *Columba livia*, and others – many of which are also commensals of humans. Relative to the babblers, these are quiet birds. Even softer, though, are the bulbuls: the Redwhiskered *Pycnonotus jocosus*, the Whitecheeked *P. leucogenys*, and most common of all, the Redvented *P. cafer*. More colourful than all of the above, but equally common, are the parakeets. The noisy Roseringed parakeet *Psittacula krameri* is a frequent sight in these forests. But also often seen are the Large Indian or Alexandrine *P. eupatria*, and the Blossomheaded *P. cynocephala*, both with startling patches of maroon, the former on its wings, the latter covering its head.

If the predominant green of the parakeet is striking, equally striking is the glistening black of the drongo. The Black drongo *Dicrurus adsimilis* and several other related species are also distinctive for the split in their tails, which flash like inverted victory signs. The Black drongo is also an accomplished mimic of other birds, and when heard but not seen, can confuse all but the best of birdwatchers.

Also adept at calls is the Indian tree-pie *Dendrocitta vagabunda*, its pretty, long tail making it one of the more distinctive birds of dry forest areas. It is a bold bird; I remember my utter surprise when one landed on an outdoor dining table at Ranthambor National Park in Rajasthan, and actually pecked at my plate while I was eating!

In summer, the drabness of the dry deciduous forest is occasionally broken by a Red silk-cotton tree *Bombax ceiba* in bloom. This can be a birdwatcher's delight, for one can see on it a score or more species of birds which come to partake of the nectar in the flowers. Apart from parakeets and tree-pies, the two common barbets – the Large green *Megalaima zeylanica* and the Crimson-breasted *M. haemacephala* – can be spotted.

The calls of both are commonly heard before and during the monsoon throughout much of India. The latter, in fact, is called the Coppersmith after its loud, monotonous, and metallic ‘tuk, tuk, tuk’ call which sounds like a coppersmith hammering at a distance.

Also visiting the silk-cotton tree would be the tiny Purple sunbird *Nectarinia asiatica*, the deep sheen of the male glowing brilliantly in the sunlight, its slender curved beak ideally suited to extract nectar. Quite the contrast in body size and beak shape, but also a visitor to this tree, is the Grey hornbill *Ocyrceros birostris*, unmistakable because of its uniquely shaped beak. Then there may be, for a very brief period, the Indian koel *Eudynamys scolopacea*, the nearly all-black male often mistaken to be a crow. The identifying trick is to look it in the eye: a koel’s eyes are deep red, which even the angriest of crows cannot approximate! (I have often felt that it is the crow who should be seeing red, considering that it is the target of the koel’s nest-parasitism and the consequent, unwitting foster parent of the koel’s offspring!)

One of our dry region’s most spectacular birds is the Indian roller or Blue jay *Coracias benghalensis*, a dull blue-gray when reposing, but a brilliant and startling bright blue in flight. The sight of 3–4 of them, hawking insects in the air, would gladden any naturalist’s heart.

Also with a splash of colour are two species of shrikes, the Rufous-backed *Lanius schach* and the Bay-backed *L. vittatus*. Their cousin, the Grey shrike *L. excubitor*, is more modestly dressed in grey and black, and prefers more open country. All three, along with some other species of shrikes, are almost entirely carnivorous, and have been nicknamed ‘butcher birds’ for their gory habit of storing insects and other prey by impaling them on thorns.

The House sparrow *Passer domesticus* needs no introduction. But it has a number of relatives which

are less well-known. Among these, the bird which has gained a place in the avian ‘hall of fame’, so to speak, is the Yellow-throated sparrow *Petronia xanthocollis*. The late Salim Ali was apparently provoked into serious birdwatching when, at the age of twelve, he shot what he thought was an ordinary House sparrow, and immediately realized that there was something different about the bird: the delicate touch of yellow on its throat that is absent in the House sparrow. Curiosity led the young Salim to the Bombay Natural History Society, where he was told the bird’s true identity, and shown the Society’s large bird collection. It was at that moment, says Ali,

that my curiosity about birds really clicked... There is no doubt that I owe the beginning of my serious interest in birds to that enigmatic Yellow-throated sparrow and the chain of events it brought in its train.



Vijay Mehan Raj

The Yellow-throated sparrow, the bird that did Indian ornithology a big favour, by evoking Salim Ali’s curiosity and launching him towards becoming the country’s finest birder.

So far I’ve discussed birds which are mostly seen in the trees, but there are a lot which are, literally, down to earth. There is the Grey partridge *Fringilla monticola*, abundant in dry forest areas. This rotund

Birds in Our Lives

The Grey partridge or francolin, is common in dry forest and scrub areas, often startling birdwatchers as it suddenly flushes out from the undergrowth.



Nitin Rai

Vijay Mohan Raj



The handsome Grey jungle fowl can be seen skulking about in the undergrowth, or dashing across paths and roads that go through forests.

bird is more often heard than seen, the latter only when accidentally flushed out of the undergrowth. And no one can, of course, miss the magnificent Indian peafowl *Pavo cristatus*, seen almost all over India, but most abundantly in drier, vegetated areas. Almost as pretty a ground dweller, but far less spectacular, is the wild look-alike of our domestic rooster, the Grey jungle fowl *Gallus sonneratii*. This bird is restricted entirely to peninsular India, replaced in the north by its cousin, the Red jungle fowl. But more on that later.

Low-density scrub and grassy or stony patches harbour a large number of bush or ground-dwelling birds. The pretty little Indian robin *Saxicoloides fulicata*, its tail almost always cocked up, as if in defiance, is abundant. Also frequently found hopping around on the ground or on boulders, is the Brown rock chat *Cercomela fusca*.

Its relatives, the Pied bushchat *Saxicola caprata*, and the Stone chat (alias Collared bushchat) *S. torquata*, prefer to hunt prey from higher perches, usually tall grass stalks or low branches of trees.

Plovers are generally birds associated with wetlands, but there is one which inhabits scrub forests, the Yellow-wattled lapwing *Vanellus malabaricus*. This bird minimizes nest-making effort by laying eggs in a depression on the ground, sometimes lining it with pebbles. Both the eggs and the new-born chicks are cleverly camouflaged, coloured dull brown or sandy, and blotched all over, to make them merge imperceptibly into the background. Such ground-nesting and protective colouring are also exhibited by a number of other scrub dwellers, such as the Ashy-crowned and Black-crowned finch-larks, *Eremopterix grisea* and *E. nigriceps*, and the abundant Crested lark *Galerida cristata*.

Two groups of birds found in dry deciduous and thorn forests are a special challenge to the birdwatcher: the tiny, smaller-than-sparrow warblers, and the raptors or birds of prey. Commonly seen warblers include the Brown leaf warbler or Chiffchaff *Phylloscopus collybita*,

Clement Francis



The Booted warbler, *Hippolais caligata*, one of the many frustratingly confusing species of warblers that reside in or migrate to India.

the Indian and Ashy wren-warblers *Prinia subflava* and *P. socialis*, the migrant Lesser whitethroat *Sylvia curruca* and Franklin's wren-warbler *Prinia hodgsonii*. Constantly flitting about, scarcely allowing the observer a long hard look, warblers are often only recognizable by their calls, behaviour, and ecological niche.

Raptors present another kind of difficulty. Not only do some of them closely resemble each other, but the same individual can look so different in different seasons or at different phases of its life, that one can easily mistake it for another species. Commonly seen in dry forests are the Shikra *Accipiter badius*, the Black-winged kite *Elanus caeruleus* (also a grassland bird), the Short-toed eagle *Circaetus gallicus*, the Tawny eagle *Aquila rapax*, the White-eyed buzzard *Butastur teesa*, and the Lesser spotted eagle *Aquila pomarina*. There are also the nocturnal raptors, the owls. Almost no forest area in India is devoid of the doll-like Spotted owlet *Athene brama*, the high-pitched screech of which can give the unwary night traveller the jitters. This owl is in fact also a known commensal of humans. Another owl often seen in these forests, nearly three times the size of the Spotted owlet, is the Great horned owl, aptly named *Bubo bubo* for its booming call.

Joining the owls in their nocturnal sojourns are the nightjars, so called for their very loud, discordant, and never-ending calls. Two species are common in dry forests, the Common Indian *Caprimulgus asiaticus* and the Franklin's *C. affinis*. An encounter with these birds is always interesting. At night, one's first inkling of a nightjar's presence is two bright pinpoints on the road, the bird's eyes reflecting the headlights of an approaching vehicle. In the day, one wouldn't see a nightjar even if passing by within a few feet, so wonderful is its camouflage. Several times I've had the eerie experience of accidentally disturbing a nightjar from where it lay,



A nightjar on the forest floor, looking for all the world like a broken branch or a bunch of fallen leaves.

almost under my feet, then seeing it fly off and settle down a few metres along the path, and just vanishing again! It is there, but look as I may, I can't see it until, walking forward, it flushes and I realize I've nearly stepped on it again!

To complete the picture, one must not forget those very useful creatures, the scavenging birds. Apart from crows (of which the Jungle crow *Corvus macrorhynchos* is common in dry forests), and birds like the Indian tree-pie, the main feathered scavengers are the vultures. By far the more common in these open woods is the Whitebacked or Bengal vulture *Gyps bengalensis*, till recently a familiar sight wherever carcasses are found, or soaring high in the skies in large numbers.

Two birds are worth a special mention before I end my account of the dry deciduous and thorn forests. Found exclusively in the stony sparsely forested drylands of the Eastern Ghats, the Jerdon's courser *Cursorius bitorquatus* was thought to have become extinct, till recently rediscovered in the south-eastern state of Andhra Pradesh. Another bird considered extinct till

recently, the Forest spotted owl *Heteroglaux blewitti*, was rediscovered in the dry forests of western Maharashtra. But more on these birds later, in Chapter 6.

GRASSLANDS

Forest areas in almost all parts of India are interspersed with grassy stretches. The Deccan plateau and the western semi-arid zones have dry, short grasslands, while the *terai* region of the Himalayan foothills, and other moist deciduous areas of the country, are characterized by wet, marshy patches with grass as tall as an elephant. In addition, there are the rolling meadows of the southern hill ranges, starting at 1500 metres above mean sea level, and the alpine meadows of the Himalaya, 3000 metres and above. While to the lay person all these grasslands would appear to be poor substitutes for forests, in actuality they are extremely productive, species-rich ecosystems. And they have their own specialized coterie of birds, apart from some of the ones mentioned in the section on deserts.

Undoubtedly the most famous of these is the Great Indian bustard *Ardeotis nigriceps*. This huge ground bird once ranged over much of western and south-central India, preferring dry grasslands with vegetation below its eye-level. Rumour has it that this species had been a candidate for the post of India's National Bird, but that the chances of an embarrassing slip in spelling its name disqualified it! Habitat destruction and hunting have now tremendously restricted its population.

India has four other species of bustards, all birds of the grassland: the Houbara bustard *Chlamydotis undulata*, the migrant Little bustard *Tetrax tetrax*, the Bengal florican *Houbaropsis bengalensis* and the Lesser florican *Sypheotides indica*. Of these, only the Bengal florican is a bird of the moist grasslands, its range extending across the Himalayan *terai*, from northern Uttar Pradesh to Assam.



Grasslands of various kinds abound in India, and contain their own unique biodiversity, including several specially adapted birds.

(Below) The handsome Lesser florican is most at home in grasslands, including where communities have traditionally grazed their livestock.



Another ground bird which shares the terai grasslands with the Bengal florican is the Swamp francolin *Francolinus gularis*. Also found in the floodplains of northern and north-eastern India, this bird has traditionally been a favourite for cock-fights. Apparently, in Assam, it was even reared for just this purpose, the eggs being incubated and hatched with the help of human body heat!

A walk through a grassland will often flush a group of quails, which will explosively scatter in all directions, and then dive into the nearest available cover. Always difficult to distinguish from one another, these 'miniature partridges' have suffered great casualties as prime game birds. Of the eight species in India, most common are the Grey quail *Coturnix coturnix*, the Jungle bush quail *Perdica asiatica*, and the Rain quail *Coturnix coromandelica*.

As confusingly similar to one another as quails are several species of larks and pipits which inhabit grasslands. The abundant crested larks (*Galerida* spp.) are easily recognizable due to their upright crest, but only a seasoned birdwatcher can distinguish between the migrant Skylark *Alauda arvensis* and the resident Small skylark *A. gulgula*. Except, of course, in summer when the former will not be present at all! Similar to a lark, but more upright and sleek, is the common Paddyfield pipit *Anthus novaeseelandiae*.



Clement Francis

The Paddyfield pipit is one of the commonest of pipits of India, found in grassy/stony areas across the country.

Many raptors seem to prefer dry grasslands, as the open surroundings afford a good view of prey. Commonly seen are the Black-winged kite *Elanus caeruleus*, and the Kestrel *Falco tinnunculus*, both of which have the amazing ability of staying perfectly stationary in mid-air, only their wings flapping rapidly, their sharp eyes scouring the land below for prey. Not so common are the Pale harrier *Circus macrourus* and the Pied harrier *Circus*

melanoleucos, the former distributed throughout India, the latter chiefly in the east and south.

DESERTS

In some parts of India, thorn forests merge into deserts, another distinct ecosystem. At first glance these sandy 'wastes' (as they are mistakenly called) are devoid of all life. But even this harshest of environments manages to sustain considerable animal life, including that of birds. This includes a relative of the above-mentioned Jerdon's courser, the Cream-coloured or Desert courser *Cursorius cursor*. Like many of the desert's creatures, this bird is wonderfully camouflaged to merge into the arid backgrounds. Similarly well-hidden are larks such as the Large desert lark *Ammomanes deserti*.

Amongst the desert's most remarkable sights are flocks of thousands of sandgrouse congregating at water points. Several species inhabit or visit the arid areas of western India, including the Imperial sandgrouse *Pterocles orientalis*, the Indian sandgrouse *P. exustus*, the Large pintail sandgrouse *P. alchata*, the Spotted sandgrouse *P. senegallus*, and the Painted sandgrouse *P. indicus*. Unfortunately their vast numbers, and the regularity of their visits at the waterholes, have made them the target of mass game-shooting in the past.

As distinctive as sandgrouse are the raptors and scavenging birds of the desert. These include several species of eagles, buzzards, and vultures. Of the eagles, most abundant is the Tawny eagle *Aquila rapax* (and its subspecies *nipalensis*, the Eastern steppe eagle). For sheer size, however, the King or Black vulture *Sarcogyps calvus* is difficult to beat. One of the least gregarious of vultures, this striking bird was mistakenly considered to be the bully of the vulture clan, hence the prefix 'king'. It is actually quite timid, waiting for a chance to get a peck at a carcass which other species of vultures are aggressively devouring. Its smaller cousin,



Asad Rahmani

Most people think of deserts as lifeless, but they have their own uniquely adapted wildlife, including several birds found only in the hot desert of Rajasthan (above) and the cold desert of Ladakh (right).

The Common sandgrouse and its cousin species come in huge flocks to the few waterpoints in the Indian desert.



Asad Rahmani



The King vulture has a striking presence in many dry regions of India.



the Egyptian or Scavenger vulture *Neophron percnopterus*, is also unusual among vultures for its non-gregarious nature.

TROPICAL MOIST FORESTS

The scanty rainfall and vegetation of dry deciduous and thorn forests contrasts starkly with two other major forest types found in India, moist deciduous and evergreen, with semi-evergreen forests as an intermediary. These forests are typically lush and green for all or most of the year, with high rainfall (1300–2000 mm in moist deciduous, 2000–4000 mm in wet evergreen) and moderate temperatures.

Moist deciduous vegetation is found scattered throughout India: along the Himalayan foothills in the area known as the terai; over large hilly stretches in the eastern Indian territories of Bihar, Orissa, and east Madhya Pradesh; on both sides of the Western Ghats; in the north-eastern states; and in the Andaman and Nicobar Islands. In the north, the forest is dominated by Sal *Shorea robusta*, but this stately tree is replaced by the equally impressive Teak *Tectona grandis* in peninsular and southern India.

Sighting of animals is not too good in a moist deciduous forest, the vegetation providing effective cover. But a number of brightly coloured birds cannot evade detection. Often only a flashing glimpse is adequate to identify the genus or family of the bird, if not the species itself. There is the group of minivets, for instance. The Scarlet minivet *Pericrocotus flammeus* and the confusingly similar Longtailed minivet *P. ethologus* would startle any walker in these woods, their deep red (males) or yellow (females), providing a delightful contrast to the lush green. A lovely splash of colour is also provided by orioles, most commonly the Golden oriole *Oriolus oriolus* (a good example of overkill in nomenclature!), but also

the Blackheaded *O. xanthorus* and the Blacknaped *O. chinensis*.

To add to this colour kaleidoscope, there are the various species of Goldenbacked or Flameback woodpeckers, (*Dinopium* spp.) their exquisitely hued backs contrasting vividly with the dark of the tree bark.

My personal favourite in these moist forests is the Paradise flycatcher *Terpsiphone paradisi*. I still remember vividly my first glimpse of this bird in Corbett National Park several years ago. It was a male in flight, crossing over from one edge of the narrow forest path to the other, about 15–20 feet in front of us. His long white tail seemed to float across like a pair of ribbons.

Talking of tails, the clan of drongos immediately springs to mind. I described the Black drongo *Dicrurus adsimilis* earlier in this chapter, but have not yet introduced other members of its ilk. The Lesser and Greater racket-tailed drongos, *D. remifer* and *D. paradiseus*, are so called because their tail-ends form thin rackets. The Ashy or Grey drongo *D. leucophaeus* also has a split tail, as does the White-bellied drongo *D. caerulescens*.

Moist deciduous forests have considerably dense undergrowth, providing cover and breeding habitat for a large number of ground-dwelling birds. Amongst the most beautiful of these is the Red jungle fowl *Gallus gallus* (I mentioned its relative the Grey jungle fowl earlier). This species is spread across northern, central, eastern, and northeastern India, and has a very striking resemblance to the everyday village rooster, both in its appearance and its call. This is not surprising, for the Red jungle fowl is the ancestor of all breeds of chicken across the world! There are indications of its having been domesticated about 5000 years ago, originally in India. Despite intense persecution by humans for its flesh and



The distinctive Racket-tailed drongo is one of the noisiest birds in India's forests, and confusing for the birdwatcher because of its very wide repertoire of calls and songs.

plumage, this fowl has managed to hold its own wherever forests remain.

Moist forests do not have a great diversity of raptors, since their mode of catching prey is more conducive to open areas. But fairly common is the handsome Crested serpent eagle *Spilornis cheela*. Its habitat preference, as also of the Crested or Changeable hawk-eagle *Spizaetus cirrhatus*, extends to drier forests too. But a raptor which seems to restrict itself to moist biotopes is the Rufousbellied hawk-eagle *Hieraaetus kienerii*. This species ranges throughout the Western Ghats, and in much of

northeast India. Its method of catching prey is typical to many forest-dwelling raptors. As described by Salim Ali and Dillon Ripley, it will,

perch bolt upright and alert on a horizontal bough up in the foliage canopy of some lofty tree overlooking a glade or clearing, watching for prey venturing into the open. From this ambush it pounces on its quarry, killing it on the ground, or striking it in the air before the victim has time to get properly underway, by a thunderbolt stoop reminiscent of a peregrine falcon.

Several species of owls are very much at home in moist forests. Their wonderful capacity to see in relative darkness gives them a distinct edge in closed-canopy vegetation. The huge Great horned owl *Bubo bubo* ranges widely from dry, open areas, to moist forests, but not so the Forest eagle owl *Bubo nipalensis*. This largest of Indian owls has a far more restricted range, inhabiting the foothill forests of north and northeast India, and the evergreen areas of the Western Ghats.

Some of the birds mentioned above also overlap into evergreen rainforests. But, this ecosystem, found on the Western Ghats, the north-eastern states east of Bangladesh,



Vijay Mohan Raj

The Malabar trogon is often visible only when it flies, despite its brilliant colours; once noticed, it is not excessively shy.

and the Andaman and Nicobar Islands, has its own unique composition of birds. One's luck is in if one spots the Red-headed trogon *Harpactes erythrocephalus*, found in the Himalayan evergreen belt, or its counterpart in the Western Ghats, the Malabar trogon *H. fasciatus*. The hunting habits of trogons are similar to the hawk-eagles, mentioned above, except for the fact that their prey consists primarily of insects. And for all their red brilliance, these birds have an astonishing ability to camouflage themselves by turning their dull backs to potential enemies, their broad tails looking like hanging bark or dry leaves.

A great many birds of the evergreen rainforest use another, simpler and equally effective, camouflage: the colour green. One might never see the leafbirds (*Chloropsis* spp.), if they did move or call out. Then there is the Blue-eared barbet *Megalaima asiatica* of northeast India, and the Crimson-throated barbet *M. rubricapilla* and Small green barbet *M. viridis*, both of the Western Ghats. The Grey-fronted and Orange-breasted green pigeon *Treron pompadora* and *T. bicincta*, look for all the world a part of the tree canopy until they startle you by flying off. The same goes for several species of parrots, notably the Bluewinged parakeet *Psittacula columboides*, and the two species restricted to the Andaman and Nicobar Islands, the Red-cheeked parakeet *P. longicauda* and the Nicobar parakeet *P. caniceps*.

The evergreen rain forests of the Andaman and Nicobar Islands are in fact a treasure house of birdlife, with many endemic species and subspecies not found anywhere else in the world. The striking Narcondam hornbill *Rhyticeros narcondami*, for instance, occurs only on one tiny island. But it is the amazing nesting habits of the Nicobar megapode or scrub-fowl *Megapodius nicobariensis* ('megapode' = Greek for 'big foot') which attract comment. One of a family of 10 species spread

throughout southeast Asia and Australia, there are two subspecies endemic to the Nicobar Islands. Megapodes are the only birds in the world who do not use their own body heat to incubate their eggs. Instead, they make huge mounds of leaves and sand by standing on one foot and kicking backwards on the forest floor, then bury their eggs deep inside, and let the heat generated by the rotting vegetation do the job! They can measure the temperature with their sensitive mouth lining and tongue, and will add leaves to a mound they consider to be underheated, or remove rotting matter in case of overheating! These mounds can sometimes be 10 metres in circumference and 1.5 metres high. Often, nesting may



Megapode nesting in the Nicobar Islands

even be communal, with several females using the same mound to hatch their eggs. Once hatched, the chicks fight their own way out of the mound, and are already completely independent of their parents.

Several hornbills inhabit the evergreen and moist deciduous forests of the mainland. An unforgettable sight is a flock of the massive Great pied hornbill *Buceros bicornis*, sailing overhead with a great big ‘whoosh’. This bird, our largest hornbill, also has a very large casque (the ‘horn’, as it is called), a feature it shares with the smaller Indian pied hornbill *Anthracoceros albirostris* and the Malabar pied hornbill *A. coronatus*. More colourful than these largely black-and-white birds is the Rufous-necked hornbill *Aceros nipalensis*, a resident of northeast India.

The precise function of the hornbill’s casque has never been understood. Some experts feel it is for defence, others say it is used in nesting. Hornbills have, in fact, as unique a nesting behaviour as megapodes. The gravid female enters a hole high up in a tree, which is then sealed from outside by the male with a combination of mud, dirt, and regurgitated food matter, and from inside by the female with her own excreta. A narrow slit is allowed, through which the male regularly feeds his ‘lover’ (as an elderly Naga villager once described the birds to me!). Once the eggs hatch, and the chicks are a little grown, the seal is broken, the female released, and the wall rebuilt to ensure the safety of the young ones until fully fledged. As a means of protecting the vulnerable female and chicks, this system is unparalleled.

The evergreen forest at night is a different world altogether. With little moon or starlight penetrating the canopy, birds have to possess extremely adaptive eyesight. Apart from owls and nightjars, this is possessed by one of nature’s most strange-faced bird families, the frogmouths. The Ceylon frogmouth *Batrachostomus moniliger* inhabits the Western Ghats, while the Hodgson’s



A rare and elusive bird, the Ceylon frogmouth uses its colouration and shape to hide itself during the day, and comes alive in the night to hunt for insects.

Pic: Clement Francis

frogmouth *B. hodgsoni* is found in the northeast. Both are brilliantly camouflaged during the day, sleeping perched on a branch with their tail and body looking much like a broken stump.

Raptors seem to prefer evergreen rainforests even less than they do moist deciduous ecosystems. Amongst the few with such a preference are Blyth's baza *Aviceda jerdoni* and the Blackcrested baza *A. leuphotes*. Their upright crests distinguishing them from most other birds of prey, bazas are found in the evergreen foothills of northeast India and the Western Ghats, but are uncommon even in this range.

Before winding up this section on moist forests, one species must not be ignored: the Fairy bluebird *Irena puella*. This brilliant ultramarine bird is an ornithologist's delight, constantly moving about the lush vegetation in search of the berries and nectar that is its food. It is found in all the three regions of India which have evergreen rain forests: the northeast, the Western Ghats, and the Andaman and Nicobar Islands.

WETLANDS: FRESHWATER

For sheer concentration of birds no habitat can beat the wetland. The rivers, lakes, tanks, marshes, and lagoons of India harbour a huge variety of resident and migrant species.

First, the 'free-floating' ones. A diminutive waterbird present in almost every tank, lake, and river of the country is the Little grebe *Podiceps ruficollis*. It has the uncanny ability to dive in and, swimming underwater, reappear at a spot several metres away. The related Great crested grebe *P. cristatus* is much rarer, found in large lakes and littoral waters of northern and north-western India, straggling to eastern India.

The three species of pelicans occurring in India are amongst the largest of waterbirds. The Rosy or White pelican *Pelecanus onocrotalus* is the commonest, though in the south it is replaced by the Grey or Spotted-billed pelican *P. philippensis*. The fishing behaviour of these birds is distinctive: forming a large semi-circle in the middle of a lake, they will move forward in tandem, flapping their wings and beating the water, catching the fish that are thus stirred up.

The occurrence of swans in India is believed to be rare and accidental; three species have been recorded at a few spots in northwest India, but none of these are resident. Also migrant but much more regular are all the species of geese found here, the most common being the Greylag goose *Anser anser*, and the Bar-headed goose *A. indicus*. The latter has perhaps the distinction of being the highest flying bird in the world, since it has been seen flying above the height of Mt. Everest!

Most abundant of the surface swimmers, or rather floaters, are the ducks. Our waterways are blessed with as many as 33 species of these, most of them (21 to be accurate) migrant or vagrant. The resident ones include the dainty Lesser whistling teal *Dendrocygna javanica*, and the tiny Cotton teal *Nettapus coromandelianus*; both are found almost throughout India. Almost as widespread a resident duck is the strange-faced Comb duck or Nakta *Sarkidiornis melanotos*. The precise function of the 'comb' on the beak of this bird (like that of the hornbill's casque) is unclear.

Come winter, and hundreds of thousands of migrant ducks fly in and scatter into the country's wetlands: the Shoveller *Anas clypeata*, the Pintail *A. acuta*, the Common teal *A. crecca*, the Garganey *A. querquedula*, the Common pochard *Aythya fuligula*, and several others.



Joanna van Gruisen

The stately Great crested grebe, nesting in Ladakh and Gujarat, visits a number of large lakes in north India.

Ornithologists always carefully scan large congregations of ducks in the hope of spotting some rare ones, including even the Pinkheaded duck *Rhodonessa caryophyllacea*, considered extinct since 1935 (see Chapter 6). Many people mistake another species, the lovely Redcrested pochard *Netta rufina*, for the Pinkheaded duck. This pochard, however, winters at large lakes and reservoirs throughout northern India, and down to the peninsula.

Fast streams are ordinarily not preferred by ducks, but a few have been able to adapt to them. These include the Common goldeneye *Mergus merganser*, the uncommon Goldeneye *Bucephala clangula*, and the rare Smew *Mergus albellus*. These are all migrants to north India, though the merganser also has a resident population, and ranges down occasionally to central India.

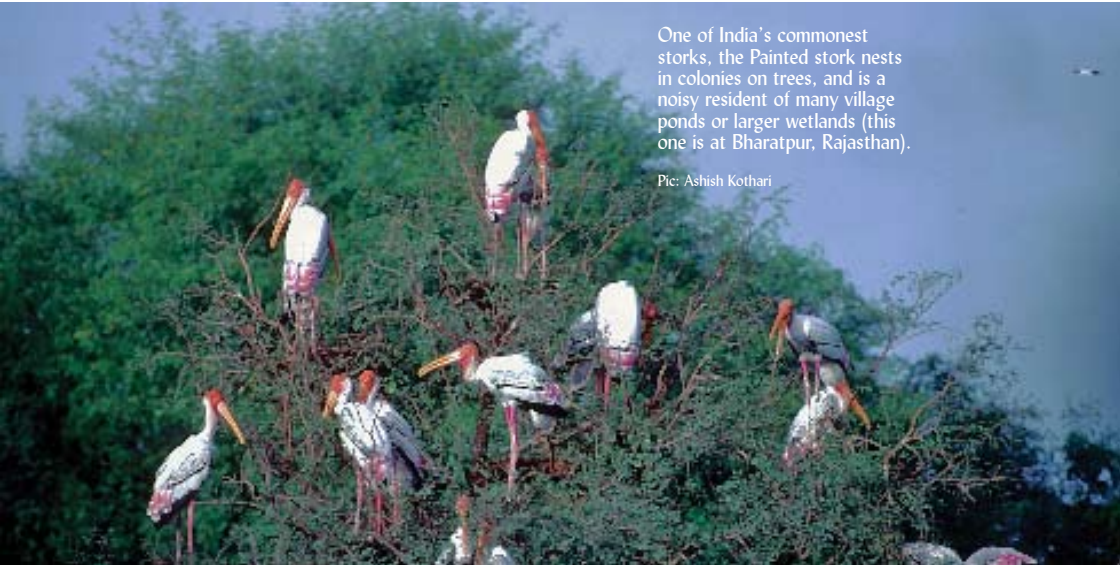
Often, amidst a flock of ducks, one can see the aptly named Indian snakebird, or Darter *Anhinga rufa*, which hunts for food by swimming underwater with only its long, sinuous neck and sharp beak exposed. A similar fishing technique is employed by cormorants, of which three species are common over most of India: the Cormorant *Phalacrocorax carbo*, the Indian shag *P. fuscicollis*, and the Little cormorant *P. niger*. Their nearly all-black plumage sets them apart from most other wetland birds.

Birds, Birds, Everywhere!

The family of coots, superficially resembling ducks when swimming on water, contains several marsh birds. There is the almost all-black Coot *Fulica atra*, a resident whose population is so greatly augmented by migrants in winter that its flocks seem to choke up waterbodies. There are three other extremely widespread coots: the White-breasted waterhen *Amaurornis phoenicurus*, the Indian moorhen *Gallinula chloropus*, and the Purple moorhen *Porphyrio porphyrio*. The first two are abundantly found at the edges of any large waterbody, even in the midst of a bustling city. The Purple moorhen, on the other hand, generally keeps a distance from human activities. Contrasting with its splendid, iridescent looks, is its loud, booming call which sounds just like the staccato, smug cackle of a Bombay-style film villain!

The shallow depths of lakes and rivers are often shared by ducks and other swimming birds, with a whole range of walking, wading birds. Typically, these are long-legged and have extended beaks, excellent for foraging underwater.

The largest of these birds are the cranes, storks, and flamingos. India has one of the world's greatest variety of cranes, as many as six resident and wintering species. The common resident is the Sarus crane *Grus antigone*, a

A photograph showing a large colony of Painted storks nesting in a tree. The birds are perched on the branches, some facing forward and others in profile. They have white bodies with distinctive reddish-brown and black markings on their necks and heads. The background is a clear blue sky.

One of India's commonest storks, the Painted stork nests in colonies on trees, and is a noisy resident of many village ponds or larger wetlands (this one is at Bharatpur, Rajasthan).

Pic: Ashish Kothari

well-known and much-revered bird of the countryside. The only other resident is the Black-necked crane *G. nigricollis*, a handful of which survive precariously in the marshes of Ladakh. While neither of these is ever seen in large concentrations, the migrant Common crane *G. grus* and Demoiselle crane *Anthropoides virgo*, are seen in hundreds. But most famous of the cranes, and one of India's most talked about birds, is the Siberian crane *G. leucogeranus*. Having undertaken a long arduous journey from Russia through the trouble-torn areas of the Middle East, this bird has been wintering almost exclusively in the Keoladeo Ghana (Bharatpur) National Park of Rajasthan.

Storks have always had a prominent place in culture and folklore, both in India and outside. Again, the diversity in India is impressive, with six resident and two migrant species. All of them prefer marshy habitat with scattered tree groves for nesting or roosting. Probably the most common, and the only one with a splash of colour on its plumage, is the Painted stork *Mycteria leucocephala*. In conjunction with other species like the Open-bill stork *Anastomus oscitans*, this bird can be frequently encountered on noisy and crowded nesting trees. Far less common than these are the adjutant storks – the Greater adjutant stork *Leptoptilos dubius* and Lesser adjutant stork *L. javanicus* – so called because of their slow, deliberate, military-like walk, and the Black-necked stork *Ephippiorhynchus asiaticus*.

A relative of the storks, the Eurasian spoonbill *Platalea leucorodia*, has a uniquely shaped beak, designed to scoop up food from the water. Who knows, perhaps humans got their inspiration for kitchenware from birds like the spoonbill!

Equally well-adapted to wetland existence are the ibises, with sharp down-curved beaks capable of minute

marshbed exploration. Then there are the other shallow water commensals, egrets and herons. Amongst the wetland's commonest sights are 'heronries', where communal nesting of several of these birds takes place on trees in the middle of or adjacent to lakes.

Egrets get their name from their exquisite white crest feathers, called 'aigrettes', which were used to adorn ladies' hats in Victorian times, and still sit atop the turbans of many tribal or peasant heads. These nearly all-white birds are an ubiquitous sight at marshes, lakes, village ponds, canals, and even sewers. The Cattle egret *Bubulcus ibis* is the only egret which is not particular about water habitats, often found on agricultural fields or grazing lands following livestock around, hence its name. In many parts of the country, cattle egrets have modernized along with the prevalent form of agriculture; they now trail after tractors, busily snapping up the insects and other food stirred up by the machines!

Many herons occur commonly throughout India: the stately Grey heron *Ardea cinera*, the lovely Purple heron *A. purpurea*, the portly Night heron *Nycticorax nycticorax*, and others. As abundant on or near waterbodies is the Pond heron *Ardeola grayii*. This species is also nicknamed Paddybird, due to its fondness for submerged rice fields, in which it forages for small animal prey. One of the lay

Nesting Grey heron pair, at
Bharatpur, Rajasthan.

Pic: Ashish Kothari



birdwatcher's greatest surprise is when this grey-brown, dull bird suddenly transforms into a graceful white in flight, this being the predominant colour of its large wings. Similarly built, but affecting dense reed-beds into which they merge imperceptibly, are the bitterns, the loveliest of the lot being the Chestnut bittern *Ixobrychus cinnamomeus*.

Lake shores and river banks are the hunting grounds of a whole host of waders and shore-nesters. An inevitable presence near water all over India is the Red-wattled lapwing *Vanellus indicus*. This alert bird can be the birdwatcher's bane, for it is the first to spread the alarm with its piercing "Did-he-do-it? Did-he-do-it?" call. Most of its other family members are quieter. The White-tailed lapwing *Vanellus leucurus* is a migrant, but the Spurwinged plover *V. spinosus* is a resident of river sandbanks and islands. Much smaller, and very common, is the Little ringed plover *Charadrius dubius* and the Kentish plover *C. alexandrinus*, both constantly scurrying about at the water's edge. An extremely familiar sight is the Black-winged stilt *Himantopus himantopus*, its long thin legs looking for all the world like an acrobat's stilts.

Moving about in little spurts are several sandpipers: the Common sandpiper *Tringa hypoleucos*, the Green sandpiper *T. ochropus*, and the Wood or Spotted sandpiper *T. glareola*. Cohabiting with these are the smallest of all waders, the stints (*Calidris* spp.), little more than the size of a sparrow. My personal favourites amongst waders are the snipes, with their bold markings and Pinnocchio-like elongated beaks. These are also, unfortunately, a great favourite with hunters, because of the challenge offered by their elusive nature and lightning-swift flight. Most widespread are the Fantail snipe *Gallinago gallinago* and the Pintail snipe *G. stenura*. Far more easily seen amongst water-side birds are wagtails, several of them migrants to India. The resident Large pied wagtail *Motacilla*



The Great thick-knee or stone plover, found on stony beds and shores of large rivers and lakes, distributed patchily throughout India.

maderaspatensis is joined in winter by the Grey wagtail *M. cinerea*, the Yellow wagtail *M. flava*, and the White wagtail *M. alba*.

Land adjacent to waterbodies is also a favourite nesting ground for several species, the typical nest being a mere scrape in the sand. Large communal colonies are set up by the Collared pratincole *Glareola pratincola*, and the Small Indian pratincole *G. lactea*. Several species of terns also do likewise.

Terns are, in fact, amongst the most common birds seen flying over water. The Indian river tern *Sterna aurantia* breeds all over India, while the Common tern *S. hirundo* nests in Ladakh but spends winter in the rest of the

Winter visitors, Brown-headed gulls (a rather confusing name in India, since the colour on their heads occurs only in their breeding grounds in Europe!) congregate in huge numbers along coasts and inland wetlands.

Pic: Clement Francis



country. All but one of the 19 species of terns found in India are resident, though some, like the Gull-billed tern *Gelochelidon nilotica* and the Whiskered tern *Chlidonias hybridus*, have both a resident and migrant population.

Sharing the tern's ecological niche to some extent are the gulls, most of whom, in contrast, are migrant. Huge, noisy congregations of Brown-headed and Black-headed gulls, *Larus brunnicephalus* and *L. ridibundus*, are a common



winter-time sight at riverside ghats, where people generously throw them food morsels. A common site at Indian wetlands and seas is a fishing boat surrounded by a flock of raucus gulls and terns, awaiting a chance to scoop down and catch surfacing fish.

As good at fishing as terns and gulls, and quite aptly named, are the kingfishers. Commonly found perched on trees next to water, the White-breasted kingfisher

Halcyon smyrnensis is also the only one of its family which is not entirely dependent on wetlands. Others include the Lesser pied kingfisher *Ceryle rudis*, with its spectacular hovering and vertical diving displays, and the Common kingfisher *Alcedo atthis*, so brilliantly attired that it has been likened to a jewel.

The Pied kingfisher waits patiently near waterbodies, then sallies forth to hover in the air, its body completely still while its wings beat at breathtaking speed. It will make a sudden dive to catch fish from even a foot or two below the water's surface.



Clement Francis



Clement Francis

The Brown dipper is a common sight along Himalayan streams, often flying ahead of trekkers as if to show the way, busily searching for invertebrates underwater, then floating downstream with its wings outstretched.

Swallows and martins invariably fill the sky above waterbodies, their bewildering speed and maneuvering making identification difficult. Abundantly distributed are the Common swallow *Hirundo rustica* and the Plain martin *Riparia paludicola*.

Wetlands have their own share of raptors, many of them heavily dependent on a fish diet. One such is the

Osprey *Pandion haliaetus*, which breeds infrequently in the Himalaya but spends winter in the rest of India. And marshes and lakes all over India are frequented by the Marsh harrier *Circus aeruginosus*, often seen 'harrying' (hence the name) ducks into a panic before striking at a straggler. Then there are the powerful fishing eagles, the most widespread being the Greater greyheaded fish-eagle *Ichthyophaga ichthyaeus*.

Most waterbirds are unable to survive in the fast-flowing Himalayan streams, but dippers and fork-tails appear to thrive even in their torrential waters. The Brown dipper *Cinclus pallasii* and the White-breasted dipper *C. cinclus* are both commonly seen upto a height of about four to five thousand metres. They have the amazing ability of walking about on the bed of a stream, *underwater*, in search of food! And then there are the whistling thrushes, found where streams pierce heavily wooded hillsides. The sing-song call of the Blue whistling thrush *Myiophonus caeruleus* is so amazingly human-like, that the bird has been nicknamed the Whistling Schoolboy.

WETLANDS: SALTWATER

Saltwater wetlands like tidal lagoons, creeks, and low tide zones often contain the same, or closely related, species present in freshwater ecosystems. There is, for instance, the Reef heron *Egretta gularis*, which turns astonishingly from a pure egret-white to a dark grey-black, in a phase appropriately called the 'eclipse plumage'. The Greater flamingo *Phoenicopterus ruber* is found both inland and in coastal areas, but the related Lesser flamingo *P. minor* is almost exclusively a bird of the coasts. There it is joined by dozens of small waders, including the distinctive Eurasian oystercatcher *Haematopus ostralegus* and Crab-plover *Dromas ardeola*. Soaring overhead would be the magnificent White-bellied sea eagle *Haliaeetus leucogaster*.



Island and marine stretch in the Lakshadweep archipelago.

Pic: Sunita Rao

Many terns and gulls are also predominantly found on India's coasts, among them the pretty Rosy tern *Sterna dougallii*, and the Herring gull *Larus argentatus*. Some others of their kin like the Large crested tern *Sterna bergii*, wander much deeper into the sea. They share these wide open marine spaces with a number of other bird families, all of which are thereby termed 'pelagic'. There are the shearwaters (*Procellaria* spp.), the petrels (*Bulweria* spp., *Oceanites* spp., and others), the frigate birds (*Fregata* spp.), the tropic-birds (*Phaethon* spp.), and the boobies (*Sula* spp.).

Going back to the coasts briefly, one of the most fascinating marine ecosystems is the mangrove or tidal forest. Characterized by trees supported by a tangle of exposed roots, this biotope captures the nutrients of both the sea and the freshwater streams from inland. Its immense productivity benefits a unique set of birds, such as the Brown-winged kingfisher *Halcyon pileata*, the Mangrove whistler *Pachycephala cinerea*, and the tiny Orange-bellied flowerpecker *Dicaeum trigonostigma*.



Large congregations of the Lesser flamingo can be seen on India's eastern and north-western coasts, and some northern Indian lakes, other than at its breeding sites in Kachch.

