

## AVIFAUNA OF INDIA



Photo: Hira Ranjani

The last wild pair of the Siberian Crane *Grus leucogeranus* was seen in the Keoladeo National Park, Rajasthan in the winter of 2000–2001. Attempts at reintroduction have not been successful.

The Indian subcontinent, a part of the vast Oriental biogeographic regions, is very rich in biodiversity. Out of the more than 9,000 birds of the world, the Indian subcontinent contains about 1,300 species, or over 13% of the world's birds (Grimmett *et al.* 1998). This subcontinent, rich in avifauna also boasts of 48 bird families out of the total 75 families in the world. However, two families - Asiatic barbets *Megalaimidae* and Leafbirds *Irenidae* - occur in the Oriental region, the rest of the bird families are found in other biogeographical regions of the world too. The Oriental region is also the centre of radiation for many bird groups such as the pheasants, laughingthrushes, drongos, leafbirds, pittas, parrotbills and flower-peckers.

Being a physical part of Asia, India is least limited by geographical barriers, thus it has acted as a centre of dispersal of species as well as has received species from the Palearctic, Ethiopian, Indo-Chinese and Indo-Malayan subregions. But the dominant groups of birds in India belong to what is sometimes called the 'Indo-Chinese' fauna, the birds adapted to life in the warm, moist tropical southeast Asia, birds primarily of jungle or heavy forests (Ali and Ripley 1987). The geographical ramifications of southeast Asia, the tangled patterns of mountain chains, river drainage systems and a long period of stable climate seem to have been ideal for the evolution of a wide array of species of birds (Ali and Ripley 1987).

Ali and Ripley (1987) consider 176 species of birds endemic (local) to the Indian subcontinent. Of these 30 (17%) have affinity to the Palearctic species (i.e. are related to birds found in Europe and temperate Asia), 109 (62%) are related to Indo-Chinese species (i.e. southeast Asian species), another 30 are related to Ethiopian (African) species, and the rest show no clear-cut affinity. Thus the overwhelming proportion of the Indian bird species are related to species of the tropical Oriental region, with an equal number of endemic species having their origin in the Palearctic and Ethiopian regions.

Grimmett *et al.* (1998) have shown that the Indian peninsula is home to many bird families (or other distinctive groups of birds) where the majority of the species of the family or group are found in this subcontinent. For instance, 71% of the treecreepers (Certhiinae), 62% of accentors (Prunellinae), 55% of laughingthrushes (Garrulacinae) and 50% of ioras (Aegithininae) are found in the Indian subcontinent. Similarly, 37% of the barbet and 38% of the drongo species of the world are seen in India.

As the birds are comparatively large, conspicuous and popular, it is unlikely that new species will be discovered, especially in the Indian subcontinent, which has been thoroughly researched during the last 200 years. Most of the recent discoveries of birds have been in the jungles of Africa or tropical America. However, in 1991, a small secretive Wren-warbler, named Nepal Wren-warbler *Pnoepyga immaculata* was first described to science from the Himalayan forest of Nepal (Martin and Eck 1995). Suresh Kumar and Pratap Singh (1999) of the Wildlife Institute of India have found a new subspecies of Sclater's Monal *Lophophorus sclateri* in Arunachal Pradesh near the Indo-Chinese border. First they found an odd tail feather and then in October 1998, they had nine sightings of this strange bird at 4,000 m within one km of Pakdung camp.



## Important Bird Areas in India – Avifauna of India

Recently, Rasmussen and Anderton (*in press*) have described nearly 120 new taxa from the Indian subcontinent, mostly subspecies were elevated to the species level. For instance, the two subspecies of the Indian Long-billed vulture *Gyps indicus indicus* and *G. indicus tenuirostris* have been made full species, with the former now known as Long-billed vulture *G. indicus*, and the latter, Slender-billed vulture, *G. tenuirostris*. Some of the upgraded species of Rasmussen and Anderton have very narrow and restricted range distribution, and some of them are Critically Endangered, as for example the Slender-billed Vulture (BirdLife International 2001).

One of the main reasons for high avian diversity in India is the presence of diverse habitats, from the arid cold desert of Ladakh and Sikkim to the steamy, tangled jungles of the Sunderbans to the wet, moist forests of the Western Ghats and Arunachal Pradesh. Rodgers and Panwar (1988) of the Wildlife Institute of India have divided India into ten major biogeographical zones: Trans-Himalayas, Himalayas, Desert, Semi-Arid, Western Ghats, Deccan Peninsula, Gangetic Plains, Northeast, Islands and Coasts. This is not a strictly biogeographical classification as it was done for the sake of identifying new protected areas that are under-represented in the protected area system of India. As we have followed Rodgers and Panwar's classification for describing the vegetation cover of India, the same classification is used for describing the avifauna of India.

### 1. THE INDIAN TRANS-HIMALAYAS

The Trans-Himalayas (4,500 to 6,000 m) consisting of Ladakh in Jammu and Kashmir, Lahul-Spiti in Himachal Pradesh, and a small area of Sikkim is a part of a much larger Tibetan plateau of Tibet and China, consisting of about 2.6 million sq. km. It has high mountains, deep valleys and flat, arid plains. Many major rivers, for example, the Brahmaputra, Sutlej and Indus start from this region but much of this has internal drainage system where the rivers end in vast lakes. Such lakes and marshes, mostly saline, are important as breeding grounds for birds such as the Black-necked Crane *Grus nigricollis*, Bar-headed Goose *Anser indicus*, Great Crested Grebe *Podiceps cristatus*, and others. While the flat plains provide habitat to the Tibetan Sandgrouse *Syrrhaptes tibetanus*, Horned Lark *Eremophila alpestris* and various species of wheatears *Oenanthe*. The Tibetan Snowcock *Tetraogallus tibetanus* and the Himalayan Snowcock *Tetraogallus himalayensis* can be seen on the treeless mountains, sometimes both the species occurring in the same area. There is no truly endemic or restricted-range bird species in this region. The Tibetan Eared Pheasant *Crossoptilon harmani*, often considered to be a subspecies of the White Eared Pheasant *Crossoptilon crossoptilon*, is found at the edges of mixed broadleaf-coniferous forests, rhododendron, juniper and deciduous scrubs and grasslands, between 3,000 to 5,000 m. It is listed as Near Threatened (BirdLife International 2001). It is locally common and has adapted to disturbed habitats (Ali and Ripley 1987, Grimmett *et al.* 1998). Recent surveys have indicated that its population must be greater than 10,000 individuals (McGowan and Garson 1995). Where unmolested, it becomes exceedingly tame, coming to monasteries in the remoter areas to be fed by Buddhist lamas, and even eating out of their hand (Ali and Ripley 1987). In India, it is found in parts of the Lohit, Siang and Subansiri districts of Arunachal Pradesh.



Another species of some conservation concern is the Giant Babax *Babax waddelli*, considered Near Threatened by BirdLife International (2001). It is again not truly a Trans-Himalayan species as it occurs in the interface of the upper Himalayas and Trans-Himalayas. It occurs in southern Tibet, mainland China and extreme northeastern Sikkim, where it inhabits dense deciduous scrub above the treeline, particularly of *Hippophae rhamnoides*, and the edges of coniferous forests, between 2,800 to 4,500 m (Ali and Ripley 1987, Grimmett *et al.* 1998). Within its restricted range, it has been described as “locally common” but, more recently, “rather scarce” (BirdLife International 2001). It is presumably declining because of deforestation, although extensive pine and mixed coniferous forests with prickly oak and rhododendron still remain to the east of Lhasa.

#### Wetlands of Trans-Himalayas

The wetlands in the Trans-Himalayas are extremely important for the protection of birds, especially globally threatened species. Most of the wetlands are found in the Changthang region of Ladakh between the altitude 4000 to 5000 m. The Changthang plains lie between the Leh and the Nyoma blocks of the Leh district in southeastern Ladakh, which is the western extension of Tibetan Changthang (Chatterjee *et al.* 2002). The Changthang Wilderness Area (Changthang Plateau) was notified in 1987 to provide a sanctuary for many species of mammals, and birds, and also to protect the culture and language of this region. Some of the important high altitude lakes such as Tso Kar, Tso Morari, Pangong Tso, and marshes such as Hanley, Phoktsey and Chushul are located in this region, most of them have been identified as IBAs.

There is no Endemic Bird Area in the Indian part of the Trans-Himalayas, but a part of Biome-5: Eurasian High Montane (Alpine and Tibetan) falls in India. BirdLife International (undated) has listed 48 bird species that represent the bird assemblage of this biome. Most of them are common and widespread, and like other desert species, live in low density (e.g. Himalayan Griffon *Gyps himalayensis*, Snow Partridge *Lerwa lerwa*) but some of the smaller species move in large flocks, especially during their migration (e.g. Long-billed Calandra Lark *Melanocorypha maxima*, Hume's Short-toed Lark *Calandrella acutirostris*). During winter, many species of this region move down to other biomes, and even to the Indian plains (Brown-headed Gull *Larus brunnicephalus*, Tickell's Warbler *Phylloscopus affinis*), while some species do not move or show small altitudinal movement (e.g. Tibetan Snowcock *Tetraogallus tibetanus*, Himalayan Snowcock *T. himalayensis*, Tibetan Sandgrouse *Syrrhaptes tibetanus*, Alpine Accentor *Prunella collaris*). Biome-5 is found mainly above the treeline, from c. 3,600 m and above. The key habitats are alpine meadows and sub-alpine scrub, cliffs and boulder-strewn open habitats, gravel plains and wetlands.