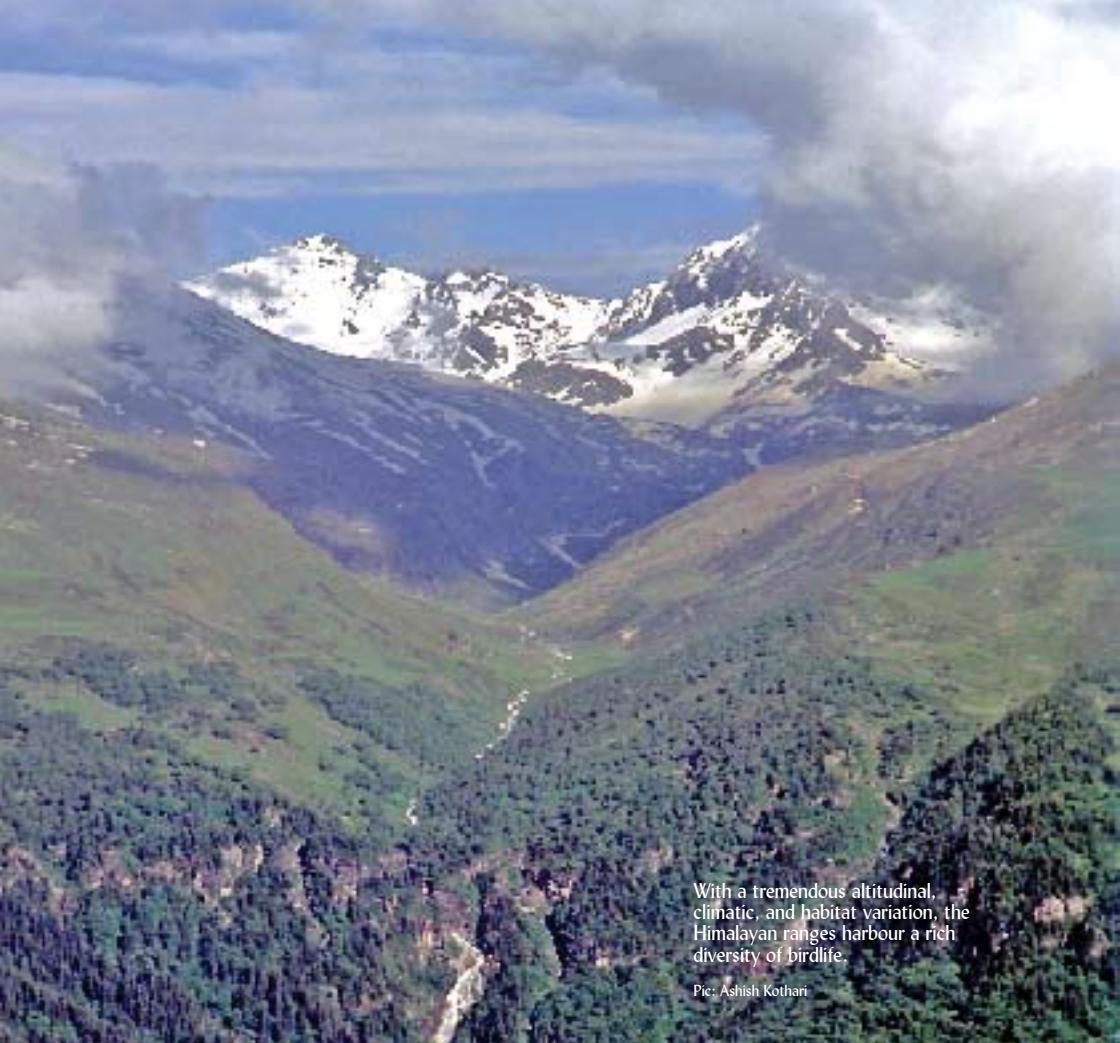
Pic: Ashish Kothari

These and other mangrove birds are found in one or more of the following areas: the Gulf of Kachch, the Sundarbans (delta of the Ganga and Brahmaputra rivers), the east coast of India at the mouth of major rivers, and the Andaman and Nicobar Islands.

THE HIMALAYAN RANGES

The Himalaya are the world's loftiest mountains. They are also extremely diverse, presenting a range of topographical and ecological zones which is unsurpassed in the world. Indeed, climatic and biotic conditions change with altitudinal variations in the Himalaya much the same way as they change between different latitudes!

The tropical forest areas of the lower Himalaya have partly the same bird communities as described earlier under moist deciduous and evergreen forests, so I will now discuss only those which are very different. Above this zone, however, sub-tropical and temperate forests



With a tremendous altitudinal, climatic, and habitat variation, the Himalayan ranges harbour a rich diversity of birdlife.

Pic: Ashish Kothari



The Monal pheasant, standing out starkly in front of a cloud.

Pic: Joanna van Gruisen

harbour many species not found elsewhere in the country. The most prominent, by far, are the pheasants.

This group of birds, consisting of 18 species in India, is quite unparalleled in its collective beauty. My own first sighting of the resplendent Himalayan monal pheasant *Lophophorus impejanus*, not long after I was initiated into birdwatching, was marked by a stunned silence. Two thoughts had flashed through my mind then: how could anything be so beautiful, and, tragically, how could anyone want to kill so beautiful a thing?

The Monal is found throughout the Himalayan ranges, and goes higher (upto 5000 m) than any other pheasant except one, the only other species reaching those exalted heights is the White-eared pheasant *Crossoptilon crossoptilon*, found only in Arunachal Pradesh. The latter bird inhabits the rhododendron and juniper understorey characteristic of high-altitude coniferous forest. It shares this habitat with the multicoloured Blood pheasant *Ithaginis cruentus*, found in the northeast. Also found in this ecosystem, but generally rare, is the group of tragopans. Amongst these brilliant red, white-spotted pheasants, the Crimson and the Western tragopans, *Tragopan satyra* and *T. melanocephalus*, are the more widespread. The greatest altitudinal range, however, belongs to the Kalij pheasant *Lophura leucomelana*, which descends down to about 400 m in the foothills, and is also among the drabbier of its kin.

A third tragopan, the Blyth's, *Tragopan blythi*, was involved in an interesting historical episode. Back in 1882, the British were finding it difficult to operate their new tea gardens in Nagaland, since the Naga tribals practiced headhunting on the labourers. After much persuasion the tribals agreed to spare the workers, and as a symbol of this, presented a live Blyth's tragopan to the British Commissioner. In Chapter 7, I will describe the

modern-day sequel to this story, in which several Naga tribes have decided to spare this species from being hunted.

Birds in the Himalaya do not get much larger than the pheasants. But they do get a great deal smaller. The family of titmice, for instance, contains a number of delightful little birds, most of them smaller than a sparrow. Commonly seen species include the Green-backed tit *Parus monticolus*, the Yellow-cheeked tit *P. xanthogenys*, and the Red-headed tit *Aegithalos concinnus*.

Tits are often spotted with birds of several other families, in a loose group which moves together from tree to tree. This mixed 'hunting party' could contain nuthatches (commonly the Velvet-fronted *Sitta frontalis* and the Chestnut-bellied *S. castanea* at lower heights, the European *S. europea* and the Whitecheeked *S. leucopsis* higher up), tree creepers (the Himalayan or Bar-tailed tree-creeper *Certhia himalayana* being frequently seen), leaf warblers (of the genus *Phylloscopus*, very difficult to accurately identify down to species level), and others.



Krupakar Senani

The Velvet-fronted nuthatch (and several others of its kin), often seen creeping up trunks or branches, hunting for insects in the bark.

The lower zones of the Himalaya (upto 4000 m or so) have, in fact, quite a breathtaking range of small birds. The Black-capped sibia *Heterophasia capistrata*, beautiful though it is, is eclipsed by the rainbow-hued Silver-eared mesia *Leiothrix argenteauris*, which in turn is given competition by the Nepal cutia *Cutia nipalensis*. All of these, with others of their genera, are found in dense evergreen and moist deciduous biotopes, including rhododendron thickets. These ecosystems also harbour a number of bush robins (*Erithacus* spp.) and shortwings (*Brachypteryx* spp.), dumpy, mostly bluish birds haunting the undergrowth. Flitting about higher up in the trees are sunbirds in various fantastic colours, including the Yellow-backed sunbird *Aethopyga siparaja* and Mrs. Gould's sunbird *A. gouldiae*.

Above the tree-line, the Himalayan avifauna changes dramatically. Starting about 4000 m, this is the zone of alpine meadows, boulder-strewn slopes, and low scrub vegetation. Much higher, permanently snow-bound conditions occur, but at altitudes between 4000 and about 5500 m, the snow thaws in the spring and the area turns into a riot of wild flowers.

Amongst the larger birds found above tree-line, the Yellow-billed chough *Pyrhocorax graculus* affects rock-strewn slopes and grassy meadows upto astonishing heights. Climbers of Mt. Everest have noticed this bird pecking at food morsels around their camps at an altitude of 8000 m! The Raven *Corvus corax* replaces the crow at high altitudes, and is usually seen near hill villages. But perhaps the largest ground bird above the tree-line is the Himalayan snowcock *Tetraogallus himalayensis*, its plumage wonderfully adapted to merge into the snow and rock background. It shares this habitat with the Snow partridge *Lerwa lerwa* and the Chukor *Alectoris chukar*, both of which can be found upto 5000 m.



Raghu Chundawat

Chukor in landscape, (inset) chukor. This partridge is a common sight at the higher altitudes of the Himalaya, but at a distance will merge miraculously into the snow and rock filled background.

The family of finches ranges over a wide degree of altitude, but its presence is most marked on these higher slopes. Several species of rosetfinch (*Carpodacus* spp.), many of them very difficult to distinguish from one another, can be seen on alpine meadows and slopes covered with dwarf rhododendron and juniper species. Many finches, accentors, chats, and other birds have also adapted to the harsh climate of the vast cold desert regions in the northern border provinces of India. Indeed, several species which are seen in other parts of the country in winter, such as wagtails and the Ruddy shelduck *Tadorna ferruginea*, nest and breed in these remote mountainous areas.

The magnificence of the Himalayan peaks is matched, most of all, by the raptors and scavengers that inhabit this cold realm. The Golden eagle *Aquila chrysaetos* is a resident of the area, and can be seen soaring way above 5000 m. The Northern goshawk *Accipiter gentilis*, a rare winter visitor to north India, breeds in the mixed temperate forests of the north-western Himalaya, above 2400 m. It can also wander up above the tree-line, in search of prey like the

Snow partridge. The Goshawk, incidentally, was at one time a highly sought after bird by falconers.

If size is impressive, then the Himalayan vultures are king. The abundant Griffon vulture *Gyps fulvus* is often seen in large congregations, circling near sheer cliffs and mountain faces. Much less common is the Bearded vulture or Lammergeier *Gypaetus barbatus*, recorded upto heights of over 7000 m! With a wing-span of nearly nine feet, this is one of the world's largest flying birds. It has the remarkable habit of obtaining bone marrow, for feeding, by dropping bones onto rocky ground while in flight!

Birds in human habitats

Birds are not found only in the 'natural' ecosystems of the country. Increasingly in India a whole range of habitats influenced and dominated by humans have come up. These are either natural areas heavily altered

Ashish Kothari





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Intensely used areas, such as salt pans and agricultural fields along the coast, can attract dense concentrations of species like the Skimmer.

by human activities, such as agricultural fields, or else areas created anew by us, such as buildings and bridges. In either case at least some bird species have been able to adapt to the changed circumstances, and a few even thrive on them. Can the House crow *Corvus splendens*, or the House sparrow *Passer domesticus*, even be conceived of now except in human company? And who can miss the congregations of pigeons and doves feeding busily on grains in city *chowks*, unmindful of the urban chaos around them?

Built-up areas in India range from the tiny tribal hamlet to the burgeoning metropolis. The village and the city contain a large number of different micro-ecosystems, but let's start with the buildings themselves. Apart from the crow and the sparrow, a number of other birds have been bold enough to seek food and nesting space in the midst of buildings. One finds the Blue rock pigeon *Columba livia*, the Little brown dove *Streptopelia senegalensis* and the Eurasian collared dove *S. decaocto* nesting in impossibly small wall niches or on parapets

of buildings. An unwary pedestrian who receives a bit of sticky dropping from some pigeon nesting high above him is likely to curse the bird, but by and large this cohabitation is not resented. Many an urban dweller has, in fact, made a ritual of spreading grains at city *chowks* for pigeons and doves to feed from. Less tolerated perhaps, but nevertheless a common phenomenon, is the attempt by sparrows and doves to nest inside houses, on top of geysers and window sills, behind stored bags, and even on fan blades.

Occasionally one comes across some unusual human commensals. I have seen, for instance, Blossom-headed parakeets *Psittacula cyanocephala* nesting in tiny holes in the walls of the Arts faculty of Delhi University! And if one assumes that these were the 'learned' kind,

what does one make of the more frequent habit of the Asian pied myna *Sturnus contra* to nest snugly on telegraph and telephone junction poles?! Perhaps they account for some of the strange noises often heard on Indian telephones, or the garbled messages frequently received by telegram! And then there is the Purple sunbird *Nectarinia asiatica*, which has been recorded occasionally nesting in the oddest of places: the trellis-work of verandahs, the hanging electric wire of a lamp in use, the chain of a flush tank in a temporarily

Ashok Captain / Jay Kadapatti



Several species of owls and raptors, such as the Barn owl, have adapted to human settlements, including densely populated cities, especially where old parks and monuments provide refuge.

disused lavatory, and the pocket of a nightgown hung up to dry on a clothes line!

Amongst the most fascinating of examples of birds in built-up areas are those nesting in monuments. I have spent many a delightful hour combing Delhi's monuments for these birds: the Common hoopoe *Upupa epops*, the Egyptian vulture *Neophron percnopterus*, the Indian or Brown rock chat *Cercomela fusca*, the Barn owl *Tyto alba*. And no-one can miss the huge colonies of the House swift *Apus affinis* which occupy the high ceilings of rooms inside these monuments, their constant chatter and bewildering pace of arrivals and departures adding considerably to the charm of the place.

Many species of swifts and swallows are also fond of making a home on the sides or underparts of bridges and flyovers, unmindful of the hustle and bustle of traffic above.

In the sheer concentration of birds, few human-influenced habitats can match the garbage dump and refuse landfill. A hectare of open landfill can contain thousands of scavenging and insectivorous birds: kites, vultures, crows, larks, mynas, and the very occasional eagle.

The hustle and bustle of birds at a dump, the constant jostling, the pervasive sound of kite shrieks and crow squawks, all add up to a unique ambiance, parallels to which can perhaps only be drawn from a crowded fruit and vegetable bazaar, or a stock exchange at peak hours. Unfortunately the fact that these birds are performing an extremely useful function, in cleaning up our waste and recycling it back into nature, is usually lost on the observer of this spectacle. Impressive congregations of vultures were once a common sight on village outskirts where carcasses of cattle and other domestic animals were thrown.

Yet another human artifact which has quickly been exploited by birds is the telecommunication or electric

wire. It is not uncommon to see thousands upon thousands of migrating swallows resting on pylons and wires. Other birds like Common starlings *Sturnus vulgaris*, and bee-eaters of various species, are also fond of perching on wires, occasionally swooping down to catch an unwary insect. But many birds also use wires for breeding purposes: a common sight in the countryside is a large colony of Baya weaver *Ploceus philippinus*, their beautifully-crafted funnel-shaped nests hanging in a neat row from a wire. Other birds have been known to follow this ingenious example, including the Purple sunbird and the Long-tailed broadbill *Psarisomus dalhousiae*. The latter seems to prefer stretches of telegraph or electricity wires which are isolated, for example where they cross a ravine or *nullah* so that they are at a greater height from the ground.

One of the more interesting human-influenced bird habitats is the salt pan, a common feature along India's extensive coastline. Several species of coastal birds seem to thrive in these pans of stagnant, rapidly evaporating, and salt-saturated water, which abound in food species like brine shrimp, pupae and larvae of several invertebrates, bivalves, etc. A study at the Vedaranyam Swamp salt ponds in Tamil Nadu showed the presence of at least 47 species, of which the most abundant were the Little stint *Calidris minuta*, and the Marsh sandpiper *Tringa stagnatilis*.

At the coast, including on salt pans such as at the Gulf of Kachch off Gujarat, one can see large flocks of the Skimmer *Rynchops albicollis*. Its beak is uniquely shaped such that the lower mandible is longer than the upper, allowing it to snap up fish as it flies low, skimming the water's surface.

There are many other semi-artificial or completely synthetic habitats which birds have learnt to adapt to: sewers (stints, sandpipers, herons), agricultural fields

(finch-larks, egrets, Pond herons), village tanks (storks, herons, pelicans), cowsheds (swifts, mynas), ash dumps (starlings, larks), and others. And so, the urbanized Union Territory of Delhi, containing all of the above-described micro-habitats, can boast of having recorded over 400 species of birds, one-third the diversity found in India!

It must however be stressed that very few, perhaps none, of the artificial 'ecosystems' created and dominated by humans can be considered superior to natural ecosystems. They are only impoverished versions of what an ideal bird habitat might be. Certainly I do not want to provide an excuse for the alarmingly rapid and continued conversion of natural areas into artificial, imbalanced, human-dominated ones!

Go see them for yourselves!

In this chapter I have tried to provide an idea of the enormous wealth and diversity of birds and bird habitats that India has been blessed with. This has been only a glimpse, a brief look at what is indeed a vast, complex, wondrous field. Those who may want to delve further into this rewarding area are advised to refer to some of the periodicals I have listed in Annexure 4, and the publications in the Bibliography. Refer in particular to the excellent series of publications authored or co-authored by Salim Ali. But books are books, and can be no substitute for field experience. So to those who are really keen, my advice is: get out of your homes, and go to where the birds are. With a bit of effort, you can experience the sort of avifaunal richness and diversity that will make this entire chapter appear insipid.

Birds in Indian Culture



Birds have always been in the hearts and minds of people in India. Mythology, folklore, art and sculpture, drama, song and dance, and just about every other manifestation of Indian culture has been touched by the avian world. How could it have been otherwise in a country where one encounters birds at nearly every step?

This constant touch with birds is reflected in both written and oral tradition, in various art forms, and in dance.

Through the ages birds have been attributed with qualities ranging from the evil to the divine, dispositions varying from the fearsome to the friendly, and traits ranging from the anthropomorphic to the superhuman. A full exposition of the extent and nature of this representation of birds in Indian arts and culture would require several volumes; I can do no better than to give a brief introduction in this book.

Birds in mythology and folklore

Perhaps the richest and most varied depiction of birds is found amongst the communities living closest to nature

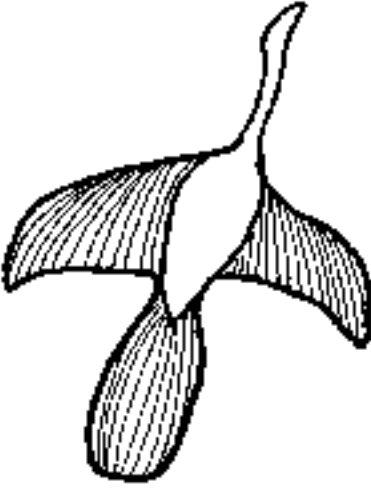
(the ecosystem people): forest-dwelling adivasis, fisherfolk, pastoralists. The Warli tribe in western India, for instance, has a number of evocative tales regarding birds and other animals. One of these concerns the eagle, whose occasional behaviour of stealing a chicken, is explained by elders to children in a manner that evokes empathy rather than hostility. The act is seen as merely the eagle's reward for an earlier 'gift of life' that it bestowed upon the village. Indeed, amongst the Warlis as in many other tribes, such depictions are part of a deeper philosophical relationship with nature, where humans and their natural surrounds are seen as being in a mutually beneficial dialogue with each other.



One Naga tale tells of the in-laws of a man, who retire into the forest ashamed at not having been able to perform a task set by their son-in-law. The man turns into a myna, calling out *kyon kyon*, and the woman, putting rice flour on the forehead and calling *woko woko*, turns into the gibbon. In a number of communities, birds are part of totemic depictions, seen as ancestors or related to ancestors. Unfortunately, such depictions are not very well known to the outside world, having not been well documented; it is only through the accounts of some anthropologists or the work of some NGOs that one gets indications of



the enormous wealth of folklore amongst ecosystem people. It is also quite likely that a number of mythological depictions of birds in more organized religions, as described later, owe their origin to such oral traditions.



Warli and
Pithoda motifs

In more organized religions and traditions, a common representation of birds is in incarnations (*avatars*) of gods, or as their mounts (*vahanas*) and companions. The eagle (Garuda), vehicle of Vishnu, is often depicted with the head, wings, and talons of a bird but the body of a man. The Brahminy kite is considered a form of the goddess Durga, and the Indian roller is called Nilkanth, a term used for the god Shiva.

Wagtails are said to represent Vishnu, for the mark on their throats resembles the sacred black stone related to this god, the Shalgrama. Agni, the god of fire, is known as the eagle of the sky. And all Hindus will be familiar with the name Jatayu, the brave bird which laid down its life in an attempt to save Sita from the clutches of the evil lord, Ravana, in the epic *Ramayana*.

In the Holy Quran (27:20), the Hoopoe *Upupa epops* (*hud-hud*) is depicted as a messenger, as part of Prophet Solomon's armies. This possibly comes from the employment of birds in communicating messages and for hunting. The Prophet is said to have once reviewed his birds and found the Hoopoe missing, whereupon he got angry and threatened to punish the bird if he did not immediately appear with a reasonable explanation. Shortly, the hoopoe returned, bringing with it a tale of having travelled to Saba (present-day Yemen, then known as the abode of rich people), and over there, to have seen a woman (possibly Bilquis) ruling, and the worship of the sun instead of Allah.

Though not a common bird of India, the swan occurs frequently in mythology. Hamsa, sometimes interpreted as a goose, is the mount of the supreme god Brahma, and

also closely associated with Saraswati, the goddess of learning. This latter association has led to the frequent use of the swan's figure on Indian lamps, symbolizing Saraswati's power to rid people of the darkness of ignorance. The swan is also credited with the power of separating milk from water, or good from bad. Hence hermits and ascetics, who are supposed to be able to make similar distinctions in choosing a good life, are sometimes called *hamsas* or *parahamsas*. The symbolism is still in use: the 1989 World Philatelic Exhibition held in New Delhi had the *rajhans* (royal swan) as its logo, with a special stamp depicting the bird being issued on the occasion.

Many other birds were given a place in mythology in their own right. There is the Chukor partridge, also called Chakora in myth, a fabulous bird which was said to live upon moon-beams. It is believed that this fanciful depiction may have its roots in the bird's habit of roosting on open ground at night. Another interesting bit of myth surrounds the origin of partridges and sparrows. In the Vedic texts, Tvastri (Visvakarma), the architect of the gods, had a son named Visvarupa who had three heads: that of wine drinker, *soma* (liquor) drinker, and food eater. When Visvarupa secretly helped the demons (*asuras*), the god Indra cut off his heads. The heads turned into birds: the wine drinker became Kalavinka (sparrow), because apparently when men are drunk they chatter like sparrows; the *soma* drinker became a Kapinjala (interpreted as either the Grey or Francoline partridge) due to the brown colour of *soma*; and the food eater became Tittiri (partridge, species unclear), for its body appears to be 'sprinkled with ghee and honey'.

The majestic peacock is a prominent figure in mythology. His skill in catching snakes, representing evil, made him venerable; the same ability was presumably the reason for his depiction as the mount of the god of war,

Kartikeya. Some texts also name the peacock as the *vahana* of Saraswati, the goddess of learning. Then again, the peacock's prolific breeding led to his veneration as a symbol of fertility, and his breathtaking beauty and majesty made him a worthy associate of the god Krishna. In the *Bhagavata Purana*, the god Krishna is even said to delight in imitating the dance of the peacock.

Not all birds have been so fortunate however. Storks garnered a bad name in the legend of Bakasura, the demon stork. The pigeon and the owl were considered creatures of ill omen since they were believed to be the messengers of Yama, the god of death. The crow was disreputable due to its association with Alakshmi, the goddess of ill luck, as also Sanaischara, the god of evil. However, as described later in the chapter, folklore often put the crow on a more creditable footing.

The Egyptian vulture was considered sacred by the ancient Egyptians, and appears to enjoy such a status in

Aejish Kothari



Unlike any other culture, the Egyptian vulture has a predominantly whitish appearance; it is also primarily solitary in nature.

some parts of India too. Considerable controversy has been caused by a strange phenomenon related to this bird in south India. A pair of Egyptian vultures comes everyday, punctually between 11:00 a.m. and noon, to the Hindu temple at Thirukalikundram, outside Chennai. There they are fed by the temple's priest with food that any self-respecting vulture would not even glance at – balls of rice and wheat sprinkled with sugar and ghee! This unique event has apparently been taking place for centuries: the *Puranas* (over a thousand years old) refer to the spot as *Pakchi Tirtha* (bird pilgrimage), and Odette Bruhl in 1935 wrote in *Indian Temples* that “hundreds of pilgrims climb daily to the summit of this rock to see Brahmins feeding the sacred birds.” But there is no explanation for a number of things: why only, and always, two birds when many more could come? How is the relationship between birds and priest maintained after one generation of the birds dies out? Where do the vultures come from (some say Benares, some say the Himalaya, no one has yet suggested Egypt!)? And why do they feed on a diet completely alien to the species? The Thirukalikundram phenomenon remains an enigma.

Of the myriad folk tales that have come down the ages in India, the most popular have undoubtedly been the Sanskrit *Panchatantra* and the Buddhist *Jataka*. The latter revolve around the previous births of Gautama Buddha, who is said to have passed through many animal (including bird) existences before attaining enlightenment. In each of his animal forms, he imparted his wisdom and learning to fellow creatures. The *Panchatantra*, written over 2000 years ago, present fables recounted by a learned scholar, Pandit Vishnu Sharma, to the sons of a king in an effort to teach them the basics of social and political life. In both these books, as well as later classics like the *Hitopadesh*, animals assumed anthropomorphic (human) qualities, with birds playing

a central role. One story tells of a parakeet, confronted by a hunter who threatened to take away her young ones, playing on his human greed to save them. She entices the hunter into believing that a hole in a nearby tree contains gold, when it is actually the home of a deadly snake. Unable to resist the temptation, the foolish hunter puts his hand into the hole, is bitten, and dies. Another story of a war between crows and owls mirrors an oft-repeated occurrence in the politics of ancient India. The crows, constantly persecuted by the owls, plot to defeat their enemies by deceit. They pretend to fight amongst themselves and throw out one crow as an outcast when the owls are watching. This crow befriends the owls, discovers the layout of their cave-home, and sets the stage for the crows to set fire to it and kill all their enemies. As is well known, many an impenetrable fort in princely India fell to similar tactics.

Perhaps the bird most widely depicted in legend and folklore is the House crow. Considering its ubiquitous presence in human settlements, and its obtrusive nature, this is not surprising. The crow's condemnation as an associate of the goddess of bad luck, Alakshmi, was offset by the belief that it carries food offerings to one's ancestors. Even today many a death ceremony (*shraddha*) ends with an offering of food to crows. The crow is also believed to announce the impending arrival of guests. Many a maiden in Indian folklore has been depicted as anxiously enquiring of a cawing crow, if it was heralding the arrival of her loved one.

Nor were folktales and epics entirely flights of fancy. A great many of the imaginative depictions of birds are rooted in acute observation of their behaviour. A good example of this appears in the *Jataka*, in a story of two woodpecker friends. One of the birds was weak, the other strong. The former wanted to share the hardwood tree in



Krupakar Senani

The Rufous woodpecker conveniently finds existing papier mache nests of tree-ants, and occupies them, confident in its knowledge that the ants do not bite it or its young ones.

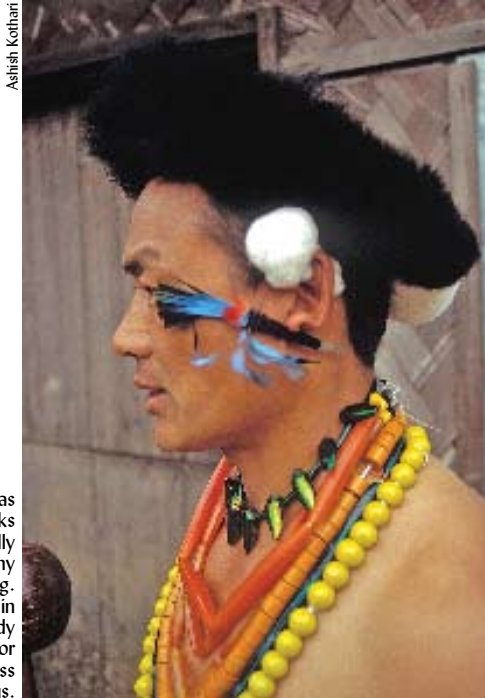
which the latter lived, and despite advice to the contrary, tried to peck a hole in it and died of exhaustion. Some Sanskrit scholars maintain that the descriptions suggest the weaker friend to be the Rufous woodpecker *Celeus brachyurus*, and the stronger to be the Goldenbacked or Flameback woodpecker *Dinopium benghalense*. Indeed, in the natural world, the former usually occupies the nests of tree-ants, and only occasionally uses tree-holes.

Birds in art and literature

Birds have been depicted in great epics such as the *Mahabharata* and *Ramayana*; in religious texts like the *Vedas* and *Upanishads*; in formalized folk tales such as the *Jataka* and *Panchatantra* stories; in the oral history and folklore of various tribes; in the work of great poets like Valmiki and Kabir, Kalidas and Tulsidas;

and in everyday language and conversation. The great poet Valmiki is believed to have been inspired to write poems when he saw one of a pair of cranes being killed. Apparently, at this painful sight, a couplet admonishing the hunter escaped his lips. There must be scarcely a major poet in ancient times who did not write about the koel, the peafowl, or the hawk-cuckoo (Papiha). Tulsidas, in his poetry, displays knowledge of the comings and goings of various migratory birds.

Although not very well documented, the relationship between human language and biodiversity appears to be very close. Human language is greatly influenced by the physical and biological world around it. For example, most bird names or words depicting natural



Ashish Kothari

Bird parts such as feathers and beaks have traditionally been used in many communities (eg. this youth in Nagaland), as body decoration, or for showing prowess and social status.

resources may have evolved due to semantic justification in reference to the local habitat. A study of Telugu bird names has indicated how the birds of agriculture, gardens, orchards, towns, buildings, sea, rivers, ponds, woodlands, forests, and grasslands have been named according to their specific habitat distribution.

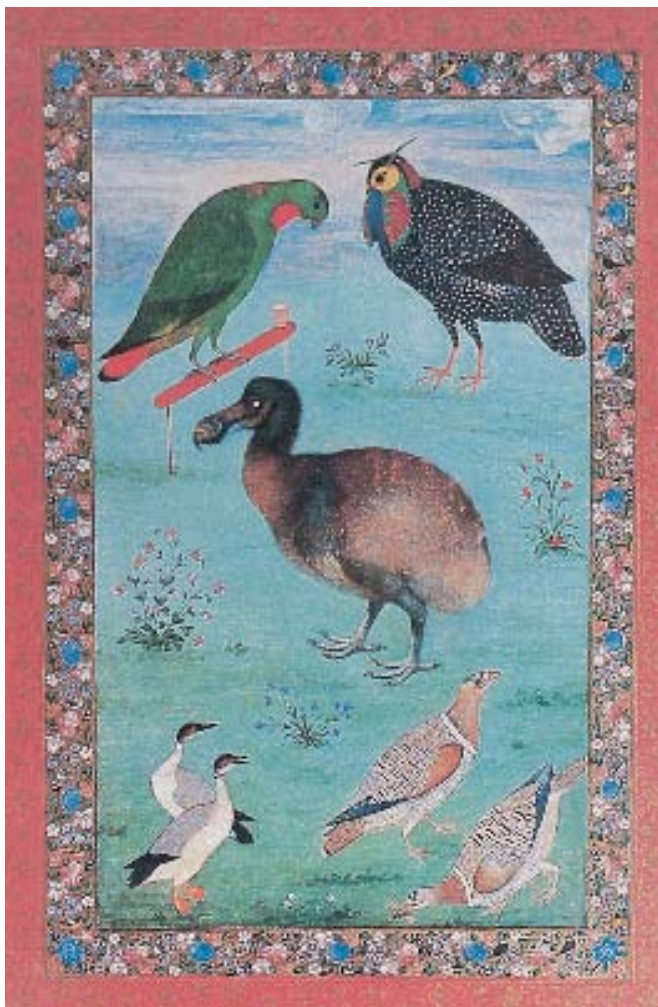
In painting and engravings, two parallel streams seem to run through Indian history and pre-history. One is a series of fanciful or spiritual depictions, especially prevalent in prehistoric paintings, and in mythological artefacts and folk art. There are, for instance, several instances of a half-human, half-bird creature depicted in prehistoric cave paintings. At the cave temples of Ellora, in Maharashtra, the Jatayu story is often represented. Artists of Rajasthan painted miniatures expressing devotion (*bhakti*) to the god Krishna – one of these depicts Krishna slaying the demon stork Bakasura. The other kind of art includes a range of realistic, conventional portraits, from the engravings on ancient coins and seals to the miniatures of the Mughals. Several rock shelters of prehistoric times, spread throughout the sandstone areas of central India, depict birds which can be identified as eagles, vultures, cranes, storks, snipe, spoonbills, stilts, peafowl, crows, and junglefowl. The Buddhist caves of Ajanta, and the caves of Elephanta, both in Maharashtra, have several depictions of swans and other birds. Birds were also favoured as symbols of, for instance, conjugal devotion and fertility. For instance the Sarus crane *Grus antigone*, and the Ruddy shelduck *Tadorna ferruginea*, were frequently depicted in paintings showing scenes of love. Such use of birds as symbols was in fact quite common in art: the dancing peacock for the rainy season, the koel for summer, the crow for incoming guests. In more modern times, this symbolism has been frequently used in movies, like a courting pair of birds to coyly depict the hero and heroine in love!

Ashish Kothari



Indian textiles have both realistic and fanciful depictions of birds, such as in this example from an exhibition of "Animals in Indian Textiles", Pragati Maidan, New Delhi.

Most gorgeous has been the depiction of birds in the Mughal miniature paintings, largely inspired by the emperor Jehangir. His court painter, Ustad Mansur, and a host of other artists created a series of exquisite, realistic portraits of birds, especially of falcons and hawks. Mansur in fact painted a Siberian crane *Grus leucogeranus* some 160 years before it was described for Western science by the



Painting of the dodo (from Mauritius) and other birds (identified as the Blue crowned hanging parrot, Western tragopan, Common merganser, and Painted sandpiper, by Divyabhanusinh). The painting is attributed to Ustad Mansur and Muhammad Baqir, Mughal and Isfahan schools, 17th and 18th centuries.

From the Oriental Manuscript collection of the St. Petersburg Branch of the Institute of Oriental Studies, Russian Academy of Sciences. For a commentary on this, see 'A tale of two animal paintings and a drawing', Divyabhanusinh, *Marg*, June 2003.

Russian zoologist Pallas! These realistic portrayals were carried on after the Mughal empire, by the British and by Indians working under the colonial rulers, in a series of paintings known as the Company School (see also the next chapter on the use of art in ornithology). Special mention must be made here of the exquisite paintings of John Gould (*Birds of Asia*, 1849), a taxidermist at the Zoological Society of London.

No less beautiful, though often more fanciful, have been the birds painted by countless tribal and peasant artists, not so much in formal paintings as on walls and wall-hangings, bedsheets, clothes, and other items of daily use. Fabrics of all kinds and designs in India used birds as motifs, a tradition which continues till today. The use of birds as decorative motifs has also been prevalent in combs, jewellery, musical instruments, weapons, gun-powder flasks, vessels, and tools. Weapon handles, box lids, and water vessel taps in many parts of the country have often been shaped like birds. Even coins of ancient times had bird emblems, like those of Garuda, used by followers of Vishnuism during the Gupta dynasty (4–5th century CE). This kind of usage has been continued on postage stamps of today, with birds like the Monal pheasant being depicted. The Garuda is even used as a symbol of the Indonesian airlines!

Bird sculptures and carvings are found on the Buddhist stupas at Sanchi in Madhya Pradesh, Amravati in Maharashtra, and other places. Many of the Sanchi carvings recount the *Jataka* stories, and commonly depict peacocks, geese, and ducks. A sculpture at Amravati depicts the peacock as a previous incarnation of the Buddha. Another, housed at the Mathura museum, illustrates the coronation of the wise owl as king of birds. Rajasthan's Rajput kings use the peacock motif liberally in their architecture, even creating an arch that emulates a dancing peacock's train.



Ashish Kohli

Ancient archaeological and historical sites often depict a wide variety of animals, including birds, such as on this Buddhist stupa at Sanchi, Madhya Pradesh.

The use of bird imagery in Indian dance and drama is also ancient, yet alive even today. Bharat Natyam contains many poses and gestures derived from, or depicting, birds. The hand gesture *Mayuram*, for instance, represents the peacock, a bird to which entire dance sequences are dedicated.

Modern depictions

Birds continue to occupy a key position in modern cultures. Most states of India have a state bird. Some use local species as political mascots (e.g. the tragopan in Nagaland), reminiscent of the traditional use of bird parts for displaying one's status (e.g. hornbill casque on a Naga chieftain's headgear). Birds were also used as political party symbols for elections, till animal rights activists pressurized the Election Commission to ban such use (for good reason; over-enthusiastic party members were

Ashish, Kohhar



Birds are still a favourite subject of folk art across India, including adivasi painting forms from central and eastern India.

sometimes misusing live birds as symbols!). Some states have chosen to honour birds through other means; Haryana, for instance, has named many of its highway-side restaurants after birds. And so on...the list of bird depictions in modern life is endless. Suffice it to say that whether it is our continuing traditions, or new lifestyles that are coming in, birds will remain an integral part of our cultural lives.

Ornithology through Indian History



While the depiction of birdlife in legends, myths, and folklore must often have been based on real-life observations and experiences, it was invariably invested with some imagination and fancy. But there was also a parallel attempt at realistic, 'objective' description, both in literature as well as in various art forms. Keen and accurate birdwatching is by no means a new phenomenon in India.

Pottery, seals, engravings, and statuettes recovered from the sites of the Mohenjodaro and Harappan settlements, in the Indus Valley, depict several animals, including birds. Common among these were the parrot and the peafowl, apart from intricate depictions such as a flying eagle holding a snake in its talons; these would have been created between 4000 and 2000 BCE. The period 2000 BCE onwards, till about 600 BCE, is known for the great Vedic texts: the *Rig Veda*, the *Samhitas*, the *Upanishads*, and others. These texts reveal a considerable knowledge of bird and other animal life. The *Yajus Samhitas* mention about 60 species, but there is reason to believe that a considerably larger number was known

to and recognized by the people of that era. The book *Indian Scientific Nomenclature of the Birds of India, Burma and Ceylon*, by Dr. Raghuvira, identifies about 250 Sanskrit words with known species, though Dr. Salim Ali doubts the veracity of some of these. The Hill myna and parakeets were already being used as cage birds for their wonderful mimicking ability, the parasitic habit of the koel in laying its eggs in a crow's nest was known, and the V-form flight (*kronchvryuh*) of Demoiselle cranes was copied by the Pandavas in assaulting the Kauravas in the *Mahabharata*. The poet Kalidasa described the migratory habits of the Bar-headed goose (Raja-hamsa) and the Greylag goose (Kadamba), in terms of their accompanying the monsoon clouds from the Vindhya hills to the Himalaya.

The *Chandogya Upanishad* classified birds (and other animals) according to their habitat and feeding habits:

- Predators (*prasaha*)
- Those living in marshland and waterlogged areas, or feeding on river banks (*anupa*)
- Those nesting in holes or burrows (*bhusaya, vilesaya*)
- Those living in fresh water or seawater (*varisaya*)
- Those living both on land and in the water (*jalachara*)
- Those living in dry forests, elevated hilly jungles, etc. (*jangala*)
- Those which scatter food while picking it up, as is done by crows, bulbuls, pigeons, etc (*viskira*)
- Those that pierce, tear their food, like fruits (*pratudda*)

It can be safely presumed that through these centuries, keen observations of birds were also a part of the daily life of India's indigenous peoples, its adivasis or tribals.

These are not depicted so much in literature as in oral traditions, some of which remain in the descriptions of birds and bird behaviour that one can still hear from many adivasis. Unfortunately, formal bird studies tend to ignore this vast storehouse of knowledge.

Substantial knowledge of birds is to be found in the classical texts of southern India. For instance, documents which form a part of the ancient Tamil Sangam literature, abound in references to kites, vultures, fowls, crows, sparrows, pigeons, peafowl, parrots, koels, skylarks, kingfishers, owls, swans, cranes, and seabirds. The hovering of the Pied kingfisher is poetically alluded to as resembling the hands of a *mridangam* player.



Krupakar Senani

The Hill myna, one of the avian world's most accomplished mimics, with dozens of calls, has been a favourite cage bird from ancient times.

Clement Francis



The Pied crested cuckoo is said to be a harbinger of the monsoons, migrating in just before the rains arrive; as the papiha, its call is well-known across much of India.

The gregarious nature and homing instincts of doves, the parasitic habits of the koel, the keen eyesight of kites – swooping down from a great height to catch their prey – all these and hundreds of other insights into ethology (animal behaviour) are scattered throughout these texts.

Bird observation was given a great boost in the Mughal period (13–17th centuries CE), many of whose emperors were keen naturalists. They often recorded their experiences and observations in minute detail, with ornithological gems being embedded in works such as the *Baburnama*, the *Ain-e-Akbari* of Abul Fazl, and the *Tuzuk-e-Jehangiri* or *Memoirs of Jehangir*. The emperor Babur was known to closely observe animals even while at war! The greatest naturalist of these was the emperor Jehangir. As the late Salim Ali remarked in one of his research papers:

It has been rightly said that had he [Jehangir] been head of a Natural History Museum he would have been

a better and happier man. His *Memoirs* are replete with observations on birds and other animals written with an accuracy and insight that would do credit to a modern student of bird behaviour and ecology.

Observations of bird ecology and behaviour by the Mughal emperors are too numerous to deal with comprehensively here, but some examples are illustrative. Jehangir in his memoirs, says of the Pied crested cuckoo *Clamator jacobinus*:

In Hindustan there is a bird called Papiha of a sweet voice, which in the rainy season utters soul-piercing lament. As the Koyel lays its eggs in the nest of a crow and the latter brings up its young so I have seen in Kashmir that the Papiha lays its eggs in the nest of the Ghaughai, and the Ghaughai brings up its young.