Globally Threatened species of the Indian Trans-Himalayas

Species	Scientific Names	IUCN Category	Number of IBAs
Black-necked Crane	<i>Grus nigricollis</i>	VU	7
Wood Snipe	<i>Gallinago nemoricola</i>	VU	4
Giant Babax	<i>Babax waddelli</i>	NT	2

VU = Vulnerable, NT =Near Threatened

In India, the Trans-Himalayas cover about 1,84,823 sq. km, or 5.62% of India’s geographical area. It has three national parks, covering a total area of 6,559 sq. km, (i.e. 3.55%) and four wildlife sanctuaries covering an area of 10,443 sq. km. About 9% of the Trans-Himalayas is covered under the PA system (Rodgers *et al.* 2000).

2. THE HIMALAYAN REGION

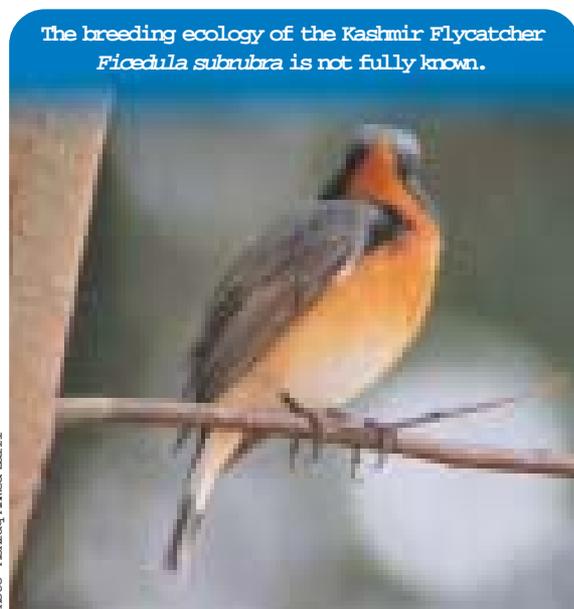


Photo: Ashfaq Ahmed Zarri

The breeding ecology of the Kashmir Flycatcher *Ficedula subrubra* is not fully known.

Nearly 6.41% of the total area of India consists of the Himalayan mountain ranges. It shows extreme temperature and rainfall variation from the West to East Himalayas, with the Western Himalayas colder and drier than the Eastern Himalayas. Besides the east-west gradation, it also has altitudinal gradation both in temperature and rainfall which again increases the habitat diversity. As the West Himalayas merge with the Hindukush and then the mountains of Central Asia, and the Eastern Himalayas merge with the Indo-Chinese and southeast Asian forests, there are not many endemic birds confined to the Himalayas, however, it is the centre of species radiation of pheasants. Out of the 49 species of pheasants in the world (del Hoyo *et al.* 1994), 18 are found in the Himalayan region (Ali and Ripley 1987). Important species found in India are the Western Tragopan *Tragopan melanocephalus*, Satyr Tragopan *Tragopan satyra*, Blyth’s Tragopan *Tragopan blythii*, Temminck’s Tragopan *Tragopan temminckii*, Monal Pheasant *Lophophorus impejanus*, Sclater’s Monal *Lophophorus sclateri*, Tibetan Eared Pheasant *Crossoptilon crossoptilon*, Cheer Pheasant *Catreus wallichii*, Blood Pheasant *Ithaginis cruentus*, Kalij (= Kaleej) Pheasant *Lophura leucomelana*, Koklass Pheasant *Pucrasia macrolopha*, and Red Junglefowl *Gallus gallus*. The Himalayas also have a monotypic species (i.e. only one species in a genera), the Ibisbill *Ibidorhyncha struthersii*. It is a bird of the shingle beds of the streams and rivers of the Himalayas (and Trans-Himalayas also). This partridge-sized bird, with

long red legs and down-curved, red bill and a black band across the breast is found from 1,700 to 4,400 m. The Himalayas are geographically divided into four biotic provinces or sub-regions, namely the Northwest Himalayas, Western Himalayas, Central Himalayas (Nepal) and Eastern Himalayas (Rodger and Panwar 1988).

a) Northwest Himalayas

This part of the Himalayas (30° 18' to 32° 06' north and 72° 32' to 79° 04' east) can be said to occur from Kashmir to the River Sutlej in Himachal Pradesh (Rodgers and Panwar 1988). The parallel mountain ranges from south to north comprise the Siwaliks, Lesser and Greater Himalayas, Trans-Himalayan Zaskar, Ladakh and Karakoram. The principal ranges of this region are the Pir Panjal, the Dauladhar and the Nag Tibba (Mehta and Julka 2002). To the north of the Pir Panjal ranges is situated the Kashmir valley. It is the largest valley in the entire Himalayan ranges, 135 km long and 40 km wide with an area of about 4,865 sq. km.

There are a number of wetlands in this region and many of them are identified as IBAs for their bird congregations, such as Pong Dam in Himachal Pradesh, and Hokasar, Walur, Shallabugh and Mirgund in Jammu and Kashmir.

b) Western Himalayas

The West Himalayas (29° 5' to 31° 25' north and 77° 45' to 81° east), the smallest among the Himalayan regions, comprises the Garwal and Kumaon hills and includes eight hilly districts of Uttaranchal. The West Himalayas lie between the Kali and Sutlej rivers, and cover an area of 51,124 sq. km comprising 9.62% of the Himalayan region (Nandi *et al.* 2000). Some of the most important rivers of the Gangetic Plains originate in this area, i.e. Yamuna, Ganga, Bhagirathi, Ramganga, Kosi, Sharda, Surya and their tributaries. Many of these rivers have been dammed for hydroelectric purposes, and many more dams are planned and are under construction.

The avifauna of the Western Himalayas is also rich and more than 500 species are found (Rashid Raza *pers. comm.* 2003). Some of the threatened species of the Western Himalayas are the Cheer Pheasant, Himalayan Quail *Ophrysia superciliosa*, Western Tragopan, Satyr Tragopan and Black-necked Crane.

Endemic Bird Areas of the Western Himalayas

The Endemic Bird Areas of the Western Himalayas (including Northwest and Western Himalayas) extend along the mountain chain from western Nepal (west of the Kali Gandaki valley) through Uttaranchal, Himachal Pradesh, Jammu and Kashmir in northwest India and northern Pakistan, and then southwest along the mountains in the border region between Pakistan and Afghanistan (Stattersfield *et al.* 1998). Eleven restricted range species are distributed in this EBA. Of them, six species are found in Temperate Forests. They are the Western Tragopan *Tragopan melanocephalus*, Tytler’s Leaf-Warbler *Phylloscopus tytleri*, Kashmir Flycatcher *Ficedula subrubra*, White-cheeked Tit *Aegithalos leucogenys*, Spectacled Finch *Callacanthus burtoni* and Orange Bullfinch *Pyrrhula aurantiaca* (Stattersfield *et al.* 1998).



## Important Bird Areas in India – Avifauna of India

Two species, Brook’s Leaf-Warbler *Phylloscopus subviridis* and White-throated Tit are found in Dry Temperate Forests. Two other species, White-cheeked Tit *Aegithalos niveogularis* and Kashmir Nuthatch *Sitta cashmirensis*, are mainly found in Coniferous Forests, while the Cheer Pheasant *Catreus wallichii* and the Himalayan Quail *Ophrysia superciliosa* (known from Uttaranchal and last recorded in about 1889) are associated with open habitats, adjacent to forests.

### Restricted Range species of the Western Himalayas ERA

Species Names	Scientific Names	Number of IBAs
Cheer Pheasant	<i>Catreus wallichii</i>	22
Himalayan Quail (Extinct?)	<i>Ophrysia superciliosa</i>	1
Western Tragopan	<i>Tragopan melanocephalus</i>	17
Brooks’s Leaf-Warbler	<i>Phylloscopus subviridis</i>	1
Tytler’s Leaf-Warbler	<i>Phylloscopus tytleri</i>	7
Kashmir Flycatcher	<i>Ficedula subrubra</i>	9
White-cheeked Tit	<i>Aegithalos leucogenys</i>	4
White-throated Tit	<i>Aegithalos niveogularis</i>	5
Kashmir Nuthatch	<i>Sitta cashmirensis</i>	0
Spectacled Finch	<i>Callacanthus burtoni</i>	2
Orange Bullfinch	<i>Pyrrhula aurantiaca</i>	3

With about 2,10,662 sq. km, the Himalayas constitute about 6.41% of India’s geographical area. According to Rodgers *et al.* (2000), there are 12 national parks, totalling 7,518 sq. km (3.57%) and 55 wildlife sanctuaries covering about 13,372 sq. km. The total area under PAs is about 21,000 sq. km (9.92%). It appears great but much of the area under larger PAs is under permanent snow cover, e.g. the Great Himalayan National Park (IBA) of Himachal Pradesh and Karakoram in Jammu and Kashmir.

Thanks to the great altitudinal variation from less than 500 m to 3,600 m, the Himalayas show three distinct biomes, based on bird assemblages (BirdLife International, undated). (i) Biome-7: Sino-Himalayan Temperate Forest, mainly between *c.* 1,800 m and 3,600 m, having Broadleaf Evergreen, Broadleaf Deciduous, Mixed Broadleaf-Coniferous, and Coniferous Forests. It also has Montane Grasslands. One hundred and twelve bird species have been identified which represent this biome. Most of them are common and widespread in suitable habitats. Most show altitudinal movement, while some migrate long distances in winter to other biomes such as the Indo-Chinese Tropical Moist Forest, Indian Peninsula Tropical Moist Forest and/or Indo-Malayan Tropical Dry Zone. (ii) Biome-8: Sino-Himalayan Subtropical Forest, found between *c.* 1,000 m and 2,000 m. The key habitats of this biome are Lower Montane Rain Forest, Hill Evergreen Forest and Pine Forest (BirdLife International, undated). Ninety-five species have been identified that represent the bird assemblages of this biome. Most of them are common and widespread. This biome is the domain of forest and under-storey birds: six species of Laughingthrushes (*Garrulax*), three species of Scimitar-babblers (*Pomatorhinus*), four species of Parrotbills (*Paradoxornis*), and many warblers, tit-babblers and wren-warblers. (Many species are found in the Eastern Himalayan part of this biome). A small portion of the Himalayas also comes under Biome-9: Indo-Chinese Tropical Moist Forests, especially in the northeast region. This biome is below 1,000 m and is covered with Lowland Evergreen Rain Forest, Semi-Evergreen Rain Forest and Moist Deciduous Forest (mainly occurring in the Eastern Himalayas). Nineteen species have been identified to represent the bird assemblages of this biome (BirdLife International, undated), including some globally threatened (e.g. White-bellied Heron *Ardea insignis*, Purple Wood-Pigeon *Columba punicea*, Masked Finfoot *Heliopais personata* and Near Threatened White-cheeked Hill Partridge *Arborophila atrogularis*) but none of them are found in the Western Himalayas. The other species are common in suitable habitats. **It should be noted that most of the area of this biome would come in the northeast region of India** (as described by Rodgers and Panwar 1988).