The Ghaughai referred to here is probably some species of babbler. Babur distinguished with considerable accuracy at least three species of quails, not the easiest of birds to observe. The Sarus crane was a favourite of these naturalists, and Jehangir's memoirs contain very detailed, and to this day valid, observations on its breeding habits, and on its legendary attachment to its mate and young ones.

As described in the previous chapter, Jehangir and other Mughal emperors also encouraged extremely detailed and accurate visual depictions of birds, such as the paintings of Ustad Mansur.

Since the crumbling of Mughal rule in the late 17th century, and the colonial takeover by the British, a substantial portion of ornithological work has been done by British residents in India, either individually or in conjunction with institutions like the Asiatic Society of

Bengal and the Bombay Natural History Society. One of the earliest records was made by Edward Buckley, a surgeon at Fort St. George, Madras. His drawings and descriptions of 22 Indian birds were used in the work of, amongst others, Linnaeus. In 1790, Dr. John Latham published *India Ornithologicus*, compiling the existing knowledge of Indian birds, and, perhaps for the first time, giving them scientific names. It is interesting that around this time (late 18th century), it was more common to record bird life by descriptions and paintings, rather than by making a collection of stuffed specimens.

The first six decades of the 19th century were amongst the most productive periods in India's ornithological history. Systematic observations were conducted by a number of people who are regarded by some as the 'founders of Indian ornithology'. These included John Gould, James Franklin, W.H. Sykes, Brian Hodgson, S.R. Tickell, T. Hutton, T.C. Jerdon, Edward Blyth and many others. Even to birdwatchers today, who may know nothing of these ornithologists, their names would ring a distant bell because they have been prefixed to many a bird's name: thus the Franklin's wren-warbler, Hodgson's tree pipit, Tickell's flowerpecker, Jerdon's courser, and Blyth's reed warbler.

By the time T.C. Jerdon wrote his comprehensive *Birds of India*, the checklist of birds known from the subcontinent had spiralled, from 156 species in Franklin's work and 236 in Sykes' list, to 420 species. Then came Alan Octavian Hume, better known as the founder of the Indian National Congress, but also a remarkable naturalist. Many consider him to be the 'father' of Indian ornithology.



Ashish Kothari

The Tickell's blue flycatcher, named after S.R. Tickell, one of many colourful flycatchers that permanently inhabit or visit India.

By Hume's time, taxidermy had become well established. He consequently collected a mind-boggling total of 60,000 bird skins. One of his chief contributions was the publication of *Stray Feathers*, India's first birding journal. From 1872 to 1888 this journal recorded all there was to record on Indian birds. And, in 1886, was launched what is certainly India's most long-standing and valuable natural history resource, the *Journal of the Bombay Natural History Society (JBNHS)*. Most of the important contributions to ornithology in India have since been published in the *JBNHS*.

Another great boost to bird studies was given by the publication of the four volumes on birds in the series *Fauna*



Alan Octavian Hume's many pursuits . . .

of British India, by Eugene W. Oates and W.T. Blanford, between 1889 and 1898. By the first three to four decades of the 20th century, field glasses and photographic equipment had been greatly improved, making bird study easier and more accurate. A number of people contributed greatly in this period, including Hugh Whistler, Claude Ticehurst, A.E. Jones, and Stuart Baker.

It is a fascinating lesson of history that most of these British (or other foreign) nationals who contributed so ably to our knowledge of birds, were not trained ornithologists: they were doctors, engineers, administrators, army officers, and policemen!

The early part of the 20th century also saw the emergence of the man who later came to dominate Indian ornithology

for several decades, Salim Ali. At times in collaboration with Whistler, S. Dillon Ripley, Dato Loke Wan Tho and others, but often simply on his own, Salim Ali carved such a deep niche for himself that birders in India will never cease to be influenced by him. It may not be improper to label him as a worthy descendant, in spirit, of Jehangir himself. Thousands of Indian birdwatchers have never ceased to be amazed by his remarkably insightful, accurate, detailed, and *alive* descriptions of birds, or by the sheer output of his voluminous work. Perhaps he took his cue from the birds themselves, always active, always alert.



An illustrator's vision of Salim Ali with the Yellow-throated sparrow, which kindled his interest in birds

Apart from a whole body of scientific work, Salim Ali also contributed immensely to popularizing bird watching. Not the least of his efforts along these lines was the publication of *The Book of Indian Birds* in 1941. This popular handbook is arguably India's best-selling book on nature, and is now in its thirteenth edition. Ali also authored several other field guides related to specific geographical regions. And he was also said to be a great teacher in the field. I still remember vividly one of my few encounters with him. It was, I think, in 1979 – I was still in my teens – and I had just been initiated into birdwatching and had gone to Bharatpur Bird Sanctuary (now a national park) with some friends. We came across Salim Ali on one of our walks through the sanctuary. He must have immediately perceived our interest in birds, for he stopped us and asked us how many species we had seen. He appeared quite delighted when we showed him our checklist, consisting of some 60–70 birds, and spent the next 10–15 minutes correcting our mistakes and giving helpful hints on how to proceed.

One problem with Salim Ali's brilliance was that, quite without meaning to, it overshadowed a number of other significant contributions to Indian ornithology made in the last few decades. Like S. Dillon Ripley, for instance, who provided us with the most comprehensive and scientifically updated checklist of birds in 1961, with *A Synopsis of the Birds of India and Pakistan*. In the period 1968 to 1975, he co-authored with Salim Ali, the monumental ten-volume *Handbook of the Birds of India and Pakistan*, since then the bible of Indian birdwatchers.

There have been a host of other major contributors to our knowledge of Indian birds: Humayun Abdulali, Zafar Futehally, Biswamoy Biswas, K.S. Dharmakumarsinhji, M.K. Himmatsinhji, M.C.A. Jackson, J.C. George, R.M. Naik, B.S. Lamba, A.K. Mukerjee, Robert Grubh, V.S. Vijayan, S.A. Hussain, Asad Rahmani, Anwaruddin



Asad Rahman

Salim Ali in the field, at Sardarpur, cleaning his binoculars, in 1984.

Choudhury, J.C. Daniel, Y.S. Shivraj Kumar, Lavkumar Khacher, K.K. Neelakantan, and dozens of field researchers at organizations like the Bombay Natural History Society and the Zoological Survey of India, all of whom have contributed significantly. Zafar Futehally's *Newsletter for Birdwatchers* (NLBW), published since 1960, has provided a popular forum for birding records in recent times; Aasheesh Pittie is carrying on the tradition with the new periodical *Indian Birds*.

In the last two–three decades, there has been a spurt of interest in birdwatching. A number of young ornithologists and naturalists have stepped into the formidable shoes of the older generation of birders mentioned above. These are too numerous to list here, and many of them are good friends and compatriots, so I won't embarrass them by naming them here. And though the heyday of

foreign contribution to ornithology in India was during the colonial occupation, a number of foreign naturalists have continued to do valuable research. Amongst these are Anthony Gaston, Peter Garson, Trevor Price, Ben King, and Otto Pfister.

Meanwhile, several excellent field guides have supplemented Salim Ali's, covering the entire spectrum of India's birds, and greatly encouraging birdwatching as a popular hobby (see Bibliography). Several voluntary organizations and societies devoted to wildlife studies and conservation, some specifically to ornithology, have emerged. The Birdwatcher's Society of Andhra Pradesh, the Madras Naturalists' Society, the Salim Ali Centre for Ornithology and Natural History, the Assam Valley Wildlife Preservation Society, Ornithological Society of India, the Birdwatcher's Field Club of Bangalore, the Andhra Pradesh Natural History Society, Ecological Society, World Wide Fund for Nature-India, and many

Ashish Kotahari

Birdwatching has become a popular hobby and serious interest amongst youth in many cities, with a plethora of nature clubs and NGOs organizing regular birding trips and camps.



other groups and individuals, along with academic and governmental institutions like the Wildlife Institute of India, Saurashtra University, the Salim Ali School of Ecology, Aligarh Muslim University, and the Zoological Survey of India, are contributing significantly to the wealth of knowledge on India's birds. Due to Salim Ali's persuasive powers, the Bombay University along with BNHS pioneered an MSc and PhD degree in field ornithology. Similar courses are now available in several other universities and institutes. There is even a school, the Rishi Valley Educational Centre in Andhra Pradesh, that offers a correspondence course in Bird Studies. The BNHS has meanwhile also set up a Environment Information System (ENVIS) on Avian Ecology and Inland Wetlands, funded by the Union Ministry of Environment and Forests. This centre is creating an easily accessible database on birds, with a regular and very useful output being its newsletter *Buceros*.

The tragedy is that while this fund of knowledge increases steadily, its subject matter, the birds themselves, are suffering severe and continued decline all over India. I will come back to this subject, in Chapter 6.

Brought in by the Wind: The Wonder of Migration



No one can fail to notice that many lakes in India, almost empty in summer, fill up with thousands of birds as winter sets in. Placid, seemingly lifeless stretches of water come alive with noise and excitement, the skies fill up with V-shaped formations of all sizes, and birdwatchers can be seen busily dusting their binoculars, and rushing helter skelter to greet the winter visitors. The great migratory flocks have arrived.

As a phenomenon, migration has always fascinated humans. Since ancient times we have puzzled over the sudden appearance and disappearances of birds, in large numbers and for lengthy stretches of time. Earlier fanciful notions of where the birds went – some said to the moon, others believed they slept underground – have been replaced now by the knowledge that they move from one region to another and back, to avoid food scarcity and the rigorous conditions of harsh winters. Yet our understanding of *how* they do it – how they find their

way to almost the exact locations year after year, how young ones, who have never made the journey before, nevertheless find their destination on their own – is still limited. Some birds seem to navigate using the sun's position in the sky, others are known to orient themselves by the stars at night, and many possibly use major landmarks on their routes. Yet birds find their way even in the absence of these factors, as on a cloudy, moonless night. A number of other theories have been forwarded to explain this, most likely of which seems to be the use of 'cerebral compasses' to orient with the help of the earth's magnetic fields. Perhaps a combination of various methods is used, especially on the long journeys which many species embark on. But these are all theories: the 'how' of navigation remains one of those delicious mysteries that make contact with nature so engrossing.

Roughly one-fourth of the bird species in the Indian subcontinent, about 320, are migrants from *outside*. Another 70 are vagrant, entering the subcontinent irregularly and



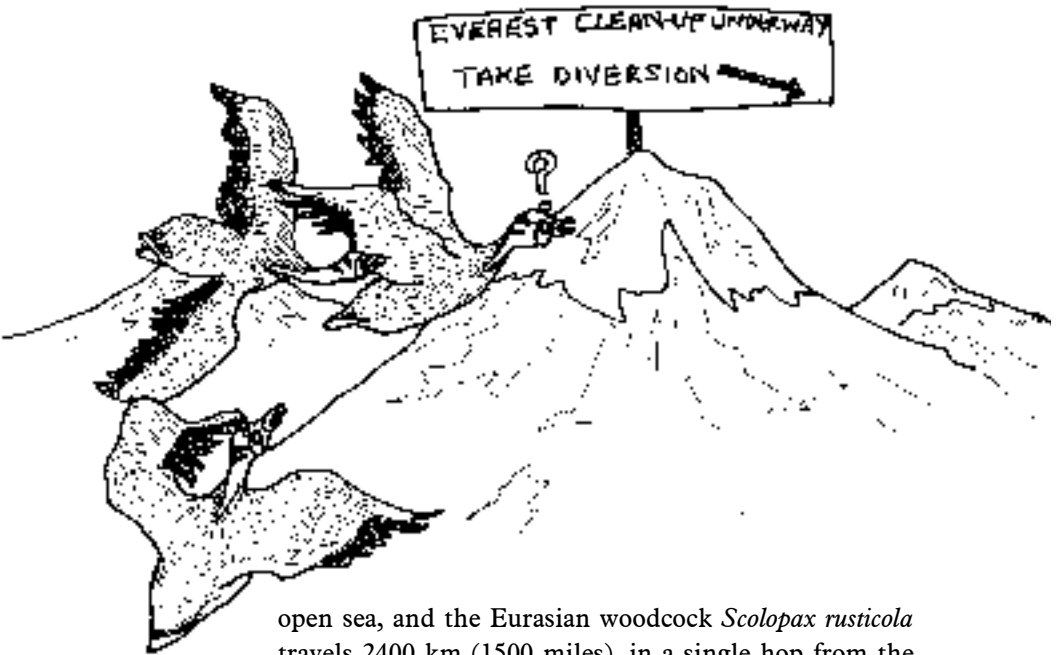


infrequently. Then there are several more which are *local migrants*, birds which move from one region to another, or one altitude to another, but within Indian limits.

International migration

Most spectacular of course is the long-distance migration of our 'foreign' guests. These birds breed in central and northern Asia, and eastern and northern Europe. By September–October, it gets cold and frozen in these regions, exposing birds to inclement weather, shorter daylight hours in which to search for food, and lack of adequate food supplies due to the freezing of water and snow-carpeting of the ground. And so, birds in their hundreds of thousands start their journey southwards. Amongst the most common ones migrating to India are waterfowl (ducks and geese), waders and shorebirds (plovers, sandpipers, snipes, and others), cranes, swallows, flycatchers, warblers, thrushes, chats, pipits, wagtails, finches, and buntings.

Some more statistics for those with a fondness for figures: amongst the longest-distance fliers are the Garganey or Blue-winged teal *Anas querquedula* and the Pintail duck *Anas acuta*, covering several thousand kilometres, one-way, between northern Europe and India. One White stork *Ciconia ciconia*, which had been ringed in Germany, was caught in Tamil Nadu; it had covered a distance of approximately 7000 km! A Garganey surpassed even this, travelling 7700 km from India to Nigeria! The average cruising speed of ducks and geese on their migratory routes has been clocked at about 65 to 80 km (40 to 50 miles) per hour, going up to 95 km (55 to 60 miles) per hour, in favourable climatic conditions. What is astonishing is the stamina of these birds; some, like the Eastern golden plover *Pluvialis dominica*, are known to fly non-stop for at least 3200 km (2000 miles) across



open sea, and the Eurasian woodcock *Scolopax rusticola* travels 2400 km (1500 miles), in a single hop from the Himalaya to the hills of south India.

Equally stupendous are the heights at which some migrants fly. Most birds seem to prefer a height of less than 400 metres above the ground, but flocks flying at over 7500 metres have been detected by radar!

Indeed till recently it was thought that the vast majority of migrations to and fro India take place via the Indus and Brahmaputra valleys, avoiding the lofty Himalaya in between. Moving in from these two ends of the Himalayan range, they converge at the tip of the Indian peninsula. One sub-stream from the northwest turns towards the northern Indian plains, and the other to the Deccan plateau and Sri Lanka. An increasing number of observations by mountaineers and ornithologists, however, shows that many species fly *directly over the Himalaya*, a much shorter route. This indicates the ability to fly at great heights. The record so far seems to be held by geese, who were observed through a telescope from Dehradun, flying at a mind-boggling height of 8830 m (29,500 feet), even higher than Mount Everest!



Clement Francis

Many birds such as the Paradise flycatcher, have pronounced 'local migration' habits, moving away from colder regions in winter.

Local migration

Apart from our 'foreign' guests, birds resident in India too have migratory habits. These local movements to and fro can range from a few kilometres to several hundred. I remember puzzling over the disappearance from Delhi, in certain seasons, of birds like the Golden oriole *Oriolus oriolus*, the Paradise flycatcher *Terpsiphone paradisi*, and the Green bee-eater *Merops orientalis*. It seems these birds periodically migrate southwards, mostly in winter. Several hundred species display this wanderlust, some appearing in a separate place in each of the three main Indian seasons: summer, monsoon, and winter.

In the Himalaya there is a pronounced altitudinal movement, with many species migrating down as winter sets in, and back up in spring as the snow-line recedes. Birds will easily 'climb' or descend several thousand feet in this movement, a feat that mountaineers would no doubt envy! It is due to this up-and down migration that many interesting species, like the Wall creeper *Tichodroma muraria*, are completely missing from many popular foothill resorts of north India in the summer. They reappear only in winter. Fortunately, for the birds and for the intrepid birdwatcher, the hordes of tourists which descend on these summer resorts have by then departed. Altitudinal migration is noticed not only in the Himalaya but also among several species in the south Indian hill ranges. Laughing thrushes are an example.

This 'international' and 'local' migration – the constant movements to and fro between seasons, the sudden appearance and disappearance of species – all this imparts a dynamism in the avifaunal character of a region. Even a small garden in a bustling metropolis displays these changes, it is never static. That is surely one of the reasons why birdwatching is always so delightful.

Ringling and migratory studies

The real cake, as far as migration goes, is taken by birds who return year after year, with pinpoint accuracy, to exactly the same wintering location. Salim Ali recorded a Grey wagtail *Motacilla cinerea* returning from its Himalayan breeding grounds, 2000 km away, to the same lawn in Greater Bombay, on almost the same date in September, for five years in a row!

The reason Salim Ali was able to identify this wagtail every year was because it had been ringed. Ringing of



Ajay Desai

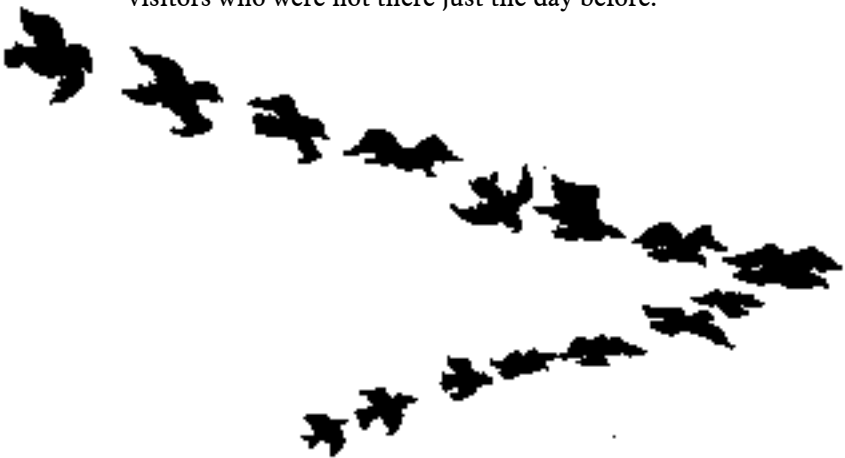
A camp for ringing birds, organised by Bombay Natural History Society.

birds is a relatively recent method of keeping track of migration routes. Before it was adopted, our information on migration came mainly from the scattered observations of mountaineers, and army and civil service personnel stationed along the Indian borders. Their records were, of necessity, restricted to larger birds, easily observed in flight or often shot for game, such as ducks, geese, and cranes. Virtually no information existed on the smaller birds; for a long time it even seemed inconceivable that a creature as small as the warbler could regularly migrate hundreds, even thousands of kilometres.

Systematic study of bird migration started only in the 1950s, with the first major attempts at ringing by the Bombay Natural History Society. Interestingly though,

this was not the first instance of ringing in India: way back in 1926, the then ruler of Dhar State (now in Madhya Pradesh), Uday Singh Puar, used hand-crafted rings on birds, some of which were subsequently recovered from as far away as northern and eastern USSR. His efforts were isolated, but they inspired Salim Ali and others to carry on the work more systematically. Since 1959, the BNHS has been ringing birds at several places in India. A total of about 400,000 birds of over 400 species have been ringed in four decades, with about one per cent being recovered. These recoveries, though miniscule compared to the numbers ringed, have provided substantial, valuable information regarding migratory routes and destinations.

It will still be a long time, if ever, before we can crack the many mysteries and complexities surrounding the phenomenon of bird migration. Perhaps this is as well, for dry scientific explanations often detract from the wholesomeness of an event. To me, the most important thing about bird migration is the sense of wonder it evokes, the pleasant surprise at suddenly coming upon a flock of unexpected, but by no means unwelcome, winter visitors who were not there just the day before.





What good are they to us?

Birds in India's Economy

Birds as benefactors

Till the 1990s, local police in Bolangir, in the east Indian state of Orissa, were using pigeons to carry messages. In February 1990, thirty of these birds were put specially on election duty, their job being to carry poll messages during the State Assembly elections.

Orissa is perhaps the only state in India where a carrier pigeon service may still be officially used, a rare continuation of an ancient tradition going back to the Prophet Solomon and many Hindu and Mughal rulers! But this isolated example is nevertheless representative of a general, larger truth: birds have been playing, and continue to play, an enormously important role in the everyday lives of humans. I have earlier tried to show their unmistakable presence in our hearts and minds; now I will outline their substantial contribution to our material and economic well-being.

Ornithologist Salim Ali was fond of saying that while birds can flourish without humans, humans cannot even survive without birds. This is certainly true in a general sense, in that birds are critical links in the ecological web of which humans are but one part. But, in India, avian service to humans goes far beyond this. A large majority of our people are dependent on agriculture and forests for survival. In turn, agricultural areas and forests are greatly dependent on birds, for the tremendous role they play in 'pest' control, seed dispersal, and pollination.

PEST CONTROL AGENTS

Indeed, were it not for the enormous appetite of birds, there is no doubt that insects and other 'pests' would have overrun our crops. Some thousands of insect species are found in India, some of which are considered the farmer's enemies. Locusts, moths, caterpillars, termites, and other insects can create havoc in a standing crop field. Natural predation is the most efficient way of keeping the number and activity of these insects low, and what better predators than birds?

Unfortunately, till recently there has been little systematic work, in India, of the role of birds in insect control. Some observations are indicative of the importance of this role. Bulbuls, mynas, drongos, shrikes, partridges, egrets, warblers, bee-eaters, robins, crows, ibises, and many other birds are voracious consumers of insects. Locusts, one of the most dreaded of crop destroyers, are kept in some control by birds like the White stork *Ciconia ciconia* and the Rosy pastor *Sternus roseus*, as also by kites, mynas, drongos, shrikes, crows, owlets, and vultures. Not only are adult insects eaten, but their eggs are also consumed. A German ornithologist has observed that one pair of tits (several species of which are found in India), along with their offspring, consume at least 120

million insect eggs, or 150,000 caterpillars and pupae, in a single year. This sounds quite extraordinary, but it is not surprising if one considers the fact that many young birds eat more than their own weight within 24 hours. Even the ‘taken-for-granted’ House sparrow, for long thought to be a strict vegetarian, has been observed feeding on various ‘pests’, including the Army worm *Mythimna separata*, which infests wheat. Interestingly, while adult sparrows feed primarily on grain and seeds, their young feed almost totally on caterpillars, moths, and other soft-bodied insects. This brings to mind the classic example of misunderstanding nature. In the 1960s, Chairman Mao launched a sparrow elimination drive in China, blaming the bird for large-scale crop damage. Apparently hundreds of thousands of sparrows were destroyed. The farmers heaved a sigh of relief. But not for long; in the following years there was a dramatic upsurge in insect populations, which caused far greater crop loss than was allegedly caused by sparrows. There are many other such examples of ‘pest’ outbreaks caused by destruction of their predators.

An interesting initiative on this has been taken by the National Centre for Integrated Pest Management (NCIPM). As part of its Integrated Pest Management modules, it has encouraged the use of live bird perches, adopting a technique used traditionally by many communities. At Barad, in Nanded district in Maharashtra, the plant *Setaria* was planted between cotton plants, as a perch for predatory and insectivorous birds. It was found that several species, including mynas and finches, used the perch, and helped in suppressing insect pests, including through feeding on the larvae of the bollworm *Helicoverpa*. Some birds even started nesting in the cotton fields. Farmers experienced higher yields in these experimental plots.

Equally effective is the control of non-insect 'pests' by birds. Traditionally, people in northern and western India have kept peafowl in their compounds to control snakes. Crabs, which cut up young seedlings in paddy fields, are controlled by Pond herons. Rats and mice, which annually destroy between 10 to 25 per cent of our total foodgrain, would consume a far greater amount if it were not for owls, hawks, and other birds of prey. Each of the larger owls, such as the Great horned owl *Bubo bubo*, catches and consumes at least two rats in a single night. These two rats could have theoretically multiplied to a population of 880 rats at the end of the year! Given that each owl does this every night, and that there are thousands and thousands of owls and other birds preying on rats, the enormous extent of control being exercised is obvious. Also obvious should be the implications of removing this natural control by destroying these birds, but human beings are slow to learn, and have caused a rapid decline in owl populations everywhere. That, however, is the subject matter of another chapter.





Clement Francis

Hundreds of bird species in India, such as this Citrine wagtail *Motacilla citreola*, feed upon a whole variety of insect and other invertebrate pests, a service whose economic benefit would be hard to estimate.

Fish-consuming birds like herons are often cursed because fisherfolk see them as competitors, little realizing that their role in controlling predatory fishes – which consume huge quantities of the fry of economically valuable species – is far more vital.

AGENTS OF REGENERATION

Birds also contribute substantially to India's economy by helping in plant regeneration, through pollination and cross-fertilization of flowers, as well as dispersal of seeds. The contribution is sometimes most surprising: who, for instance, would think that there is a close connection between birds and India's matchwood industry? Well, there is, for the softwood considered best for the manufacture of matchsticks is that of the silk-cotton tree *Bombax ceiba*, a species which is largely propagated

by birds. The nectar of the large red flowers of this tree attracts several birds – in one area over 60 species were observed visiting. In the process of drinking this nectar the feathers of the bird get coated with pollen dust, which helps to pollinate the next flowers visited by the bird. Another example of this indirect gift that the avian world bestows on us is the Coral tree *Erythrina* spp. Apart from the exquisite aesthetic value of these gorgeously red-flowered trees, they also have value as shade trees in tea and coffee plantations. And like the silk-cotton, their principle regenerating agencies are birds.

Then there are a number of trees whose propagation is ensured by dispersal of their seeds by birds. One of India's most valuable trees, the Sandalwood *Santalum album*, is spread mainly by fruit-eating birds like bulbuls and barbets. At the Kalakad–Mundanthurai Tiger Reserve of Tamil Nadu, 23 bird species were recorded feeding on Sandalwood fruits. An island in the Lower Dam reservoir at Mundanthurai, clearfelled in the 1940s,

Ashish Kothari

Several bird species, like this Purple sunbird, perform a vital role in propagating plant species, including many trees and shrubs that are socially and economically important for millions of people.



was by the 1980s covered with Sandal trees, introduced there primarily by birds. Their afforestation record may in this case be better than the State Government's! Popular species like the Mulberry *Morus alba* have also been propagated by birds. In Punjab, this tree was first planted on the banks of irrigation canals. Today it has spread far and wide, thanks to the birds which eat its fruit and disperse its seeds. Several species of *Ficus* also benefit from this avian service.

GARBAGE CONTROLLERS AND SCAVENGERS

While nectar-drinking and fruit-eating birds make their own specific contributions to the Indian economy, there is another set of birds which play an important role: scavengers. One of the remarkable things about a forest is the virtual absence of animal carcasses rotting away for long. This is because a whole set of animals specialize in devouring the dead, including several bird species: Salim Ali once observed a pack of 50 to 70 vultures reducing two sloth bear carcasses, down to the bone, within 40 minutes! It is this habit of scavenging that some birds have adapted to human settlements too. In the process vultures, kites, crows, and other birds help, daily, in cleaning up a tremendous amount of the garbage that humans produce. The once-common sight of hundreds, sometimes thousands, of scavenging birds at a carcass dump outside a village, or at a city waste heap, was repulsive to many of us. But in the repulsion we often forget the vital role they were playing in our lives. As it is, our municipal authorities have a tough time disposing of all the garbage produced by wasteful urban dwellers. Were it not for the birds, this task would be impossible.

The tremendous scavenging powers of vultures has also been an integral part of the culture of Parsis in India and elsewhere. In a unique practice in complete harmony

with nature, this community leaves its dead in open 'Towers of Silence' to be fed upon by vultures and other scavenging birds. The famous Towers in Mumbai used to attract thousands of these birds, till the catastrophic decline in vultures (which I will describe in the next chapter).

NATURAL FERTILIZERS

The excrement of many birds, especially the famed 'guano' of aquatic species such as cormorants, pelicans, terns and many sea-birds, is of great value as a natural fertilizer. Some agricultural communities have traditionally used it, and indeed several heronries and pelicanries, such as Nelapattu in Andhra Pradesh and Kokkare Bellur in Karnataka, have been protected by villagers at least partly due to the constant availability of free fertilizer. At the Vedanthangal Sanctuary in Tamil Nadu, the value of guano was realized by villagers much before the famed deposits on the Pacific Islands were discovered in the 19th century. A study here showed how guano-rich water adds phosphates and nitrates to fields. At the Kanjirankulam Tank in Ramnad district of Tamil Nadu, crop yields are recorded to have doubled on application of guano-saturated silt. Then again, the excrement of birds like the pigeon is used in gardening, especially for vegetables and ornamental flowering plants.

FOOD AND MEDICINE

Perhaps the avian world's biggest contribution to human food needs, is the Red jungle fowl. Not because it is itself eaten (though of course it is!), but because it is the ancestor of all the world's domestic chickens... and therefore, as the World Pheasant Association-India says, the 'founder of the worldwide multi-billion dollar poultry industry'!



Raghu Chundawat

Cattle and other carcasses have traditionally been thrown outside the village, with vultures and other scavengers performing the cleaning up task, much as they would do in nature; the same service was performed at garbage sites in cities.

Guano, the droppings of colonial nesting birds, has been traditionally used by farmers as a rich fertiliser.



Ashish Kohari

What good are they to us? Birds in India's Economy

Ashish Kothari



Birds have been an important part of the diet of many communities, especially indigenous forest-dwelling tribes; many ingenious methods have been used by them to catch birds, such as this simple glue-and-stick technique

The peafowl's brilliant plumage and once-abundant status makes it a worthy choice as India's national bird, but also the target of traders in bird parts.

R. K. Gaur



But there are many other ways in which birds have contributed to our food. An ingenuous way in which bird skills have been employed for this purpose, is the use of the Darter or Snakebird for fishing. In northwest Assam, for instance, a ring with a 'leash' is put around a Darter, which is then let into the water. Some of the fish it catches and brings back in this manner, is given to it as reward. Fisherfolk in these parts were known to wander around with several Darters in summer, stopping wherever water was available, and trading the fish caught for rice and other goods.

A more common use of birds for the purpose of obtaining food has been falconry. Many of us would now disapprove of this practice, but it has for long been considered almost an art. Guru Gobind Singh, the Sikh guru, had hawks and falcons as constant companions. The Muslim rulers and Mughal emperors were known to be exceedingly fond of it, with Akbar's favourite being the sparrow-hawk. It is said that Muhammad Tughlak had a retinue of 10,000 horse-riders, each carrying a trained falcon. The French physician Bernier, who visited India during Mughul rule, says of Aurangzeb, that there passed before him at his daily court:

every species of the birds of prey used in field sports for catching partridges, cranes, hares, and even it is said for hunting antelopes.

Indeed, the list of animals caught with falconry is remarkable, and is reported to have included, apart from the above, gazelles (probably fawns), egrets, herons, ibises, spoonbills, stone plovers, storks (probably juveniles), Houbara bustards, floricans, junglefowl, peafowl, sandgrouse, crows, kites, grass owls, vultures, hoopoes, larks, rollers, and sparrows! Fortunately for these and other animals, falconry has declined considerably in India, and seems to have hardly any practitioners now.

The economic value of a number of birds and their various body parts – cage birds, plumage of pheasants and other strikingly attired birds, meat of dozens of 'game' birds – is well-known. For several communities in India, they have been an important part of the diet. This is especially so around waterbodies, since waterfowl are amongst the most commonly eaten birds. Traditionally, these hunters spent the winter months subsisting almost entirely on eating, or trading in, waterfowl. Unfortunately this has partly contributed to serious declines in bird populations in many places.

Ayurveda, the ancient Indian system of medicine, has used various bird parts in its cures (as distinct from the use of birds like the hornbill for its mythical medical properties). Much of the peafowl's body, especially the cock's gorgeous train feathers, is used in various medicines: for curing liver diseases, abscesses, leprosy, and other ailments. It is instructive that, despite the bird's obvious value, it was not traditionally persecuted. Rather, it was protected as a life-giver, and it was mainly the naturally fallen feathers, and parts of dead birds, that were used.

Birds as enemies

Though its gifts to humanity are many, the avian world is not a wholly unmixed blessing. Birds can also cause a great deal of damage, especially to farmers. Several species are known to maraud agricultural fields or grain houses, and thereby cause considerable economic loss.

CROP DAMAGE

A striking example of this is the Roseringed parakeet, abundantly found in many parts of India. The description of its destructive nature, as given by Salim Ali



Clement Francis

Several species, such as the Roseringed parakeet, can cause substantial damage to economically important crops.

and S. Dillon Ripley in their *Handbook of the Birds of India and Pakistan*, is worth reproducing in full:

... often bands together in enormous swarms to raid ripening crops of jowar, maize, and other cereals, and orchard fruit. The birds clamber about among the twigs and gnaw into the half-ripe fruits, one after another, wasting far more than they actually eat. Frantic shouts and stones hurled from slings by the ryot from his machan amidfield only serve to move the destructive horde to a different corner of the field where the deprecation complacently continues. Rabbles of these parakeets commonly gather at wayside railway stations and goods sheds, clambering amongst the sacks of grain and groundnuts awaiting entrainment, biting through the fabric and helping themselves to the contents...

Clement Francis



Some migratory species such as the Barheaded goose, when foraging in large flocks, can cause considerable damage to standing crops.

Other birds which cause considerable crop damage include the Barheaded and Greylag geese, and various species of cranes. These birds love to feed on winter crops like wheat and gram, and, when massed in thousands, can cause severe localized loss to farmers. To add salt to the cultivator's wounds, geese mostly raid fields at night.

Orchard owners are also often hard put to fend off the crows, mynas, starling, parakeets, barbets, bulbuls, and other birds which maraud fruit and vegetable gardens.

SPREAD OF HARMFUL AGENTS

The role of birds as seed dispersers and flower pollinators has another, unfortunately negative, side: the regeneration not only of indigenous and useful plant varieties, but also of harmful ones. A classic case is that of the dreaded *Lantana camara*, a highly destructive 'pest' plant. Lantana, along with other weeds like *Eupatorium*, has colonized tens of thousands of hectares in India, where all indigenous vegetation is smothered. Perhaps birds have played the single largest role in the spread of Lantana, fond as they are of its berries: Salim Ali once noted an oriole eating 77 berries in three minutes flat! It is, of course, worth noting that the fault still lies clearly with humans, for they were the ones who foolishly introduced Lantana (and many other exotic 'weeds') into India.

An ironical facet of the ongoing research on bird migration, being carried on by the Bombay Natural History Society, is that it was initiated by a grant from the World Health Organization, for research into the role of migratory birds as carriers of disease! It is well-known that many birds can be hosts of parasites, and, when they move along their migratory route, they spread these disease-causing organisms. There is unfortunately not much understanding yet of the exact nature and extent of this problem in India, though work on this has started at centres like the National Institute of Virology at Pune, Maharashtra. One amusing sidelight to this was the widespread, but fortunately short-lived, notoriety that the BNHS achieved in researching the role of birds in carrying disease. Apparently at one stage there was a proposal to obtain funding from the US Army Medical Research Laboratory, which had a bird-ringing project

named MAPs (Migratory Animals Pathological Survey) in South Asia. One overly imaginative journalist got wind of this, and promptly cooked up a story alleging that BNHS was involved with the United States in exploring the possibility of migrant birds being used in biological warfare, by spreading disease-carrying germs and viruses in the enemy camp! The 'scandal' was even discussed in the Indian parliament, and subsequently BNHS was clearly exonerated by three separate enquiry committees!

However the possibility of wild birds being carriers of disease has been a hot item of news since 2005, when news of 'avian flu' spread like wildfire after some reported cases of people being affected by poultry. While the disease was quite prevalent in other parts of Asia, in India there was only one reported outbreak, in Maharashtra. There is as yet no report of a wild bird being a carrier in India, but authorities have been on the alert for possible signs. One scare came from Chilika lake, when, in the winter of 2005-06, several dozen wildfowl were reported to be dying, or listless for mysterious reasons. Prompt collection by Bombay Natural History Society, and subsequent tests, however revealed that they were not affected by the dreaded avian flu.

BIRD STRIKES

There is considerable concern over incidents of 'bird strikes', which can cause very serious damage to aircraft. In a detailed study carried out by the BNHS at 22 aerodromes, it was found that there had been at least 428 bird strike incidents between 1980 and 1988. About one-third of the hits, for which appropriate data was available, were apparently caused by vultures. While the damage done cannot be ignored, anyone who blames the birds for these mishaps would be dead wrong. The BNHS study has clearly brought out the fact that birds proliferate at and near airports due to various

human-related factors: lack of hygiene in surrounding areas, artificial availability of food (like crop grains), and others. Besides, it must not be forgotten that the skies were the domain of birds, and it is humans who have engendered the conflicts by increasingly encroaching on this domain. It is also a little sad that in all the attention paid to loss of human property and lives, the death of the poor birds themselves, is ignored.

Friend or foe?

As seen from the account above, birds are a mixed blessing for humanity, but with the scales heavily tilted towards being beneficial. Yet, we seem to condemn them in no uncertain words, citing the harm they do to our economy, but spend precious little time praising their positive contributions. It is significant that India's most systematic initiative on economic ornithology, started in 1982 by the Indian Council of Agricultural Research (with centres at Hyderabad, Anand, Delhi, Ludhiana, Kota, Solan, and Thrissur), has as its main aim the reduction of crop losses, *not* the reduction of bird populations. It focusses not only on birds as pests, but also as predators of insect pests and as pollinators. A number of its research publications, by scientists like M.S. Dhindsa, H.K. Saini, P.S. Rao, and B.M. Parasharya, dwell on these important roles of birds.

Perhaps the birds are not even aware of what they give us. But *we* know, and if, in spite of this knowledge, we continue to encourage or tolerate their rapid decimation, it is only because as a species we are too myopic and insensitive.

That brings me to the myriad facets of bird decline in India, which I will deal with in some detail now.

An Ill Wind Blows: Indian Birds in Danger



Flight was Nature's masterstroke. Not only an ode to freedom, flight was also a form of defence that was incomparable. That was at least one reason why birds thrived all over the world.

But even flight has become a weak defence in front of the human onslaught on Nature. The bullet can outpace even the fastest of fliers, and over the ages humans have devised all sorts of ways to poison, trap or kill birds, or destroy their habitats. The result has been an alarming decline in birdlife in India in the last century or so.

The dimensions of this decline are not very well known, except in the case of a few select species. Much of the research done on birds in the last few decades has been on their biology and behaviour, and precious little on their survival status. Even the work done on the latter has concentrated primarily on large, 'publicly visible' birds, ignoring the very many smaller species which must also be facing decline.

The causes of bird decline

HUNTING

Until recently, hunting was the predominant factor in the destruction of birds. In many parts of India there was some check on this activity for moral, religious, or other persuasions, but the sheer scale of hunting has still been massive. It was (and continues to be) present in many tribal societies, was 'elevated' to an elite phenomenon in the Mughal period, and finally, given its most destructive boost by the British colonialists who introduced fire-arms and spread the 'sport' of 'game' hunting.

Birds have been hunted for a number of reasons. Many species were, and continue to be, killed for food. Primary among these are the so-called 'game birds': pheasants, partridges, quails, junglefowl, cranes, bustards, sandgrouse, ducks, geese, and snipes. Once commonly available in the market, or in hotels and restaurants, many of these birds are still served, illegally, as culinary delicacies in select places.

Some of the hunting and trapping techniques adapted by tribal and fisherfolk communities were ingenuous, if agonizingly cruel. In many coastal and riverine tracts, live birds were used as bait. They were first blinded by tying their eyelids together. Sufficiently stunned by a blow that would make them remain stationary, these birds would be lined up near a concealed net. Deceived into a false sense of security, other waterbirds would land near the 'decoys', and promptly be caught. This practice still continues, albeit much less commonly. One recent study at the Pillaimadam lagoon, on the Mandapam coast next to the Palk Bay (Tamil Nadu), found that an average of 2000 birds were thus caught in a six-month period. The greatest casualties were amongst the Gullbilled tern *Gelochelidon nilotica*, and the Lesser crested tern *Sterna*

bengalensis. The local Narikuruvas, a nomadic tribe, caught and sold these birds to coastal communities which considered them delicacies. Simple stick-and-glue techniques have been used by Naga tribals to catch many perching species such as sunbirds, forktails, and buntings. And many Naga villages still have bamboo poles strung up with a dozen or more birds – as part of a once-a-year competition amongst village youth – which have been caught with bare hands!

Many birds have also been slaughtered for the use of one or more of their body parts in rituals, in real or imagined medicinal remedies, and in decorative ways. The curious ‘horned’ beak of several species of hornbills is much valued as a status symbol in some tribal communities of northeast India, who also kill these birds for the alleged medicinal properties of the oil contained in their flesh. Tail feathers of the Wire-tailed swallow have adorned the headgear of Gond tribal people in Bastar (Chhattisgarh). Grey junglefowl *Gallus sonneratii* were once extensively slaughtered for their neck hackles, the yellow wax-like tip of which was used by European and American fisherfolk as fish bait. Reportedly, about 50,000 neck-hackles were exported to America in 1957. Countless numbers of pheasants have lost their lives because some humans thought their plumage would look better on them than on the birds themselves. The dazzling beauty of many a species has thus proved to be a curse; an invitation to death rather than to mate. Most persecuted is the peacock, its tail feathers being one of India’s major trade and export items. Tens of millions of these have been obtained from their original owners, the birds, and sold. The practice continues, though in decline since the export in peafowl feathers was banned in 2002 (while domestic trade is still allowed). In 1988 alone, 260,927 (in numbers) and another 320 kg (in weight) of peacock tail feathers were exported.



Ashish Kohbar

In some parts of Nagaland such as Phek district, an annual competition drives youth to catch as many birds as they can, after which they are strung up on bamboo poles for display during the rest of the year.

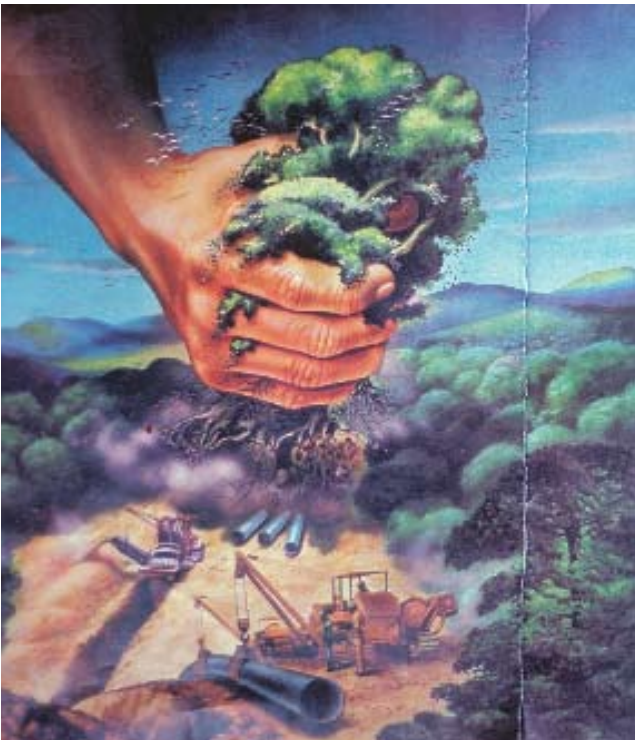
An Ill Wind Blows: Indian Birds in Danger

The head crest of Monal pheasants, being sold in the market in Manali, Himachal Pradesh, perhaps as decorative gear; such open sale is now mercifully rare, but hidden trade continues.



Pallava Bagla

India's 'development' process, as exemplified by this advertisement, has been singularly insensitive to ecological conservation, with massive habitat destruction being one consequence. Pic: Ashish Kothari



All over the world, nature's mighty barriers separate oil, gas, minerals and water from their destinations. Only a handful of international giants can bridge these gaps. One of them is Indian. Dodsal Ripping through jungles in Indonesia... Moving the earth in India... Laying pipelines.

The Indian oil giant, ONGC, is the largest in the world. It is the only one that can bridge the gaps between the oil fields and the refineries. It is the only one that can bridge the gaps between the refineries and the pipelines. It is the only one that can bridge the gaps between the pipelines and the refineries.

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Dodsal
The Indian hand...worldwide

Hunting for 'sport' (what a misnomer!) has taken its own heavy toll. The shoots that were indulged in by British VIPs and Indian princes were mind-boggling. In Kashmir, one unnamed gentleman is credited with a tally of 58,613 wild fowl between 1907 and 1919! And, in Rajasthan, some 11,000 Imperial sandgrouse were shot in two days at Gajner lake. At the Keoladeo Ghana (Bharatpur) National Park in Rajasthan, formerly a shooting preserve of the local king, there are plaques inscribed with records of shoots. There are several entries with a tally of over 2000 ducks and other waterfowl in a day. But the one which really takes the cake is a day's 'bag' of 4273, shot by the then Viceroy, Lord Linlithgow, and other people in his retinue.

HABITAT DESTRUCTION

The recent past has seen an even greater decimating factor than hunting: habitat destruction. Despite their powers of flight and adaptability, birds are almost as tied to their own habitats as terrestrial creatures are. As I pointed out in Chapter 1, many species are found in only a particular kind of ecosystem, the destruction of which would make them especially vulnerable. This may be because they are highly specialized eaters, dependent on a food source which is found only in one kind of habitat. Or it may be because they nest and breed in narrow ecological niches, e.g. flamingos in the salty expanse of the Great Rann of Kachch, Gujarat. Once the niche is destroyed, the birds become disinclined to breed. Or again it could be because their wintering grounds are extremely localized, and are being damaged. This could have happened, for instance, with many migrant waterfowl, whose wetlands both in India as well as along migratory routes, have been drained or polluted.

Indeed, every one of the habitats I described in Chapter 1, is under attack. Satellite imagery in the early part of the

21st century shows our forest cover to be about 21 per cent of the land mass. Perhaps over half of the original forests of the country are now no more, having been cut for agriculture, dams, mining, cities, and so on. Dry and moist deciduous, thorn, semi-evergreen, and evergreen coniferous, tidal, and alpine: none of the forests have been spared. As disastrous has been the forest department's past practice of converting natural forests into industrial plantations. Between 1951 and 1979, over 33,300 sq km (3.33 million ha), were thus converted from biologically diverse ecosystems into sterile single-species stands of pine, teak, eucalyptus, acacia, or other commercially valuable trees.

A majority of our surface water bodies are polluted, and increasing numbers are drying or silting up, or being destroyed by colonization, dredging, and garbage dumping. The famous Chilika lake in Orissa, one of India's largest bird reserves, was reported to be shrinking at the rate of 1.45 sq km (145 ha) annually, due to silting (until some restoration measures have reportedly reversed the decline in the early 2000s; see next chapter). The rich Salt Lakes region adjoining Kolkata, once home to over 200 species of birds, has largely been drained and built over. The extensive wetlands of the Gangetic plains in Bihar and eastern Uttar Pradesh, once home to millions of waterfowl, are seriously encroached upon and fragmented. Many other lakes and waterways have been choked up by the weed Water hyacinth *Eichhornia* spp., foolishly introduced into India as a decorative plant! Beaches, and other coastal ecosystems are being degraded by overuse, by tourism development, and by sand extraction, and over 40 per cent of the country's mangroves have already been cleared.

Apart from forests and wetlands, an ecosystem which has received short shrift is the grassland. Human understanding being as narrow as it is, this type of habitat



Ashish Kohli

Tea, coffee, and other plantations have devastated vast areas of rich tropical forests in the Western Ghats and Eastern Himalaya.

has been widely considered a treeless ‘waste’. And so it has been the first to be built over or burnt, where it has not already been overgrazed by livestock. Ironically, even forestry activities have contributed to the destruction of grasslands, as, in a misplaced bid to make them more ‘productive’, they have been planted with trees! Not surprisingly, some grassland birds, such as bustards and floricans, are amongst the most endangered of India’s avifauna.

Of late, even the vast marine areas off India’s coasts have been affected, especially by oil leaks, pollution from inland settlements, ships, and destructive trawling. And, finally, that pre-eminent domain of the birds, the sky, is also not sacrosanct any more: air pollution levels in many parts of India are horrendous, reaching several times the human safety level set by the World Health Organization.

Amongst the various activities causing habitat destruction are large ‘development’ projects like dams.

Ashish Kothari

Mining of marble and sandstone in Sariska Tiger Reserve, Rajasthan: devastation meant to adorn the houses of rich city-dwellers.



Many of the reservoirs created by damming rivers are today bird sanctuaries, attracting significant water fowl populations. But what this picture hides is the destruction that must have been wrought when the area was being flooded. Unfortunately, very few studies exist on the specific impact on birds. It can however be gauged by the fact that since 1951, about 6360 sq km (636,000 ha) of forests have been diverted for dams alone; this is the official figure, the unofficial one suggesting that the destruction may be to the order of 90,000 sq km (9 million ha). Continued dam construction threatens many important bird habitats, such as Pakke Sanctuary in Arunachal Pradesh, home to over 245 bird species, including many endemic ones. The proposed Human Dam in Maharashtra threatens habitats where the Forest owllet *Athene (Heteroglaux) blewitti*, once considered extinct, has been recently rediscovered. One study under the Man and Biosphere Programme of the Government of India – of the partial submersion of Corbett National

Park by the Ramganga Hydrel Project Dam – revealed that the inundation severely affected many species which roosted and bred in small trees, bushes, and reedbeds. Examples given were of the Red munia or avadavat *Amandava amandava*, the Spotted or Scaly-breasted munia *Lonchura punctulata*, the Baya weaver *Ploceus philippinus*, and the Black-breasted weaver *P. benghalensis*. Thousands of these birds were observed in 1976, prior to submersion. By 1978–79, after inundation had taken place, the birds almost disappeared. So did thousands of Common mynas *Acridotheres tristis*, which used to roost in the area that was to be submerged.

On the other hand, a number of bird species were benefited by the Ramganga Dam. This primarily included waterfowl, waders, and others who found a new, conducive environment in the reservoir area. But that is small consolation for the birds that lost out. And, even a reservoir can cut two ways – many bird habitats are severely damaged when the flood water from a dam is released suddenly. S.G. Neginhal, formerly a senior wildlife official of Karnataka, witnessed one such occurrence at the Ranganathittu Bird Sanctuary, situated on the Kaveri river. His account, reproduced in *Newsletter for Birdwatchers*, is graphic:

Ranganathittu receives only about 25 inches of rainfall. Yet the heavy precipitation upstream in the Kodagu District a 100 kms away, frightens the PWD authorities of the nearby Krishnarajasagar Dam, and this leads them to release waters into the Cauvery river...

On 26th July 1977 while I was in my wildlife office at Mysore, the telephone rang at 3:00 pm and the Engineer-in-charge of the KRS dam informed me that he was releasing 10,000 cusecs of water that very day at 5:00 pm, and that I should take the necessary precautions. What precautions could I possibly take except to stop boating downstream of Ranganathittu and to warn the tourists about the imminent rise in the river level?...

[By about 5:00 p.m.], 10,000 cusecs of water had commenced gushing down the river. It was a terrible scene; the river went on rising, and uprooted trees, brushwood, and snakes were speeding along in the current...

I watched the birds on the islets through the binoculars and the view was heartrending. The rising waters submerged all the low built nests containing eggs, hatchling, and nestlings. The parents who had lost their nests were in deep agitation. The Median egrets, the Cattle egrets, the Pond herons which had their nests on the lower levels of the vegetation abandoned the trees. But the Little egrets and the Night herons did not quit their posts so readily. They stuck to their submerging nests and sat firmly on them until the nests were actually washed away.

Large-scale mining too has destroyed many an important bird habitat, and continues to threaten many more. Since 1980, when the Forest Conservation Act was passed – requiring State Governments to take Central Government clearance before diverting forest lands for non-forest purposes – 776.55 sq km (77,655 ha) have been given over for mining. A consolidated figure for such diversion before 1980 is not available, but it would definitely be an even larger figure. About 70 national parks and sanctuaries, supposedly free from all destructive activity, are under threat from ongoing or proposed mining. Such threats are only increasing since India has entered into a phase of globalization and an export-oriented economy, with some of the world's biggest mining companies bringing in investments into the country.

TRADE IN LIVE BIRDS

Trade in birds is almost as old as hunting. The end use of live birds so traded ranges from 'ornamental' cage-birds to falconry, from cock-fights to zoo stocking, from 'black



Clement Francis

The Spotted or Scalybellied munia and all its cousins have been favourite cage-birds, and caught in their tens of thousands for domestic and international trade.

magic' to circuses. And so long as there is a demand, there will be someone to supply. In Delhi itself, under the very nose of the Central Government, one could till recently get almost *any* bird one wanted to, provided one could build up some trust with the trader.

Till very recently, authorized trade in birds, both domestic and international, was of epic proportions. Over 450 species (a third of India's total diversity) have been documented in trade, and as recently as 2002, over a decade after trade was banned, some 370 species were still being traded. In terms of numbers, the top ten species are the Rose-ringed parakeet *Psittacula krameri*, Plum-headed parakeet *Psittacula cyanocephala*, Alexandrine parakeet *Psittacula eupatria*, Black-headed munia

Lonchura malacca, Red munia *Amandava amandava*, White-throated munia *Lonchura malabarica*, Baya weaver *Ploceus philippinus*, Spotted munia *Lonchura punctulata*, Red-headed bunting *Emberiza bruniceps*, and Blue rock pigeon *Columba livia*. Over a million birds are probably still being traded every year, according to studies by TRAFFIC-India. Most of the dealers in birds in north and east India are based in Uttar Pradesh (Meerut, Lucknow, Rampur, and Varanasi), Delhi, and Kolkata. A spot check of four Meerut dealers, by wildlife officials in April 1988, revealed a total stock of 90,000 birds! A similar inventory was made of nine Kolkata dealers, and the figure obtained in April 1990 was 18,514 birds of 23 species. The vast majority of these were Red and Black-headed munias.

Farhad Vania



Several dozen species have been the subject of trade in live birds, including this Chukor partridge in the Himalaya.

Much of the bird trapping for Indian and foreign markets is in Uttar Pradesh and Bihar. Licences for trapping were till recently issued by the Uttar Pradesh government, for birds which were on Schedule IV of the Wild Life (Protection) Act (WLPA) of 1972 and allowed to be hunted or captured. Each licence issued was for a maximum of 2000 birds. In 1988 alone, the U.P. Government issued 1000 such licences. Theoretically, therefore, trappers could have legally caught upto two million birds in just that year! In 1991, all such trade involving capture from the wild, was fortunately banned under the amended WLPA.

The millions of birds involved till recently in authorized internal trade were augmented by illegally traded birds, which may be even greater in number. Again, only indicative figures are available. A series of raids by wildlife officials on bird shops and hawkers in Delhi yielded the following illegal 'catches': 1180 birds in two premises in June 1989, 2050 in three premises in December 1989, and 3980 in September 1990. A majority of the birds were munias (Black-headed, Spotted, Red, and White-throated), parakeets (Rose-ringed and Alexandrine), and weavers. In rare cases, Grey partridges, Spotted owlets, and even falcons (species unrecorded) were recovered. At Kolkata, the catch of illegally held birds has been lower, but much more diversified. Between May 1988 and March 1989, a total of 1670 birds were retrieved, including flowerpeckers, barbets, hawks, orioles, thrushes, shamas, weavers, mynas, cuckoos, parakeets, munias, bulbuls, kingfishers, green pigeons, and Indian robins.

Several threatened species are involved in trade. The Swamp francolin *Francolinus gularis* has been a frequently traded species, and even the Sarus crane *Grus antigone* continues to be traded in annual numbers of between 30 and 50 birds. Others include the Green munia *Amandava formosa* and the Finn's weaver *Ploceus megarhynchus*.

What happens to the live birds once they are sold off to the customer? The majority of them end up as cage-birds, destined to live their life in confinement. Some of them, primarily partridges and quails, are used in cock-fights. Falconry is the fate of many of the raptors traded. And then, there is a whole range of quaint practices using live birds: one which can still be seen in fairs and weekly markets is the employment, by street-side fortune-tellers, of parakeets with allegedly divine powers, who will discern your future by choosing cards.

Domestic trade was greatly augmented by the export (permitted till recently) and smuggling of birds to other countries. Before it became subject to a number of internal and international restrictions, export of birds was of an unbelievable magnitude. Several thousand Monal pheasants were taken to Europe in the latter part of the 19th century. Between 1970 and 1976, a period intensively studied, nearly 13 million birds were exported, an average of 1.85 million per year! The diversity of species involved was also large, about 289 in all. This included several species now considered threatened: the Green munia or avadavat *Amandava formosa*, the Finn's weaver *Ploceus megarhynchus*, the Eurasian spoonbill *Platalea leucorodia*, falcons of various species, the Satyr tragopan *Tragopan satyra*, the Grey peacock-pheasant *Polyplectron bicalcaratum*, the Black stork *Ciconia nigra*, and several species of eagles. At least 10 species strictly endemic to India, have been a part of the international trade.

Fortunately there has been a downward trend in both the numbers and diversity of Indian birds sent abroad. Authorized export of birds is now only of exotic cage-birds, though occasionally some uncommon species are allowed for research, exhibition, or other purposes. The number of countries importing Indian birds once ran into several dozen (62 in the period 1970–76), but was then mostly restricted to Belgium, Germany, France,

Greece, Italy, Japan, and the Netherlands, till completely prohibited.

Then there is, of course, illegal international trade. This used to happen when registered traders attempted to smuggle out a larger number of birds than permitted, or species for which they had no authorization. Or it happens when passengers try to sneak out birds in their personal baggage. Overstepping the quota used to take place mainly with Rose-ringed parakeets, while false identities were usually sought to be imposed on the Hill myna. One glaring loophole that is still used is that trade on a number of foreign bird species already existing in India (such as Albino budgerigars, Bengal finches, White finches, Zebra finches) is not banned; traders are thus able to obtain false permits to export Indian birds in the guise of foreign ones. Studies in the late 1990s showed that over 2000 Green munias (a globally threatened species) were being smuggled every year under the name of Tiger finches. Indian species of buntings and finches, passed off as 'lovebirds', are often the other victims of this subterfuge.

Occasionally, these attempts are thwarted at airports in India or abroad. In the early 1970s, 42 Lagger falcons and 10 Peregrine falcons were exported to Germany under the label 'Ravens'. Unfortunately for the traders, the disguise was not good enough. In 1987, Spanish authorities reported the receipt of an illegal consignment, containing Black vultures, Griffons, Himalayan griffons, and other raptors. The birds had gone there from Bhutan, but were most likely to have originated from Kolkata. Two shipments of Hill mynas, 400 in all, were seized in February 1989, in Delhi. There is also smuggling across our international borders. At the Punjab border, for instance, parakeets, occasionally even falcons, are caught being taken across. And for all the cases detected, there must be many more that go through unnoticed.

Those whose drawing rooms are finally livened up by these cage-birds often do not realize, or do not care about, the fact that there is considerable mortality of birds in the whole process of trapping, transporting, caging, and displaying. Experts estimate that for every three birds caught, only one ends up alive and in a condition to be used for its intended purpose. Crude trapping methods take a toll in the form of injured and dead birds which are discarded. The highest mortality occurs during the transfer of 'intact' birds to the dealer, for this may involve several middlemen who care little for the condition of their 'goods'. Then, birds die in the hands of dealers, especially when kept in unhygienic and crowded conditions.

Sometimes epidemics can sweep through the entire stock; wildlife researchers found in 1977 that one dealer in Kolkata had lost 790 of the 800 Green munias in his stock! Finally, deaths occur during export and quarantine at the country of destination. In January 1975, 80 per cent of the 600 parakeets and 25 Indian rollers exported to England died in one week due to disease. And in another horrendous incident, over 2000 parakeets and finches on board an Air India flight to London are reported to have died in 1976. Apparently the plane was delayed at Kuwait for 23 hours, during which no-one thought of giving the birds any food or water. What kind of mortality occurs now, under conditions of illegal trade, is anyone's guess.

TOXICS AND POLLUTION

Of late, hunting, trade and habitat destruction have been joined by other, less visible, causes of bird decline. Foremost is the ever-increasing use of synthetic pesticides. Residues of many pesticides are extremely long-lasting, and accumulate in animal fat in greater and greater concentrations as one goes up the food pyramid. Birds

at the apex of the pyramid, such as raptors, are worst off. Sufficient evidence from several countries is available to directly implicate pesticides in the alarming decline in birds like the Peregrine falcon *Falco peregrinus*. Pesticides such as DDT and other organochlorines, still widely used in India, cause metabolic changes in birds. This in turn leads to thinning of eggshells, and breaking of eggs before the embryo has developed fully. Some pesticides can also cause direct and quick mortality. In one area in Israel, spraying of Monocrotophos (also used in India), is recorded to have killed about several hundred raptors in the period 1975–79; the same pesticide is blamed for bird deaths in many other parts of the world, including several thousand hawks in Argentina in 1996, and hundreds in separate incidents across the USA.

In India, this is a scantily researched subject. Large-scale mortality due to the ingestion of pesticides, has been reported in the case of peafowl *Pavo cristatus* and the Sarus crane *Grus antigone*. The drastic decline in some other very common birds is a cause of serious concern; this includes the House sparrow *Passer domesticus*, Common myna *Acridotheres tristis*, Black drongo *Dicrurus macrocercus*, Green bee-eater *Merops orientalis*, Grey-headed fish eagle *Ichthyophaga ichthyaetus*, and even the House crow *Corvus splendens*. This decline is not only a threat to the birds, but also an indicator of serious environmental hazards that human beings are unwittingly facing. Recently a large number of birds were found dead in and around a tea estate in Dibrugarh district in Assam, and it is believed that the cause for this is the pesticide spraying that takes place in the estate. Studies on the effects of DDT on the breeding of the Grey-headed fish eagle, carried out at Corbett National Park, have revealed egg shell thinning, leading to either the eggs not hatching or the death of fledglings.

A completely unexpected product has been responsible for what is perhaps the world's most rapid decimation of a group of species. Vultures have always been a common part of the Indian countryside, and even its city-scapes. I remember when we did our bird counts in Delhi in the 1980s, it was sometimes difficult to count the number of vultures soaring up in the sky or feeding at garbage dumps. No more. Today, it would be hard to find them in numbers greater than the fingers on your hands. Scientists estimate that the population of the White-backed vulture *Gyps bengalensis* and the Long-billed vulture *Gyps indicus*, have dropped by an astounding 97 per cent in northern India, *in less than a decade*. A third species, the Slender-billed vulture *Gyps tenuirostris*, is now perhaps the world's rarest vulture. Similar declines are being seen in neighbouring Pakistan and Nepal.

For the first few years since this decline was noticed by ornithologists of the Bombay Natural History Society, various theories of the cause included pesticide contamination, lack of food, viral disease, and others. In 2003, however, the culprit was traced to the pain-killer Diclofenac, used for cattle. This drug was introduced in the late 1980s or early 1990s in veterinary care, and is administered on several million cattle annually. When vultures feed on cattle carcasses, the drug seems to fatally affect the kidney or liver.

A rather difficult-to-detect form of pollution, genetic contamination, may be affecting the Red jungle fowl *Gallus gallus*. It is believed that the pure race of this species may be threatened due to widespread cross-breeding with domestic fowl... rather ironical, as the latter has evolved from the former! Scientific studies on this by the Wildlife Institute of India have been recently initiated, and the National Board for Wildlife has constituted a specialist group to prepare an action plan for the bird's conservation.

Birds in Our Lives

Raghu Chundawat



Vibhu Prakash



Sites such as the vulture-laden tree (above) were once common; today, afflicted by toxic contamination that causes the birds to become listless and their necks to droop, their populations have crashed to near-extinct levels.

Domestic and industrial pollution, especially of water, could also seriously affect bird populations. The Indian skimmer *Rynchops albicollis*, for instance, is hardly seen on urban waterways any more, possibly because pollution has affected its fish prey, and also left little clear surface which it can 'skim' with its beak in search of food.

Pesticides and other pollutants affect bird populations in another, equally disastrous, way: by killing off the prey species. Large-scale fish mortality by highly toxic effluents affects waterbirds, while rodent and reptile decimation by pesticides makes food scarce for raptors.

INTRODUCTION OF EXOTICS

Yet another worldwide threat to birds has been the introduction of exotic species of plants and animals by humans, either deliberately or by accident. The most famous example of this is, of course, the Dodo *Raphus cucullatus*. Most people know the phrase 'dead as a dodo', but few are aware that this creature was driven to extinction by a combination of predation by domestic

Ashish Kothari

The only exotic bird species to have formed a population in the wild in mainland India, the Java sparrow, seen here in a zoo cage.



dogs, and hunting. These dogs, introduced to the island of Mauritius by humans, found the flightless Dodo to be easy prey.

Once again, there is insufficient data on India to make conclusive statements on this. Vast areas of natural habitat have been completely colonized by exotic plant species, such as *Parthenium* (Congress grass) and *Chromolena odorata* (Eupatorium) on grasslands, *Lantana* in forest areas, and *Eichhornia* (Water hyacinth) in wetlands. Which birds would have been driven out by these drastic habitat changes is anyone's guess. Ironically, some bird species seem to thrive on *Lantana* berries, and are an agency for their propagation!

A similar mixed impact has been felt in areas where exotic animals were introduced. Fortunately, in India as a whole, there is only one introduced bird species which has established itself (i.e. acquired breeding success in the wild), the Java sparrow *Padda oryzivora*. This popular cage-bird may have originally escaped from a cage, or may have been deliberately brought and released into India. It is found in and around Chennai and Kolkata only, and is neither spreading significantly nor known to be displacing indigenous species.

Unfortunately, this cannot be said about introductions of birds from one region of India to another, where they do not belong. The worst examples of this are birds taken from the mainland to the islands of Andaman and Nicobar: the House sparrow *Passer domesticus*, the Common myna *Acridotheres tristis*, and the Grey francolin or partridge *Francolinus pondicerianus*. At least the first two are likely to have started displacing some indigenous birds, by aggressively occupying the limited niches (ecological spaces) used by these species. Again, however, this is a scantily-researched topic in India.

ACCIDENTS

Some amount of bird injury and death occurs due to plane strikes, oil leaks, vehicular accidents, etc. Once sporadic and infrequent, these accidental occurrences are becoming an alarmingly regular feature in India and other countries.

Take vehicular hits, for example. It is estimated that in Bulgaria some seven million birds, and in the Netherlands about 653,000, are killed on roads every year! Till recently, in India, narrow, rough roads and low-speed vehicles restricted such accidents, but with the rapid expansion of highways this is no longer true. Spilled grains, refuse, and crushed animals make roadsides an attractive food source, while, in winter, the heat trapped by black-tarred roads is enjoyed by many birds. A study in Punjab showed that bird hits are greatest at speeds above 100 km per hour; below 80 kmph they get reduced to a negligible number. On a five km stretch of National Highway No. 11, in Bharatpur district, Rajasthan, 219 birds were killed in a one-year period in 1980–81, due to road accidents; 66 of these were Indian ring doves.

THE JATINGA MYSTERY

In the 1960s, naturalist E.P. Gee wrote about a mysterious phenomenon in Jatinga, a remote village near Haflong in Assam. Apparently on certain nights of the year, birds of many species would come and crash around artificial lamps, stunning themselves into immobility. Those which were not picked up by villagers would just stay put and starve to death. Their behaviour was puzzling, to say the least.

The phenomenon takes place only in the months of August to October, and only during a mix of heavy fog, wind, moonlessness, and rain. The more severe the

weather, the more the birds. Villagers of Jatinga have learned when and where to light the lamps, and wait for the birds, killing them when they fall, or whipping them out of the air as they arrive within reach. Some 45 species, including kingfishers, drongos, pittas, bulbuls, woodpeckers, swifts, koels, parakeets, pigeons, doves, waterhens, floricans, egrets, bitterns, rails, teals, and flycatchers, are the victims.

The attraction of birds to light, especially in conditions of darkness, is well known. Heavy bird mortality has been reported, in similar climatic conditions, from places as far apart as Lunglie in Mizoram, and Malshej Ghat, a plateau in the Sahyadri mountain range in Maharashtra. At all these places, as also others where this phenomenon has been reported, most of the species involved are resident, or locally migratory, and diurnal. But why do they come to Jatinga in the first place? One explanation is that during heavy rains, their nesting places in the valleys lower down get flooded, forcing them to migrate. Those flying towards Jatinga find it difficult to cross this point in the dark, due to barriers created by river valley depressions and hill ranges. They are thus tempted to settle down near light.

However, the Jatinga phenomenon is not so easily explicable. While the lamps are the obvious attraction, why do the birds become immobile, even when not badly hurt? Perhaps bright lights also paralyze them; in Assam, villagers are known to use lighted torches on dark nights to immobilize waterbirds from a distance, before spearing them. But why do the birds at Jatinga not eat subsequently, even when offered food on the following day? One possible explanation relates to changes in the magnetic field of the area during storms. Apparently the number of birds landing at the village goes up at higher degrees of electrical activity in the atmosphere; hence perhaps their physiological functions are adversely

affected? But then, why does this effect continue to last several hours after the storm has abated?

Unless we can find an entirely new way to communicate with birds, perhaps Jatinga will remain a mystery.

Birds in danger

In a certain sense, almost all Indian birds are threatened. But there are a few which have been especially affected, and which therefore require immediate attention. The tally of these 'endangered' or 'threatened'¹ species differs from one expert to the other, partly due to the absence of uniform and clear criteria for determining the status of a bird, and partly because of the sheer inadequacy of accurate data on each species.

The Wild Life (Protection) Act of 1972 (amended in 2002) names 58 species and one family of birds (hawks²) in a list called 'Schedule I', which consists of animals considered threatened and therefore given complete protection all over India. Then there is the list of the BirdLife International (formerly International Council of Bird Preservation or ICBP), which is based on the globally

¹ Several different terms are used to denote the varying degrees of threat to bird species (the standard nomenclature being taken from the Red List Categories of IUCN–The World Conservation Union): *endangered* birds face extinction in the near future (with *critically endangered* ones being at extremely high risk), *vulnerable* ones could soon become endangered. All three can be combined into the generic term *threatened*. Purely for reasons of convenience and style, I have used *threatened* interchangeably with the term *endangered*, to denote the same thing. *Near threatened* birds are those close to the above categories.

² Hawks of the family Accipitridae. But it is unclear if all the 45 species of raptors which are in this family, are to be considered as part of Schedule I. Some of these species, such as the Shikra *Accipiter badius* and the Marsh harrier *Circus aeruginosus*, are by no means scarce, and the Pariah kite *Milvus migrans* is actually thriving as a human commensal.

recognized Red Data Books on endangered species of plants and animals, prepared by the World Conservation Union (IUCN). The 1979 ICBP Bird Red Data Book named 17 Indian species as threatened. Significantly, the 1988 Bird Red Data Book *Birds to Watch*, had 69 Indian species listed as threatened, including 47 which were not then in Schedule I, and in the 2005 Red Data Book, the figure has jumped to 140 species (See Annexure 1 for the list of threatened bird species).

How does this compare with the rest of the world? BirdLife International, in a 2004 report, reckons that over 12 per cent of the world's species, i.e. 1211 species, are 'in varying degrees at risk from global extinction'. If one combines various threatened bird lists prepared for India, it appears that over 100, or about eight per cent, of Indian species are threatened. This is only marginally better than the world situation, and in any case a cause for serious concern.

ALREADY EXTINCT?

Tragically, some species may already have vanished. Two species are considered extinct in India, i.e. have not been authentically recorded for a sufficiently long time despite extensive search. These are the Pinkheaded duck *Rhodonessa caryophyllacea*, and the Himalayan or Mountain quail *Ophrysia superciliosa*.

The Pinkheaded duck was probably never a very abundant bird. Mainly restricted to east and northeast India, it inhabited swampy grasslands and forests. This lovely bird seems to have fallen prey mainly to hunting and trapping; it is reported to have been commonly sold in Kolkata's markets, either alive as an ornamental pet, or killed for food. In the 1890s it sold for Rs 15 each; by 1915, the price had gone up to Rs 100, but very few birds were available. Large-scale conversion of its

swampy habitat into agricultural fields was perhaps the final nail in its coffin. The last authentic sighting was in 1935, in Bihar. Today, its only remains may be the 80 skins preserved in museums across the world. Ornithologists continue to hope that it still survives in the wild in Myanmar; in early 2005, a possible sighting has been reported by BirdLife International, which has subsequently launched a major expedition in its search.

The Mountain (or Himalayan) quail is believed to have gone extinct in 1868, an year which has the dubious distinction of recording the extinction of yet another bird species: the New Zealand quail *Coturnix noveazelandiae*. There is no reliable record of the Mountain quail since that year, and even museums all over the world have a total of only 10 skins! Extensive surveys have been carried out in the lower Himalaya, where it formerly resided, but to no avail. Most of its known habitat has been altered or destroyed.

Biologists and bird-lovers are always hopeful that species considered extinct may suddenly surface again. One of the most startling ornithological events in the recent past has been the rediscovery of the Jerdon's courser *Rhinoptilus bitorquatus*. Last seen in 1900, and believed to be extinct, an intensive publicity and search effort by Bombay Natural History Society staff yielded results when a local hunter saw it one night and managed to capture it. This was in 1986, at Lankamalai in Andhra Pradesh. Since then there have been several sightings of a single bird or pair of birds, in a small patch of scrub forest in the Eastern Ghats. One bird has even been spotted at Penchalakona, 100 km south of Lankamalai. The reasons for its near disappearance are not very clear. Habitat destruction could be one, since the restricted range it inhabits in the south-eastern states, has suffered serious deforestation and degradation.



Ashish Kothari

Specimen of the extinct Pinkheaded duck preserved in the Bombay Natural History Society museum.

A decade later, another bird long thought to be extinct, resurfaced. The Forest spotted owl *Athene (Heteroglaux) blewitti* was one of the least-known birds of India. In the 19th century, seven specimens were collected from India: one from Phuljar district in east Madhya Pradesh (now in Chhatisgarh), one from Karial near Udet river in Sambalpur, Orissa, four from Taloda and one from Shahada district of north-western Maharashtra. Col. Richard Meinertzhagen claimed to have collected a specimen from Mandvi, Gujarat, in 1914, but later, this was proved to be a scientific fraud. The specimen was originally Davidson's missing specimen, stolen from the Natural History Museum, London (BMNH). Thus, the Forest owl remained unreported for 113 years, till its rediscovery on 25 November 1997 by Ben King, Pamela Rasmussen and David Abbott in Toranmal Reserve Forest of Shahada in Nandurbar district, Maharashtra. Even before this, a young naturalist from Maharashtra, Kishore Rithe, had reported seeing it. The Forest owl

An Ill Wind Blows: Indian Birds in Danger

Bharat Bhushan



One of the first photographs of the rediscovered Jerdon's courser, found to be still surviving in scrub forests of Andhra Pradesh.

One of hopefully several live Forest spotted owlets still left in the wild, precariously hanging on in the dry forests of Maharashtra.

Girish Jathar



is protected under Schedule I of the Indian Wildlife (Protection) Act of 1972 and is listed as critically endangered.

The rediscovery of a long-lost species can bring instant fame to a birdwatcher. So from time to time, sensational stories of the reappearance of extinct birds are splashed across the world, only to be later revealed as fraudulent. A really audacious attempt is the one that appeared in *Newsweek* in December 1988. In the special advertizing section of the magazine, one Rory Nugent, said to be an ‘adventure traveller’ (who has also gone looking for dinosaurs in the Congo), described his search for the Pinkheaded duck in the remote stretches of the Brahmaputra river. Somewhere near the India–China–Burma border, after 29 days of paddling in his canoe, he came across,

... one of the fabled ducks among the multitude. As if to confirm that I had just witnessed one of the most elusive animals in nature, the jungle rimming the banks came alive. Monkeys shrieked, big cats roared, and land birds hooted. I lay back in the canoe, a smile on my face, finally satisfied that the Pinkheaded duck was there, to be found for anyone willing to search for it.

The authenticity of this sight record is impossible to verify, but the colourful language used certainly does



not inspire much faith! Most ornithologists have rightly ridiculed Nugent's account. Interestingly, in a book he published (called *In Search of the Pink-Headed Duck: A Journey into the Himalayas and Down the Brahmaputra*), he talks about going in search for it, but does not confirm sighting it, so it is not clear why *Newsweek* carried such an advertisement! But, who knows, some day the Pinkheaded duck and the Mountain quail may well be given a fresh lease of life by some chance rediscovery.

Meanwhile, however, many other species may join the 'extinct' category if not protected from further decimation. Amongst those which are in immediate danger are several wetland birds, raptors and scavengers, alpine game birds, and grassland dwellers.

WETLAND AND MARINE BIRDS

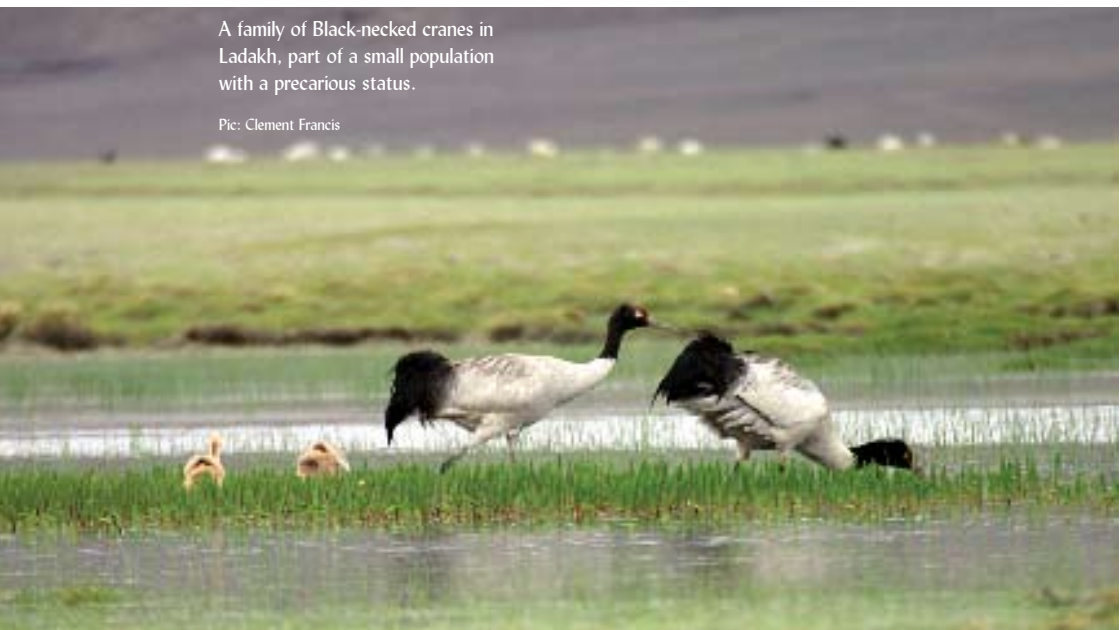
Amongst birds of the wetland, great concern has been focussed on the dwindling populations of at least two of our cranes. Most vulnerable of these is the Black-necked crane *Grus nigricollis*, found to be breeding within Indian limits only in Ladakh. There are a mere two to three breeding pairs, along with 7 to 11 non-breeding birds, in the high-altitude marsh ecosystems there. The local Buddhist population in the area is very protective of the birds, but hunting by outsiders seems to have taken a heavy toll. Sporadic hunting and egg-collection has



Birds in Our Lives


A family of Black-necked cranes in Ladakh, part of a small population with a precarious status.

Pic: Clement Francis



continued even after substantial publicity regarding the need to conserve the birds; shock waves were felt in the ornithological world when news came that, in 1983, a pair of Black-necked cranes were shot by para-military force personnel.

These lovely cranes were also known to winter in the Apa Tani valley of Arunachal Pradesh, where local people left them strictly alone. The entry of outsiders, especially soldiers with arms and vehicles, seems to have driven them away by the 1970s. A pair of wintering cranes was, however, sighted in February 1990 in the Sangti valley of Arunachal. The only saving grace is that the total world population of this crane is not as desperately near extinction as its Indian counterpart, there being some 1400 to 1500, mainly in China and Bhutan. But that would be small consolation if India were to completely lose this lovely bird from the wild.

A photograph showing three Siberian cranes in flight against a clear, bright blue sky. The cranes are captured in various stages of their wing strokes, with their long necks extended forward and their legs trailing behind. The birds have white bodies with dark wings and long, thin necks.

The magnificent sight of Siberian cranes in flight, perhaps never to be seen in India again.

Pic: Nitin Rai

Another crane severely endangered within India is the Siberian crane *Grus leucogeranus*. The plight of this bird has been the focus of considerable media and research attention. Migrating from Siberia via Iran, Pakistan, and Afghanistan, a small fluctuating population of Siberian cranes winters regularly at the Keoladeo Ghana (Bharatpur) National Park. In the 1880s, there were reportedly 2000 cranes wintering in the Gangetic basin of northern India; in the early 20th century E.C.S. Baker reported it in the *Fauna of British India* as ‘not uncommon’. By the 1930s, most records were only from Bharatpur. In the last three decades, there has been a catastrophic decline: about 200 in 1965, to 33 in 1980–81, marginally increasing to 41 in 1984–85, then down to 5 in 1992–93, 4 in 1996, 2 in 1999 and 2000, and none after 2002. Birdwatchers still hope for a miraculous re-appearance, but chances are dim.

The drastic decline in the number of these cranes entering India, points to considerable poaching outside the country. Equally alarming is the fact that Bharatpur faces serious problems of management, not least because it is an artificial ecosystem. In certain years, water shortages, and possible imbalances in vegetational composition, seem to have discouraged the cranes from wintering at Bharatpur (see a more detailed explanation, in Chapter 7). Some other wintering spots have been identified in recent times: a single bird spent the winter of 1988–89 at Dihailaghat lake in the Karera Bustard Sanctuary, Madhya Pradesh, and a pair was sighted on a wetland called Baretha Bandh, some 60 km southwest of Bharatpur, in January 1990. However, there have been no sightings of this species outside Bharatpur, since 1990.

Cranes are, as a group, under severe threat. Even the Sarus crane *Grus antigone*, so well-known a sight in India, is believed to be declining. A survey in the 1980s estimated the total population to be about 12,000, and another in 1999 estimated less than 2000. The main cause of decline seems to be wetland destruction. Cranes are now found mainly where industrial and urban sprawl has not taken place, and where agricultural practices are still traditional.

The Rosy or White pelican *Pelecanus onocrotalus* is a common waterbird of India. But two other pelican species, the Spotted-billed and the Dalmatian, are less widely distributed, and are both reported to facing serious decline in numbers all over the world. The Spotted-billed pelican *P. philippensis* has suffered due to a combination of several factors: destruction of nesting and roosting areas, killing by fisherfolk who see it as a serious competitor, decline in fish stocks, and possible egg shell thinning by pesticides. Several bustling pelicanries of the past, such as the Kolleru lake in Andhra Pradesh, have been abandoned due to human disturbance. The Indian population is now not more

than 2000 pairs, concentrated in the southeast (primarily the Aredu–Sarepalle heronry near Kolleru lake, and the Nelapattu Sanctuary in Andhra Pradesh, the Chitrandugi pelicanry in Tamil Nadu, and Kokkare Bellur heronry in Karnataka). The Dalmatian pelican *P. crispus*, once estimated to number millions across the world, is today down to a few thousand breeding pairs. The causes are perhaps the same as for the Spotted-billed. It only winters in India, primarily in lakes and large rivers in the north and east, where its precise status is unclear.

Serious alarm is warranted for another large waterbird, the Greater adjutant stork *Leptoptilos dubius*, and its cousin the Lesser adjutant stork *L. javanicus*. Both are threatened globally as well as within India, with the Adjutant having suffered, according to the ICBP, ‘catastrophic decline’. This is not entirely explicable, since adjutants are known to frequent even garbage and carcass dumps. Pesticides and pollution may be decimating factors.