### c) Central Himalayas

As most of this region falls in Nepal, it is not considered here.

### d) Eastern Himalayas

The Eastern Himalayas, consisting of the Kingdom of Bhutan and the Indian states of Sikkim and Arunachal Pradesh, is one of the richest bird zones in India. Ali (1977) has identified 536 bird species. This zone, about 1000 km long and 150 to 200 km wide, consists of extremely rugged mountains, deep-forested valleys, and steamy tropical plains. The altitude varies from 300 to 4,500 m and the region is a meeting point of Palaeartic, Indo-Chinese and Indo-Malayan biogeographical regimes. This has created numerous biotopes or life zones, resulting in abundant plant, insect and bird life. As it is close to the Bay of Bengal, moisture-laden clouds are intercepted by abruptly rising chains of mountains, resulting in heavy precipitation.

Most of the birds of Eastern Himalayas are small passerines or perching birds which live in forests. Fourteen species of pigeons and doves, 17 species of cuckoos, six species of barbets, 17 species of woodpeckers, seven species of drongos, nine species of bulbuls, seven species of scimitar babblers, eight species of wren-babblers and eight species of parrotbills, and 16 species of laughingthrushes make the Eastern Himalayas a centre of speciation for many groups of birds. In the Indian subcontinent, 28 species of laughingthrushes *Garrulax* have been recognized by Ripley (1982) out of which Ali (1977)

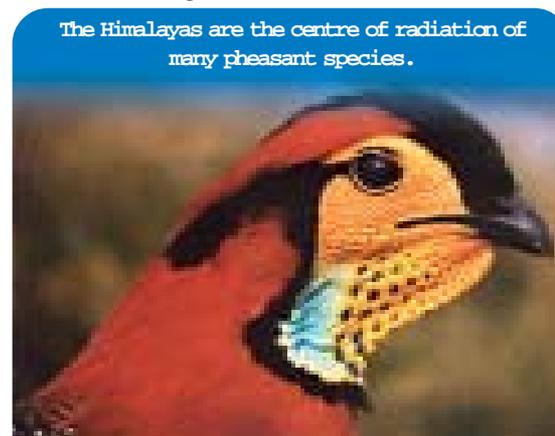


Photo: Jean Bowen/NEA/BirdLife International

has reported 16 species from the Eastern Himalayas. All the seven species of scimitar babblers are found in the jungles of the Eastern Himalayas. Another group which is well represented is parrotbill *Paradoxornis* spp., of which we have eight species in the Indian subcontinent and all are found in the Eastern Himalayas.

The Eastern Himalayas is one of the biodiversity hotspots of the world. It is also the least studied region of India, perhaps many taxa await discovery. As the human population density is low, this region still has good natural forest cover, and 'there, is still time to select a well designed protected area system which adequately protects the range of biological and other natural resource values (Rodgers and Panwar 1988).

**Globally threatened\* species of the Himalayas Biogeographic zone**

Species	Scientific Names	IUCN Category	Number of IBAs
Slender-billed Vulture	<i>Gyps tenuirostris</i>	CR	4
Pallas's Fish-Eagle	<i>Haliaeetus leucoryphus</i>	VU	7
Greater Spotted Eagle	<i>Aquila clanga</i>	VU	7
Eastern Imperial Eagle	<i>Aquila heliaca</i>	VU	3
Lesser Kestrel	<i>Falco naumanni</i>	VU	2
Cheer Pheasant	<i>Catreus wallichii</i>	VU, RR	22
Himalayan Quail	<i>Ophrysia superciliosa</i>	CR, RR	1
Western Tragopan	<i>Tragopan melanocephalus</i>	VU, RR	17
Blyth's Tragopan	<i>Tragopan blythii</i>	VU	11
Sclater's Monal	<i>Lophophorus sclateri</i>	VU	7
Black-necked Crane	<i>Grus nigricollis</i>	VU	2
Wood Snipe	<i>Gallinago nemoricola</i>	VU	5
Rufous-necked Hornbill	<i>Aceros nipalensis</i>	VU	26
Fea's Thrush	<i>Turdus feae</i>	VU	0
Rusty-bellied Shortwing	<i>Brachypteryx hyperythra</i>	VU	17
Mishmi Wren-Babbler	<i>Spelaeornis badeigularis</i>	VU	4
Tawny-breasted Wren-Babbler	<i>Spelaeornis longicaudatus</i>	VU	0
Austen's Babbler	<i>Stachyris oglei</i>	VU	1
Jerdon's Babbler	<i>Chrysomma altirostre</i>	VU	2
Slender-billed Babbler	<i>Turdoides longirostris</i>	VU	2
Black-breasted Parrotbill	<i>Paradoxornis flavirostris</i>	VU	5
Hodgson's Prinia	<i>Prinia cinereocapilla</i>	VU	2
Bristled Grass-Warbler	<i>Chaetornis striatus</i>	VU	0
Kashmir Flycatcher	<i>Ficedula subrubra</i>	VU, RR	5
Beautiful Nuthatch	<i>Sitta formosa</i>	VU	20

CR= Critically Endangered, EN = Endangered, VU = Vulnerable, RR = Restricted Range

\*Only those threatened species for which this biogeographic zone is very important are listed

**Endemic Bird Areas of Eastern Himalayas**

This range starts from the Arun-Kosi valley of eastern Nepal, and runs through Bhutan, northeast India (Sikkim, northern West Bengal and Arunachal Pradesh), southeast Tibet autonomous region and northeast Myanmar to southwest China (northwest Yunnan province) (Stattersfield *et al.* 1998). The Eastern Himalayas also include the mountain ranges to the south of the Brahmaputra river, which extend through Nagaland, Manipur, southern Assam, Meghalaya and Mizoram to the Chin hills in western Myanmar, and the Chittagong hills in southeast Bangladesh. Rodgers and Panwar (1988) and Rodgers *et al.* (2000) have included the area south of the Brahmaputra river under their biogeographic zone Northeast, sub-province North-East Hills.

Some of the restricted range species of the Eastern Himalayas breed in mainly two types of forests, Subtropical Wet Hill Forests found between the altitudes of 1,000 and 2,000 m, and Wet Temperate Forests at altitudes between 1,800 m and 3,000 m. Some of the species also breed in Moist Temperate and Subalpine Forests, and many are altitudinal migrants, moving out during the breeding season into Tropical Lowland Evergreen and Semi-Evergreen Rain Forests below 1,000 m (Mani 1974, Whitmore 1984, Stattersfield *et al.* 1998).

This region is important for many globally threatened, near threatened and restricted range species. Stattersfield *et al.* (1998) have identified 22 restricted range species, of which 19 are confined to this region and the remaining three are also present in other endemic and secondary areas. These restricted range species are found between the altitudes of 300 to 4,000 m. Many of these species are altitudinal migrants and found outside their breeding areas. As the region is remote and little studied, the information available is inadequate. The genus *Sphenocichla* is endemic to this EBA. Two main habitats are important for these birds to breed, namely the Subtropical Wet Hill Forest and the Wet Temperate Forest. The Tropical Lowland Evergreen and Semi-Evergreen Rain Forests are used by many bird species outside the breeding season (Stattersfield *et al.* 1998).

Several species have particularly small ranges (Stattersfield *et al.* 1998). For example, the Rusty-throated Wren Babbler *Spelaeornis badeigularis* and Snowy-throated Babbler *Stachyris oglei* have been recorded only from the Lohit and Tirap Divisions of eastern Arunachal Pradesh, while the Tawny-breasted Wren Babbler *Spelaeornis longicaudatus* is restricted to the hills of Meghalaya, southern Assam and western Manipur, and the Khasi-Hills Swift or Dark-rumped Swift *Apus acuticauda* is known to breed only in

the Khasi Hills in Meghalaya and the Blue mountains in Mizoram where around 30 birds were seen (Ahmed 2003). The Rusty-throated Wren Babbler, also called Mishmi Wren-Babbler (Ali and Ripley 1987) is known only from the type specimen collected at Dreyi, Mishmi Hills, at about 1600 m. This tiny (9 cm), skulking bird of the Subtropical Wet Forests has not been seen after that.

Eleven out of the 21 restricted range species found in this region are considered as threatened (BirdLife International 2001), a number greater than in any other EBA of India (Stattersfield *et al.* 1998). They include the species with very small ranges (Wren-babblers) or species living in low densities and subject to hunting pressures e.g. pheasants, Rufous-necked Hornbill *Aceros nipalensis* and Wood Snipe *Gallinago nemoricola*.