Another stork with a grim future is the Oriental white stork *Ciconia boyciana*. Coming from Siberia and China, it winters in northeast India. In 1985–86, about 250 individuals were reported. Of late, there have been only a handful of sightings, and may be regarded as vagrant now. Its cousin, the European white stork *Ciconia ciconia* is doing better. Breeding in Europe, northern Africa, and Western Asia, this beautiful bird has been subjected to considerable hunting till recently, even after being protected under the Wild Life (Protection) Act of 1972. A stronghold with about 3000 White storks was noticed in 1984 at the Dhand area, near the Great Rann of Kachch, Gujarat.

The Black-necked stork *Ephippiorhynchus asiaticus* has suffered serious decline all over India. Destruction of its wetland habitat is one reason, another may be trapping for zoos. Several dozen of these storks are ‘displayed’

in Indian zoos, and between 1970 and 1978, at least 68 were exported to England, Belgium, America, and the Netherlands.

One species of waterfowl which may well go the way of the Pinkheaded duck is the White-winged wood duck *Cairina scutulata*. Inhabiting pools and swamps in the dense evergreen forests of Assam, Arunachal Pradesh and Manipur, this bird has declined considerably due to shrinkage in habitat, hunting of adults and collection of young, and water pollution. In 1976, its total population in Assam was reported at a mere 44. Estimates from Arunachal Pradesh and Manipur are not available. With a total world population of perhaps less than 200 pairs, this bird has justifiably been called the world's rarest duck. The survival of this species is now dependent on strict protection of its remaining habitat, and on ongoing captive breeding and release programmes in India and the United Kingdom (see next chapter).



Ashish Kohari

A severely threatened species, the Greater adjutant stork survives in small groups patchily distributed, including a population in the heart of Guwahati city in Assam!

Another threatened duck is the Andaman or Sunda teal *Anas gibberifrons*. Once common in the Middle Andaman group of islands, it has been reduced by poaching and destruction of its habitat (freshwater pools, tidal creeks, and mangroves) to a few hundred individuals.

Birds which were never common, but which seem to be on the decline, include the Goliath heron *Ardea goliath* and the Large or Fulvous whistling-duck *Dendrocygna bicolor*. There are very few authentic records of these species of late.

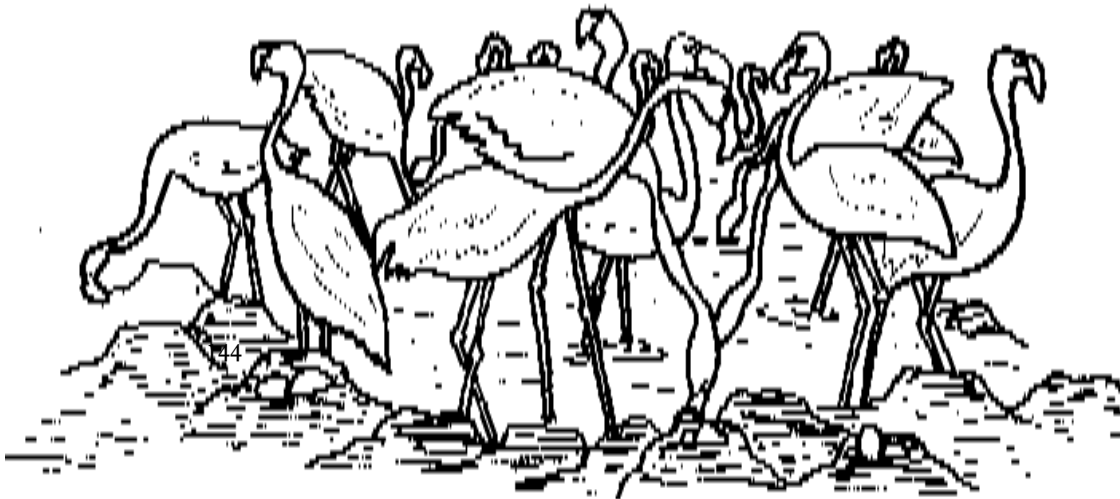
An extremely rare and elusive waterbird of northeast India is the Masked finfoot *Heliopais personata*. Found in the dense forest areas of east Assam and possibly Manipur; both its flesh and eggs were apparently a local delicacy. This bird has not been authentically recorded within India for over half a century now, but hopes of its continued survival persist. Small populations do occur in other Southeast Asian countries.

Shimpei Watanabe



The Spoonbill sandpiper, its beak uniquely adapted to picking up food from its aquatic habitat, has only occasionally been seen in some Indian wetlands.

While the Greater flamingo *Phoenicopterus ruber* is not doing too badly in India, concern has been voiced over the decline in its breeding populations. The spectacular 'Flamingo City' in the Great Rann of Kachch, Gujarat, has on and off harboured thousands of breeding birds. It was reported by Maharao Khengarji (ruler of Kachch) to the BNHS in the 1890s, and Salim Ali subsequently studied it. It appears that from 1977 till the early 1990s, this flourishing colony was completely abandoned. Various conjectures regarding the cause of this event included pesticidal pollution, military disturbance, and even a rise in global mean sea level induced by global warming. Ornithologists, however, heaved a sigh of relief when, in early 1991, it was reported that the flamingos had returned to breed at Hanji Bet near Khavda in the Rann of Kachch. Apparently these birds need the perfect combination of climatic and hydrological conditions to breed, a combination which was achieved in 1991 because dams in Rajasthan overflowed following heavy rains. A new threat, however, emerged in the form of inquisitive tourists and wildlife enthusiasts, large numbers of which invaded the nesting colony. Some video shooting teams even deliberately chased adults and chicks to record 'action shots'! As a result, several chicks ventured into deeper water and drowned, and many adults may have abandoned the site altogether, leading their eggs to



deteriorate. Fortunately the District Administration was alerted to the problem by BNHS and other groups, and the area was declared as 'restricted' and 'inner line'. This must be the first time in India's history that an area was given politically sensitive status in the cause of conservation!

The Lesser flamingo *Phoenicopterus minor*, also nests in the Rann of Kachch (fittingly, in the Little Rann!). Its nesting site seems to shift frequently, depending on the site the birds feel most comfortable and secure in. In 2003, 100,000 adults and 35,000 chicks of the Lesser flamingo were observed at the Vachraj Solanki Bet near Jhinjuvada.

Amongst the smaller wetland birds considered threatened in India, are the Wood snipe *Gallinago nemoricola*, and the Spoonbill sandpiper *Calidris pygmeus*. The former is a resident of small waterbodies amidst tall grass and scrub in the lower Himalaya, and a winter visitor to south Indian hill ranges. There appear to be very few records of this species, and none at all of breeding in the last several decades. The Spoonbill sandpiper is a rare winter migrant to eastern and southern India, with only a few recent sightings. Five individuals of this species have been ringed at Point Calimere Sanctuary, Tamil Nadu. The January 1989 sighting of 257 of these birds in Bangladesh is significant.

A few of the pelagic (open sea) species which wander into Indian limits may be threatened by egg collection, hunting, destruction of habitat, and predation by introduced species in their breeding grounds. The Masked booby *Sula dactylatra* has declined throughout its range. Red-footed boobies *S. sula* are killed extensively on Christmas Island in the Indian Ocean, a horrifying 2000-plus tally being recorded in one period of three months alone. While much of the decline of pelagic



Pankaj Sekhsaria

Portions of an Edible-nest swiftlet's nest, which are highly priced in the international market as a soup delicacy.

species is due to factors outside India, these birds are not necessarily safe even here; witness the mass capturing of terns and other birds on our coasts, an example of which was given under the section on Hunting above.

A seriously threatened bird is the Edible-nest swiftlet *Collocalia fuciphaga*, for a peculiar reason. This species makes jelly-like nests out of saliva, which are so highly valued for use in soups and other dishes in many parts of the world, that the nest is one of the most valued of animal products. Due to this, there is considerable collection of nests from caves off the Andaman Islands. According to a study, there has been over an 80 per cent decline in the population of the species here, in the last decade.

GRASSLAND BIRDS

As severely threatened as wetlands in India, are its grasslands. There has been a direct and catastrophic impact of this on at least three species: the Great Indian bustard, the Bengal florican, and the Lesser florican.

Along with the Siberian crane, perhaps India's best known endangered bird is the Great Indian bustard *Ardeotis nigriceps*, known as the GIB for short. Much of this bird's original grassland habitat, spread over a vast area in western and southern India, has been taken over for urban and agricultural expansion, or degraded by overgrazing and the introduction of exotics like *Prosopis juliflora*. Hunting had once taken a big toll; one unidentified gentleman, calling himself a 'lover of all sports', claimed to have shot 961 GIBs between 1809 and 1829! While earlier hunting was mainly done by falconry and traditional weapons, the period after the Second World War witnessed a rapid expansion in the use of vehicles and sophisticated fire-arms. The drive to increase food production rapidly, after Independence, also resulted in widespread availability of crop protection guns, which were frequently used to hunt the GIB and other game.

Asad Rahmani

Once nominated to be India's national bird, the grassland-inhabiting Great Indian bustard has severely declined in numbers across its western and central Indian range.



The species is now reduced to small isolated populations in Rajasthan, Gujarat, Maharashtra, Madhya Pradesh, Karnataka, and Andhra Pradesh. Over half the present population of 1500 to 2000 birds is located in Rajasthan itself. The alarm over its decline prompted serious conservation measures in all the states, and the population appeared to have stabilized for some time. However, a comparison of the population of bustards at nine key sites, between 1985 and 2004, showed a decline in eight of them. At four sites, including two wildlife sanctuaries, the species had been reduced to zero. (I shall come back to the peculiar story of one of these, Karera Bustard Sanctuary, in the next chapter.)

Similar population decline has been seen in the case of the Bengal and Lesser floricans. A comprehensive survey of these bustards has been undertaken by the Bombay Natural History Society. According to its final report, the Bengal floricane *Houbaropsis bengalensis* “is perhaps the rarest member of the Otididae (bustard) family, with an estimated population of 250–300 individuals in India”. Once again, the major cause is the destruction of its habitat, primarily the alluvial grasslands of the *terai* region at the foot of the Himalaya, and in the Brahmaputra river valley. It is now restricted to about a dozen scattered sites, with over half the population concentrated in Assam. The only places where it is relatively secure are national parks and sanctuaries. Recent political disturbances in Manas National Park in Assam, a stronghold for the floricane, has sent shivers down the backs of naturalists.

In some other protected areas, an ironical situation has arisen due to management practices oriented towards endangered mammal species. At Dudhwa National Park, for instance, the extensive grasslands are shared by the Bengal floricane and the endangered Swamp deer. In an effort to keep the deer from moving out of the Park

during floods, or to provide them with fresh fodder, the wildlife authorities have resorted to harrowing and burning of the grasslands, and making mounds above the flood level. This, however, has had a direct negative impact on the breeding of the floricans.

The Lesser florican *Sypheotides indica* is better off in numbers than the Bengal florican, but its semi-arid breeding habitat is under even greater pressure. Large parts of the grasslands it lived in have been converted to cash cropping, e.g. peanuts, cotton, sugarcane in Jamnagar district of Gujarat, or into plantations of the exotic *Prosopis juliflora*, once encouraged by the forest department in Rajasthan. Also formerly, during drought, it could move into areas where localized rainfall was good. But with colonization of such areas, this option is much narrower now, and it is more than likely that its population suffered serious decline during the three or four drought years in the 1980s. Subsequently, though, the population began a recovery, especially after a series of good monsoons. In 1999, extrapolation of field observations from a few sites, suggested a population of 3730 birds. This appears to be not too far less than a 1982 estimate of 4374 birds, but, there is a caveat: it is possible that the extrapolations are based on higher than normal concentrations of the bird at the field sites studied, which in turn could be due to destruction of surrounding habitats.

Along with these conspicuous species of the grassland, many small birds will have suffered decline. The rare Stoliczka's bushchat *Saxicola macrorhyncha*, for instance, has been affected by overgrazing of its habitat. The Jerdon's babbler *Chrysomma altirostre* and the Finn's weaver *Ploceus megarhynchus*, both frequenting inundated grassy patches and floodplains, are declining due to conversion of this habitat into cultivated fields.

RAINFOREST BIRDS

The recent destruction of evergreen rainforests in India has, in turn, affected the status of many birds which reside in them. Several species of hornbills, already under threat from hunting, have been badly affected by this. In northeast India the Rufous-necked hornbill *Aceros nipalensis*, the Brown hornbill *Anorrhinus tickelli*, and the Wreathed hornbill *Aceros undulatus* have all become vulnerable. Local tribal communities have traditionally considered the flesh, fat, bones, and casque of these birds to be of medicinal value; in addition, the casque, bones, and feathers have ornamental and status value. Equally threatened are the Great pied hornbill *Buceros bicornis*, the



Kajat Bhargava

The magnificent Great pied hornbill, once frequently seen in large flocks, has declined due to hunting and habitat destruction.

Oriental or Indian pied hornbill *Anthracoceros albirostris*, and the Malabar pied hornbill *Anthracoceros coronatus*.

Other threatened birds of the evergreen rainforest are from the magnificent Andaman and Nicobar Islands. Relatively untouched till recently, these islands are coming under increasing ‘developmental’ pressure, including logging, forest clearance for human settlement, and conversion of natural forests to plantations. Amongst the species affected is the Nicobar pigeon *Caloenas nicobarica*. The Andamanese population of this bird has been nearly wiped out, and its habitat in the Nicobars is steadily being colonized. One of its strongholds, the island of Battimalve, was, in the 1980s, being used for shelling practice by the navy! It is now, mercifully, designated a sanctuary.

Also threatened is the Nicobar megapode *Megapodius nicobariensis*. Nicobarese tribals have always been adept at catching this bird, and they are the only community

Pankaj Sekhsaria

The Nicobar megapode, uniquely adapted to its coastal forest habitat, is unable to cope with human-induced pressures, and more recently, the impacts of the Indian Ocean tsunami of 2004.



in India which is given special exemption from the Wild Life (Protection) Act, which otherwise bans the hunting and capture of the megapode. But most of the tribal groups also have had self-imposed restrictions on hunting this bird or taking its eggs. The much greater threat is that of destruction of its habitat for various purposes (settlement of Indians from the mainland, rubber plantations, roads, airstrips, and defence establishments). This is compounded by indiscriminate egg collection and hunting carried out by recent settlers, by road-construction workers, and by tribal people who no longer adhere to traditional restrictions. This is especially so on Great Nicobar Island. Even the Megapode Island Sanctuary in the Nicobars, set up specially to protect the bird, offers little safety since there is no protection staff stationed there. In 1995, the population was estimated to be between 4500 and 8000 birds, and it was classified as vulnerable. While this was not a situation of great alarm, the impacts of the Indian Ocean tsunami of 2004 have been severe. In particular, a considerable part of its nesting habitat has been damaged, with over 1000 of its unique incubation mounds having been lost.

Other species of the evergreen forest which have warranted concern of late are the Nilgiri wood pigeon *Columba elphinstonii* and the Red-faced malkoha *Phaenicophaeus pyrrhocephalus*. Both are found in the hills of southern India, and appear to be declining.

It is generally accepted that species whose range is very restricted, or which are highly specialized, are especially prone to dangers like habitat destruction and loss of prey. In this sense, many species which are naturally rare in India, must be considered threatened if their habitats are under pressure. Wren-babblers and parrotbills are examples of this. What is also important to note here is that small birds like these receive far less attention than

the larger ones, yet some of them may be as seriously threatened. The BirdLife list mentions several such species (see Annexure 1).

MOUNTAIN BIRDS

From the grasslands of the plains we move to the forests and meadows of the mountains. Here too, birds designated as game species have suffered huge losses. Prominent among these are pheasants, whose beautiful plumage has attracted death and imprisonment.

A majority of India's 16 pheasant species are today threatened in varying degrees. The severe decline of the four tragopan species, especially the Western and the Blyth's, and of the Cheer pheasant, causes the greatest amount of concern.

Like all the species of its genus, the Western tragopan *Tragopan melanocephalus* is a brilliantly coloured bird. Its preferred habitat of mixed or coniferous forests with dense undergrowth of bamboo, ferns, and other species, has suffered widespread destruction. Hunting, trapping, egg collection, and grazing pressure have tightened the noose, with the result that the bird survives in any appreciable numbers in only a few locations in Kashmir and Himachal Pradesh. The total world population (including Pakistan and possibly China) is perhaps less than 5000. Of special concern is the fact that, unlike the other tragopans, this species has not bred well in captivity. If its population in the wild were to be wiped out, therefore, its extinction could become inevitable.

Perhaps even more endangered is the Blyth's or Grey bellied tragopan *Tragopan blythi*. A resident of heavy undergrowth in the dense evergreen forests of northeast India, there may be no more than 500 birds left here, of a total world population of about 1000.

The Cheer pheasant *Catreus wallichii* has been hunted mercilessly for its flesh. There has also been large-scale encroachment on its preferred habitat of scrub and grass covered hillsides, and disturbance by grass-cutting activities. The present population in India, chiefly in Himachal Pradesh, may be no more than a thousand pairs.

Of the other pheasants, there has been no recent authentic sighting of at least four species in India: Mrs Hume's bartailed pheasant *Syrmaticus humiae*, Himalayan grey peacock-pheasant *Polyplectron bicalcaratum*, Tibetan or White-eared pheasant *Crossoptilon harmani*, and Sclater's monal *Lophophorus sclateri*. This of course does not mean that they are extinct, for surveys in their possible distributional range have been far from comprehensive (for instance, villagers in Phek district of Nagaland report that Mrs Hume's pheasant is seen in their forests), but it does justify special concern. The Himalayan or Impeyan monal pheasant *Lophophorus impejanus* is still common, but nowhere near the abundance it enjoyed in the last century, when one *pahari*, Wilson, is said to have hunted about 1500 monal and tragopan pheasants every year, for 30 years!

BIRDS OF PREY

Raptors are especially susceptible to poisoning by pesticides, and human disturbance in breeding areas. In India, populations of several birds of prey have visibly fallen. The Peregrine falcon *Falco peregrinus* (including its subspecies *peregrinator*, the Shaheen falcon) has declined everywhere in the world. It is frequently killed by people who mistakenly consider it to be a major poultry-lifter, or captured by falconers. Its precise status in India is unknown. The magnificent Himalayan golden eagle *Aquila chrysaetos*, has become highly vulnerable in both

An Ill Wind Blows: Indian Birds in Danger

Clement Francis



Raptors like the Crested hawk-eagle (above) and the Honey Buzzard (below) are rapidly losing their habitat to 'developmental' pressures, as also being poisoned by toxics.

Viraj Mohan Raj



its breeding and wintering spots. The migrant Osprey *Pandion haliaetus* is becoming scarce as its water habitats get seriously polluted, and its young ones succumb to pesticide poisoning. The imposing Himalayan bearded vulture or Lammergeier *Gypaetus barbatus* is now rarely seen, possibly as a result of frequent hunting for its flesh. And, as mentioned earlier in the section on toxics, one of the biggest environmental disasters in the Indian subcontinent has been the catastrophic decline of populations of three species of vultures, now determined by scientists to be caused by the toxic impacts of the veterinary drug Diclofenac.

The case of the Rajpipla forests of south Gujarat is instructive. This dry deciduous ecosystem is the home of a large diversity of raptors, including the Oriental honey buzzard *Pernis ptilorhyncus*, the Crested or Changeable hawk-eagle *Spizaetus cirrhatus*, the Crested serpent-eagle *Spilornis cheela*, and the Shikra *Accipiter badius*. Intensive commercial exploitation of the forests in the 1970s began to devastate the habitat, a process that was exacerbated by felling of bamboo for a pulp mill. Growing alienation of the tribals in the area led to a dependence on 'stealing' and selling wood. A combination of the habitat destruction caused by all these factors, and decline in prey species, and hunting, has greatly decreased the population of raptors in the area. Now the latest threat is the Sardar Sarovar Dam on the Narmada river, which, has submerged some of the forests and greatly increased pressure on the rest.

An unspeakable sadness

There is an unspeakable sadness about extinction. Species do die out as a natural process – they have done so ever since life began – but humans have pushed the rate of extinction to far beyond what was natural. In a

10,000 year period before the 17th century, the world lost bird species at the rate of one every 83 years. Since 1600, however, at least about 150 species of birds have vanished, at a rate of one every two-and-a-half years! Some biologists estimate that if present trends of tropical habitat destruction continue, we may be losing *30 to 40 species every year!* This would be 30,000 times the rate of extinction witnessed when the dinosaurs and other species died out. And almost all of these would be due to human action. This entirely avoidable extermination is an unparalleled tragedy, an act unworthy of a species which believes itself to be nature's most intelligent and compassionate.

Can we regain and revitalize our wisdom and compassion sufficiently to reverse the processes of extinction that we have set in motion? Can we redirect our energies from destruction to conservation? That is the subject of my next, and final chapter.

The Winds of Change: Conservation of India's Birds



Humanity's destructive impact on the avian world has been paralleled, though unfortunately never equalled, by an attempt to conserve what remains as well as undo the damage already done. Indeed, India has amongst the world's oldest conservation traditions. Religious beliefs, spiritual persuasions, social protection, royal decrees, legal measures, and scientific techniques have all served to protect birds and bird habitats. Were it not for these, the damage I have talked of in the previous chapter would have been far greater.

Historical and traditional protection

Though much of the language of wildlife conservation is new, and borrowed from the West, its principles and practices have ancient roots in India. Local tribal and other communities have had a bewildering diversity of practices that ensured the sustenance of ecosystems and wildlife. This includes restrictions on the seasonality and

Ashish Kot hani



The village of Kokkare Bellur is two-storied: the lower story houses humans, the upper is inhabited by storks and pelicans, all having existed in relative harmony for centuries.

The village of Kheechan in Rajasthan annually hosts a huge flock of Demoiselle cranes, and the villagers feed the birds for several months of their stay.

Asad Rahmani



intensity of hunting, setting aside patches of the landscape for protection (e.g. sacred groves and lakes), conserving breeding populations of wild animals, restraints of the intensity of use of land and resources (e.g. nomadic grazing and shifting cultivation in areas that could not sustain year-round use), and so on. The Rig Veda talked, some 3000 years ago, of how each creature had a right to live, and was fitted into a web of life. The Jain religious community has, since ancient times, not only believed but also practiced non-violence to all living beings. Emperors like Ashoka (3rd century BCE) decreed that hunting of many wild animals was prohibited or severely restricted. The small but significant community of Bishnois, in Rajasthan, has for centuries been protecting the living creatures in and around its villages as if they were all part of the same family.

What applied to nature in general also, of course, applied to birds. Many birds, like the Sarus crane and the peafowl, were given protection because of their stated association with gods and goddesses or because of certain behavioural attributes which humans considered 'divine' (see Chapter 2). Even today, one of the few hospitals in the world devoted exclusively to birds is in a Jain temple in the heart of Delhi. The age-old protection of entire ecosystems for religious, social, and cultural reasons – the temple forests of Tamil Nadu, the sacred groves of Maharashtra, Kerala, and the north-eastern states, and other such sites where hunting and other destructive activities were completely prohibited – served to protect the very many bird species found in them. But there were also many specialized bird habitats which were protected for their value to local communities, or simply for their own intrinsic worth. This was true especially for village wetlands or pasturelands. Instances of this are found in various parts of India, but a couple of examples will suffice here.

Kokkare Bellur is a small village in the state of Karnataka, some 12 km off the Bangalore–Mysore road near Maddur. Its name literally means ‘village of storks’, and the description is apt. For centuries now, according to the local people, storks and pelicans have been coming in large numbers to nest here. The village has a fair sprinkling of Tamarind *Tamarindus indica*, Pipal *Ficus religiosa*, Portia *Thespesia populnea*, and other trees. Large waterbodies which are some distance away offer fish, the trees provide nesting spots, and, most important, the villagers extend a protective hand. Even disturbance to the birds, let alone their killing or injuring, is frowned upon. And so considerable numbers of Painted storks, and Spottedbilled or Grey pelicans breed here.

The villagers have more than an ethical reason for protecting these birds. The bird droppings found under the nesting trees are collected, and sold as fertilizer, for they have rich nutritional value. Also, villagers believe that the behaviour of the monsoon, on which their rain-fed farming is completely dependent, can be predicted by observing the birds. Pelicans breed towards the start or middle of winter; if they skip nesting one season, it is an indication of possible failure of the coming monsoon.

The other example is from a very different habitat: the desert. In the village of Kheechan, part of the Bishnoi community's territory in Rajasthan, about 2000 wintering Demoiselle cranes (*Anthropoides virgo*) find a safe home. For generations, these cranes have been given food (jowar grain) by the villagers, who have also recently built them a large enclosure to keep away belligerent cattle and dogs. The quantity of grain is enormous: some 55,000 kg, at a cost of Rs 1.25 lakhs (0.12 million). In the day the cranes congregate inside the enclosure, at night they retire to the numerous rain-fed tanks nearby. Of course, the grain

also helps to feed a number of other species: Blue rock pigeons, peafowl, Ring doves, and House sparrows.

Traditionally, entire bird habitats were also given protection by royal decree. These princely reserves were more often than not motivated by selfishness, for the regent wanted hunting areas all for himself. Bharatpur is a classic example. But there were also more enlightened rulers, such as the Maharaja of Mysore who gave complete protection to the Ranganathittu bird-nesting area in 1940, not allowing even himself to hunt there.

Legal protection

While sacred birds and habitats, and community lands devoted to birds, were protected by force of social opinion and customary law, there has also been a history of formal legal protection.

Perhaps the first law which afforded protection to birds was the Indian Forest Act of 1879, which prohibited or restricted hunting in areas designated as Reserved or Protected Forests. The first law specific to wildlife conservation, however, was the Wild Birds and Wild Animals (Protection) Act of 1912. Extending to nearly the whole of British India, this Act indicated 'closed seasons' in which hunting was prohibited, and listed animals for whose hunting a licence was required. Birds given some level of protection under it were bustards, ducks, floricans, junglefowl, quails, sandgrouse, painted snipe, spurfowl, woodcock, herons, egrets, rollers, and kingfishers. Subsequently, and especially after Independence, most State Governments enacted their own laws modelled on the above.

However, it was increasingly felt that instead of these scattered, area-specific laws, there was a need for an all-India act, which could give comprehensive

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Peafowl have been traditionally protected in many parts of India, with huge concentrations present in Gujarat and Rajasthan whose residents encourage or tolerate their presence in settlements, farms, and grazing lands.



protection to wildlife. Thus was formulated the Wild Life (Protection) Act of 1972, which now applies to the entire country barring the state of Jammu and Kashmir (which has its own Wild Life Act loosely modelled on the national one).

The 1972 Act deals not only with hunting, but also with habitat destruction. It provides for the creation of protected areas, controls trade in wildlife products, and authorises the creation of Wildlife Advisory Boards and the appointment of Wildlife Protection Staff. It creates certain categories of animals, listed in Schedules. Schedule I contains animals which are given complete protection throughout India, Schedules II to IV have animals which are permitted to be hunted or captured only under certain conditions, and Schedule V is a list of 'vermin', allowed to be hunted freely outside protected areas.

Schedule I is the most important of the lot, for the Act clearly states that “no person shall hunt any wild animal specified in Schedule I, II, III, and IV”. The definition of ‘hunting’, as used here, is very wide, and includes,

- (a) killing or poisoning of any wild animal or captive animal, and every attempt to do so,
- (b) capturing, coursing, snaring, trapping, driving, or baiting any wild or captive animal and every attempt to do so,
- (c) injuring or destroying or taking any part of the body of any such animal or, in the case of wild birds or reptiles, damaging the eggs of such birds or reptiles, or disturbing the eggs or nests of such birds or reptiles.

When the Act was promulgated in 1972, Schedule I contained only 18 species and one family (hawks) of birds. By 1986, the list had increased to 49 species and one family (see Annexure 1). Currently (under the 2003 Amendment of the Act) there are 58 individually listed species, and the family of hawks, on Schedule I, one in Schedule II, and most other birds are covered in Schedule IV. Those on Schedule I are the birds which are officially considered threatened, or which are naturally rare and therefore vulnerable. Independent assessment exercises have come up with a somewhat different list of threatened birds, based on the lists of BirdLife International, as also exercises carried out in India (see Annexure 1). The peafowl was placed in Schedule I because it is India’s National Bird, and not because it was seriously threatened; however of late, even this once-abundant bird seems to be on the decline.

Apart from the species listed in Schedule I, the 1972 Act extends some degree of protection to a majority of other birds found in India. This it does by allowing for the creation of protected areas (more on this in a minute), by

authorizing State Governments to declare periods when all hunting is banned, and by controlling and restricting trade in birds and bird products.

Control of trade in birds and bird products

Amongst the earliest attempts to control the export of birds and bird products was under the Sea Customs Act of 1878. A notification issued in 1959 prohibited the export of the Mountain quail, Jerdon's courser, Pinkheaded duck, Great Indian bustard, and White-winged wood duck. Subsequently, export of the following was banned except to scientific institutions: Finn's baya, egret feathers, swiftlet's nests, crane plumes, swan and goose quills, and the feathers of adjutant storks, peafowl, and some vultures. Unfortunately, trade in some of these (notably the Finn's baya) was opened up again in the 1960s.

The Wild Life (Protection) Act of 1972 was the first comprehensive attempt to regulate trade. It specified procedures for declaring existing stocks of wild birds and bird products, for exchanging or trading birds from one state to another, for issuing licenses to trappers and traders, and for penalizing offenders. Regulation and control under the Act was however not considered effective enough; in 1991, therefore, an Amendment to this Act completely prohibited export and domestic trade. Due to paucity of patrolling staff, inadequacy of prosecuting procedures, and other reasons, however, such a ban has been only partly effective.

Before the total prohibition in 1991, export of birds was controlled in other ways. Like all other items of international trade, bird exports were handled by the Commerce Ministry of the Government of India. The teeth it uses are the Import and Export Policy, and the Exports (Control) Order of 1988 issued under the

Imports and Exports (Control) Act of 1947. By the late 1980s, birds which could be earlier exported without restrictions, could now be taken out only by permit. The number that could be taken, and the place from which export could be done, was also greatly restricted.

Attempts to restrain exports of birds were given a great boost by the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES; see section on International Treaties later), signed in 1973. This Convention had a twin effect. Within India, it provided the momentum to stop the export of all threatened species. Outside, it gave countries of destination, occasion to carefully scrutinize bird imports for violations. In addition, the reduction in the number of exportable species has made it much easier for the customs officials to identify birds being exported. Also, more and more airlines, such as Pan Am and Lufthansa, began to refuse to accept any cargo of live birds.

Finally, in 1990, the Import and Export Policy announced by the Government of India, completely banned bird export. The only birds allowed for trade are exotics, bred in aviaries and zoos here, as also birds used for 'specific scientific and zoological purposes', and only with the previous consent of the Ministry of Environment and Forests. Even the quota for export of peacock tail feathers was slashed from about six million pieces per year to two million, and then a complete ban was imposed in 2002.

The 1990 policy caused an uproar among dealers. Under the aegis of the so-called 'All-India Federation of Wildlife Birds and Animals Traders', a writ petition was filed in the Delhi High Court, in mid-1990, pleading that the trade should be allowed to continue. They argued that the Government had not demonstrated the necessity of this step, that the birds sought to be exported are fairly common, and that there is very little cruelty involved. Their contention was, however, not upheld by the court.

Protected areas and community conserved areas

Prior to 1972, a number of bird sanctuaries and reserves were declared under various State Acts. The tiny Ranganathittu Sanctuary in Karnataka, for instance, was notified in 1940 under the Mysore Game and Fish Preservation Act of 1901. But the great boost to the setting up of protected areas for birds was given by the WLPA. Today, there are several dozen in India which are devoted primarily to the conservation of birds (see Annexure 2 for a list of Important Bird Areas, which includes protected areas).

The country's best known bird reserve is, without doubt, the Keoladeo Ghana (Bharatpur) National Park. This amazing 27 sq km (2700 ha) area has amongst the country's most densely populated and diverse avifauna. Nearly 350 species have been recorded in a variety of

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One of India's most spectacular bird habitats, Bharatpur or the Keoladeo Ghana National Park, has also been one of its most troubled, with periodic conflicts with surrounding human populations and mismanagement of its hydrological regime.



habitats, including marsh and lake, dry thorn and scrub forest, and surrounding agricultural fields. Formed by the periodic release of dam waters into a low-lying area, Bharatpur was the hunting preserve of the Maharajah of Bharatpur, until Salim Ali was able to persuade the king to give up shooting and let the area be given full legal protection. It was declared a Sanctuary in 1956 (though shooting continued till 1964), and upgraded to a National Park in 1981. Unfortunately this priceless site has been clouded with periodic controversy and mismanagement. A sudden ban on buffalo grazing, which had been traditionally permitted, created an ugly clash between villagers and officials (more on this later in this chapter). Off and on, the State Government also fails to release water to the Park, causing drought-like conditions. At the time of finalizing this manuscript, naturalists across the country were up in arms over the latest such episode. In 2004, the State Government gave in to pressure from commercial farmers and let them use all the water. As a consequence, Bharatpur was bone-dry through the critical breeding and winter seasons, and ornithologists were wondering if it would ever be restored to its full glory.

There are several other freshwater sanctuaries and parks with significant bird populations. The 121 sq km (12,082 ha) Nal Sarovar Sanctuary in Gujarat is amongst the largest of these. It comprises a shallow, in-part seasonal, rain-fed lake with a tremendous diversity of waterbirds and waders. Unfortunately uncontrolled tourism has reduced its value considerably. In south India, protected wetlands are represented by sanctuaries such as Nelapattu in Andhra Pradesh and Vedanthangal in Tamil Nadu. Interestingly, both of these are small village tanks with scattered tree groves, where heronries have been traditionally well-protected. Vedanthangal, in fact, was also given legal protection as far back as 1836, when the then Collector of the area declared it a bird sanctuary.

In the north, the natural lakes of Sukhna in Chandigarh and Sultanpur in Haryana are significant waterbird sanctuaries, as are artificial reservoirs like Harike in Punjab, and Gobind Sagar and Pong in Himachal Pradesh. The Pong Lake Sanctuary, besides harbouring a large variety of waterbirds, is one of the only two places in India where the extremely rare Rednecked grebe *Podiceps griseigena* has been recorded (the other being near Rajkot, Gujarat).

Marine or saltwater ecosystems have their own avian compositions, but they are unfortunately not so well represented in India's protected areas. The 1040 sq km (104,000 ha) Chilika lagoon in Orissa is the largest brackish lake in India. A small 15.5 sq km (1550 ha) part of this is the Nalabana Sanctuary. Chilika reportedly harbours Asia's biggest concentration of waterfowl, with upto half a million birds congregating in winter! The endangered Irrawady dolphin *Orcaella brevirostris* too is found here. Then there is the beautiful Pulicat lake, a 1400 sq km (140,000 ha) lagoon straddling the states of Andhra Pradesh and Tamil Nadu, and declared a sanctuary in both states. In some years, over 50,000 flamingos have been estimated to use this lake. The Sambhar lake in Rajasthan harbours tens of thousands of waterfowl, and is one of the few nesting sites for Greater flamingos (with 1100 mud nests being found there in 1995). And there is the Point Calimere Sanctuary on the coast of Tamil Nadu, now well-known as a focal point of the bird migration and ringing project of the Bombay Natural History Society. This 17 sq km (1729 ha) area of lagoon, tidal swamp, and coastline harbours not only a large variety of birds, but also mammals like the Common dolphin *Delphinus delphis*.

The idea of declaring wetlands and related ecosystems as bird reserves appears to be catching on fast (though perhaps nowhere near fast enough). Thus, for instance, the state of Uttar Pradesh declared more than 10 new bird sanctuaries, mostly wetlands, in the 1990s.

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India's first national park, Corbett in Uttaranchal, is home or wintering ground to over 550 species of birds, in addition to having healthy populations of tiger, elephant, and myriad other wildlife.

Bird reserves have been set up in or proposed in many urban areas also, such as on the Mula Mutha river in Pune, which attracts several thousand ducks, geese, terns, gulls, waders, and other waterbirds.

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Over 3000 hectares of forest and grassland habitat are strictly protected by the Angami tribal village of Khonoma (below), in Nagaland, for the Blyth's tragopan (right) and several other species.



Jean Howman



Ashish Kohbari

There is also now recognition that wetlands are not the only bird habitats needing protection. As I tried to show in Chapter 1, grasslands, scrub forest, and moist forests also have specialized bird communities, and harbour many threatened species. Some of these have also been declared protected areas (see Annexure 2, a list of Important Bird Areas). Several states have declared sanctuaries for the Great Indian bustard, and for related birds like the Lesser florican. These include the Desert National Park in Rajasthan, Karera and Ghatigaon Sanctuaries in Madhya Pradesh, Great Indian Bustard Sanctuary in Maharashtra, Gaga and Rampura Sanctuaries in Gujarat, and Rollapadu Sanctuary in Andhra Pradesh (however, I will later discuss the sad fate of bustards in some of these areas after they were notified as sanctuaries!). Following the rediscovery of the Jerdon's courser, the Andhra Pradesh government declared part of its scrub habitat as Sri Lankamalleswaram Sanctuary (and had to be persuaded in early 2006 to re-route an irrigation canal that was planned through this area!). The state of Karnataka has the only area protected especially for peafowl, the Adichunchangiri Sanctuary. In the Nicobar Islands is the Battimalve Island Sanctuary for the Nicobar pigeon, the South Reef Island Sanctuary for the Andaman or Grey teal, and the Megapode Island Sanctuary for the Nicobar megapode. The world's only known population of the Narcondam hornbill was the *raison d'être* for the Narcondam Island Sanctuary in the Andamans. Pitti Island in the Lakshadweep Islands is proposed as a sanctuary for the large number of terns, including the Noddy tern *Anous stolidus*, which breed there.

The scrub habitat of the Jerdon's courser in Andhra Pradesh, part of which has been declared a sanctuary, continues to face threats such as a recently initiated irrigation project, especially since no-one seems to consider such a habitat as ecologically important.

It must be stressed that bird sanctuaries are not the only protected areas for birds. In a sense all national parks and sanctuaries, declared under the WLPA or earlier Acts, serve to protect avian populations. The world-famous Corbett National Park in Uttar Pradesh, for instance, harbours an amazing variety of birds, over 550 species at last count! A survey in the mid-1980s by the Indian Institute of Public Administration showed that nearly all of the birds listed under Schedule I of the WLPA, and thereby considered endangered, are protected in one or more wildlife reserves. The Ranabennur Blackbuck Sanctuary of Karnataka has a population of Great Indian bustards; Dudhwa National Park in Uttar Pradesh and Kaziranga National Park in Assam, set up for conserving endangered mammal species, harbour significant numbers of Bengal florican; several Himalayan reserves offer protection to pheasants, Bearded vultures, and Golden eagles. The oak forests of the Majathal Sanctuary in Himachal Pradesh contain what has been described by pheasant expert Peter Garson as “the single-most important locality for Cheer pheasant in the world.”

Undoubtedly, protection of natural habitats in reserves has been instrumental in pulling back many a bird species from the brink of extinction. The population of the Great Indian bustard, for instance, appeared for some time to have stabilized, though more recently a decline seems to be again taking place. In some protected areas, such as the Desert National Park in Rajasthan, and the Rollapadu Sanctuary in Andhra Pradesh, the populations for a period did start to increase, a sure sign that the bustards felt safer and happier.

I should hasten to add that declaration of national parks, sanctuaries, and other official protected areas is not *necessarily* adequate for conserving the birds they contain. There are, firstly, inherent limitations of such areas; they will almost never cover the entire migratory

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route of migrant species, and often not even the feeding or breeding areas of many birds. Protection within their boundaries could well be offset by threats elsewhere. This is clearly the case with the Siberian crane, which is assured protection in Keoladeo Ghana National Park, but not on its long journey from Siberia through West Asia. Secondly, a considerable area covered by these reserves in India is still subject to various kinds of threats, and has thoroughly inadequate management and conservation inputs. The survey conducted by the Indian Institute of Public Administration, mentioned above, found that in 1983–84, as many as 127 (64 per cent) of the 187 national parks and sanctuaries, for which information was available, continued to have private rights and leases within their boundaries; 27 per cent reported habitat destruction of various kinds; and 46 per cent reported illegal hunting. At Chail Sanctuary, a critical habitat for the endangered Cheer pheasant, timber felling continued into the mid-1980s, as perhaps did trapping by Gorkha labourers brought in for the felling operations. Most areas continue to be

The village of Mangalajodi in Orissa protects wetlands with several hundred thousand wintering and breeding waterbirds, the responsibility for protection taken up by a village committee consisting of several ex-poachers (right).

Pics: Ashish Kothari



gravely understaffed, under-financed, and ill-protected, and attempts to gain support of local communities remain half-hearted, if at all present. Clearly, a lot more needs to be done to ensure full, effective conservation of their wildlife.

It is here that initiatives by communities and NGOs become critical. There are hundreds, perhaps thousands of sites that are under community management in India, with varying levels of conservation of the wildlife they harbour. Some are a continuation of traditional practices such as sacred sites and protected heronries (like Kokkare Bellur mentioned above). But many are also more recent initiatives, motivated by one or more of the following motivations: ethical concern for wildlife, protection of watersheds and sources, maintenance of areas for sustainable harvesting of natural resources, spiritual or religious values, and others. Examples include:

- Village wetlands containing heronries or nesting sites for waterbirds: some wetlands have more recently come under community conservation, e.g. Mangalajodi



village at the edge of Chilika lake in Orissa, once consisting of people who extensively hunted birds for food and trade, who now zealously protect a few thousand hectares of marsh and lake habitat that harbour hundreds of thousands of waterbirds. The NGO Wild Orissa has been a catalyst for this transformation. Many wetlands, such as Vedanthangal and Chitragudi in Tamil Nadu, Nelapattu and Pulicat in Andhra Pradesh, and Patna in Uttar Pradesh, were under community management till declared protected areas and taken over by the Government, only a few such as Kokkare Bellur remaining in the hands of villagers.