**Globally Threatened\* and Restricted Range species of the Eastern Himalayas**

Species Name	Scientific Names	IUCN Status	No. of IBAs
White-bellied Heron	<i>Ardea insignis</i>	EN	0
Greater Adjutant	<i>Leptoptilos dubius</i>	EN	1
Lesser Adjutant	<i>Leptoptilos javanicus</i>	VU	7
White-winged Duck	<i>Cairina scutulata</i>	EN	11
Greater Spotted Eagle	<i>Aquila clanga</i>	VU	4
Oriental White-backed Vulture	<i>Gyps bengalensis</i>	CR	7
Slender-billed Vulture	<i>Gyps tenuirostris</i>	CR	5
Red-breasted Hill-partridge	<i>Arborophila mandellii</i>	VU	0
Blyth's Tragopan	<i>Tragopan blythii</i>	VU	13
Sclater's Monal	<i>Lophophorus sclateri</i>	VU	0
Wood Snipe	<i>Gallinago nemoricola</i>	VU	2
Purple Wood-pigeon	<i>Columba punicea</i>	VU	1
Dark-rumped Swift	<i>Apus acuticauda</i>	VU	6
Ward's Trogon	<i>Harpactes wardi</i>		0
Rufous-necked Hornbill	<i>Aceros nipalensis</i>	VU	17
Fea's Thrush	<i>Turdus feae</i>	VU	1
Rusty-bellied Shortwing	<i>Brachypteryx hyperythra</i>	VU	0
Striped Laughingthrush	<i>Garrulax virgatus</i>		4
Brown-capped Laughingthrush	<i>Garrulax austeni</i>		4
Rufous-throated Wren-babbler	<i>Spelaeornis caudatus</i>		0
Rusty-throated Wren-babbler	<i>Spelaeornis badeigularis</i>		0
Wedge-billed Wren-babbler	<i>Sphenocichla humei</i>		3
Tawny-breasted Wren-Babbler	<i>Spelaeornis longicaudatus</i>	VU	4
Austen's Babbler	<i>Stachyris oglei</i>	VU	0
Brown-throated Tit-Babbler	<i>Alcippe ludlowi</i>		0
Hoary-throated Barwing	<i>Actinodura nipalensis</i>		0
Austen's Barwing	<i>Actinodura waldeni</i>		5
Grey Sibia	<i>Heterophasia gracilis</i>		23
Beautiful Sibia	<i>Heterophasia pulchella</i>		5
White-naped Yuhina	<i>Yuhina bakeri</i>		14
Black-browed Leaf-Warbler	<i>Phylloscopus cantator</i>		5
Broad-billed Flycatcher-Warbler	<i>Tickellia hodgsoni</i>		0
Beautiful Nuthatch	<i>Sitta formosa</i>	VU	2

CR= Critically Endangered, EN =Endangered, VU = Vulnerable

\*Only those globally threatened species for which this region is very important are listed

**3. THE INDIAN DESERT (THAR)**

The Thar desert occupies nearly ten per cent of India's geographical area and covers 2,08,751 sq. km in Rajasthan alone. To the North, it extends into Punjab in the Ferozpur, Sangrur and Bhatinda districts (14,510 sq. km), and in the Northeast it joins the desert areas of Haryana (12,840 sq. km) in parts of the Mahendragarh and Hissar districts. The Aravalli mountains, starting from Champaner in North Gujarat and extending up to Delhi form the eastern boundary of the Thar. In the west are the Thar-Parkar, Cholistan and Thal deserts of Pakistan. In the South, it extends into Gujarat, mainly in the Kutch, Mehsana and Banaskantha districts, and to some extent in the Saurashtra region. The total desert area in Gujarat is about 62,180 sq. km or 20% of the Thar desert.

Depending upon the rainfall and edaphic factors, the Thar desert can be divided into four divisions: (i) the Luni basin comprising Pali, Jalore, the southeastern part of Barmer, eastern part of Jodhpur, western part of Ajmer, Sirohi, and the



The Great Indian Bustard *Ardeotis nigriceps* has seen massive decline mainly due to habitat destruction and hunting.

Photo: Asad R. Rahmani



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southern part of Nagaur district; (ii) the northern drainage zone, comprising Sikar, Jhunjhunu and northern Nagaur; (iii) the agriculturally rich district of Shri Ganganagar adjoining Punjab and Haryana; and (iv) the true desert or *Marusthali* consisting of entire Jaisalmer, northern Barmer, western parts of Jodhpur, Bikaner and Churu districts.

The Thar Desert is one of the smallest deserts in the world, but it exhibits a wide variety of habitats and biodiversity. It is the most thickly populated deserts in the world with an average density of 83 persons per sq. km, whereas, in other deserts, the average is only seven persons per sq. km (Baqri and Kankane 2001). It is considered an important desert in terms of its location where Palaearctic, Oriental and Saharan elements of biodiversity are found.

### Avifauna of the Thar desert

Despite its comparatively small area, the Thar Desert has a high avian diversity, from its location on the crossroads of the Palaearctic and Oriental biogeographic regions. As the Thar desert is not isolated, avian endemism is very low. To the west, it is connected through the Sind plains with the Persian and then the Arabian deserts, to the northeast with the Gangetic plains, and to the east, it joins the Semi-Arid biogeographic zone. In the south, it merges with the Rann of Kutch. Therefore most species of birds of the Thar are widely distributed.

Between 250 to 300 species have been reported from the Thar desert. This variation is mainly due to the fact that some authors include Kutch, parts of Saurashtra and the western side of the Aravalli mountains in the Thar desert while others have a more restrictive definition of the desert that includes only nine districts of western Rajasthan and Kutch in Gujarat. In the Rajasthan part of the Thar, nearly 250 species have been reported (Rahmani, 1997a, 1997b). Tremendous changes in the avifaunal structure of the Thar desert are taking place due to the Indira Gandhi Nahar Project (IGNP) and species never seen earlier are now regularly found near the canal (Rahmani 1997a, 1997b; Rahmani and Soni 1997). However, this project is playing havoc with the desert ecosystem by changing the crop pattern, traditional grazing regime and because of colonization by new people who do not have the same conservation value system which the desert people have. Due to easy availability of water everywhere, unsustainable livestock grazing is taking place and the famous Sewan grasslands which have survived for hundreds of years with low grazing pressure are now under tremendous pressure. These grasslands are the major habitat of the highly endangered Great Indian Bustard *Ardeotis nigriceps*, and the winter migrant Houbara or the Macqueen's Bustard *Chlamydotis macqueeni*.

Other important desert species are the Cream-coloured Courser *Cursorius cursor*, Greater Hoopoe-Lark *Alaemon alaudipes*, various species of sandgrouse, raptors, wheatears, larks, pipits and munias. In the Rann of Kutch of Gujarat, both Greater *Phoenicopterus roseus* and Lesser *P. minor* flamingos breed when conditions are suitable. These nesting colonies come under increasing pressure due to tourist disturbance, and a large number of nests have been reported to be destroyed. As the sites of the nesting colonies shift, depending upon inundation, it is difficult to protect them.

In the Thar desert, Rodgers *et al.* (2000) have listed one national park of 3,162 sq. km. and five wildlife sanctuaries of 12,914 sq. km. On paper, 7.45% of the desert is under the PA network. However, the ground situation is very different. There are 44 villages in the Desert National Park, and more than half of the Little Rann Wildlife Sanctuary (4,953 sq. km) is under human occupation. Similarly, the Kutch Desert Sanctuary (7,506 sq. km) is under military occupation, being located in the border areas. There are only two PAs in the Thar desert with legally no human occupation: the seven sq. km Tal Chhaper Blackbuck Sanctuary in Rajasthan and the two sq. km Lala Bustard Sanctuary in Gujarat, both are IBAs.

### Globally Threatened\* species of the Indian Thar Desert

Species name	Scientific names	IUCN Category	Number of IBAs**
Greater Spotted Eagle	<i>Aquila clanga</i>	VU	1
Eastern Imperial Eagle	<i>Aquila heliaca</i>	VU	2
Oriental White-backed Vulture	<i>Gyps bengalensis</i>	CR	4
Long-billed Vulture	<i>Gyps indicus</i>	CR	4
Great Indian Bustard	<i>Ardeotis nigriceps</i>	EN	4
Lesser Florican	<i>Sypheotides indica</i>	EN	1
Sociable Lapwing	<i>Vanellus gregarius</i>	VU	1
Stoliczka's Bushchat	<i>Saxicola macrorhyncha</i>	VU	4

CR= Critically Endangered, EN =Endangered, VU = Vulnerable

\*Only those globally threatened species for which this biogeographic zone is very important are listed

\*\*As most of the species listed in this table are widespread, they are likely to be present in many more IBAs and in a wider landscape.

Besides the globally threatened species mentioned above, the Thar desert hosts many Near Threatened species in significant numbers. The main Near Threatened species for which the Thar desert is extremely important are: Lesser Flamingo *Phoenicopterus minor*, Macqueen's Bustard, Cinereous Vulture *Aegyptius monachus*, Red-headed Vulture *Sarcogyps calvus* and Pallid Harrier *Circus macrourus*. There could be 50,00,000 Lesser Flamingos in the world (BirdLife International 2001), with a majority of them in East Africa. The population in Asia could be up to 1,50,000 birds, with the bulk of them in India. Kutch in Gujarat is the only district where both the species of flamingos breed (Ali and Ripley 1987, Grimmett and Inskipp 2003, Ali 1974, Mundkur *et al.* 1989). Two IBAs, Flamingo City and Little Rann of Kutch, have been identified on the basis of the breeding of flamingos, both Greater and Lesser. In the Wild Ass Sanctuary, Singh *et al.* (1999) estimated a population of about 11,000 Lesser Flamingos. Earlier, it was known to nest only in the Greater Rann of Kutch (an IBA) (Ali 1974) but in 1989, Mundkur *et al.* reported its nesting in the Little Rann also. According to Wetlands International (2002), 1% threshold of the South Asian population of Lesser Flamingo is 1,500. With its population of 11,000, this site has almost 9% of the Lesser Flamingos of South Asia. Therefore, this site qualifies for the A4ii criteria.