- Khonoma Nature Conservation and Tragopan Sanctuary, declared by the village of Khonoma in Nagaland specially to protect the threatened Blyth's tragopan; additionally, several dozen other villages in Nagaland such as Sendenui, Luzuphuhu, Phek, Ghosu, Chishiling, Chizami, and others, have declared wildlife or forest reserves, some of which are listed as Important Bird Areas and contain threatened and/or endemic species such as Blyth's tragopan, the Dark-rumped swift *Apus acuticauda* and Mrs. Hume's pheasant *Syrmaticus humiae*.
- Thousands of sacred sites (forest groves, lakes, river stretches, and grasslands) across the country help protect some critical bird populations, such as at the Law-Lyngdoh Sacred Grove at Mawphlang, Meghalaya which harbours the globally threatened Tawny-breasted wren babbler *Spelaeornis longicaudatus*.
- Several nesting sites of Greater Adjutant storks in Assam, such as at Mukalmuwa, Puran Gudam, Khutikatia, and North Hoibargaon in Nalbari and Nagaon districts, are protected by local people.
- Grassland or mixed ecosystems such as Sangti in Arunachal Pradesh (harbouring one of India's few

Black-necked crane populations), Changthang in Ladakh (surviving due to the low-intensity, nomadic lifestyle of the pastoral population), Kheechan in Rajasthan (famous for its wintering population of Demoiselle cranes strictly protected by villagers).

- Forests in the Himalaya, including those protected through the famous Chipko movement, and under a unique village institution called Van Panchayats in Uttaranchal; also forests in other parts of India, including stretches in central India under management by adivasis.

More recently, a number of organizations under the banner of the Indian Bird Conservation Network, coordinated by the Bombay Natural History Society, undertook a nation-wide survey to identify Important Bird Areas. These were sites of critical importance to bird conservation. A total of 466 sites have been identified (see Annexure 2), and now the IBCN is working out ways to promote their conservation. 267 of these sites are wildlife sanctuaries, national parks, and/or tiger reserves, while 199 are outside the official protected area network of which some might be under conservation by communities or private land-owners.



A number of corporate sector agencies, and armed forces establishments, are also conserving bird habitats. Indian Oil's Mathura Refinery, in Uttar Pradesh, has an ecological park of over 2 hectares, with nesting colonies of Night herons, egrets, cormorants, Purple and Grey herons, Darters, White ibis, and Painted storks. Several waterbirds also winter here. At Panipat Refinery, a 40 hectares wetland supports several thousand ducks, including the rare Great crested grebe. The Corps of Military Engineering campus, in Pune, maintains a number of wetlands as bird reserves. Several other armed forces establishments have also initiated conservation measures on their campuses.

Captive breeding and reintroduction

Conservation of birds in their natural habitat is the best way to protect them, but sometimes that might not be immediately possible. Such *in-situ* conservation, to use some ecological jargon, needs to be supplemented by *ex-situ* efforts. These include the breeding of birds in zoological parks and aviaries, and their consequent release into the wild.

There are serious dilemmas here. There is perhaps no worse form of torture for a bird than caging it, depriving it of the gift of flight. I therefore have absolutely no hesitation in condemning the keeping of birds in zoos, aviaries, and other caged conditions. The overwhelming number of birds kept in these are simply for 'display', and, the more 'exotic' the bird, the better. Conditions in most zoos are pathetic, and it is not uncommon to find a dozen birds struggling for space in a cage which even a single bird would find cramped. No animal should have to undergo this treatment.

But an exception could possibly be made in the case of species which are dangerously close to extinction in

the wild, and whose only chance of survival may well be captive breeding. This is provided, of course, that the ultimate aim is to release the progeny back into the wild.

Amongst the threatened birds which have been bred in captive conditions in India are the Great Indian bustard, and several species of pheasants, ducks, and hornbills. Unfortunately there is not yet enough expertise in India in captive breeding of birds. Help has therefore been taken from a number of international agencies. One of the success stories involves the endangered White-winged wood duck *Cairina scutulata*. Over 200 of these have been raised from an initial population of 12, at the Wildfowl Trust, Slimbridge, England. There is some success at breeding this duck in captivity in Assam too. The International Crane Foundation and other organizations have managed breeding programmes for the Siberian crane *Grus leucogeranus*, in the USA, Russia, and Belgium.

The story with regard to captive breeding of pheasants is somewhat mixed. Monals have not fared well, but Cheer pheasants have been bred successfully by both the Himachal Pradesh Forest Department as well as individuals connected to the World Pheasant Association in India. A number of zoos have tried their hand at such breeding: the Delhi Zoo of the Red jungle fowl, Alipore Zoo (Kolkata) of the Grey peacock-pheasant, Mysore Zoo and Bannerghatta Park of the Kalij pheasant. The Western tragopan has been successfully bred at Sarahan by the Himachal Pradesh Forest Department, and the Blyth's tragopan by the Nagaland Forest Department.

Release efforts, however, have not been tried out for most species, and where tried, have mostly been failures. Several dozen Cheer are reported to have died in their breeding cages. There is no evidence of survival of the few that

have been released, such as the ones reintroduced into the Shimla Water Catchment Sanctuary in 1971. A much more systematic and large-scale attempt at releasing Cheer in Pakistan, has also fared badly, the birds probably being shot, or predated upon by cats. Careful steps are being envisaged for possible reintroduction of Siberian cranes in an Indo-Russian project, signed in 2002.

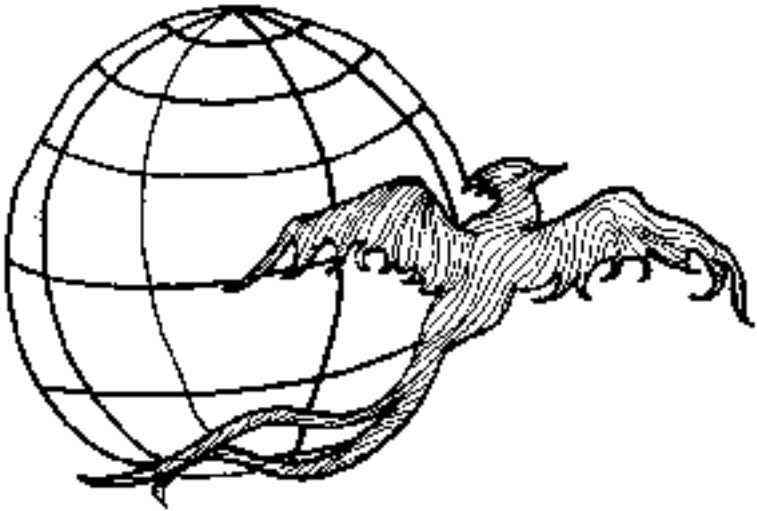
Two lessons are clear: one, we need far more expertise in handling these complex situations, and two, we must ensure a healthy and safe habitat into which birds can be released. Hopefully, with ongoing or proposed efforts at breeding and reintroducing the White-winged wood duck, Cheer pheasant, Blyth's tragopan, Western tragopan, Siberian crane, and other birds, we will have learned these lessons.

The Bombay Natural History Society has established two vulture-breeding centres (in Haryana and West Bengal), with an aim to breed 100 pairs each of several species, for reintroduction. This is a modest but crucial attempt at repopulating the Indian countryside with vultures, which have shown such drastic decline over the last few years. This follows the prolonged campaign by BNHS to get the drug Diclofenac banned, a campaign that finally succeeded in mid-2006.

International treaties and organizations

The recognition that many birds and other animals do not feed, breed, and migrate within a single country – their critical range may extend over several – has led to a series of treaties and agreements extending international protection. India is a party to some of these. Almost none of these relate exclusively to birds, but are nevertheless important for bird protection.

Amongst the first of these was the **Convention on Wetlands of International Importance** (especially as



Waterfowl Habitat), called, for convenience, the Ramsar Convention, as it was convened in Ramsar, Iran. Signed by several countries in 1971, this agreement aims to 'stem the progressive encroachment on and loss of wetlands now and in future'. Wetlands are given a broad definition, and include rivers, lakes, mangrove swamps, marshes, coastal areas, salt flats, mudbanks, and others. Under the convention a 'List of Wetlands of International Importance' has been built up, on which each signatory nation designates one or more of its sites. Once so designated, the nation is obliged to 'promote its conservation' and 'wise use', and notify the IUCN of any changes in its boundaries or legal status. As of early 2006, India had 25 wetlands on the Ramsar list, of which the first two were Keoladeo Ghana (Bharatpur) National Park (Rajasthan) and Chilika lake (Orissa). The full list appears in Annexure 3.

However, Bird Life International and the Bombay Natural History Society have listed 173 more wetlands (or series of wetlands, as in the Andaman and Nicobar Islands) as fulfilling the criteria for being internationally important (see full list in Annexure 3). Several NGOs and institutions are lobbying with the Government to have these declared as Ramsar sites.

Unfortunately Ramsar's legal binding on party countries is weak. The advantage, however, is that designated sites start receiving international attention. This helps to strengthen the protection of areas already given national legal protection, and to hasten the process of legally protecting other designated areas which have not yet been given such national status. It also helps to restrain governments from undertaking destructive activities in the designated areas. An instance of this is the Lake Haleji Sanctuary in Pakistan, a designated site whose impending destruction by proposed commercial development was averted as international focus fell on it.

In India, perhaps the most spectacular example is Chilika lagoon. Over the last few decades, the lagoon has been in serious trouble. Siltation from degraded catchment areas, pollution, intensive commercial aquaculture, and other factors were causing so much damage that the lagoon was said to be dying. The mouth of the lagoon towards the sea, which helped maintain a delicate balance of salt and freshwater in the lagoon, was closing due to silt deposition from the lake basin. The resulting changes in salinity in the water, were impacting both wildlife and people. Several species such as the Irrawady dolphin were threatened, as were fisherfolk whose production was declining. The uncontrolled spread of commercial shrimp and prawn farming, mostly by outsiders to the area including some corporations, had caused further degradation. So serious was the situation that Chilika was put onto the list of Ramsar sites in danger (the Montreux Record), in 1993.

It was in this scenario that the Chilika Development Authority stepped in, in the early 1990s. Since then, the CDA has galvanized a series of measures to tackle the above threats. Through innovative collaboration with scientific institutions, NGOs, and some of the local

communities, these measures appear to have reversed the decline of the lagoon. Available evidence suggests that Chilika is back on the road to recovery, and that many wild animals and plants, as also many of the fisherfolk, are benefiting from this revival. The Ramsar Bureau was suitably impressed, after an evaluation in 2001, to remove it from the Montreux Record, and to present it with the Ramsar Wetland Conservation Award. Subsequently, some threats due to significantly increased tourism and the re-appearance of commercial aquaculture, have posed challenges to this area.

Following closely on the heels of the Ramsar Convention came the **Convention on International Trade in Endangered Species of Fauna and Flora (CITES)**, signed in 1973 and brought into effect in 1975. Aimed at protecting species which are being commercially exploited for trade across national boundaries, this agreement lists species which can and cannot be traded, and fixes quotas for those which can. India became a party to it in 1976. Since then, much of the authorized international trade in birds that has been carried out by India has been subject to CITES regulations.

As in the case of the Wild Life (Protection) Act of 1972, CITES categorizes various animals and plants into different appendices. Appendix 1 of CITES contains the species believed to be threatened with extinction; Appendix 2 lists the species not yet threatened, but liable to be if trade continues at present levels; and Appendix 3 includes species which are subject to regulation within a specific country, but still require some international cooperation. According to the Convention, trade in species listed in Appendix 1 of CITES 'must be subject to particularly strict regulation in order not to endanger further their survival and must be only be authorized in exceptional circumstances'. As of late 2005, there were 29 Indian birds listed in Appendix 1 (see Annexure 1).

In 1979, came the **Convention on the Conservation of Migratory Species of Wild Animals (CMS)**, the contracting parties to which agreed to take special measures to protect species of animals which periodically move between countries, such as birds and marine turtles. Known as the Bonn Convention, this was the precursor to a series of bilateral treaties on migratory birds.

India and the then USSR signed one such agreement in 1984. Called the **Indo-Soviet Treaty for the Protection of Migratory Birds**, this convention came into effect on 8 October 1984 (and in 2002 was modified to the Convention on Protection of Migratory Birds Between India and Russia). It aims to protect 128 species of birds which migrate between India and Russia, including rare and endangered ones like the Siberian crane and the Spoonbill sandpiper. It commits the two countries to take special care in conserving these birds, prohibit their hunting or capturing, and take other measures necessary to understand and ensure their survival needs. A combined project on the restoration of the Siberian crane population was agreed to in 2002.

Apart from governmental action under treaties, international coordination of monitoring and conservation work is also carried out by certain organizations. The largest and oldest of these, in the case of birds, is BirdLife International. This is a federation of national organizations, non-governmental and governmental, which form National Sections. Its Indian partner is the Bombay Natural History Society. BirdLife has, in 2003, prepared a strategy for threatened birds of Asia, which gives, in detail, actions necessary for conserving several key sites and species.

Another important organization is Wetlands International, focussing on national and international activities relating to waterbird and wetlands conservation. It spearheaded the Ramsar Convention, and has helped

to coordinate the Asia-Pacific Migratory Waterbird Conservation Strategy (1996–2000, extended to 2001–2005). It is currently promoting international action to conserve critical migratory routes such as the Central Asian–Indian Flyway and the East Asian–Australasian Flyway.

NGO and Citizens' Action

I started off this chapter by describing the protection traditionally given to birds by human communities, for religious, ethical, or economic reasons. This social protection often stood the test of time, but could not adequately counter the destructive forces unleashed by the successive political invasions that the Indian subcontinent has been subjected to, or the massive take-over of forests and wetlands and grasslands by the Government, effectively disempowering local communities from managing them. Legal protection of various kinds was introduced on a large scale in an attempt to check the rot. But, as has become increasingly evident, the official machinery in India has been incapable of adequately tackling the problem, not least because the Government has often violated its own laws and policies.

It is in this context that individuals and groups outside the Government have had to play a more and more active role in bird conservation, through both research and direct action.

For over a century the Bombay Natural History Society has led the field of research and monitoring. Starting with birdwatching and ornithological studies, the BNHS also pioneered bird ringing programmes, conservation management, public awareness campaigns, publication of serious as well as popular material, and other arenas.

Its headquarters in Mumbai also houses India's largest collection of bird specimens, a morgue-like place which depresses me immensely but which is undoubtedly of great scientific value.

A great many organizations and individuals have got deeply involved in researching and monitoring India's birds. Perhaps the most common of their activities is the preparation of checklists of different localities – there must be hundreds of these now. A less widespread activity is bird censuses or counts. Most of these are localized. Perhaps the only nationwide bird census operation is the waterfowl count, held as part of the Asian Waterfowl Census. This was initiated in 1987 by the International Waterfowl and Wetlands Research Bureau (United Kingdom), now merged into Wetlands International, and is coordinated in India by BNHS. Starting with counts over 172 locations in 1987, this operation has covered several hundred sites over the next few years, and has involved hundreds of people. It has become



the single-most important source of information on the distribution and range of waterfowl in India today. Another important monitoring activity is being carried out in relation to cranes, which comprise one of the country's most threatened bird families. In collaboration with the International Crane Foundation (USA) and BNHS, the Indian Crane Working Group has mapped the distribution and abundance (or rather, lack of it!) of various species of cranes. One of its members rediscovered Black-necked cranes in Arunachal Pradesh, the only spot in India where they seem to winter (as distinct from their breeding population in Ladakh). Some work along these lines is also being done on pheasants, by the Indian chapter of the World Pheasant Association.

In 2002, India and Russia agreed to a collaborative 'Siberian Crane Project'. By then the Russians were already carrying out satellite marking of Siberian and Common cranes. The International Crane Foundation has also been 'piloting' the western flock of Siberian cranes as a first step to restore the population coming to Bharatpur.

Another critical nation-wide monitoring exercise is of vulture nesting sites. BNHS has been studying such sites at nine places in India, to assess the nesting and breeding success of various vulture species.

All in all, the ornithological research and monitoring situation has become fairly dynamic in India. But is this adequate in itself? Clearly, the answer is no. After all, if the birds themselves are disappearing, what will be researched and monitored? It is here that citizens have perhaps an even more critical role: stemming the wholesale destruction of birds and bird habitats, reversing the decline, evolving ways to harmonize growing human wants with bird conservation.



Mahendra Vyas

Citizens' action such as this demonstration by young naturalists in front of the Saudi Arabian embassy in Delhi, to protest its princes' arrival in India to hunt bustards, has been vital in saving many a threatened species.

As I mentioned earlier, more and more groups and individuals are doing precisely this. There are scores, perhaps hundreds of instances of wildlife habitats being saved, poaching stopped, new protected areas declared, law enforcement made effective, and even official plans and projects altered to accommodate the interests of birds, all because of citizens' pressure. I recall my own exciting involvement in one such campaign, when I was still studying in school. In 1978–79 there was a nationwide protest by several groups against the decision of the Indian Government to allow the hunting of bustards in Rajasthan, in violation of its own laws. Hunting by whom? Believe it or not, by members of the Saudi Arabian royal family! Perhaps the Government calculated that Arabian oil may flow easier into India if it allowed this 'small' favour. Anyway, the upshot of the protest (which included 10 of us standing in front of the Saudi Arabian embassy with placards like "Eat custard, not bustard"!), and which brought international shame on the Indian Government, was that the princes were politely asked to leave. The bustards were saved.

I have mentioned the above example only because I knew the details intimately, but it needs stressing that similar work by several other organizations is equally if not more vital. Groups like BNHS and the Ecological Society, Pune, have helped in drawing up scientific management plans for important bird habitats. The Endangered Species Project of the BNHS has not only focussed the country's attention on the grave dangers faced by the Great Indian bustard, the Bengal florican, and the Lesser florican, but also engendered detailed conservation strategies where these birds still survive. And now, its IBA project (mentioned above), in which several hundred people took part, has provided a valuable database for conservation action.

Where do we head from here?

The few success stories notwithstanding, habitat destruction, hunting and trade, pollution and poisoning still take a heavy toll of birds. The result is a continuing decline in the populations of all but a handful of species. What then, still needs to be done?

Our most important task, as a nation, is to reconcile the ever-growing conflicts between human needs and desires on the one hand, and ecological sustainability on the other. But how?

One must here make a distinction between activities which are essential for the survival of local communities, such as fodder and fuel collection, and those which are not. The latter are primarily carried out by, or on behalf of, outsiders to the area, and include many mining, industrial, forestry, and other commercial activities. Traditional fisherfolk at Chilika lake in Orissa annually harvested hundreds of tons of fish, without threatening the area's teeming birdlife. But when trawlers were introduced offshore, and commercial aquaculture

was allowed within the lagoon, the exploitation levels increased dramatically, and conflicts immediately arose. Sometimes, even commercial activities meant for 'outsiders' can be tolerated by the ecosystem. Rampura Bheed, a 20 sq km (2000 ha) grassland near Dahod, Gujarat, has been well protected as a source of 1.5 to 2 million kg of grass per year and also harbours a significant Lesser florican population.

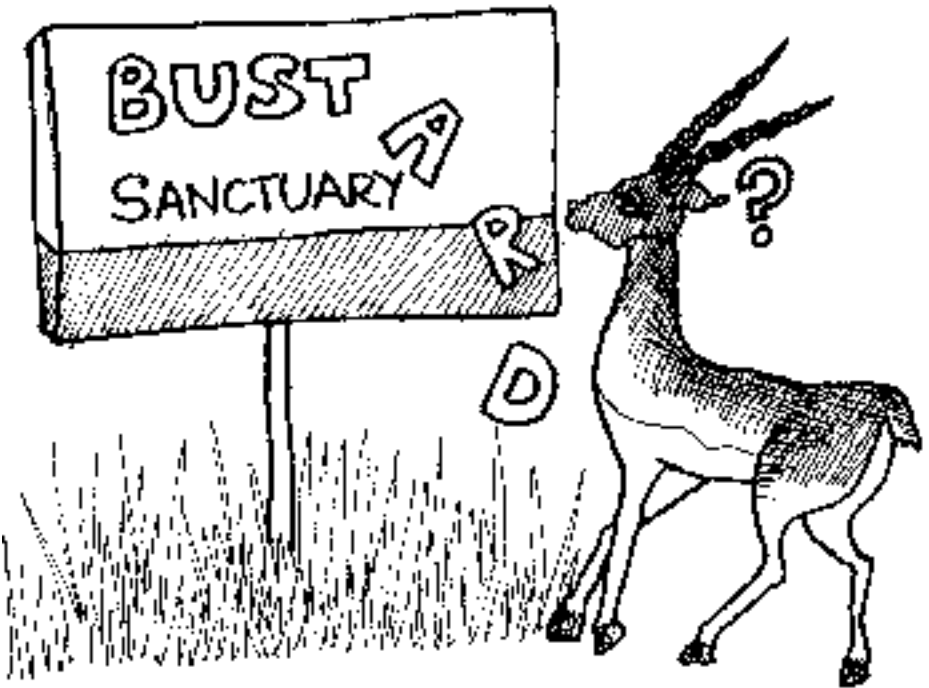
I would have no hesitation in advocating a complete removal of activities which are not essential for the survival of local communities, from areas which have considerable ecological significance, including critical bird habitats. And so, NGOs have been justifiably fighting to stop mining, damming, pollution, and so on, in critical wildlife habitats. But if there is a tribal or peasant group dependent on, and causing considerable damage to, a good bird area, what does one do? The traditional, knee-jerk reaction of many conservationists in the past has been to advocate the relocation of these people. But increasingly it is realized that this is, in most cases, neither desirable nor feasible. Nor is it right to stop all access of the people to their natural surrounds.

I remember reading with horror, one morning in 1982, about the killing of six people inside the Keoladeo Ghana (Bharatpur) National Park. These villagers had forcibly tried to enter the Park to graze their cattle inside, and were gunned down by the police. An investigation by Kalpavriksh revealed that the blame for the incident lay squarely with the State Government. Indeed, the incident tragically highlighted the short-sightedness of many of our conservation strategies. Prior to 1980, Bharatpur (then a wildlife sanctuary) had been open to grazing, and over generations, the surrounding villagers had become dependent on it. Then, almost overnight after the 'upgrading' of the area to a national park (in which the

WLPA does not allow grazing), a wall was built around it and people suddenly denied access, because it was felt that grazing damaged the habitat. No alternative fodder sources were provided. The villagers had no option but to break in.

The Bharatpur episode provides clear lessons on how *not* to handle a potential or actual human–wildlife conflict. If it had been established that grazing was detrimental to the long-term stability of this vital bird habitat (and this was not done before imposing the ban!), then livestock presence could have been phased out gradually. Simultaneously a programme to establish pastures and other fuel sources around the park, to convince the villagers of the need to conserve the area, and to provide them with incentives like jobs as forest guards, could have been undertaken. None of this was done. The result is that today Bharatpur is a tightly guarded oasis of wildlife, surrounded by a hostile human population, and an atmosphere of tension that could any time erupt into a clash between villagers and park staff. No area can survive for long in such a situation. What is supremely ironical is that there are doubts about the wisdom of altogether removing the buffalos from Bharatpur. According to the BNHS, which was monitoring the ecosystem for several years, the wetland was in danger of turning into a grassland and scrub ecosystem as the principle agent of controlling grass growth, buffalos, had been removed. Its studies also indicated that the bird diversity had been dropping since there was a ban on grazing and fodder collection. Indeed, scientific institutions such as the Salim Ali Centre for Ornithology and Natural History (SACON) and Zoological Survey of India (ZSI) have categorically stated that the best way to conserve wetlands is through ‘wise use’, which includes a mix of protection and sustainable use through decision-making that involves the local wetland-dependent communities.

But this is not only the case with wetlands. As a case study of management problems in protected areas, Karera Bustard Sanctuary is a prime example. Initial moves to protect habitat involved totally protecting a 0.2 sq km (20 ha) grassland plot, a measure that led to it becoming overgrown and entirely unsuitable for the species (which only returned when the protected site was burnt by 'a disgruntled farmer'). Protection within the entire 202 sq km area of the sanctuary caused the number of blackbuck to increase; these in turn caused considerable damage to villagers' crops, and these villagers in turn, after readily supporting conservation around Karera, turned against the bustard and are even thought to have purposefully damaged nests. This situation was repeated at Sorsan in 1998 when three bustards were poisoned by villagers in retaliation for blackbuck damage to their crops. By 1989, despite repeated pleas to stem the decline of Great Indian Bustards at Karera, the Forest Department claimed that the population had reached 40 and was still increasing.



In 1994, the last bustard disappeared from the sanctuary, despite an official estimate of 16 birds, and it was two years before the Forest Department admitted that the project had failed. It is believed that the Karera bustard population merely died of old age, unable to reproduce because of breeding failure.

Clearly, more respect for the interests of *both* wildlife and local people is badly needed:

- Step one, which is unfortunately rarely taken, is to establish the exact boundaries of the bird habitats which are to be conserved. How much of which critical ecosystem should be protected, at what levels of strictness, using which legal category?
- Step two is to establish the degree and kinds of conflict in these areas. How much and in what way does which human activity impinge on the survival of which species, and conversely, which traditions and practices actually help in conservation? What are the traditional rights and responsibilities of local communities?
- Step three is to provide alternatives, which are feasible and convenient, to those local resource uses which unavoidably threaten birds and habitats that are considered vital; and conversely, to provide long-term rights or stakes in the case of practices that are helping to sustain wildlife.
- Step four is to build up a long-term, positive relationship between local people and the ecosystem, respectfully utilizing local knowledge, encouraging conservation-oriented traditional practices, channelizing special benefits to them, providing educational, health and other inputs. Ironically, Bharatpur also provides an example of such a relationship; many local families earn a livelihood by plying cycle-rickshaws inside

the park. Over the years they have picked up good knowledge of birds, and the park authorities now give them some training at bird identification, with the help of which they earn money as guides for park visitors. Unfortunately there is a legitimate local complaint that many of these jobs have been cornered by youths from Bharatpur town, rather than from the villages that have sacrificed their fodder source for the sake of the birds. In Chilika, local villagers (some of whom were involved in poaching) in settlements like Mangalajodi have formed bird protection committees, and some are able to earn as tourist guides. In Kumarakom Bird Sanctuary in Kerala, and the Khonoma Tragopan Sanctuary in Nagaland, the NGO EQUATIONS is helping the local communities to work out a sustainable tourism plan from which locals will benefit. A number of community conserved areas also involve an integration of conservation and livelihoods from sustainably used fish or forest produce, using strategies from which official protected areas could learn a lot.



Asad Rahman

Grassland species like the Great Indian bustard, having traditionally co-existed with pastoral and farming communities, need different conservation strategies than species that need less disturbed habitats.

Asad Rahmani

The scrub habitat of the Jerdon's courser in Andhra Pradesh, part of which has been declared a sanctuary, continues to face threats such as a recently initiated irrigation project.



The issue of trade in birds and bird products is another case in point. The prohibition of all trade in Indian birds, was in itself, a laudable step. Unfortunately, the implementation has been ham-handed and potentially counter-productive. Bird traders have been heavily fined and arrested, their 'stocks' confiscated, and their trade stopped overnight. Much like the Bharatpur incident, this sudden attack has evoked a lot of hostility.

While I hold no brief for bird traders, I think it important to realize that many of the bird trappers and sellers are poor, and have for generations been heavily dependent on this trade for their livelihood. They must be provided alternative livelihood sources, for instance, employment as wildlife guards or zoo keepers, where their intimate knowledge of wildlife would be useful. Unfortunately, very little has been done along these lines. An entire community which could become an ally in conservation, must not be forced into a defensive and hostile position.

Local people can benefit from bird conservation in other ways also, as long as we don't impose uniform solutions to diverse situations. When the rapid decline of the Edible-nest swiftlet was reported from Andaman and Nicobar Islands, some conservationists reacted by demanding its inclusion in Schedule I of the WLPA. But, researcher Dr Ravi Sankaran, after spending considerable time studying the situation, argues that legal protection is not what the species needs. It is difficult if not impossible to protect the off-shore caves that the bird nests within. Much more successful, he argues, would be to encourage local people to create the conditions for the bird to nest in their houses, and to allow regulated trade in the nests. Such an approach has worked wonders in many other countries. Unfortunately, this suggestion has met with resistance from those who put the bird on Schedule I, undermining an initiative that Ravi and others had experimentally begun.



Ajay Desai

Rather than treat traditional bird-catchers as criminals, their immense knowledge of birds and bird habits could be productively channelled into conservation.

Sensitivity to local communities was amply shown most recently (even as this book goes to press!) in the dramatic discovery of a species new to science, by astronomer and amateur ornithologist Ramana Athreya. He had been regularly birding in the Eaglenest Wildlife Sanctuary of Arunachal Pradesh, had seen a pair of liocichlas (a type of babbler) that he could not identify back in 1995, and then again spotted the bird in 2005–06. He managed to net one, examine and photograph it (before releasing it), and realized that it was a new species never before recorded. What is very interesting is his explanation for why he has proposed to name it Bugun liocichla or *Liocichla bugunorum*:

1. The bird was discovered in Bugun community forest land and some of them have contributed a lot to our project.
2. Many tribes are legitimately upset that 'outsiders' get all the credit for their patrimony and this is my way of sending the message that I personally intend to play it straight.
3. If naming the bird after them gets the Buguns more enthused about conservation of Eaglenest – what more can I ask for!

Ramana Athreya

The beautiful
Bugun liocichla
Liocichla
bugunorum,
newly
described to
science in
September
2006.



He also says that “the Buguns are eagerly awaiting the formal acknowledgement of the new species and want to display a big hoarding of it in their community!”

Unfortunately, the area in which this species was found, is likely to be bifurcated by a proposed highway, which Athreya feels might sound the death-knell of this rare bird. On the positive side, Athreya has recently initiated a community-based ecotourism programme, which is beginning to bring some economic benefits to the tribe, and hopefully provide a stake for long-term conservation of the area.

Governments also have to be persuaded, pressurised, even forced by litigation or other means, to stop treating bird habitats as expendable. There are many instances of a State Government having denied local people’s access to a sanctuary, only to hand it over for commercial forestry, elite tourism, or some other non-essential purpose. This is unacceptable.

Representative areas of habitats which do not figure prominently in India’s protected area network, such as estuaries, mangroves, beaches, dry evergreen forests, grasslands, mudflats, and coastal lagoons, need to be conserved as official protected areas, community conserved areas, biodiversity heritage sites, or some other such category. Resting and feeding sites on migratory routes, and wintering areas, require special attention. Some birds could become flagships or symbols for such conservation; BNHS, for instance, has proposed a Project Bustard to help conserve critical grassland habitats. Areas with significant plant and insect communities need greater protection, since they form the ecological base on which all birds depend.

All of the above, of course, requires a far greater degree of research, monitoring, awareness, and scientific

management input than has been the case so far. A great deal of research needs to be done on the status of various birds, on their relationship with specific habitats, and the impact of human activities on their survival. The effect of pesticides, for instance, is hardly known. Monitoring of bird populations will tell us which species are approaching the danger mark. Educational and awareness programmes of an innovative kind need to be greatly expanded, not least of all targeted at our 'resource-illiterate' development planners. The vital role of birds in our culture and economy, needs far wider publicity. But primary focus in these programmes, especially those involving children, should be on invoking an empathy, a feeling of oneness, with birds.

Apart from resolution of human-wildlife conflicts, our protected areas need considerably enhanced management inputs and facilities. Most bird sanctuaries and national parks in India are grossly under-staffed, under-researched, and ill-equipped. State Governments have to be persuaded to devote greater resources to these areas. Especially important would be to improve the working conditions of the wildlife field staff, who are at present being asked to do arduous and often dangerous work, yet given measly salaries, thoroughly inadequate facilities, and little or no moral support. Most critical, local communities need to be involved as managers themselves, using their traditional knowledge supplemented with appropriate modern skills.

The above suggestions are generalized and simplistic, and seemingly idealistic. Space does not permit me to flesh them out, bring out the complexities, provide enough concrete examples to demonstrate their feasibility. But I firmly believe that they are not unreal.

Many of our own traditional communities showed us how to live in harmony with birds. Their approach

was a mix of pragmatism, and spiritual and ethical beliefs. The modern world likes to approach the issue logically, 'scientifically'. The science of ornithology does indeed have a lot to contribute in the understanding and management of bird habitats. But in the ultimate analysis, it is only a feel for the essential bond between humans and birds, and an acceptance of their equal right to live, that will set us firmly on the path of conservation. And what is true of birds is also true of nature in general. Do we have the courage and wisdom to create a synthesis of ethical wisdom, spiritual and emotional empathy, and ecological understanding, that will save the birds, the world, and ourselves?











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(Note: This is not a comprehensive bibliography of published material on birds. However, it contains not only the material directly referred to for each of the book's seven chapters, but also lists at the end, references which the reader might find useful.)

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Annexure I : Threatened Birds of India (including birds listed in CITES)

Table I : Threatened Birds of India

(Source: The Red Data list of BirdLife International. This table was updated in May 2006 by Arun Kumar, Zoological Survey of India, Dehra Dun.)

No.	Name of species	Common English name	Threat category (BirdLife, 2006)
1	<i>Accipiter butleri</i>	Nicobar shikra	VU C1
2	<i>Aceros narcondami</i>	Narcondam hornbill	VU D1+2
3	<i>Aceros nipalensis</i>	Rufous-cheeked hornbill	VU A1cd+2cd, C1
4	<i>Acrocephalus orinus</i>	Large-billed reed warbler	DD
5	<i>Aegyptius monachus</i>	Cinereous vulture	NT C1
6	<i>Alcedo hercules</i>	Blyth's kingfisher	NT C1; C2a(i)
7	<i>Amandava formosa</i>	Green avadavat	VU A1acd+2bcd
8	<i>Anas formosa</i>	Baikal teal	VU A1cd+2cd
9	<i>Anas Falcata</i>	Falcated duck	NT
10	<i>Anhinga melanogaster</i>	Oriental darter	NT A2b,c,d; A3b,c,d

11	<i>Anorhynchus tickelli</i>	Brown hornbill	NT C1
12	<i>Anser erythropus</i>	Lesser white-fronted goose	VU
13	<i>Anthracoceros coronatus</i>	Malabar pied hornbill	NT C1
14	<i>Anthus milghiriensis</i>	Nilgiri pipit	NT B1a+b(i,ii,iii,iv,v)
15	<i>Apus acuticauda</i>	Dark-rumped swift	VU D1
16	<i>Aquila clanga</i>	Greater spotted eagle	VU C1
17	<i>Aquila hastata</i>	Indian spotted eagle	VU
18	<i>Aquila heliaca</i>	Imperial eagle	VU C1
19	<i>Arborophila atrogularis</i>	White-cheeked partridge	NT C1; C2a(i)
20	<i>Arborophila mandellii</i>	Chestnut-breasted partridge	VU C1 + 2a
21	<i>Ardea insignis</i>	Imperial heron	EN A2c, C1
22	<i>Ardeotis nigriceps</i>	Great indian bustard	EN C1 + 2b
23	<i>Aythya baeri</i>	Baer's pochard	VU A1cd+2cd, C1
24	<i>Aythya nyroca</i>	Ferruginous duck	NT A2c,d; A3c,d
25	<i>Babax zwaddelli</i>	Giant babax	NT C1; C2a(i)
26	<i>Brachypteryx hyperythra</i>	Rusty-bellied shortwing	VU C1
27	<i>Brachypteryx major</i>	White-bellied shortwing	VU B1 + 2abcde

28	<i>Bradypterus major</i>	Long-billed bush-warbler	NT C1; C2a(i)
29	<i>Buceros bicornis</i>	Great hornbill	NT A2a,c,d; A3c,d; C1
30	<i>Cairina scutulata</i>	White-winged wood duck	EN A1cd + 2cd, C1 + 2a
31	<i>Anas falcata</i>	Falcated duck	
32	<i>Caloenas nicobarica</i>	Nicobar pigeon	NT C1; C2a(i)
33	<i>Catreus wallichii</i>	Cheer pheasant	VU C1 + 2a
34	<i>Chaetornis striatus</i>	Bristled grass-warbler	VU A1c + 2c, C1
35	<i>Chlamydotis undulata</i>	Houbara bustard	VU
36	<i>Chrysomma alirostre</i>	Jerdon's babbler	VU A1c + 2c, C1
37	<i>Ciconia boyciana</i>	Oriental stork	EN A2c, C1
38	<i>Circus macrourus</i>	Pale harrier	NT A2c,d,e; A3c,d,e
39	<i>Columba elphinstonii</i>	Nilgiri wood-pigeon	VU C1
40	<i>Columba eversmanni</i>	Pale-backed pigeon	VU A1acd
41	<i>Columba palumboides</i>	Andaman wood-pigeon	NT C1
42	<i>Columba punicea</i>	Purple wood-pigeon	VU C1 + 2a
43	<i>Coracias garrulus</i>	European roller	NT
44	<i>Crossoptilon harmani</i>	Tibetan eared-pheasant	NT C1; C2a(i)

45	<i>Dendrocitta bayleyi</i>	Andaman treepie	NT B1a+b(i,iii,iii,iv,v)
46	<i>Dicrurus andamanensis</i>	Andaman drongo	NT B1a+b(i,ii,iii,iv,v)
47	<i>Dryocopus hodgii</i>	Andaman woodpecker	NT B1a+b(i,ii,iii,iv,v)
48	<i>Emberiza aureola</i>	Yellow-breasted bunting	NT A2d; A3d
49	<i>Ephippiorhynchus asiaticus</i>	Black-necked stork	NT C1
50	<i>Esacus magnirostris</i>	Beach thick-knee	NT C1
51	<i>Eumyias albicaudata</i>	Nilgiri flycatcher	NT B1a+b(i,ii,iii,iv,v)
52	<i>Eurymorhynchus pygmaeus</i>	Spoonbill sandpiper	EN
53	<i>Falco cherrug</i>	Saker falcon	EN
54	<i>Falco jugger</i>	Laggar falcon	NT A2c,d,e; A3c,d,e; C1
55	<i>Falco naumanni</i>	Lesser kestrel	VU A1bce+2bce
56	<i>Ficedula nigrorufa</i>	Black-and-rufous flycatcher	NT B1a+b(i,ii,iii,iv,v)
57	<i>Ficedula subrubra</i>	Kashmir flycatcher	VU B1+2abcde, C1
58	<i>Francolinus gularis</i>	Swamp francolin	VU A1cd+2cd
59	<i>Gallinago media</i>	Great snipe	NTA2c,d; A3c,d
60	<i>Gallinago nemoricola</i>	Wood snipe	VU C1
61	<i>Garrulax cachinnans</i>	Rufous-breasted laughing thrush	EN B1+2abcde

62	<i>Garrulax jerdoni</i>	Grey-breasted laughing thrush	NT B1a+b(i,ii,iii,iv,v)
63	<i>Garrulax nuchalis</i>	Chestnut-backed laughing thrush	NT C1; C2a(i)
64	<i>Graminicola bengalensis</i>	Rufous-rumped grassbird	NT A2c; A3c; C1; C2a(i)
65	<i>Grus antigone</i>	Sarus crane	VU A1cde+2cde
66	<i>Grus leucogeranus</i>	Siberian crane	CR A2cde
67	<i>Grus monacha</i>	Hooded crane	VU C1
68	<i>Grus nigricollis</i>	Black-necked crane	VU C1
69	<i>Gyps bengalensis</i>	Asian white-backed vulture	CR A1ce+2ce
70	<i>Gyps indicus</i>	Indian vulture	CR A4ce
71	<i>Gyps tenuirostris</i>	Slender-billed vulture	CR A4ce
72	<i>Haliaeetus albicilla</i>	Grey sea eagle	NT C2a(i)
73	<i>Haliaeetus leucoryphus</i>	Pallas's fish-eagle	VU C1
74	<i>Harpactes wardi</i>	Ward's trogon	NT C1; C2a(i)
75	<i>Heliopais personata</i>	Masked finfoot	VU A1c+2c, C1
76	<i>Heteroglaux blewitti</i>	Forest owl	CR C1+2a
77	<i>Houbaropsis bengalensis</i>	Bengal bustard	EN C1
78	<i>Hypsipetes nicobariensis</i>	Nicobar bulbul	VU C1

79	<i>Ichthyophaga humilis</i>	Lesser fish-eagle	NT A2b,c,e; A3b,c,e; C1; C2a(i)
80	<i>Ichthyophaga ichthyvetus</i>	Grey-headed fish-eagle	NT A2b,c; A3b,c; C1
81	<i>Indicator xanthonotus</i>	Yellow-rumped honeyguide	NT C1
82	<i>Leptoptilos dubius</i>	Greater adjutant	EN A2cde, C1
83	<i>Leptoptilos javanicus</i>	Lesser adjutant	VU C1
84	<i>Limosa limosa</i>	Black-tailed godwit	NT
85	<i>Limnodromus semipalmatus</i>	Asian dowitcher	NT A2c,d,e; A3c,d,e; C1
86	<i>Lophophorus sclateri</i>	Sclater's monal	VU C1+2a
87	<i>Luscinia pectardens</i>	Fire throat	NT C1
88	<i>Macropygia rufipennis</i>	Andaman cuckoo-dove	NT B1a+b(i,ii,iii,iv,v); C1
89	<i>Marmaronetta angustirostris</i>	Marbled teal	VU A1cd+2cd, C1
90	<i>Megapodius nicobariensis</i>	Nicobar megapode	VU C1
91	<i>Mycteria leucocephala</i>	Painted stork	NT A2b,c,d; A3b,c,d
92	<i>Ninox affinis</i>	Andaman hawk-owl	NT B1a+b(i,ii,iii,iv,v)
93	<i>Ophryysia superciliosa</i>	Himalayan quail	CR D
94	<i>Otus alius</i>	Nicobar scops-owl	DD
95	<i>Otus balli</i>	Andaman scops-owl	NT B1a+b(i,ii,iii,iv,v)

96	<i>Oxyura leucocephala</i>	White-headed duck	EN A1acde
97	<i>Paradoxornis flavirostris</i>	Black-breasted parrotbill	VU A1c+2c, C1
98	<i>Parus nuchalis</i>	White-naped tit	VU A1c, C1+2a
99	<i>Pavo muticus</i>	Green peafowl	VU A1cd+2cd, C1+2a
100	<i>Pelargopsis amauropterus</i>	Brown-winged kingfisher	NT A2a,c,d; A3c,d; C1
101	<i>Pelecanus crispus</i>	Dalmatian pelican	VU A2c; A3c
102	<i>Pelecanus philippensis</i>	Spotted-billed pelican	VU A1cde, C1
103	<i>Pellorneum palustris</i>	Marsh babbler	VU A1c+2c
104	<i>Perdicula manipurensis</i>	Manipur bush-quail	VU A1cd+2cd, B1+2abcde, C1+2a
105	<i>Phoenicopterus minor</i>	Lesser flamingo	NT A3c
106	<i>Phylloscopus tytleri</i>	Tytler's leaf-warbler	NT
107	<i>Ploceus megarhynchus</i>	Finn's baya weaver	VU A1c+2c, C1+2a
108	<i>Prinia burnesii</i>	Long-tailed prinia	NT A2c; A3c
109	<i>Prinia cinereocapilla</i>	Grey-crowned prinia	VU A1c+2c
110	<i>Psittacula caniceps</i>	Nicobar parakeet	NT B1a+b(i,j,ii,iii,iv,v); C1
111	<i>Psittacula longicauda</i>	Long-tailed parakeet	NT A2c; A3c
112	<i>Puffinus persicus</i>	Persian shearwater	NR

113	<i>Pycnonotus xantholaemus</i>	Yellow-throated bulbul	VU C1+2a
114	<i>Rallina canningi</i>	Andaman crane	DD
115	<i>Rhinomyias brunneata</i>	Brown-chested flycatcher	VU C1
116	<i>Rhinoptilus bitorquatus</i>	Jerdon's courser	CR C2b
117	<i>Rhodonessa caryophyllacea</i>	Pinkheaded duck	CR
118	<i>Rynchops albigollis</i>	Indian skimmer	VU A1ce+2ce, C1
119	<i>Sarcogyps calvus</i>	Indian black vulture	NT A2b,c,d,e; A3b,c,d,e
120	<i>Saxicola insignis</i>	Hodgson's bushchat	VU C1
121	<i>Saxicola macrorhyncha</i>	Stoliczka's bushchat	VU C1
122	<i>Schoenicola platyura</i>	Broad-tailed grassbird	VU B1+2abcde, C1+2a
123	<i>Seiurus whistleri</i>	Whistler's warbler	LC
124	<i>Seiurus tephrocephalus</i>	Grey-crowned warbler	LC
125	<i>Sitta formosa</i>	Beautiful nuthatch	VU C1+2a
126	<i>Spelaornis badeigularis</i>	Rusty-throated wren-babbler	VU B1+2abce, C1+2b, D2
127	<i>Spelaornis caudatus</i>	Rufous-throated wren-babbler	NT B1a+b(iii); C1
128	<i>Spelaornis longicaudatus</i>	Assam wren-babbler	VU B1+2abcde, C1+2a
129	<i>Sphenocichla humei</i>	Wedge-billed wren-babbler	NT C1; C2a(i)

130	<i>Spilornis elgimi</i>	Andaman serpent-eagle	NT B1a+b(i,j,ii,iii,iv,v); C1; C2a(ii)
131	<i>Spilornis klossi</i>	South nicobar serpent-eagle	NT C1
132	<i>Stachyris oglei</i>	Austen's babbler/ Snowy-throated babbler	VU B1 + 2abcde, C1
133	<i>Sterna acuticauda</i>	Black-bellied tern	NT A2c; A3c
134	<i>Syphionides indica</i>	Lesser florican	EN A2bc, C1
135	<i>Symaticus humiae</i>	Hume's pheasant	NT C2a(i)
136	<i>Tetrax tetrax</i>	Little bustard	NT A2c,d; A3c,d
137	<i>Threskiornis melanocephalus</i>	Black-headed ibis	NT A2b,c,d; A3b,c,d
138	<i>Tragopan blythii</i>	Blyth's tragopan	VU C1 + 2a
139	<i>Tragopan melanocephalus</i>	Western tragopan	VU C1 + 2a
140	<i>Tragopan satyra</i>	Crimson horned-pheasant	NT C1
141	<i>Tringa guttifer</i>	Nordmann's greenshank	EN C1
142	<i>Turdoides longirostris</i>	Slender-billed babbler	VU A1c+2c, C1
143	<i>Turdus feae</i>	Grey-sided thrush	VU C1
144	<i>Vanellus gregarius</i>	Sociable lapwing	CR A3b,c

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Mike Crosby (pers. comm., January and May, 2006)

Guide to threat categories

EXTINCT (EX)

A taxon is Extinct when there is no reasonable doubt that the last individual has died. A taxon is presumed Extinct when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.