The Thar desert falls in Biome-13 (Saharo-Sindian Desert) in which BirdLife International (undated) has identified 11 bird species representing the biome assemblage [one species, Sind Woodpecker *Dendrocopos assimilis* is found in Pakistan, with only one 19<sup>th</sup>



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century record from India: Hargitt (1890)]. Except for two (Great Indian Bustard and Stoliczka's Bushchat or White-browed Bushchat), the remaining nine species are not threatened. For many species such as the Spotted Sandgrouse *Pterocles senegallus*, Desert Finch Lark *Ammomanes deserti*, Greater Hoopoe Lark *Alaemon alaudipes*, Grey Hypocolius *Hypocolius ampelinus* and Trumpeter Finch *Rhodopechys githaginea*, the Thar Desert forms their extreme eastern distributional range. Many of them occur from the Thar desert westward in the whole of the Middle East and then all the way up to Morocco in North Africa. Incidentally, the Thar desert does not have any Endemic Bird Area or Secondary Area as none of the species is wholly restricted to this biogeographic zone.

### 4. THE SEMI-ARID REGION

It is a region with rainfall varying from 400 to 1,000 mm and dominated by grass and shrub species. The semi-arid region shows high avian numbers, especially granivorous species such as finches, munias, larks, doves and pigeons. It has Dry Deciduous Forests and extensive tracts of grasslands on the Deccan plateau in central India, Malwa plateau in northwest India, and Saurashtra region in Gujarat. The Semi-Arid region merges with the Desert on the western side and with the Gangetic Plains in the north. More than 100 species of birds use the semi-arid grasslands for foraging and/or nesting (Rahmani 1996b). A majority of the species (83%) are present in other grassland types or even in small grassland patches within forests, but 17 species are exclusively present in this zone. Four species are found only in the Semi-Arid and Deccan regions and nowhere else. They are the Malabar Crested Lark *Galerida malabarica*, the Syke's Crested Lark *G. deva*, the Green Munia *Amandava formosa* and the Rock Bush Quail *Perdicula argoondah*. The Indian Chat or Brown Rock Chat *Cercomela fusca* is another endemic bird found in



Photo: B.I. Lal, Habitat

the Arid, Semi-arid regions and the Gangetic Plains. Perhaps the most endangered species of the Semi-Arid Zone is the Lesser Florican *Sypheotides indica*. Its main breeding areas used to be the grasslands of the Malwa plateau and Suarashtra but due to destruction of grasslands, this bird has disappeared from most of its range (Sankaran *et al.* 1992).

According to the biogeographic zone classification of Rodgers *et al.* (2000), the Semi-Arid Zone occurring in eastern Rajasthan, Gujarat (except Kutch which falls in the Desert Zone), western Madhya Pradesh, parts of Uttar Pradesh, Haryana, Punjab and southern parts of Jammu and Kashmir, constitutes about 5,48,850 sq. km or 16.60% of India's geographical area. In this zone, there are eight national parks, totalling 1,319 sq. km or 0.24%, and 83 wildlife sanctuaries, covering nearly 14,000 sq. km or 2.56% of surface. The average size of a national park is less than 200 sq. km. Similarly, wildlife sanctuaries are also small, and to top that, are beset with numerous human-related problems (encroachment, overgrazing, illegal tree felling, poaching, mining etc). Some sanctuaries are on paper only, with no effective control and management.

### Globally Threatened\* species of the Semi-Arid Zone

Species Name	Scientific Name	IUCN Category	Number of IBAs
Greater Spotted Eagle	<i>Aquila clanga</i>	VU	14
Eastern Imperial Eagle	<i>Aquila heliaca</i>	VU	10
Oriental White-backed Vulture	<i>Gyps bengalensis</i>	CR	31
Long-billed Vulture	<i>Gyps indicus</i>	CR	25
Lesser Kestrel	<i>Falco naumanni</i>	VU	5
Sarus Crane	<i>Grus antigone</i>	VU	29
Great Indian Bustard	<i>Ardeotis nigriceps</i>	EN	2
Lesser Florican	<i>Sypheotides indica</i>	EN	6
Sociable Lapwing	<i>Vanellus gregarius</i>	VU	3
Indian Skimmer	<i>Rynchops albicollis</i>	VU	12
Stoliczka's Bushchat	<i>Saxicola macrorhyncha</i>	VU	5
Pied Tit	<i>Parus nuchalis</i>	VU	6
Green Munia	<i>Amandava formosa</i>	VU	3

\*Only those threatened species for which this biogeographic zone is very important are listed

CR = Critically Endangered, EN = Endangered, VU= Vulnerable

\*\*As many species listed in this table are widespread, they are likely to be present in many more IBAs and in a wider landscape.

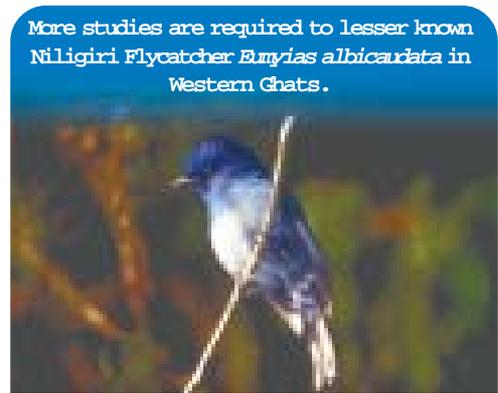
### 5. THE WESTERN GHATS

The Western Ghats on the northwest coast of India extend for about 1600 km from the River Tapti (21° N) in the north to Kanyakumari (8° N) in the south. Except for the 25 km Palghat Gap, the Western Ghats stand unbroken but the peaks vary greatly. The highest peak is Anamudi (2,700 m). More than 500 species of birds have been reported from the Western Ghats, including 16 endemic species found nowhere else in the world. None of which is at present in danger of extinction but habitat loss is a major concern.

Despite being tropical, the forests of the Western Ghats are comparatively poorer in bird life compared to similar forests in northeast India or southeast Asia. For instance, 12 species of pittas are found in Southeast Asia but a single species is seen in the Western Ghats (Daniels 1997). Only five species of sunbirds are reported from the Western Ghats while 76 species are found in similar tropical forests in Africa. Nevertheless, the Western Ghats are one of the biodiversity hotspots of the world. Consider this. The Montane Rain Forests contain about a third of the plants, almost half of the reptiles, and more than three-fourths of the amphibians known in India are found in this narrow strip (Wikramanayake *et al.*

2002). About 90 of India's 484 reptile species are endemic to these forests, including eight endemic genera (*Brachyophidium*, *Dravidogecko*, *Melanophidium*, *Plectrurus*, *Ristella*, *Salea*, *Teretrurus* and *Xylophis*). The amphibian fauna exhibits even greater levels of endemism: almost 50 per cent of India's 206 amphibian species are endemic to this region (Wikramanayake *et al.* 2002).

The Western Ghats could be divided into three regions, (a) northern; (b) central; and (c) southern Western Ghats. These divisions are appropriate in the context of birds as well (Daniels 1997). The major rivers which originate in the Western Ghats are the Godavari (1,500 km), Krishna (1,400 km), and Cauvery (805 km). All these rivers flow eastwards while other rivers such as Gayatri, Kalinadi, Nethravathi, Sharavathi, Bharathapuzha and Periyar flow westwards. These rivers are dependent on the monsoons, because the Western Ghats are chiefly monsoonic and the main rainy season lies between June-September. Rainfall also depends on the elevation and topography of the area. Kerala receives the maximum rainfall, over 7,000-8,500 mm in some places.



More studies are required to lesser known Nilgiri Flycatcher *Eumyias albicaudata* in Western Ghats.

Photo: Clement Brancisi M.

#### Restricted Range species in the Western Ghats

Sixteen restricted range species of birds have been recorded from the Western Ghats. Of which seven species are distributed between the sea-level to about 1,500 m of elevation in Evergreen and Semi-Evergreen Rain Forests, although most also occur in Moist Deciduous Forest and Subtropical Hill Forest (Stattersfield *et al.* 1998). Five of them are found all over the Ghats, but two of them are not recorded north of Goa, namely the Wynaad Laughingthrush *Garrulax delesserti* and the White-bellied Treepie *Dendrocitta leucogastra*. Wet Temperate Sholas and Subtropical Broadleaf Hill Forests are important habitats for five restricted range species and they are distributed in the Bababudan, Brahmagiri, Biligirangan, Nilgiri, Palni and Anamalai Hills. The Nilgiri Laughingthrush *Garrulax cachinnans* is distributed only in the Nilgiri Hills. The Nilgiri Pipit *Anthus nilghiriensis* and the Broad-tailed Grass-Warbler or Grassbird *Schoenicola platyura* are found in the Montane Grasslands on the higher southern ranges and earlier were known to be distributed in the southern Western Ghats only but now both have been seen in northern Western Ghats also. For instance, the Broad-tailed Grass-Warbler has been seen near Nasik (B. Raha *pers. comm.* in 2003), and the Nilgiri Pipit near Mumbai (K. B. Singh *pers. comm.* in 2003). The lowland to high altitude birds such as Nilgiri Wood-Pigeon *Columba elphinstonii* and Small or Crimson-backed Sunbird *Nectarinia minima* are found in the whole of the Western Ghats.

#### Globally Threatened\* and Restricted Range species in the Western Ghats

Species Name	Scientific Name	IUCN Category	Number of IBAs
Lesser Adjutant	<i>Leptoptilos javanicus</i>	VU	9
Greater Spotted Eagle	<i>Aquila clanga</i>	VU	8
Lesser Kestrel	<i>Falco naumanni</i>	VU	4
Wood Snipe	<i>Gallinago nemoricola</i>	VU	4
Nilgiri Wood-pigeon	<i>Columba elphinstonii</i>	VU, RR	54
Blue-winged Parakeet	<i>Psittacula columboides</i>	RR	38
Malabar Grey Hornbill	<i>Ocyrceros griseus</i>	RR	39
Nilgiri Pipit	<i>Anthus nilghiriensis</i>	VU, RR	22
Grey-headed Bulbul	<i>Pycnonotus priocephalus</i>	RR	31
White-bellied Shortwing	<i>Brachypteryx major</i>	VU, RR	27
Indian Rufous Babbler	<i>Turdoides subrufus</i>	RR	29
Broad-tailed Grass-Warbler	<i>Schoenicola platyura</i>	VU, RR	20
Wynaad Laughingthrush	<i>Garrulax delesserti</i>	RR	23
Nilgiri Laughingthrush	<i>Garrulax cachinnans</i>	VU, RR	11
Grey-breasted Laughingthrush	<i>Garrulax jerdoni</i>	RR	17
Black-and-Orange Flycatcher	<i>Ficedula nigrorufa</i>	RR	27
Nilgiri Flycatcher	<i>Eumyias albicaudata</i>	VU, RR	28
Kashmir Flycatcher	<i>Ficedula subrubra</i>	VU	3
White-bellied Blue-flycatcher	<i>Cyornis pallipes</i>	RR	36
Small Sunbird	<i>Nectarinia minima</i>	RR	51
White-bellied Treepie	<i>Dendrocitta leucogastra</i>	RR	30

\*Only those Threatened species for which this biogeographic zone is very important are listed

CR = Critically Endangered, EN = Endangered, VU= Vulnerable, RR = Restricted Range

The Western Ghats (1,32,606 sq. km), constituting about 4.03% of India's geographical area, have 12 national parks and 44 wildlife sanctuaries, covering 13,425 sq. km or 10.12% of the land surface (Rodgers *et al.* 2000).

The Western Ghats and isolated areas of Moist Forests in the Eastern Ghats and elsewhere in peninsular India constitute Biome-10: Indian Peninsula Tropical Moist Forest (BirdLife International, undated). This biome is located mainly below c. 1,000 m and the key habitats are Lowland Evergreen Rain Forest, Semi-Evergreen Rain Forest, Moist Deciduous Forest and Hill Evergreen Forest. Fifteen bird species have been identified that represent the bird assemblage of this biome. None of them are globally threatened, although some of them such as the Ceylon Frogmouth *Batrachostomus moniliger*, the Malabar Trogon *Harpactes fasciatus*, the Malabar Pied Hornbill *Anthracoceros coronatus*, the Malabar Whistling Thrush *Myiophonus horsfieldii* and the Black-headed Babbler *Rhopocichla atriceps* are confined to undisturbed forests, hence of some conservation concern as the forest habitats are restricted.



## 6. THE DECCAN PENINSULA

Deccan is derived from *Dakshina* (Sanskrit word) which means south. The area of the Deccan Peninsula is about 13,80,380 sq. km, or 42% of the total area of India (Rodgers *et al.* 2000).

Much of the Peninsula is constituted by the Deccan plateau, with a mean elevation of about 600 m, sometimes up to 900 m. The plateau is flanked by a narrow coastal strip on the west and by a much broader coastal region on the east. The rivers flowing through the Peninsula have flat, shallow valleys with a low gradient. The main rivers of the Deccan Peninsula are the Narmada, Tapi, Mahanadi, Godavari, Krishna and Cauvery and their tributaries and associated lakes.

The climate of the Deccan Plateau is dry. The Deccan Peninsula has five divisions, (1) Deccan plateau south; (2) Deccan plateau north; (3) Eastern Highlands; (4) Chhota Nagpur and (5) Central Highlands. The northern plateau is very dry while the Eastern Highlands is a small province but biologically the richest (Cherian 2000). This region (Eastern highlands) also consists of the Eastern Ghats and the moist hills and valleys of the Chattisgarh-Dandakaranya areas. Chhota Nagpur is moist in the northwest while the remaining parts are dry. The Central Highlands include both the Satpura and the Vindhya Hill ranges.

There are 21 national parks covering 8,571 sq. km (0.62% of the area), and 116 wildlife sanctuaries totalling about 42,580 sq. km or 3.08% of the Deccan Peninsula (Rodgers *et al.* 2000). However, this figure is distorted by the huge, almost 9,000 sq. km Jawaharlal Nehru Bustard Sanctuary of the Solapur and Ahmednagar districts. Human beings occupy more than 95% of this 'paper sanctuary'.

The Deccan Peninsula has some of the finest Dry Deciduous Forests, particularly in Madhya Pradesh, Orissa and Maharashtra. It also has some grasslands where relict populations of the Great Indian Bustard and Lesser Florican are found. The common endemic species (found in India only) are Grey Junglefowl *Gallus sonneratii*, Painted Francolin *Francolinus pictus*, Rock Bush-Quail *Pedicularia argoondah*, Painted Bush-Quail *Pedicularia erythrorhyncha* and Syke's Crested Lark *Galerida deva*. Some of these species are found in other biogeographical regions such as the Western Ghats, the Semi-Arid and the Desert regions, and the Gangetic Plains. Among the threatened species of birds in the Deccan Peninsula, there are endemic species namely Yellow-throated Bulbul *Pycnonotus xantholaemus*, Forest Owlet *Heteroglaux blewitti*, Jerdon's Courser *Rhinoptilus bitorquatus* and Green Munia *Amandava formosa*. The first three species are the birds of the Secondary Areas as defined by Stattersfield *et al.* (1998). The other threatened birds are the Great Indian Bustard and the Lesser Florican.

### Secondary bird areas in the Deccan Peninsula

In this biogeographical zone (of Rodgers and Panwar's classification), we find two Secondary Areas as per the classification of BirdLife International. (A secondary area is an area which supports one or more restricted-range bird species, but does not qualify as an Endemic Bird Area because fewer than two species are entirely confined to it). These Secondary Areas are, (1) Southern Deccan plateau and (2) Central Indian Forest.

#### Southern Deccan Plateau (SA: s072)

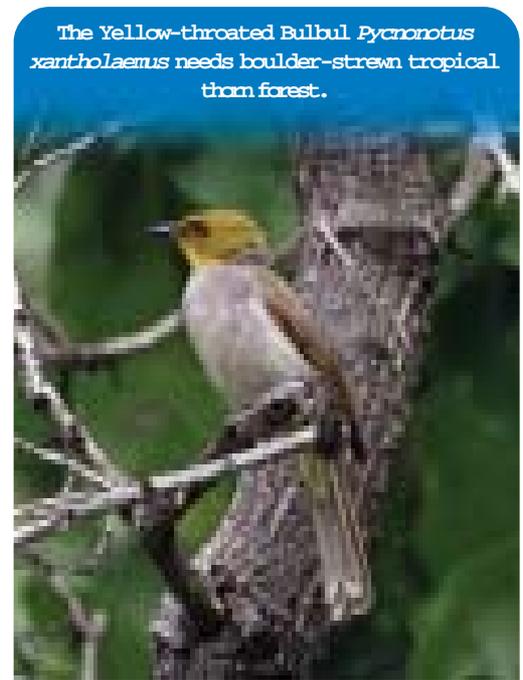
This area falls in the states of Karnataka, Andhra Pradesh, Tamil Nadu, Kerala and possibly Orissa, where the Yellow-throated Bulbul *Pycnonotus xantholaemus* is distributed. This bird is uncommon and patchily distributed on boulder-strewn hills with vegetation ranging from Tropical Thorn Scrub and Dry Deciduous Forests to Moist Deciduous Forests between about 600 and 1,200 m (Ali and Ripley 1987, Subramanya *et al.* 1993, 1995, Stattersfield *et al.* 1998). The main threats to this particular bird are total clearance of vegetation, excessive wood-cutting, cattle-grazing and the quarrying of hillocks (Subramanya *et al.* 1993, 1995, Stattersfield *et al.* 1998).

The IBAs occurring in the Secondary Area where this species is found are: Horsely Hills, Kaundinya, Sri Peninsula Narasimha WLS, Sri Venkateswara WLS, Hampi, Jogimatti State Forest, Ramanagara State Forest, and Chinnar WLS.

#### Central Indian Forests (SA: s075)

This Secondary Area is where the Critically Endangered Forest Owlet *Heteroglaux blewitti* occurs, especially in eastern Madhya Pradesh, northwest Maharashtra and northwest Orissa. This bird was thought to be extinct but was rediscovered in 1997. Very little information was available till recently. The BNHS has started a project on this species.

The IBAs occurring in the Secondary Area where this species is found are: Melghat Tiger Reserve, Gugamal, Taloda (Shahada) and Toranmal.





## 7. THE EASTERN GHATS

Although Rodgers and Panwar (1988) and Rodgers *et al.* (2000) have included the Eastern Ghats in the Deccan Peninsula biogeographic zone, we are describing the region separately as the Eastern Ghats are important from the avifaunal distribution point of view.