EXTINCT IN THE WILD (EW)

A taxon is Extinct in the Wild when it is known only to survive in cultivation, in captivity or as a naturalized population (or populations) well outside the past range. A taxon is presumed Extinct in the Wild when exhaustive surveys in known and/or expected habitat, at appropriate times (diurnal, seasonal, annual), throughout its historic range have failed to record an individual. Surveys should be over a time frame appropriate to the taxon's life cycle and life form.

CRITICALLY ENDANGERED (CR)

A taxon is Critically Endangered when the best available evidence indicates that it meets any of the criteria A to E for Critically Endangered (see below), and it is therefore considered to be facing an extremely high risk of extinction in the wild.

ENDANGERED (EN)

A taxon is Endangered when the best available evidence indicates that it meets any of the criteria A to E for Endangered (see below), and it is therefore considered to be facing a very high risk of extinction in the wild.

VULNERABLE (VU)

A taxon is Vulnerable when the best available evidence indicates that it meets any of the criteria A to E for Vulnerable (see below), and it is therefore considered to be facing a high risk of extinction in the wild.

NEAR THREATENED (NT)

A taxon is Near Threatened when it has been evaluated against the criteria but does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.

LEAST CONCERN (LC)

A taxon is Least Concern when it has been evaluated against the criteria and does not qualify for Critically Endangered, Endangered, Vulnerable or Near Threatened. Widespread and abundant taxa are included in this category.

DATA DEFICIENT (DD)

A taxon is Data Deficient when there is inadequate information to make a direct, or indirect, assessment of its risk of extinction based on its distribution and/or population status. A taxon in this category may be well studied, and its biology well known, but appropriate data on abundance and/or distribution are lacking. Data Deficient is therefore not a category of threat. Listing of taxa in this category

indicates that more information is required and acknowledges the possibility that future research will show that threatened classification is appropriate. It is important to make positive use of whatever data are available. In many cases great care should be exercised in choosing between DD and a threatened status. If the range of a taxon is suspected to be relatively circumscribed, and a considerable period of time has elapsed since the last record of the taxon, threatened status may well be justified.

NOT EVALUATED (NE)

A taxon is Not Evaluated when it has not yet been evaluated against the criteria.

CRITERIA

A. Population Reduction

(1) observed, inferred, suspected or estimated reduction, or (2) projected or predicted reduction of at least 20 per cent (VU), or 50 per cent (EN) or 80 per cent (CR) in 10 years or 3 generations whichever is longer based on: (a) direct observation; (b) index of abundance appropriate for the taxon; (c) declined in areas of occupancy, extent of occurrence and/or quality of habitat; (d) actual or potential labels of exploitation; (e) effects of introduced taxa, hybridization, pathogens, pollutants, competitors, or parasites.

B. Restricted Distribution

Extent of occurrence estimated to be less than 20,000 sq km (VU), or 5,000 sq km (EN), or 10 sq km (CR), and qualifying for any two of the following: (1) severely fragmented, or known to exist in not more than 10 locations (VU), or 5 locations (EN), or single locations (CR); (2) continuing decline, observed, inferred, projected in any (a) extent of occurrence, (b) area of occupancy, (c) area, extent and/or quality of habitat, (d) number of locations or subpopulations, (e) number of mature individuals; (3) extreme fluctuations in either (a) extent of occurrence, (b) area of occupancy (c) number of populations or subpopulations, (d) number of mature individuals.

C. Population Estimates

Populations estimated to number less than 10,000 (VU), or 2,500 (EN), or 250 (CR) mature individuals and either (1) estimated, continuing decline of at least 10 per cent in 10 years or 3 generations or which ever is longer (VU), or 20 per cent in 5 years or 2 generations, which ever is longer (EN), or 25 per cent in 3 years or in one generations, which ever is longer (CR) or (2) continuing decline, observed, projected, inferred, number of mature individuals and population structure in the form of either (a) severely fragmented (no sub-population estimated to contain more than 1,000 (VU), or 250 (EN), or 50 (CR) mature individuals; (b) all individuals or in a single sub-population.

D. Restricted Populations

(1) population estimated to number less than 1,000 (VU), or 250 (EN), or 50 (CR) mature individuals; (2) population restricted to area of occupancy of less than 100 sq km or less than 5 locations (VU).

E. Probability of Extinction

Quantitative analysis showing the probability of extinction in the wild is at least 10 per cent in 100 years (VU), or 20 per cent in 20 years or 5 generations, whichever is longer (EN), or 50 per cent in 10 years or 3 generations, whichever is longer (CR).

Table 2: Birds listed in Appendix I of CITES

(Source: CITES, courtesy Arun Kumar, Zoological Survey of India, Dehra Dun)

Scientific name	Common English name
<i>Fregata andrewsi</i>	Christmas Island frigatebird
<i>Grus leucogeranus</i>	Siberian crane
<i>Rhodonessa caryophyllacea</i>	Pinkheaded duck
<i>Ardeotis nigriceps</i>	Great Indian bustard
<i>Cairina scutulata</i>	White-winged duck
<i>Ciconia boyciana</i>	Japanese white stork
<i>Tringa guttifer</i>	Nordmann's greenshank
<i>Aquila heliaca</i>	Imperial eagle
<i>Catreus wallichii</i>	Cheer pheasant
<i>Chlamydotis undulata</i>	Houbara bustard
<i>Grus monacha</i>	Hooded crane
<i>Grus nigricollis</i>	Black-necked crane
<i>Lophophorus sclateri</i>	Crestless monal
<i>Pelecanus crispus</i>	Dalmatian pelican
<i>Syrmaticus humiae</i>	Hume's bar-tailed pheasant
<i>Tragopan blythii</i>	Blyth's tragopan
<i>Tragopan melanocephalus</i>	Black-headed tragopan
<i>Caloenas nicobarica</i>	Nicobar dove
<i>Crossoptilon harmani</i>	Tibetan eared-pheasant (E)
<i>Falco jugger</i>	Laggar falcon
<i>Haliaeetus albicilla</i>	Grey sea eagle

Annexure 2: Important Bird Areas of India

(Source: Bombay Natural History Society, Bombay; see also M.Z. Islam and A.R. Rahmani (eds). *Important Bird Areas of India: Priority Sites for Conservation*. Mumbai: Indian Bird Conservation Network, Bombay Natural History Society, and UK: BirdLife International, 2004. Corrections to original list by Abhijit Malekar, IBCN/BNHS, February 2006.)

No.	Site Name	District	Province
1	Austin Strait	Andaman Islands	Andaman and Nicobar
2	Baratang, Rafters Creek	Andaman Islands	Andaman and Nicobar
3	Car Nicobar	Nicobar Islands	Andaman and Nicobar
4	Chainpur and Hanspuri	Andaman Islands	Andaman and Nicobar
5	Great Nicobar, Little Nicobar	Nicobar Islands	Andaman and Nicobar
6	Jarawa Reserve (Middle and South Andaman)	Andaman Islands	Andaman and Nicobar

Annexure 2: Important Bird Areas of India

7	Kadakachang	Andaman Islands	Andaman and Nicobar
8	Little Andamans	Andaman Islands	Andaman and Nicobar
9	Mount Diavalo, Cuthbert Bay	Andaman Islands	Andaman and Nicobar
10	Mahatma Gandhi Marine	Andaman islands	Andaman and Nicobar
11	Mount Harriet, Shoal Bay	Andaman Islands	Andaman and Nicobar
12	Rani Jhansi Marine	Andaman Islands	Andaman and Nicobar
13	Saddle Peak	Andaman Islands	Andaman and Nicobar
14	Interview Island	Andaman Islands	Andaman and Nicobar
15	Land Fall Island	Andaman Islands	Andaman and Nicobar
16	Narcondam Island	Andaman Islands	Andaman and Nicobar
17	North and South Sentinel	Andaman Islands	Andaman and Nicobar
18	North Reef Island	Andaman Islands	Andaman and Nicobar
19	Tilangchong, Camorta, Katchal, Nancowry, Trinkat	Nicobar Islands	Andaman and Nicobar
20	Horsely Hills	Chittoor	Andhra Pradesh
21	Telineelapuram	Srikakulam	Andhra Pradesh

22	Uppalapaddu	Guntur	Andhra Pradesh
23	Sri Venkateswara	Chittoor and Cuddapah	Andhra Pradesh
24	Nagarjuna Sagar–Srisailem, Rajeev Gandhi	Nalgonda, Mahaboobnagar, Kurnool, Prakasam and Guntur	Andhra Pradesh
25	Coringa and Godavari Estuary	East Godavari	Andhra Pradesh
26	Kaundinya	Chittoor	Andhra Pradesh
27	Kolleru	West Godavari, Krishna	Andhra Pradesh
28	Manjira	Medak	Andhra Pradesh
29	Nelapattu	Nellore	Andhra Pradesh
30	Pakhal	Warangal	Andhra Pradesh
31	Pocharam	Medak and Nizamabad	Andhra Pradesh
32	Pulicat Lake	Nellore	Andhra Pradesh
33	Rollapadu	Kurnool	Andhra Pradesh
34	Sri Lankamalleswaram	Cuddapah	Andhra Pradesh
35	Sri Penusula Narasimha	Nellore and Cuddapah	Andhra Pradesh
36	Chaglaugaum–Denning–Walong	Lohit	Arunachal Pradesh

37	Chayang Tajo-Khenewa-Lada Area	East Kameng	Arunachal Pradesh
38	Dibang and adjacent areas	Lower Dibang Valley	Arunachal Pradesh
39	Ditchu	Lohit	Arunachal Pradesh
40	Kolo Riang-Sarli-Damin areas	Lower Subansiri	Arunachal Pradesh
41	Mago Thingbu and Luguthang area	Tawang	Arunachal Pradesh
42	Manabum and Tengapanis	Lohit	Arunachal Pradesh
43	Mechuka-Monigong-Jorgging	West and Upper Siang.	Arunachal Pradesh
44	Nacho-Limeking-Taksing-Majha and neighbouring areas	Upper Subansiri	Arunachal Pradesh
45	Nafra-Lada area	West Kameng & East Kameng	Arunachal Pradesh
46	Namsang Mukh-Vodoria	Tirap	Arunachal Pradesh
47	Papum	East Kameng	Arunachal Pradesh
48	Sangti Valley	West Kameng	Arunachal Pradesh
49	Shergaon, Mandla Phudung and Kalaktang	West Kameng	Arunachal Pradesh

50	The Chaporis of Lohit Reserve	West Siang	Arunachal Pradesh
51	Thungri Changlang Poshingla, Maji, Basti and Liak area	West Kameng	Arunachal Pradesh
52	Zamithang–Nelya–Sageshwar Lake area	Kameng	Arunachal Pradesh
53	Mouling	Upper, East and West Siang	Arunachal Pradesh
54	Namdapha and Kamlang	Changlang and Lohit	Arunachal Pradesh
55	D’Ering Memorial	East Siang	Arunachal Pradesh
56	Dibang	Upper Dibang Valley	Arunachal Pradesh
57	Eaglenest and Seesa	West Kameng	Arunachal Pradesh
58	Itanagar	Papumpare	Arunachal Pradesh
59	Kane	West Siang	Arunachal Pradesh
60	Mehao	Dibang Valley	Arunachal Pradesh
61	Pakhui	East Kameng	Arunachal Pradesh
62	Tally Valley	Lower Subansiri	Arunachal Pradesh
63	Yardi–Rabe Supse	West Siang	Arunachal Pradesh

64	Amchang Hills	Kamrup	Assam
65	Barail Range	Cachar/North Cachar Hills	Assam
66	Bauwwa Beel	Hailakandi	Assam
67	Behali	Sonitpur	Assam
68	Bordoloni-Sampora	Lakhimpur and Dhemaji	Assam
69	Chand Dubi Beel and adjacent area	Kamrup	Assam
70	Deobali Jalah	Nagaon	Assam
71	Dhansiri	Karbi Anglong	Assam
72	Dum Duma, Dangori and Kumsongs	Tinsukia	Assam
73	Habang	Karbi Anglong	Assam
74	Inner Line and Kathakal	Cachar and Hailakandi	Assam
75	Jamjing-Senghjang	Dhemaji	Assam
76	Jatinga	North Cachar	Assam
77	Jengdia Beel and Satgaon	Kamrup	Assam

78	Jhanjimukh–Kokilamukh	Jorhat	Assam
79	Kuarbari Dalani	Lakhimpur	Assam
80	Langting–Mupa	North Cachar Hills	Assam
81	Majuli	Jorhat	Assam
82	Pabho Reserve	Lakhimpur	Assam
83	Ripu Chirang	Kokrajhar	Assam
84	Sibsagar Tanks	Sibsagar	Assam
85	Son Beel	Karimganj	Assam
86	Subansiri	Dhemaji (Subansiri Reserve Forest), Lakhimpur (Dulung RF)	Assam
87	Tamranga–Dalani–Bhairav Complex	Bongaigaon	Assam
88	Tirap–Patkai (Saliki – adjacent)	Tinsukia	Assam
89	Upper Dihing (East Complex)	Tinsukia	Assam
90	Upperdihing (West Complex)	Dibrugarh / Tinsukia	Assam
91	Urpada Beel	Goalpara	Assam

Annexure 2: Important Bird Areas of India

92	Dibru-Saikhowa	Tinsukia, Dibrugarh and Dhemaji	Assam
93	Kaziranga	Golaghat/Nagaon/Sonitpur	Assam
94	Nameri	Sonitpur	Assam
95	Orang	Darrang And Sonitpur	Assam
96	Manas	Barpeta and Bongaigaon	Assam
97	Barnodi	Darrang	Assam
98	Bherjan-Borajan Padumoni	Tinsukia	Assam
99	Bordoibum-Beelmukh	Dhemaji-Lakhimpur	Assam
100	Chakrasila Complex	Dhubri / Kokrajhar	Assam
101	Dipor Beel	Kamrup	Assam
102	East and North Karbi Anglong	Karbi Anglong	Assam
103	Garam Pani	Karbi Anglong	Assam
104	Gibbon (Hollongapar)	Jorhat	Assam
105	Laokhowa and Burhachapori	Sonitpur and Nagaon	Assam
106	Lumding-Marat Longri	Nagon, Karbi, Anglong	Assam

107	Pabitora	Morigaon	Assam
108	Panidihing, Phokolai Beel	Sibsagar	Assam
109	Sonai-Rupa	Sonitpur	Assam
110	Chours of North Bihar	Darbhanga	Bihar
111	Danapur Cantonment Area	Patna	Bihar
112	Gogabil Pakshi Vihar	Katihar	Bihar
113	Kurseala River Course and Diyara Flood Plains	Kathiar	Bihar
114	Kusheshwarsthan	Bihar	Bihar
115	Mokama Taal (Barah) Wetlands	Patna, Samastipur and Begusarai	Bihar
116	Reservoirs of Chota Nagpur	Dhanbad, Hazaribagh	Bihar
117	Valmiki	West Champaran	Bihar
118	Kanwarjheel	Begusarai	Bihar
119	Nagi Dam and Nakti Dam	Jamui	Bihar
120	Vikram Shila Gangetic Dolphin	Bhagalpur	Bihar
121	Indravati	Dantewada, Bastar	Chhattisgarh

Annexure 2: Important Bird Areas of India

122	Barnawapara	Raipur	Chhattisgarh
123	Gomarda	Raipur	Chhattisgarh
124	Udanti and Sitanadi	Raipur, Dhamtari	Chhattisgarh
125	Okhla	Gautam Buddha Nagar	Delhi
126	Carambolim	Ilhas taluka	Goa
127	Bhagwan Mahavir	South Goa	Goa
128	Cotigao	South Goa	Goa
129	Madei	North Goa	Goa
130	Banni Grassland and Chhari Dhand	Kachch	Gujarat
131	Bhal Area	Bhavnagar	Gujarat
137	Bhaskarpara	Surendranagar	Gujarat
132	Charakla Salt Pans	Jamnagar	Gujarat
133	Kaj Wetlands	Junagadh	Gujarat
134	Rampura Grassland	Dahod	Gujarat
135	Salt Pans of Bhavnagar	Bhavnagar	Gujarat

136	Wetlands of Kheda District	Kheda	Gujarat
138	Gir	Junagadh (NP), Junagadh and Amreli (WLS)	Gujarat
139	Marine	Jamnagar	Gujarat
140	Velavadar Blackbuck	Bhavnagar	Gujarat
141	Flamingo City	Kachch	Gujarat
142	Khijadia	Jamnagar	Gujarat
143	Nal Sarover	Ahmadabad, Surendranagar	Gujarat
144	Naliya	Kachch	Gujarat
145	Thol Lake	Mahesana	Gujarat
146	Wild Ass and Nanda Island	Kachch, Rajkot, Mehsana, Banaskantha and Surendranagar	Gujarat
147	Basai Wetlands	Gurgaon	Haryana
148	Wetlands of Yamuna	Yamunanagar	Haryana
149	Sultanpur	Gurgaon	Haryana
150	Bhindawas	Rohtak	Haryana

Annexure 2: Important Bird Areas of India

151	Kalesar	Kurukshetra	Haryana
152	Sarah Valley, Lower Dharamshala	Kangra	Himachal Pradesh
153	Great Himalayan	Kullu	Himachal Pradesh
154	Pin Valley	Lahaul, Spiti	Himachal Pradesh
155	Bandli	Mandi	Himachal Pradesh
156	Chail	Solan and Shimla	Himachal Pradesh
157	Churdhar	Sirmaur	Himachal Pradesh
158	Daranghati	Shimla	Himachal Pradesh
159	Dhauladhar	Kangra	Himachal Pradesh
160	Gangul Siahbehi	Chamba	Himachal Pradesh
161	Govind Sagar and Naina	Bilaspur, Mandi	Himachal Pradesh
162	Kais	Kullu	Himachal Pradesh
163	Kalatop Khajjiar	Chamba	Himachal Pradesh
164	Kanawar	Kullu	Himachal Pradesh
165	Kibber	Lahaul & Spiti	Himachal Pradesh

166	Kugri	Chamba	Himachal Pradesh
167	Lippa Asrang	Kinnaur	Himachal Pradesh
168	Majathal	Solan, Shimla	Himachal Pradesh
169	Manali	Kullu	Himachal Pradesh
170	Nargu	Mandi	Himachal Pradesh
171	Pong Dam Lake	Kangra	Himachal Pradesh
172	Rupi Bhaba	Kinnaur	Himachal Pradesh
173	Sangla (Raksham Chitkul)	Kinnaur	Himachal Pradesh
174	Sechu Tuan Nala	Chamba	Himachal Pradesh
175	Shikari Devi	Mandi	Himachal Pradesh
176	Shimla Water Catchment	Shimla, Kufri	Himachal Pradesh
177	Talra	Shimla	Himachal Pradesh
178	Tirthan	Kullu	Himachal Pradesh
179	Chushul Marshes	Leh, Ladakh	Jammu & Kashmir
180	Dehra Gali Forest	Poonch, Rajouri	Jammu & Kashmir

Annexure 2: Important Bird Areas of India

190	Gharana Wetland Reserve	Jammu	Jammu & Kashmir
181	Haigam Rakh	Baramulla	Jammu & Kashmir
182	Hanle Shado-Bug	Leh, Ladakh	Jammu & Kashmir
183	Hokarsar	Budgam and Srinagar	Jammu & Kashmir
184	Mirgund Jheel	Budgam	Jammu & Kashmir
185	Pangong Tso	Leh, Ladakh	Jammu & Kashmir
186	Shallabugh Lake and marshes	Srinagar	Jammu & Kashmir
188	Tso Morari Lake and adjacent marshes	Leh	Jammu & Kashmir
187	Tsokar Basin	Leh, Ladakh	Jammu & Kashmir
189	Wular Lake	Baramulla	Jammu & Kashmir
191	Dachigam	Srinagar	Jammu & Kashmir
192	Hemis	Ladakh	Jammu & Kashmir
193	Kishtwar	Dodo	Jammu & Kashmir
194	Gulnar	Baramulla	Jammu & Kashmir
195	Hirapora	Pulwama	Jammu & Kashmir

196	Lachipora	Baramulla	Jammu & Kashmir
197	Limber	Baramulla	Jammu & Kashmir
198	Overa-Aru	Anantnag	Jammu & Kashmir
199	Ramnagar	Jammu	Jammu & Kashmir
200	Palamu	Palamau	Jharkhand
201	Hazaribagh and North Karnpur Valley	Hazaribagh	Jharkhand
202	Udhwa Lake	Sahebganj	Jharkhand
203	Bimgad and Castle Rock	Belgaum	Karnataka
204	Hampi	Bellary	Karnataka
205	Jogimatti State Forest	Chitradurga	Karnataka
206	Karanji Tank	Mysore	Karnataka
207	Kemmangundi and Babudan Hills	Chikmagalur	Karnataka
208	Kemphole	Hassan and Dakshina Kannada	Karnataka
209	Kokkare Bellur	Mandya	Karnataka

Annexure 2: Important Bird Areas of India

210	Krishna Rajsagar Reservoir	Mysore and Mandya	Karnataka
211	Kukkarahalli Tank	Mysore	Karnataka
212	Kunthur-Kallur Lakes	Chamarajanagar	Karnataka
213	Ligambudhi Lake	Wetlands, Arid Grassland	Karnataka
214	Magadi Wetland	Wetland	Karnataka
215	Nandi Hills	Koller	Karnataka
216	Narasimabudhi Lake	Mysore	Karnataka
217	Ramanagara State Forest	Bangalore	Karnataka
218	Sulekere Lake	Mandya	Karnataka
219	Anshi	North Kannada	Karnataka
220	Bannerghatta	Bangalore	Karnataka
221	Kudermukh	Chikmagalur	Karnataka
222	Nagarahole	Mysore, Kodagu	Karnataka
223	Bandipur	Mysore	Karnataka
224	Bhadra	Chikmagalur, Shimoga	Karnataka

225	Adichunchunagiri	Mandya	Karnataka
238	Arabhi thittu	Mysore	Karnataka
226	Biligiri Rangaswamy Hills	Chamarajanagar	Karnataka
227	Bramhagiri	Kodagu	Karnataka
228	Kaveri	Mysore, Bangalore, Mandya	Karnataka
229	Dandeli	Uttarkanada	Karnataka
230	Gudavi	Shimoga	Karnataka
231	Melkote Temple	Mandya	Karnataka
232	Pushpagiri	Kodagu and Dakshina Kannada	Karnataka
233	Ranebennur	Dharwad	Karnataka
234	Ranganathitu	Mysore	Karnataka
239	Shettiahalli	Shimoga	Karnataka
235	Shravathi Valley	Shimoga	Karnataka
236	Someshwara	Udipi	Karnataka
237	Talakaveri	Kodagu	Karnataka

Annexure 2: Important Bird Areas of India

240	Amarambalam–Nilambur	Malapuram	Kerala
241	Kattampally	Kannur	Kerala
242	Kole	Thrissur and Malappuram	Kerala
243	Konni	Kollam and Pathanamthitta	Kerala
244	Kottiyoor	Kannur	Kerala
245	Kulathupuzha	Kollam	Kerala
246	Nellyampathy	Palghat	Kerala
247	Ranni	Kollam	Kerala
248	Vazhachal Forest Division	Thrissur & Ernakulam	Kerala
249	Vembanad Lake	Ernakulam, Alleppey, Kottayam, and Pathanamthitta	Kerala
250	Eravikulam	Idukki	Kerala
251	Silent Valley	Palakkad	Kerala
252	Periyar	Idukki	Kerala
253	Aralam	Kannur	Kerala
254	Chimmony	Thrissur	Kerala

255	Chinnar	Idukki	Kerala
256	Idukki	Idukki	Kerala
257	Neyyar	Thiruvananthapuram	Kerala
258	Parambikulam	Palghat	Kerala
259	Peechi-Vazhani	Thrissur	Kerala
260	Peppara	Thiruvananthapuram	Kerala
261	Shendurney	Kollam	Kerala
262	Thattakkad	Idukki	Kerala
263	Wayanad	Wayanad	Kerala
264	Pitti Island	Lakshadweep	Lakshadweep
265	Barna Reservoir	Raisen	Madhya Pradesh
266	Bhoj (Upper Lake) Wetland	Bhopal	Madhya Pradesh
267	Dihaila Jheel	Shivpuri	Madhya Pradesh
268	Gandhi Sagar Reservoir	Neemuch, Mandsoar	Madhya Pradesh
269	Halali Reservoir	Bhopal, Raisen	Madhya Pradesh

Annexure 2: Important Bird Areas of India

270	Rangawa Reservoir	Chhattarpur	Madhya Pradesh
271	Yeshwantsagar Reservoir	Indore	Madhya Pradesh
272	Madhav	Shivpuri	Madhya Pradesh
273	Bandhavgarh	Shahdol	Madhya Pradesh
274	Kanha	Mandla and Balaghat	Madhya Pradesh
275	Panna	Panna, Chhattarpur	Madhya Pradesh
276	Pench	Seoni and Chhindwara	Madhya Pradesh
277	Bori	Hoshangabad	Madhya Pradesh
278	Ghatigaon Bustard	Gwalior	Madhya Pradesh
279	Ratapani	Raisen, Sehore	Madhya Pradesh
280	Sailana Kharmor	Ratlam	Madhya Pradesh
281	Sardarpur	Dhar	Madhya Pradesh
282	Burnt Island (Bandra) Vengurla	Sindhudurga	Maharashtra
283	Gangapur Dam and Grassland	Nashik	Maharashtra
284	INS Shivaji and adjoining areas, Lonavla	Pune and Raigad	Maharashtra

285	Mahul–Sewri Mudflats	Mumbai	Maharashtra
286	Ozar, Wani and adjoining grasslands	Nashik	Maharashtra
287	Talodas	Nandurbar	Maharashtra
288	Thane Creek	Mumbai/Thane	Maharashtra
289	Toranmal	Nandurbar	Maharashtra
290	Nawegaon	Bhandara and Gondia	Maharashtra
291	Sanjay Gandhi and Tungreshwar	Mumbai and Thane	Maharashtra
292	Melghat and Gugamal	Amravati	Maharashtra
293	Tadoba and Andheri	Chandrapur	Maharashtra
294	Bhimashankar	Pune, Raigad, Thane	Maharashtra
295	Jaikwadi	Ahmadnagar and Aurangabad	Maharashtra
296	Nannaj	Solapur, Ahmednagar	Maharashtra
297	Koyna	Satara	Maharashtra
298	Nagzira	Bhandara	Maharashtra
299	Nandur Madhameshwar	Nashik	Maharashtra

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300	Radhanagari	Kolhapur	Maharashtra
301	Tansa	Thane	Maharashtra
302	Ango Hills	Ukhrul	Manipur
303	Dzuko	Senapati	Manipur
304	Sitroi	Ukhrul	Manipur
305	Loktak Lake and Keibul	Bishnupur and Imphal West	Manipur
306	Bunning	Tamenglong	Manipur
307	Jiri-Makru	Imphal East and Tamenglong	Manipur
308	Kailam	Churachanpur	Manipur
309	Yangoupokpi-Lokchao	Chandel	Manipur
310	Zeilad Lake	Tamenglong	Manipur
316	Cherapunjee: cliffs, gorges and sacred groves	East Khasi Hills	Meghalaya
311	Mawphlang Sacred Grove	East Khasi Hills	Meghalaya
312	Norpuh-Narpuhs	Jaintia Hills	Meghalaya
313	Riat Khwan-Umiam Lake	East Khasi Hills and Ri-Bhoi	Meghalaya

314	Saipung Link	Jaintia Hills	Meghalaya
315	Upper Shillong	East Khasi Hills	Meghalaya
317	Balphakram and Siju	South Garo Hills	Meghalaya
318	Nokrek Ridge	East and West Garo Hills	Meghalaya
319	Nongkhyllem	Ri-Bhoi	Meghalaya
320	Palak Lake	Saiha	Mizoram
321	Blue Mountain	Saiha	Mizoram
322	Murlen	Champhai	Mizoram
323	Dampa	West Phaileng	Mizoram
324	Lengteng	Champai	Mizoram
325	Ngengpui	West Phaileng	Mizoram
326	Mount Paona	Kohima	Nagaland
327	Mount Zanibu	Phek	Nagaland
328	Mount Ziphu	Phek	Nagaland
329	Pfuisero-Chizami	Phek	Nagaland

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330	Satoi Range	Zunheboto and Phek	Nagaland
331	Intanki	Dimapur, Kohima	Nagaland
332	Fakim and Saramati Area	Tuensang	Nagaland
333	Khonoma Nature Conservation and Tragopan	Kohima	Nagaland
334	Puliebadze	Kohima	Nagaland
335	Mangalajodi	Khurda	Orissa
336	Bhitarkannika	Kendrapara (formally Cuttack)	Orissa
337	Chilika Lake	Khurda, Puri and Ganjam	Orissa
338	Simlipal	Mayurbhanj	Orissa
339	Chandka	Khurda and Cuttack	Orissa
340	Satkosia Gorge	Dhenkal, Cuttack, Puri, Phulbani	Orissa
341	Sunabeda	Nuapada	Orissa
342	Bahour Lake	Pondicherry	Pondicherry
343	Ousteri Lake	Pondicherry	Pondicherry
344	Kanjli Lake	Kapurthala, Amritsar	Punjab

345	Ropar Wetland	Ropar	Punjab
346	Harike Lake	Amritsar, Kapurthala and Ferozpur	Punjab
347	Alniya Dam	Kota	Rajasthan
358	Baghdarrah	Udaipur	Rajasthan
348	Bardha Dam Reservoir	Bundi	Rajasthan
349	Diyatra	Bikaner	Rajasthan
350	Gagwana Arain, Mangliyawas, Ramsar, Goyal, Ratakot and Bandar	Ajmer	Rajasthan
351	Kheechan	Jodhpur	Rajasthan
352	Ram sagar Bandh	Bundi	Rajasthan
353	Sambhar Lake	Nagaur, Jaipur, Ajmer	Rajasthan
354	Sareri Bandh	Bhilwara	Rajasthan
355	Sei Dam	Udaipur	Rajasthan
356	Sonkhilya	Ajmer	Rajasthan

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357	Udaipur-Lajke Complex	Udaipur	Rajasthan
359	Thar Desert	Jaisalmer and Barmer	Rajasthan
360	Keoladeo	Bharatpur	Rajasthan
361	Ranthambore	Sawai Madhopur	Rajasthan
362	Sariska	Alwar	Rajasthan
363	Jaisamand Lake	Udaipur	Rajasthan
364	Kumbhalgarh	Udaipur, Pali, Rajsamand	Rajasthan
365	Mount Abu	Sirohi	Rajasthan
366	National Chambal	Kota, Bundi	Rajasthan
367	Phulwari-Ki-Nal	Udaipur	Rajasthan
368	Sajjan Garh	Udaipur	Rajasthan
369	Sitamata	Chittorgarh, Udaipur	Rajasthan
370	Talchapar	Churu	Rajasthan
371	Dombang Valley-Lachung-Lema Tusunghang	North Sikkim	Sikkim
372	Lhonak Valley	North Sikkim	Sikkim

373	Lowland Forest of South Sikkim (Melli-Kerabari, Baguwa, Kitam, Nayabazar	South & West Sikkim	Sikkim
374	Tso Lhamo Plateau	North Sikkim	Sikkim
375	Khangchendzonga	North Sikkim	Sikkim
376	Barsey Rhododendron	West Sikkim	Sikkim
377	Fambong Loh	East Sikkim	Sikkim
378	Kyongnosla Alpine East Sikkim	East Sikkim	Sikkim
379	Maenam	South Sikkim	Sikkim
380	Pangolakha WLS-Zuluk- Bedang Tso-Natu La Complex	East Sikkim	Sikkim
381	Yumthang-Shingba Rhododendron	North Sikkim	Sikkim
382	Avalanche	Nilgiris	Tamil Nadu
383	Berijam (Kodaikanal)	Dindigul	Tamil Nadu
384	Big Tank (Peria Kanmai) and Sakkarakotai Kanmai	Ramanathapuram	Tamil Nadu

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385	Bison Swamp	Nilgiris	Tamil Nadu
386	Cairnhill	Nilgiris	Tamil Nadu
387	Governor's Shola	Nilgiris	Tamil Nadu
388	Grass Hills	Coimbatore	Tamil Nadu
389	Kaliveli Tank and Yedyanthittu Estuary	Cuddalore	Tamil Nadu
390	Kothagiri, Longwood Shola	Nilgiris (North Division Forest)	Tamil Nadu
391	Kullur Santhai Dam	Virudunagar	Tamil Nadu
402	Muthukuzhi	Nagercoil	Tamil Nadu
392	Naduvattam	Nilgiris	Tamil Nadu
393	Poomparai and Kukkal	Dindigul	Tamil Nadu
394	Shola forest around Kodaikanal	Dindigul	Tamil Nadu
395	Suchindram Therur	Kanyakumari	Tamil Nadu
396	Thaishola	Nilgiri	Tamil Nadu
397	Tirunelveli	Kanyakumari and Tirunelveli	Tamil Nadu
398	Vadidoor and Kunnathur Tanks	Madurai	Tamil Nadu

399	Veeranam Lake	Cuddalore	Tamil Nadu
400	Warrap Periakulam and Virakasamuthrakulam	Virudhunagar	Tamil Nadu
401	Wellington Lake	Cuddalore	Tamil Nadu
403	Gulf of Mannar	Ramanathapuram, Tuticorin	Tamil Nadu
404	Indira Gandhi	Coimbatore	Tamil Nadu
405	Mudumalai	Nilgiris	Tamil Nadu
406	Mukurthi	Nilgiris	Tamil Nadu
407	Kalakad–Mundanthurai	Tirunelveli	Tamil Nadu
408	Chitragudi	Ramanathapuram	Tamil Nadu
409	Karaivetti	Tiruchchirappalli	Tamil Nadu
410	Koonthangulam	Tirunelveli	Tamil Nadu
411	Point Calimere	Nagapattinam	Tamil Nadu
412	Srivilliputhur	Virudunagar	Tamil Nadu
413	Vaduvoor	Tiruvarur	Tamil Nadu
414	Vedanthangal and Karikili	Chengalpet	Tamil Nadu

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415	Vettangudi	Sivagangai	Tamil Nadu
416	Gumti WLS	Dhalai and South Tripura	Tripura
417	Trishna	South Tripura	Tripura
418	Kudaiyya Marshland	Mainpuri	Uttar Pradesh
419	Kurra Jheel	Etawah, Mainpuri	Uttar Pradesh
420	Lagga-Bagga	Pilibhit	Uttar Pradesh
421	Narora	Bulandshahr & Badaun	Uttar Pradesh
422	Pyagpur and Sitadwar Complex	Bahraich	Uttar Pradesh
423	Sarsai Nawar Lake	Etawah	Uttar Pradesh
424	Sauj Lake	Mainpuri	Uttar Pradesh
425	Sheikha Jheel	Aligarh	Uttar Pradesh
426	Dudwa	Lakhimpur Kheri (Palia tehsil)	Uttar Pradesh
427	Bakhira	Sant Kabir Nagar	Uttar Pradesh
428	Hastinapur	Muzaffarnagar, Meerut, Ghaziabad, Bijnor and Jyotibaphuley Nagar	Uttar Pradesh

429	Katernia Ghat	Behraich	Uttar Pradesh
430	Kishanpur	Lakhimpur Kheri	Uttar Pradesh
431	Lakhabahosi	Farrukhabad	Uttar Pradesh
432	National Chambal	Agra, Etawah	Uttar Pradesh
433	Nawabganj	Unnao	Uttar Pradesh
434	Parvati Aranga	Gonda	Uttar Pradesh
435	Patna	Etah	Uttar Pradesh
436	Saman	Mainpuri	Uttar Pradesh
437	Samaspur	Raebareilly	Uttar Pradesh
438	Sandi	Hardoi	Uttar Pradesh
439	Sohagibarwa	Maharajanj	Uttar Pradesh
440	Soheldev	Balrampur, Saravasti	Uttar Pradesh
441	Sur Sarovar	Agra	Uttar Pradesh
442	Surha Tal	Ballia	Uttar Pradesh
443	Asan Barage	Dehradun	Uttaranchal

444	New Forest Campus	Dehradun	Uttaranchal
445	Upper Pindar Catchment in East Almora Forest Division	Almora	Uttaranchal
450	Gangotri	Uttarkashi	Uttaranchal
446	Govind and Sandra, Kotinad and Singtur Ranges	Uttarkashi	Uttaranchal
447	Nanda Devi	Chamoli and Bageshwar	Uttaranchal
448	Rajaji	Dehradun, Haridwar and Garhwal	Uttaranchal
449	Valley of Flowers	Chamoli	Uttaranchal
451	Corbett	Pauri Garhwal and Nainital	Uttaranchal
452	Askot and Surrounding Forests in Goriganga Basin	Pithoragarh	Uttaranchal
453	Binog-Bhadraj-Jharipani	Dehradun	Uttaranchal
454	Binsar	Almora	Uttaranchal
455	Kedarnath	Chamoli	Uttaranchal
456	Sonanadi	Garhwal, Bijnor	Uttaranchal

457	Farakka Barrage and Adjoining	Malda	West Bengal
458	Naya Bandh Wetland Complex	Malda	West Bengal
459	Gorumara	Jalpaiguri	West Bengal
460	Lava-Neora Valley	Darjeeling	West Bengal
461	Singhalila	Darjeeling	West Bengal
462	Buxa	Jalpaiguri	West Bengal
463	Sundarban	North & South 24 Parganas	West Bengal
464	Jaldapara	Jalpaiguri	West Bengal
465	Kulik	Uttar Dinajpur	West Bengal
466	Mahananda	Darjeeling	West Bengal

Annexure 3: Ramsar Sites in India

Table 1: Sites declared as of end-2005

The Convention on Wetlands came into force for India on 1 February 1982. As of late 2005, India has 25 sites designated as Wetlands of International Importance, with a surface area of 677,131 hectares. Given below is a list, followed by short descriptions of each site. Source: http://www.ramsar.org/profile/profiles_india.htm

Site	State
Ashtamudi Lake	Kerala
Bhitarkanika Wildlife Sanctuary and National Park	Orissa
Bhoj Wetland	Madhya Pradesh
Chandertal	Himachal Pradesh
Chilika Lake	Orissa
Dipor Beel Bird Sanctuary	Assam
East Kolkata Wetlands	West Bengal
Harike Lake Bird Sanctuary	Punjab
Hokera	Jammu and Kashmir
Kanjli Lake	Punjab
Keoladeo National Park and Ajan Bande	Rajasthan
Kolleru Lake Wildlife Sanctuary	Andhra Pradesh
Loktak Lake and Keibul Lamjao National Park	Manipur

Point Calimere Wildlife Sanctuary	Tamil Nadu
Pong Dam Lake Wildlife Sanctuary	Himachal Pradesh
Renuka	Himachal Pradesh
Ropar Lake	Punjab
Rudrasagar	Tripura
Sambhar Lake	Rajasthan
Sasthamkotta Lake	Kerala
Surinsar–Mansar	Jammu and Kashmir
Tso Moriri Lake and adjacent marshes	Jammu and Kashmir
Upper Ganga River	Uttar Pradesh
Vembanad Lake	Kerala
Wular Lake and associated marshes	Jammu and Kashmir

Ashtamudi Wetland. 19/08/02. Kerala. 61,400 ha. 08°57'N 076°35'E. An extensive estuarine system, the second largest in Kerala, which is of extraordinary importance for its hydrological functions, its biodiversity, and its support for fish. The site supports a number of mangrove species as well as over 40 associated plant species, and 57 species of birds have been observed, including six that are migratory. Nearly 100 species of fish sustain a lively fishing industry, with thousands of fishermen depending directly upon the estuary for their livelihood. Population density and urban pressures pose threats to the site, including pollution from oil spills from thousands of fishing boats and from industries in the surrounding area and conversion of natural habitat for development purposes. Ramsar site no. 1204.