The Eastern Ghats (11° 31' and 21° 0' North and 77° 22' and 85° 21' East) are spread through Orissa, Andhra Pradesh, and Tamil Nadu. The Eastern Ghats consist of about 75,000 sq. km with an average width of 200 km in the north and 100 km in the south. They extend over a length of 1,750 km between the Rivers Mahanadi in the north and Vaigai in the south, along the east coast of India (Pullaiah 2002). The northernmost boundary of the Eastern Ghats consists of the Mahanadi basin, while the Nilgiri Hills form the southern boundary of the Eastern Ghats. Pullaiah (2002) also mentions that in the west, the Eastern Ghats merge with the tips of the Bastar, Telangana and Karnataka plateaux and Tamil Nadu uplands, while the coastal area in the east limits its eastern part. The Eastern Ghats are not contiguous because the rivers Mahanadi, Godavari and Krishna cut across them (Pullaiah 2002). In the north, the highest peak is Mahendragiri (1,501 m) in the Ganjam district of Orissa. The average elevation in the northern Eastern Ghats is about 400 m. There is a 130 km gap in the Ghats in the Guntur district, and then the middle Eastern Ghat start and extend from the Krishna to near about Chennai, including the Nallamalais, Palakonda, Velikonda and Seshachalam Hills where the average elevation is about 750 m (Pullaiah 2002). The southern Eastern Ghats run towards the Western Ghats and meet in the Nilgiris. This section includes the Javadi Hills, the Kollimalai, the Pacchamalai, the Kalrayan, the Shevoar and the Biligirirangan Hills. The highest peak in this region is 1750 m in the Biligirirangan Hills which forms the southern tip of the Eastern Ghats.

The climate of the Eastern Ghats is tropical. The region receives rainfall from the southwest monsoon, and the northeast retreating monsoon, ranging from 1200 to 1600 mm. The region also has semi-arid climate. Cyclonic storms are frequent during the rainy season, especially on the coastal plains. The temperature in January ranges between 20 °C and 25 °C, and the maximum temperature shoots up to 41 °C during the summer months and the minimum is 5 °C in the winter. The relative humidity varies from 70 to 75%.

The vegetation of the Eastern Ghats consists of Evergreen Forests, Tropical Semi-Evergreen Forests, Tropical Moist Deciduous Forests, Southern Tropical Dry Deciduous Forests, Northern Mixed Dry Deciduous forests, Dry Savannah Forests, Tropical Dry Evergreen Forests and Tropical Dry Evergreen Scrub (Pullaiah 2002).

The Eastern Ghats are very rich in biodiversity, which consists of 2,500 species of angiosperms or about 13% of the flowering plants of India (Pullaiah 2002). As far as the fauna of the Eastern Ghats is concerned, adequate information is lacking. Nevertheless, 115 species of amphibians and reptiles have been reported from the Eastern Ghats (Daniels 2000). Golden Gecko *Calodactylodes aureus* was rediscovered from Chittoor in 1986 (Daniel *et al.* 1986).

The Eastern Ghats are rich in avifaunal diversity. However, they have received relatively little attention from the biologists (Ripley *et al.* 1987-88). There are only two systematic and comprehensive ornithological surveys undertaken so far in the entire Eastern Ghats region. They are the Vernay scientific survey of the Eastern Ghats (Whistler and Kinnear 1930-37) and the Hyderabad State Ornithological Survey (Ali 1933-34). Other significant studies on the birds of the Eastern Ghats were done by Abdulali (1945), Krishna Raju (1985), Trevor Price (1978, 1979), Ripley *et al.*, (1987-88) and Bhushan (1994).

The Eastern Ghats support nearly 400 species and subspecies of birds (Bhushan 1994). The Critically Endangered Jerdon's Courser *Rhinoptilus bitorquatus* is found in the Eastern Ghats. Apart from this, the Yellow-throated Bulbul *Pycnonotus xantholaemus*, which is endemic to southern peninsular India, is also found in the southern part of the Eastern Ghats.

The occurrence of Tree Sparrow *Passer montanus*, Abbot's Babbler *Malacocincla abbotti* and Little Spiderhunter *Arachnothera longirostra* in the northern parts of the Eastern Ghats is of zoogeographical interest since these species are considered as Himalayan/Southeast Asian relicts (Ripley *et al.* 1987-88). The Eastern Ghats in their southernmost part run in a southwest direction to meet the Western Ghats. Species such as the Yellow-browed bulbul *Iole indica* and the White-bellied Treepie *Dendrocitta leucogastra*, which are mainly confined to Western Ghats, are found in this region as well (Ali and Ripley 1987). Apart from these resident species, the Eastern Ghats are important flyways for winter visitors. Coastal wetlands and forested watershed in the Eastern Ghats hill ranges act as important wintering ranges for migrant bird species (Bhushan 1994).

### Secondary Bird Area in Eastern Andhra Pradesh (SA: s071)

This area is identified for the Endangered Jerdon's Courser *Rhinoptilus bitorquatus* which is a poorly known nocturnal bird, thought extinct for 86 years (King 1978-1979) until its rediscovery in January 1986. Historically, the bird was found in the Penner and Godavari valleys in Andhra Pradesh (east-central India). The habitat of this bird is thin scrub on rocky and undulating ground including disturbed areas where regeneration is affected by grazing and firewood collection (Bhushan 1986a,b, Ali and Ripley 1987). The BNHS has started a major project on this bird to study the ecology and biology and has recently recorded the species from three sites around the Lankamalai ranges (near the Penner valley) in southern Andhra Pradesh (Jeganathan *et al.* 2002, Jeganathan *et al.* 2004, Jeganathan and Wotton 2004).

Two IBAs identified for Jerdon's Courser are Sri Lankamalleswara and Sri Peninsula Narasimha wildlife sanctuaries.



Globally threatened\* species of the Deccan Biogeographic Zone

Species Name	Scientific Name	IUCN Category	Number of IBAs
Spot-billed Pelican	<i>Pelecanus philippensis</i>	VU	23
Lesser Adjutant	<i>Leptoptilos javanicus</i>	VU	8
Oriental White-backed Vulture	<i>Gyps bengalensis</i>	CR	42
Long-billed Vulture	<i>Gyps indicus</i>	CR	26
Greater Spotted Eagle	<i>Aquila clanga</i>	VU	17
Lesser Kestrel	<i>Falco naumanni</i>	VU	8
Great Indian Bustard	<i>Ardeotis nigricaps</i>	EN	4
Lesser Florican	<i>Sypheotides indica</i>	EN	5
Jerdon's Courser	<i>Rhinoptilus bitorquatus</i>	CR	2
Purple Wood-Pigeon	<i>Columba punicea</i>	VU	3
Forest Owlet	<i>Heteroglaux blewitti</i>	CR	3
Yellow-throated Bulbul	<i>Pycnonotus xantholaemus</i>	VU	12
Broad-tailed Grass-Warbler	<i>Schoenicola platyura</i>	VU	1
Pied Tit	<i>Parus nuchalis</i>	VU	1
Green Munia	<i>Amandava formosa</i>	VU	12

\*Only those Threatened species for which this biogeographic zone is very important are listed  
CR = Critically Endangered, EN = Endangered, VU= Vulnerable

8. THE GANGETIC PLAINS

About 3,54,800 sq. km in area, the Gangetic Plains are one of the most fertile areas of the world, with a nearly 3,000 year history of human occupation. It is also one of the most densely populated areas of the world. The twin combination of a long history of human occupation and dense and still growing human population has resulted in an almost complete conversion of the original vegetation into cropland and human settlements. The Gangetic Plains are drained by numerous rivers and streams, the most famous obviously is River Ganga.

This region is famous for its flood-plain wetlands – results of copious rainfall in the Gangetic Plains and also in the Himalayas from where most of the rivers originate. Large areas are annually flooded and when the flood recedes, it leaves low-lying areas under water. These wetlands are extremely productive in terms of vegetation biomass and avian diversity (Howes 1995). Some of the most important wetland IBAs are found in this region with significant populations of waterfowl. Sultanpur in Gurgaon, Bhindawas in Rohtak, Patna *jheel* in Etah, Lakh-Bahosi in Farrukhabad, Saman in Mainpuri, and Nawabganj in Unnao are some of the more spectacular wetlands for migratory waterfowl in winter.



Photo: Penwez Inghal

The marshes and wetlands of the Gangetic drainage system show a long history of stability in the geological sense, thus a large number of marsh-dependent species are found such as the Striated Marsh Warbler or Grassbird *Megalurus palustris*, Bristled Grass-Warbler or Grassbird *Chaetornis striatus*, Rufous-rumped Grass-Warbler or Grassbird *Graminicola bengalensis*, Yellow-bellied Prinia *Prinia flaviventris*, Swamp Francolin *Francolinus gularis*, Bengal Florican *Houbaropsis bengalensis* and various ducks. Unfortunately, one of the species, the Pink-headed Duck *Rhodonessa caryophyllacea*, has become extinct, not due to any geological upheaval but due to human-related activities.

There is practically no natural vegetation left in the Gangetic Plains, except in the region known as *terai*, which is sandwiched between the *bhabhar* tract of the Sub-Himalayas and the main Gangetic Plains. The tall, moist grasslands of the *terai*, interspersed with the Sal *Shorea robusta* forest contain some of the most endangered bird species of India (Rahmani 1988, Javed and Rahmani 1998) such as the Swamp Francolin, Bengal Florican, and Finn's Weaver *Ploceus megarhynchus*. Javed and Rahmani (1998) have recorded 330 species from the Dudwa National Park which is perhaps the best *terai* forest left in north India.

The Gangetic Plains Biogeographic Zone is also important for many Near Threatened species, especially Darter *Anhinga melanogaster*, Painted Stork *Mycteria leucocephala*, Black-necked Stork *Ephippiorhynchus asiaticus*, Oriental White or Black-headed Ibis *Threskiornis melanocephalus*, Ferruginous Duck *Aythya nyroca*, and Black-bellied Tern *Sterna acuticauda*.

The Gangetic Plains forms almost 11% of the land surface of India. According to Rodgers *et al.* (2000) it has six national parks, covering 2,363.44 sq. km or 0.67% the area, and 30 wildlife sanctuaries totalling 5,285.48 sq. km or 1.49%. Most of the PAs are rather small and may not have significant long-term viable populations of large mammals and birds.