Bhitarkanika Mangroves. 19/08/02. Orissa. 65,000 ha. 20°39'N 086°54'E. Wildlife sanctuary. One of the finest remaining patches of mangrove forests along the Indian coast; 25 years of continued conservation measures have made the site one of the best known wildlife sanctuaries. The site's Gahirmatha beach is said to host the largest known olive ridley sea turtle nesting beach in the world, with half a million nesting annually, and the site has the highest density

of saltwater crocodiles in the country, with nearly 700 *Crocodylus porosus*. It is a major breeding and wintering place for many resident and migratory waterbirds and is the east coast's major nursery for brackish water and estuarine fish fauna. Like many mangrove areas, the dense coastal forests provide vital protection for millions of people from devastating cyclones and tidal surges; of India's 58 recorded species of mangroves, 55 species are found in Bhitarkanika, a wider mangrove diversity than in the Sundarbans! Traditionally, sustainable harvesting of food, medicines, tannins, fuel wood, and construction materials, and particularly honey and fish, has been the rule, but population pressures and encroachment may threaten that equilibrium. Ramsar site no. 1205.

Bhoj Wetland. 19/08/02. Madhya Pradesh. 3,201 ha. 23°14'N 077°20'E. Two contiguous human-made reservoirs; the Upper Lake was created in the 11th century by construction of an earthen dam across the Kolans river, and the lower was constructed nearly 200 years ago, largely from leakage from the Upper, and is surrounded by the city of Bhopal. The lakes are very rich in biodiversity, particularly for macrophytes, phytoplankton, zooplankton, both natural and cultured fish species, both resident and migratory birds, insects, and reptiles and amphibians. Since implementation of a management action plan was begun in 1995 with financial support from the government of Japan, a number of bird species have been sighted which had rarely or never before been seen in the region. WWF-India has been of great assistance in preparing the site's designation. A photo essay is available at http://ramsar.org/photo_essay_india_bhoj.htm. Ramsar site no. 1206.

Chandertal Wetland. 08/11/05; Himachal Pradesh, 49 ha; 32°29'N 077°36'E. A high altitude lake on the upper Chandra valley flowing to the Chandra river of the Western Himalayas (4,337m ASL) near the Kunzam pass joining the Himalayan and Pir Panchal ranges. It supports the CITES and IUCN redlisted snow leopard and is a refuge for many species like Snow cock, chukor, Blackringed stilt, Kestrel, Golden eagle, Chough, Red fox, Himalayan ibex, and Blue sheep. These species, over the years, have developed special physiological

features as adaption strategies to cold arid climate, intense radiation, and oxygen deficiency. Some 65 per cent of the larger catchment is degraded forest due to overgrazing by the nomadic herdsmen, while 35 per cent are covered by grasslands. Other threatening factors to this fragile and sparse vegetation are summer trekking, littering waste, and lack of sanitation facilities. Since declaring the site a nationally important wetland in 1994, the authorities have been providing funds for ecotourism facilities. The Spiti Forest Department is the custodian and State Council of Science, Technology and Environment is coordinating conservation management. Ramsar site no. 1569.

Chilika Lake. 01/10/81; Orissa; 116,500 ha; 19°42'N 085°21'E. Added to the Montreux Record, 16 June 1993; removed from the Record, 11 November 2002. Brackish lake separated from the Bay of Bengal by a long sandy ridge and subject to sea water exchange, resulting in extreme seasonal fluctuations in salinity in different sections of the lake. Saline areas support aquatic algae. The site is an important area for breeding, wintering and staging for 33 species of waterbirds. It also supports 118 species of fish, including commercially important species. Significant numbers of people are dependent upon the lake's resources. Placed on the Montreux Record in 1993 due to problems caused by siltation and sedimentation which was choking the mouth of the lake; removed from the Record in 2002 following rehabilitation efforts for which the Chilika Development Authority received the Ramsar Wetland Conservation Award for 2002. Subject of a Ramsar Advisory Mission, 2001. Ramsar site no. 229.

Deepor Beel. 19/08/02. Assam. 4,000 ha. 26°08'N 091°39'E. Sanctuary. A permanent freshwater lake in a former channel of the Brahmaputra river, of great biological importance and also essential as the only major storm water storage basin for the city of Guwahati. The beel is a staging site on migratory flyways and some of the largest concentrations of aquatic birds in Assam can be seen, especially in winter. Some globally threatened birds are supported, including Spotbilled pelican (*Pelicanus philippensis*), Lesser and Greater Adjutant stork (*Leptoptilos javanicus* and *dubius*), and Baer's pochard (*Aythya baeri*). The 50 fish species present provide livelihoods for a

number of surrounding villages, and nymphaea nuts and flowers, as well as ornamental fish, medicinal plants, and seeds of the Giant water lily *Euryale ferox* provide major revenue sources in local markets; orchids of commercial value are found in the neighbouring forest. Potential threats include over-fishing and hunting pressure upon waterbirds, pollution from pesticides and fertilisers, and infestation by water hyacinth *Eichhornia crassipes*. A proposal to create a sewage canal from the city directly to the beel is considered to be disastrous in its potential effects. Ramsar site no. 1207.

East Calcutta Wetlands. 19/08/02. West Bengal. 12,500 ha. 22°27'N 088°27'E. World-renowned as a model of a multiple use wetland, the site's resource recovery systems, developed by local people through the ages, have saved the city of Kolkata from the costs of constructing and maintaining waste water treatment plants. The wetland forms an urban facility for treating the city's waste water and utilizing the treated water for pisciculture and agriculture, through the recovery of nutrients in an efficient manner; the water flows through fish ponds covering about 4,000 ha, and the ponds act as solar reactors and complete most of their bio-chemical reactions with the help of solar energy. Thus the system is described as "one of the rare examples of environmental protection and development management where a complex ecological process has been adopted by the local farmers for mastering the resource recovery activities". The wetland provides about 150 tons of fresh vegetables daily, as well as some 10,500 tons of table fish per year, the latter providing livelihoods for about 50,000 people directly and as many again indirectly. The fish ponds are mostly operated by worker cooperatives, in some cases in legal associations and in others in cooperative groups whose tenurial rights are under legal challenge. A potential threat is seen in recent unauthorized use of the waste water outfall channels by industries which add metals to the canal sludge and threaten the edible quality of the fish and vegetables. Ramsar site no. 1208.

Harike Lake. 23/03/90; Punjab; 4,100 ha; 31°13'N 075°12'E. Bird sanctuary. A shallow water reservoir with thirteen islands, at the confluence of two rivers. Dense floating vegetation covers 70 per cent

of the lake. An important site for breeding, wintering and staging birds, supporting over 200,000 Anatidae (ducks, geese, swans, etc) during migration. The entire lake is leased on an annual basis to commercial fishery organizations. Ramsar site no. 462.

Hokera Wetland. 08/11/05; Jammu and Kashmir; 1,375 ha; 34°05'N 074°42'E. Located at the northwest Himalayan biogeographic province of Kashmir, back of the snow-draped Pir Panchal (1,584m asl.), Hokera wetland is only 10 km from scenic paradise of Srinagar. A natural perennial wetland contiguous to the Jhelum basin, it is the only site with remaining reedbeds of Kashmir and pathway of 68 waterfowl species like Large Egret, Great Crested Grebe, Little Cormorant, Common Shelduck, Tufted Duck and endangered White-eyed Pochard, coming from Siberia, China, Central Asia, and Northern Europe. It is an important source of food, spawning ground and nursery for fishes, besides offering feeding and breeding ground to a variety of water birds. Typical marshy vegetation complexes inhabit like *Typha*, *Phragmites*, *Eleocharis*, *Trapa*, and *Nymphoides* species ranging from shallow water to open water aquatic flora. Sustainable exploitation of fish, fodder and fuel is significant, despite water withdrawals since 1999. Potential threats include recent housing facilities, littered garbage, and demand for increasing tourist facilities. Ramsar site no. 1570.

Kanjli. 22/01/02; Punjab; 183 ha; 31°25'N 075°22'E. A permanent stream, the Kali Bein, converted by construction of a small barrage in 1870 into a water storage area for irrigation purposes. The site fulfils Criteria 3 because of its importance in supporting a considerable diversity of aquatic, mesophytic, and terrestrial flora and fauna in the biogeographical region, and acts also as a key regulator of groundwater discharge and recharge with the seasons. By this means and by direct abstraction of water for irrigation by the local population, the site plays a crucial role in the agriculture which predominates on the surrounding fertile plain, with fewer pressures upon water supplies than elsewhere in the Punjab. The invasive water hyacinth is present and must be removed from time to time; increasing pollution levels, deforestation in the catchment area, and excessive grazing are seen as

potential threats. The stream is considered to be the most significant in the state from the religious point of view, as it is associated with the first guru of the Sikhs, Guru Nanak Dev. The stream itself and surrounding marsh is under provincial ownership and surrounding areas privately owned. The site is a centre for environmental tourism and picnicking. Ramsar site no. 1160.

Keoladeo National Park. 01/10/81; Rajasthan; 2,873 ha; 27°13'N 077°32'E. Added to the Montreux Record, 4 July 1990. World Heritage Site; National Park; Bird Sanctuary. A complex of ten artificial, seasonal lagoons, varying in size, situated in a densely populated region. Vegetation is a mosaic of scrub and open grassland that provides habitat for breeding, wintering and staging migratory birds. Also supported are five species of ungulates, four species of cats, and two species of primates, as well as diverse plants, fish and reptiles. The canal provides water for agriculture and domestic consumption. Cattle and water buffalo graze on the site. A field research station exists. Placed on the Montreux Record in 1990 due to "water shortage and an unbalanced grazing regime". Additionally, the invasive growth of the grass *Paspalum distichum* has changed the ecological character of large areas of the site, reducing its suitability for certain waterbird species, notably the Siberian crane. Subject of Ramsar Advisory Missions in 1988 and 1990. Ramsar site no. 230.

Kolleru Lake. 19/08/02. Andhra Pradesh. 90,100 ha; 16°37'N 081°12'E. Wildlife sanctuary. A natural eutrophic lake, situated between the two major river basins of the Godavari and the Krishna, fed by two seasonal rivers and a number of drains and channels, which functions as a natural flood balancing reservoir between the deltas of the two rivers. It provides habitat for a number of resident and migratory birds, including declining numbers of the vulnerable Grey pelican (*Pelecanus philippensis*), and sustains both culture and capture fisheries, agriculture and related occupations of the people in the area. Damage and losses due to flooding in monsoon seasons and partial drying out during summers, the results of inadequate management planning and action, are seen as areas for improvement. WWF-India has been of great assistance in preparing the site's designation. Ramsar site no. 1209.

Loktak Lake. 23/03/90; Manipur; 26,600 ha; 24°26'N 093°49'E. Added to the Montreux Record, 16 June 1993. A large, but shrinking freshwater lake and associated swamplands supplied by several streams. Thick, floating mats of weeds covered with soil ('phumids') are a characteristic feature. The lake is used extensively by local people as a source of water for irrigation and domestic use and is an important wintering and staging area for waterbirds, particularly ducks. It also plays an important role in flood control. Included on the Montreux Record in 1993 as a result of ecological problems such as deforestation in the catchment area, infestation of water hyacinth, and pollution. The construction of a dam for hydroelectric power generation and irrigation purposes has caused the local extinction of several native fish species. Ramsar site no. 463.

Point Calimere Wildlife and Bird Sanctuary. 19/08/02. Tamil Nadu. 38,500 ha; 10°19'N 079°38'E. Wildlife sanctuary. A coastal area consisting of shallow waters, shores, and long sand bars, intertidal flats and intertidal forests, chiefly mangrove, and seasonal, often-saline lagoons, as well as human-made salt exploitation sites. Some 257 species of birds have been recorded, 119 of them waterbirds, including the vulnerable species Spoonbill Sandpiper (*Euryhorhynchus pygmaeus*) and Grey pelican (*Pelecanus philippensis*) and some 30,000 Greater and Lesser flamingos. The site serves as the breeding ground or nursery for many commercially important species of fish, as well as for prawns and crabs. Some 35,000 fishermen and agriculturalists support their families around the borders of the sanctuary. Illegal collection of firewood and forest produce such as fruits (gathered by lopping off tree branches), the spread of *Prosopis chilensis* (Chilean mesquite), increasingly brackish groundwater caused by expansion of the historical salt works, and decreasing inflow of freshwater are all seen as potential causes for concern. Visitors come to the site both for recreation and for pilgrimage, as it is associated with the Hindu god Rama. Ramsar site no. 1210.

Pong Dam Lake. 19/08/02. Himachal Pradesh. 15,662 ha; 32°01'N 076°05'E. Wildlife sanctuary. A water storage reservoir created in 1975 on the Beas river in the low foothills of the Himalaya on the

northern edge of the Indo-Gangetic plain. The RIS notes that “at a time when wetlands in northern India are getting reduced due to extensive drainage and reclamation, the avian habitats formed by the creation of the Pong Dam assume a great significance.” Given the site’s location on the trans-Himalayan flyway, more than 220 bird species have been identified, with 54 species of waterfowl. Hydrological values include monsoon-season flood prevention, both in the surroundings and downstream due to water regulation, groundwater recharge, silt trapping and prevention of soil erosion; electricity is generated for this and neighboring states, and irrigation water is being channeled to fertile areas of the Punjab and Rajasthan deserts. Low-yield subsistence fishing existed prior to impoundment, but since, a lucrative fishery has grown up, with 27 fish species and a yield increasing markedly each year – some 1800 fishermen now have direct employment and 1000 families benefit indirectly. A nature conservation education centre is found on the island of Ramsar or Ramsar [sic]. Recent management strategies have shifted away from law enforcement and use restrictions towards more participatory approaches and community awareness, and the site is well suited to ‘community-based ecotourism’. Ramsar site no. 1211.

Renuka Wetland. 08/11/05; Himachal Pradesh; 20 ha; 31°37'N 077°27'E. Wildlife sanctuary, reserve forest. A natural wetland with freshwater springs and inland subterranean karst formations, fed by a small stream flowing from the lower Himalayan out to the Giri river. The lake is home to at least 443 species of fauna and 19 species of ichthyofauna representative of lacustrine ecosystems like *Puntius*, *Labeo*, *Rasbora*, *Channa*. Prominent vegetation ranges from dry deciduous like *Shorea Robusta*, *Terminalia tomentosa*, *Dalbergia sissoo* to hydrophytes. There are 103 species of birds of which 66 are residents, e.g. Crimson-breasted barbet, myna, bulbul, pheasants, egrets, herons, mallards and lapwings. Among ungulates sambar, Barking deer and ghorals are also abundant in the area. The lake has high religious significance and is named after the mother of the Hindu sage Parasuram, and is thus visited by thousands of pilgrims and tourists. Conservation measures so far include community

awareness, and prevention of silt influx from eroded slopes and 50 ha. of massive plantation in the catchment. The site is managed by the Shimla Forest Department, Himachal Pradesh. Ramsar site no. 1571.

Ropar. 22/01/02; Punjab; 1,365 ha; 31°01'N 076°30'E. National wetland. A human-made wetland of lake and river formed by the 1952 construction of a barrage for diversion of water from the Sutlej river for drinking and irrigation supplies. The site is an important breeding place for the nationally protected Smooth Indian Otter, Hog deer, sambar, and several reptiles, and the endangered Indian pangolin is thought to be present. Some 35 species of fish play an important role in the food chain, and about 150 species of local and migratory birds are supported. Local fisheries are economically significant, and wheat, rice, sugar cane, and sorghum are cultivated in the surrounding area. Deforested local hills leading to siltation, and increasing industrialization causing an inflow of pollutants, are potential threats, and invasive weeds are a further cause for concern. Nature lovers, birdwatchers, swimmers and boaters visit the site in considerable numbers. Ramsar site no. 1161.

Rudrasagar Lake. 08/11/05; Tripura; 240 ha; 23°29'N 090°01'E. A lowland sedimentation reservoir in the northeast hills, fed by three perennial streams discharging to the River Gomti. The lake is abundant in commercially important freshwater fishes like *Botia spp*, *Notopterus Chitala*, *Mystus spp.*, *Ompok pabda*, *Labeo bata*, and freshwater scampi, with annual production of 26 metric-tons, and an ideal habitat for IUCN redlisted Three-striped roof turtle *Kachuga dhongka*. Owing to high rainfall (2500 mm) and downstream topography, the wetland is regularly flooded with 4–5 times annual peak, assisting in groundwater recharge. Aquatic weeds are composed of rare marginal-floating-emergent-submerged weeds. Lands are owned by the state with perennial water areas leased out to the subsistent fishermen's cooperative, and surrounding seasonal waterbodies are cultivated for paddy. Main threats are increasing silt loads due to deforestation, expansion of agricultural land and intensive farming, and land conversion for population pressure.

Vijaya Dashami, one of the most important Hindu festivals with various sports events, attracts at least 50,000 tourists and devotees every year. A management plan is underway by the MoEF–India. Ramsar site no. 1572.

Sambhar Lake. 23/03/90; Rajasthan; 24,000 ha; 27°00'N 075°00'E. A large saline lake fed by four streams set in a shallow wetland and subject to seasonal fluctuations. It is surrounded by sand flats and dry thorn scrub and fed by seasonal rivers and streams. The site is important for a variety of wintering waterbirds, including large numbers of flamingos. Human activities consist of salt production and livestock grazing. Ramsar site no. 464.

Sasthamkotta Lake. 19/08/02. Kerala. 373 ha; 09°02'N 076°37'E. The largest freshwater lake in Kerala state in the southwest of the country, spring-fed and the source of drinking water for half a million people in the Kollam district. Some 27 freshwater fish species are present. The water contains no common salts or other minerals and supports no water plants; a larva called 'cavaborus' abounds and eliminates bacteria in the water, thus contributing to its exceptional purity. The ancient Sastha temple is an important pilgrimage centre. WWF–India has been of great assistance in preparing the site's designation. Ramsar site no. 1212.

Surinsar–Mansar Lakes. 08/11/05; Jammu and Kashmir; 350 ha; 32°45'N 075°12'E. Wildlife sanctuary, Hindu sacred site. Freshwater composite lake in the semi-arid Punjab plains, adjoining the Jhelum basin with catchment of sandy conglomeratic soil, boulders and pebbles. Surinsar is rain-fed without permanent discharge, and Mansar is primarily fed by surface run-off and partially by mineralised water through paddy fields, with inflow increasing in rainy season. The lake supports CITES and IUCN redlisted *Lissemys punctata*, *Aspideretes gangeticus*, and *Mansariella lacustris*. This composite lake is high in micro-nutrients for which it is an attractive habitat, breeding and nursery ground for migratory waterfowls like *Fulica atra*, *Gallinula chloropus*, *Podiceps nigricollis*, *Aythya fuligula*, and various *Anas* species. The site is socially and culturally very important with many temples around owing to its supposed origin in

the mythological *Mahabharata*. Although the lakes support variety of fishes, fishing is discouraged for religious values. The main threats are increasing visitors, agricultural runoff, bathing and cremation rituals. Conservation is focussed on awareness-raising. Ramsar site no.1573.

Tso Moriri. 19/08/02. Jammu and Kashmir. 12,000 ha; 32°54'N 078°18'E. Wetland reserve. A freshwater to brackish lake lying at 4,595m above sea level, with wet meadows and borax-laden wetlands along the shores. The site is said to represent the only breeding ground outside of China for one of the most endangered cranes, the Black-necked crane, and the only breeding ground for Bar-headed geese in India. The Great Tibetan sheep or Argali and Tibetan wild ass are endemic to the Tibetan plateau, of which the Changthang is the western-most part. The barley fields at Korzok have been described as the highest cultivated land in the world. With no outflow, evaporation in the arid steppe conditions causes varying levels of salinity. Ancient trade routes and now major trekking routes pass the site. The 400-year-old Korzok monastery attracts many tourists, and the wetland is considered sacred by local Buddhist communities and the water is not used by them. The local community dedicated Tsomoriri as 'WWF Sacred Gift for the Living Planet' in recognition of WWF-India's project work there. The rapidly growing attraction of the recently opened area to western tourists (currently 2500 per summer) as an 'unspoilt destination' with pristine high desert landscapes and lively cultural traditions brings great promise but also potential threats to the ecosystem. Ramsar site no. 1213.

Upper Ganga River (Brijghat to Narora Stretch). 08/11/05; Uttar Pradesh; 26,590 ha; 28°33'N 078°12'E. A shallow river stretch of the Ganga with intermittent small stretches of deep-water pools and reservoirs upstream from barrages. The river provides habitat for IUCN redlisted Gangetic dolphin, gharial, six species of turtles, otters, 82 species of fish and more than hundred species of birds. Major plant species, some of which have high medicinal values, include *Dalbergia sissoo*, *Saraca indica*, *Eucalyptus globulus*, *Ficus bengalensis*, *Dendrocalamus strictus*, *Tectona grandis*, *Azadirachta indica*

and aquatic *Eichhorina*. This river stretch has high Hindu religious importance for thousands of pilgrims and is used for cremation and holy baths for spiritual purification. Major threats are sewage discharge, agricultural runoff, and intensive fishing. Conservation activities carried out are plantation to prevent bank erosion, training on organic farming, and lobbying to ban commercial fishing. Ramsar site no. 1574.

Vembanad-Kol Wetland. 19/08/02. Kerala. 151,250 ha; 09°50'N 076°45'E. The largest brackish, humid tropical wetland ecosystem on the southwest coast of India, fed by 10 rivers and typical of large estuarine systems on the western coast, renowned for its clams and supporting the third largest waterfowl population in India during the winter months. Over 90 species of resident birds and 50 species of migratory birds are found in the Kol area. Flood protection for thickly-populated coastal areas of three districts of Kerala is considered a major benefit, groundwater recharge helps to supply well water for the region, and the value of the system for the local transport of people and trade is considerable. Ramsar site no. 1214.

Wular Lake. 23/03/90; Jammu and Kashmir; 18,900 ha; 34°16'N 074°33'E. The largest freshwater lake in India with extensive marshes of emergent and floating vegetation, particularly water chestnut, that provide an important source of revenue for the State Government and fodder for domestic livestock. The lake supports an important fishing industry and is a valuable source of water for irrigation and domestic use. The area is important for wintering, staging and breeding birds. Human activities include rice cultivation and tree farming. Ramsar site no. 461.

Table 2: Proposed Sites

(Note: Since these were proposed, a few have already been added to the declared list as of November 2006.)

Site	State
Coringa and Godavari estuary	Andhra Pradesh
Kolleru	Andhra Pradesh
Manjira	Andhra Pradesh
Nelapattu	Andhra Pradesh
Pakhal	Andhra Pradesh
Pulicat Lake	Andhra Pradesh
Rollapadu	Andhra Pradesh
Telineelapuram	Andhra Pradesh
Uppalapaddu	Andhra Pradesh
D'Ering Memorial	Arunachal Pradesh
Dibang and adjacent areas	Arunachal Pradesh
The Chaporis of Lohit reserve	Arunachal Pradesh
Amchang Hills	Assam
Bauwwa Beel	Assam
Bordoibum–Beelmukh	Assam
Bordoloni–Sampora	Assam
Chakrasila Complex	Assam
Chand Dubi Beel and adjacent area	Assam
Deobali Jalah	Assam
Dipor Beel	Assam
Jengdia Beel and Satgaon	Assam
Jhanjimukh–Kokilamukh	Assam
Kaziranga	Assam
Kuarbari Dalani	Assam

Laokhowa and Burhachapori	Assam
Majuli	Assam
Orang	Assam
Pabho Reserve	Assam
Pabitora	Assam
Panidihing, Phokolai Beel	Assam
Sibsagar Tanks	Assam
Son Beel	Assam
Tamranga–Dalani–Bhairav Complex	Assam
Urpada Beel	Assam
Chauras of North Bihar	Bihar
Danapur Cantonment area	Bihar
Gogabil Pakshi Vihar	Bihar
Kanwarjheel	Bihar
Kurseala river course and Diyara floodplains	Bihar
Mokama Taal (Barah) Wetlands	Bihar
Nagi Dam and Nakti Dam	Bihar
Reservoirs of Chota Nagpur	Bihar
Vikram Shila Gangetic Dolphin	Bihar
Okhla	Delhi
Carambolim	Goa
Banni Grassland and Chhari Dhand	Gujarat
Charakla Salt Pans	Gujarat
Flamingo City	Gujarat
Kaj Wetlands	Gujarat
Khijadia	Gujarat
Marine	Gujarat

Nal Sarovar	Gujarat
Salt Pans of Bhavnagar	Gujarat
Thol Lake	Gujarat
Wetlands of Kheda District	Gujarat
Wild Ass and Nanda Island	Gujarat
Bhaskarpara	Gujarat
Pong Dam Lake	Himachal Pradesh
Basai Wetlands	Haryana
Bhindawas	Haryana
Sultanpur	Haryana
Wetlands of Yamuna	Haryana
Udhwa Lake	Jharkhand
Chushul Marshes	Jammu & Kashmir
Haigam Rakh	Jammu & Kashmir
Hanle Shado–Bug	Jammu & Kashmir
Hokarsar	Jammu & Kashmir
Mirgund Jheel	Jammu & Kashmir
Pangong Tso	Jammu & Kashmir
Shallabugh Lake and marshes	Jammu & Kashmir
Tsokar Basin	Jammu & Kashmir
Tso Morari Lake and adjacent marshes	Jammu & Kashmir
Wular Lake	Jammu & Kashmir
Gharana Wetland Reserve	Jammu & Kashmir
Gudavi	Karnataka
Karanji Tank	Karnataka
Kokkare Bellur	Karnataka
Krishanarajsagar Reservoir	Karnataka

Kukkarahalli Tank	Karnataka
Kunthur–Kallur Lakes	Karnataka
Ligambudhi Lake	Karnataka
Magadi Wetland	Karnataka
Narasimabudhi Lake	Karnataka
Ranganathitoo	Karnataka
Sulekere Lake	Karnataka
Kole	Kerala
Vembanad Lake	Kerala
Pitti Island	Lakshadweep
Burnt Island (Bandra) Vengurla	Maharashtra
Gangapur Dam and Grassland	Maharashtra
Jaikwadi	Maharashtra
Mahul–Sewri Mudflats	Maharashtra
Nandur Madhameshwar	Maharashtra
Thane Creek	Maharashtra
Riat Khwan–Umiam Lake	Meghalaya
Loktak Lake and Keibul Lamjao	Manipur
Zeilad Lake	Manipur
Barna Reservoir	Madhya Pradesh
Bhoj (Upper Lake) Wetland	Madhya Pradesh
Dihaila Jheel	Madhya Pradesh
Gandhi Sagar Reservoir	Madhya Pradesh
Halali Reservoir	Madhya Pradesh
Madhav	Madhya Pradesh
Rangawa Reservoir	Madhya Pradesh
Ratapani	Madhya Pradesh

Yeshwantsagar Reservoir	Madhya Pradesh
Bhitarakanika	Orissa
Chandaka	Orissa
Chilika Lake	Orissa
Mangalajodi	Orissa
Harike Lake	Punjab
Kanjli Lake	Punjab
Ropar Wetland	Punjab
Bahour Lake	Pondicherry
Ousteri Lake	Pondicherry
Alniya Dam	Rajasthan
Bardha Dam Reservoir	Rajasthan
Jaisamand Lake	Rajasthan
Keoladeo	Rajasthan
Kheechan	Rajasthan
National Chambal	Rajasthan
Ramsagar Bandh	Rajasthan
Sambhar Lake	Rajasthan
Sareri Bandh	Rajasthan
Udaipur Lake Complex	Rajasthan
Khangchendzonga	Sikkim
Lhonak Valley	Sikkim
Big Tank (Peria Kanmai) and Sakkarakotai Kanmal	Tamil Nadu
Chitragudi	Tamil Nadu
Gulf of Mannar	Tamil Nadu
Kaliveli Tank and Yeduyanthittu Estuary	Tamil Nadu

Karaivetti	Tamil Nadu
Koonthangulam	Tamil Nadu
Kullur Santhai Dam	Tamil Nadu
Point Calimere	Tamil Nadu
Suchindram Therur	Tamil Nadu
Vadidoor and Kunnathur Tanks	Tamil Nadu
Vaduvoor	Tamil Nadu
Vedanthangal and Karikili	Tamil Nadu
Veeeranam Lake	Tamil Nadu
Vettangudi	Tamil Nadu
Watrap Periakulam and Virakasamuthrakulam	Tamil Nadu
Wellington Lake	Tamil Nadu
Gumti WLS	Tripura
Bakhira	Uttar Pradesh
Dudhwa	Uttar Pradesh
Hastinapur	Uttar Pradesh
Katerniaghat	Uttar Pradesh
Kudaiyya Marshland	Uttar Pradesh
Kurra Jheel	Uttar Pradesh
Lakhabhosi	Uttar Pradesh
Narora	Uttar Pradesh
National Chambal	Uttar Pradesh
Nawabganj	Uttar Pradesh
Parvati Aranga	Uttar Pradesh
Patna	Uttar Pradesh
Pyagpur and Sitadwar Complex	Uttar Pradesh
Saman	Uttar Pradesh

Birds in Our Lives

Samaspur	Uttar Pradesh
Sandi	Uttar Pradesh
Sarsai Nawar Lake	Uttar Pradesh
Sauj Lake	Uttar Pradesh
Sheikha Jheel	Uttar Pradesh
Sohagibarwa	Uttar Pradesh
Sur Sarovar	Uttar Pradesh
Surha Tal	Uttar Pradesh
Asan Barage	Uttaranchal
Corbett	Uttaranchal
Farakka Barrage and adjoining areas	West Bengal
Jaldapara	West Bengal
Kulik	West Bengal
Naya Bandh Wetland Complex	West Bengal
Sundarban	West Bengal

Source: M.Z. Islam and A.R. Rahmani. *Potential Ramsar Sites in India*. IBCN: BNHS and BirdLife International, 2006.

Annexure 4: Some Periodicals on Indian Birds and Related Issues

(This is not an exhaustive list of periodicals containing matter on Indian birds, but contains most of those which deal primarily or substantially with such birds.)

NATIONAL

Blackbuck

Madras Naturalists' Society
No.8, Janaki Avenue
Abhiramapuram
Chennai 600018
www.blackbuck.org

Flamingo

Bird Conservation Society, Gujarat
B-8, Veterinary Staff Quarters
Near Jagnath
Anand 388001

Hornbill

Bombay Natural History Society
Hornbill House
Shaheed Bhagat Singh Road
Mumbai 400 023
www.bnhs.org

Indian Birds

New Ornithology Foundation
P. O. Box # 2
Banjara Hills
Hyderabad 500034
www.indianbirds.in

Journal of the Bombay Natural History Society

(as above, for *Hornbill*)

Birds in Our Lives

Journal of Ecological Society

1B Abhimanshree Society
Off Pashan Road
Pune 411008
www.ecological-society.org

Malabar Trogon

Malabar Natural History Society
17/548A Indira Gandhi Link Road
Mavoor Road
Calicut 673004

Mayura

Post Box # 45
Banjara Hills
Hyderabad 500034

Mistnet: Quarterly Newsletter of IBCN

Indian Bird Conservation Network
c/o BNHS (as above, for *Hornbill*)

Naturalist

Journal of Prakriti Samsad
Prakriti Samsad
65 Golf Club Road
Kolkata 700033

Newsletter for Birdwatchers

c/o Navbharath Enterprises
#10 Sirur Park B Street, Seshadripuram
Bangalore 560020
navbharat@blr.vsnl.net.in

Panda: Newsletter of the World Wide Fund for Nature-India

172-B Lodhi Estate
New Delhi 110003
www.wwfindia.org

Pavo: The Indian Journal of Ornithology

The Society of Animal Morphologists and Physiologists
M.S. University Department of Zoology
Faculty of Science
Baroda, Gujarat

Pitta

Post Box # 45
Banjara Hills
Hyderabad 500034

Protected Area Update

Kalpavriksh
Apt. 5 Shree Datta Krupa
908 Deccan Gymkhana
Pune 411004
www.kalpavriksh.org

Samsad News

Prakriti Samsad
65 Golf Club Road
Kolkata 700033

Sanctuary Asia

145/146, Pragati Industrial Estate
N.M. Joshi Marg
Lower Parel
Mumbai – 400 011
www.sanctuaryasia.com

WII Newsletter

Wildlife Institute of India
Post Bag # 18
Chandrabani
Dehradun 248001
www.wii.gov.in/publications.htm

INTERNATIONAL

Asian Wetland News

Asian Wetland Bureau, Institute of Advanced Studies
University of Malaya
Lembah Pantai 59100, Kuala Lumpur, Malaysia

Birding Asia

Oriental Bird Club
P.O.Box 324, Bedford,
MK42 0WG
United Kingdom
www.orientalbirdclub.org/club

Forktail: Journal of the Oriental Bird Club

(as above, for *Birding Asia*)

Ibis: The International Journal of Avian Science

Department of Zoology, University of Oxford
South Parks Road, Oxford OX1 3PS
United Kingdom
www.bou.org.uk/pubibis.html

Oriental Bird Club Bulletin

(As above, for *Birding Asia*)

World Pheasant Association Journal

World Pheasant Association
7/9 Shaftesbury Street
Fordingbridge, Hampshire
SP6 1JF
United Kingdom
www.pheasant.org.uk

Zoologische Verhandelingen. Systematic notes on Asian birds

Nationaal Natuurhistorisch Museum Naturalis
PO Box 9517, 2300 RA Leiden
The Netherlands
www.naturalis.nl

Picture Credits

PRELIMINARY PAGES

page (i) Eurasian hobby, *Clement Francis*

page (iii) Gold-fronted chloropsis, *Clement Francis*

pages (iv) and (v) birds on textile, *Ashish Kothari*

pages (vi) and (vii) waterbirds – two reef herons and a large egret, *Ashish Kothari*

pages (viii) and (ix) An army jawan in Ladakh with the chick of a Black-necked crane

(In the early 1980s, army personnel and the cranes developed such a good rapport that reportedly the adults would fly off to forage, leaving their chicks in the safe custody of jawans like this one.), *R.K. Gaur*

page (x) Narcondam hornbill in the Andaman Islands, *Ravi Sankaran*

page (xiii) Sarus crane, *Rajpal Singh*

page (xv) Malabar whistling thrush, *Clement Francis*

END PAGES

(p 201) Malabar pied hornbill, *Vijay Mohan Raj*

(p 202, 203) fishermen and birds, *Ashish Kothari*

(p 204, 205) cranes in the sunset, *Clement Francis*

LIST OF PHOTOGRAPHERS WITH PICTURE CREDITS

Ajay Desai *Chapter 1* (p 13) nightjar, (p 15) grasslands; *Chapter 4* (p 88) ringing camp; *Chapter 7* (p 196) tribal with cage

Asad Rahmani *Chapter 1* (p 15) Lesser florican, (p 18) desert with dunes, (p 18) Common sandgrouse; *Chapter 3* (p 78) Salim Ali; *Chapter 6* (p 147) Great Indian bustard; *Chapter 7* (p 159) man feeding Demoiselle cranes, (p 194) Great Indian bustard, (p 195) Jerdon's courser habitat

Ashish Kothari *Preliminary pages*: (p iv,v) birds on textile, (p vi,vii) waterbirds; *Chapter 1* (p 2,3) waterbirds in low light, (p 31) Painted stork colony, (p 33) Grey herons, (p 6) dry forests of the Delhi ridge, (p 41) Lesser flamingo, (p 42) Himalayan altitudinal scape, (p 47) feeding gulls at Jamnagar, (p 48) Khijadiya salt pans; *Chapter 2* (p 57) Egyptian vulture, (p 61) bird feathers in head-dress, (p 63) fanciful depiction of birds on textile, (p 67) birds in adivasi art, (p 66) Sanchi stupa; *Chapter 3* (p 79) birding at Chilika Lake, (p 74) Tickell's blue flycatcher; *Chapter 4* (p 83) migrating flamingos, *Chapter 5* (p 94) Purple sunbird, (p 98) Blacknaped terns, (p 99) birds on stick in Nagaland; *Chapter 6* (p 110) bamboo with dead birds, (p 111) Dodsai advertisement, (p 114) tea plantations in Western Ghats, (p 115) marble mining in Rajasthan, (p 127) Java sparrow, (p 134) Pinkheaded duck, (p 142) Greater adjutant storks; *Chapter 7* (p 159) Kokkare Bellur, (p 163) peacock, (p 167) Bharatpur sunset, (p 170) Corbett National Park, (p 170) proposed bird reserve at Mula Mutha, (p 171) Khonoma, (p 174) waterbirds at Mangalajodi, (p 175) Mangalajodi bird committee; *End pages* (p 202,203) fishermen and birds

- Ashok Captain/Jay Kadapatti** *Chapter 1* (p 49) Barn owl
- Bharat Bhushan** *Chapter 6* (p 135) Jerdon's courser
- Clement Francis** *Preliminary pages* (p i) Eurasian hobby, (p iii) Gold-fronted chloropsis, (p xv) Malabar whistling thrush; *Chapter 1* (p 11) Booted warbler, (p 16) Paddyfield pipit, (p 22) Racket-tailed drongo, (p 26) Ceylon frogmouth, (p 36,37) Brown-headed gull, (p 38) Pied kingfisher, (p 38) Brown dipper; *Chapter 3* (p 71) Pied crested cuckoo; *Chapter 4* (p 86) Paradise flycatcher; *Chapter 5* (p 95) Citrine wagtail, (p 102) Roseringed parakeet, (p 103) Barheaded geese; *Chapter 6* (p 118) Spotted or Scalybellied munia, (p 138) Blacknecked cranes, (p 155) Crested hawk-eagle ; *End pages* (p 204,205) cranes in the sunset
- Farhad Vania** *Chapter 6* (p 119) Chukor and cage
- Girish Jathar** *Chapter 6* (p 135) Forest spotted owlet
- Jean Howman-WPA** *Chapter 7* (p 171) Blyth's tragopan
- Joanna Van Gruisen** *Chapter 1* (p 30) Great crested grebe, (p 42) Monal pheasant
- Krupakar Senani** *Chapter 1* (p 44) Velvet-fronted nuthatch; *Chapter 2* (p 60) Rufous woodpecker; *Chapter 3* (p 70) Hill myna
- Mahendra Vyas** *Chapter 7* (p 188) Demonstration against bustard hunting
- Nitin Rai** *Chapter 1* (p 10) Grey partridge; *Chapter 6* (p 139) Siberian cranes
- Pallava Bagla** *Chapter 6* (p 111) Monal kalgi
- Pankaj Sekhsaria** *Chapter 6* (p 146) nest material of the Edible-nest swiftlet, (p 151) Nicobar megapode
- R.K. Gaur** *Preliminary pages* (p VIII,IX) Javan with chick of Black-necked crane; *Chapter 5* (p 99) peafowl
- Raghu Chundawat** *Chapter 1* (p 46) chukor in landscape, chukor; *Chapter 5* (p 98) vultures on carcass; *Chapter 6* (p 126) vultures in tree
- Rajat Bhargava** *Chapter 6* (p 150) Great pied hornbill
- Rajpal Singh** *Preliminary pages* (p XIII) Sarus crane; *Chapter 1* (p 19) King vulture
- Ramana Athreya** *Chapter 7* (p 197) Bugun liocichla
- Ravi Sankaran** *Preliminary pages* (p x) Narcondam hornbill
- Shimpei Watanabe** *Chapter 6* (p 143) Spoonbill sandpiper
- Sujatha Padmanabhan** *Chapter 1* (p 19) cold desert of Ladakh
- Sunita Rao** *Chapter 1* (p 40) coral island in Lakshadweep
- Vibhu Prakash** *Chapter 6* (p 126) sick vulture
- Vijay Mohan Raj** *Chapter 1* (p 9) Yellow-throated sparrow, (p 10) Grey jungle fowl, (p 23) Malabar trogon, (p 35) Great thick-knee; *Chapter 6* (p 155) Honey buzzard; *End pages* (p 201) Malabar pied hornbill

ERRATA

page XIII, line 27: sites considered imporfftant *should read as* sites considered important
page 85, line 2: 2400 km (1500 mph) *should read as* 2400 km (1500 miles)
page 113, line 10: 3,330,000 sq km (3.33 million ha) *should read as* 33,300 sq km (3.33 million ha)