Globally threatened bird species of the Gangetic Plains

Species name	Scientific name	Category	Number of IBAs
Spot-billed Pelican	<i>Pelecanus philippensis</i>	VU	3
Lesser Adjutant	<i>Leptoptilos javanicus</i>	VU	16
Greater Adjutant	<i>Leptoptilos dubius</i>	EN	0
White-headed Duck	<i>Oxyura leucocephala</i>	EN	0
Lesser White-fronted Goose	<i>Anser erythropus</i>	VU	0
Baikal Teal	<i>Anas formosa</i>	VU	0
Marbled Teal	<i>Marmaronetta angustirostris</i>	VU	2
Pink-headed Duck (Extinct?)	<i>Rhodonessa caryophyllacea*</i>	EX	0
Baer's Pochard	<i>Aythya baeri</i>	VU	3
Pallas's Fish Eagle	<i>Haliaeetus leucoryphus</i>	VU	14
Oriental White-backed Vulture	<i>Gyps bengalensis</i>	CR	16
Long-billed Vulture	<i>Gyps indicus</i>	CR	8
Greater Spotted Eagle	<i>Aquila clanga</i>	VU	18
Eastern Imperial Eagle	<i>Aquila heliaca</i>	VU	3
Lesser Kestrel	<i>Falco naumanni</i>	VU	5
Swamp Francolin	<i>Francolinus gularis</i>	VU	11
Siberian Crane	<i>Grus leucogeranus**</i>	CR	0
Sarus Crane	<i>Grus antigone</i>	VU	24
Bengal Florican	<i>Houbaropsis bengalensis</i>	EN	4 (excluding the Assam Plains)
Indian Skimmer	<i>Rynchops albicollis</i>	VU	3
Hodgson's Bushchat	<i>Saxicola insignis</i>	VU	0
Marsh Babbler	<i>Pellorneum palustre</i>	VU	0
Jerdon's Babbler	<i>Chrysomma altirostre***</i>	VU	1
Slender-billed Babbler	<i>Turdoides longirostris****</i>	VU	0
Bristled Grass-Warbler	<i>Chaetornis striatus</i>	VU	1
Finn's Weaver	<i>Ploceus megarhynchus</i>	VU	4

CR= Critically Endangered, EN =Endangered, VU = Vulnerable

\*Last authentic sight record from Darbhanga, Bihar in 1935.

\*\*Not reported in India since 2002

\*\*\*Most records from terai of Nepal, likely to occur in Bihar and Uttar Pradesh.

\*\*\*\*Old record from Uttar Pradesh. Probably occurs in north West Bengal.

Note: As many species listed in this table are widespread, they are likely to be present in more IBAs, other suitable wetlands and/or a wider landscape.

9. THE NORTHEAST INDIA

Northeast India is one of the biodiversity hotspots of the world. There are various classifications of this region but for this chapter we have followed Rodgers and Panwar (1988) and Rodgers *et al.* (2000). They have included the states of Assam, Meghalaya, Manipur, Mizoram, Nagaland and Tripura, covering a total area of 1,71,341 sq. km. The Northeast is a poorly protected area, with only 1.13% (1933 sq. km) under nine national parks, and 1.41% (2,421 sq. km) under 28 wildlife sanctuaries (see Eastern Himalayas, described under the Himalayan Region).

The Northeast is considered as the 'biological gateway' for much of India's fauna and flora, as the Gondwanaland first touched this region, during the Tertiary period. It represents the transition zone between the Indian, Indo-Malayan and Indo-Chinese biogeographic regions. Rodgers and Panwar (1988) have divided this zone into two provinces: Brahmaputra Valley and the Assam Hills. Stattersfield *et al.* (1988) have identified the Assam Plains (Brahmaputra Valley) as one of the Endemic Bird Areas of India.

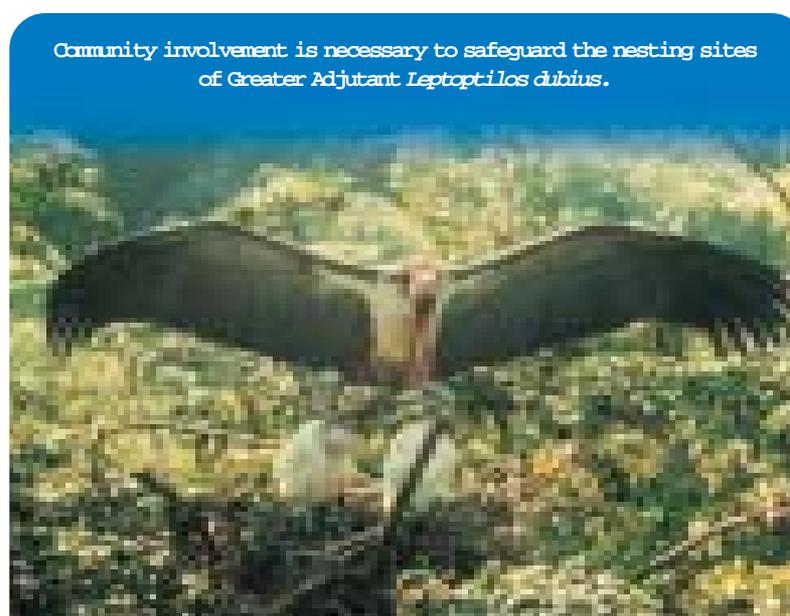


Photo: Hii Lal Jyoti, Sirgha

Important Bird Areas in India – Avifauna of India

Threatened birds of the Northeast Biogeographic Zone (as classified by Rodgers *et al.* 2000)

Species	Scientific Names	IUCN Category	Number of IBAs
Spot-billed Pelican	<i>Pelecanus philippensis</i>	VU	20
White-bellied Heron	<i>Ardea insignis</i>	EN	8
Oriental White Stork	<i>Ciconia boyciana</i>	EN	3
Lesser Adjutant	<i>Leptoptilos javanicus</i>	VU	43
Greater Adjutant	<i>Leptoptilos dubius</i>	EN	22
White-winged Duck	<i>Cairina scutulata</i>	EN	25
Baikal Teal	<i>Anas formosa</i>	VU	1
Marbled Teal	<i>Marmaronetta angustirostris</i>	VU	1
Pink-headed Duck (Extinct?)	<i>Rhodonessa caryophyllacea</i>	CR	0
Baer's Pochard	<i>Aythya baeri</i>	VU	11
Pallas's Fish-Eagle	<i>Haliaeetus leucoryphus</i>	VU	16
Oriental White-backed Vulture	<i>Gyps bengalensis</i>	CR	36
Long-billed Vulture	<i>Gyps indicus</i>	CR	8
Slender-billed Vulture	<i>Gyps tenuirostris</i>	CR	27
Greater Spotted Eagle	<i>Aquila clanga</i>	VU	21
Eastern Imperial Eagle	<i>Aquila heliaca</i>	VU	2
Lesser Kestrel	<i>Falco naumanni</i>	VU	5
Swamp Francolin	<i>Francolinus gularis</i>	VU	21
Manipur Bush-Quail	<i>Perdica manipurensis</i>	VU	1
Red-breasted Hill-Partridge	<i>Arborophila mandellii</i>	VU	2
Blyth's Tragopan	<i>Tragopan blythii</i>	VU	13
Sclater's Monal	<i>Lophophorus sclateri</i>	VU	0
Mrs. Hume's Pheasant	<i>Syrmaticus humiae</i>	VU	12
Green Peafowl	<i>Pavo muticus</i>	VU	6
Sarus Crane	<i>Grus antigone</i>	VU	1
Masked Finfoot	<i>Heliopais personata</i>	VU	4
Bengal Florican	<i>Houbaropsis bengalensis</i>	EN	13
Wood Snipe	<i>Gallinago nemoricola</i>	VU	2
Spotted Greenshank	<i>Tringa guttifer</i>	EN	4
Purple Wood-Pigeon	<i>Columba punicea</i>	VU	7
Dark-rumped Swift	<i>Apus acuticauda</i>	VU	6
Rufous-necked Hornbill	<i>Aceros nipalensis</i>	VU	26
Fea's Thrush	<i>Turdus feae</i>	VU	1
Rusty-bellied Shortwing	<i>Brachypteryx hyperythra</i>	VU	0
Hodgson's Bushchat	<i>Saxicola insignis</i>	VU	4
Marsh Babbler	<i>Pellorneum palustre</i>	VU	8
Mishmi Wren-Babbler	<i>Spelaornis badeigularis</i>	VU	0
Tawny-breasted Wren-Babbler	<i>Spelaornis longicaudatus</i>	VU	4
Austen's Babbler	<i>Stachyris oglei</i>	VU	0
Jerdon's Babbler	<i>Chrysomma altirostre</i>	VU	5
Slender-billed Babbler	<i>Turdoides longirostris</i>	VU	3
Black-breasted Parrotbill	<i>Paradoxornis flavirostris</i>	VU	8
Hodgson's Prinia	<i>Prinia cinereocapilla</i>	VU	2
Bristled Grass-Warbler	<i>Chaetornis striatus</i>	VU	3
Beautiful Nuthatch	<i>Sitta formosa</i>	VU	3
Finn's Weaver	<i>Ploceus megarhynchus</i>	VU	5

\*Only those threatened species for which this biogeographic zone is very important are listed

CR = Critically Endangered, EN = Endangered, VU= Vulnerable

The Assam Plains Endemic Bird Area in Assam, lowlands of Sikkim, northern West Bengal, parts of Arunachal Pradesh, Nagaland, Manipur and Meghalaya, is basically the flood plains of the mighty River Brahmaputra and its tributaries. The main vegetation of the Assam Plains is floodplain forest and grassland, with adjacent strips of undulating land at the base of the foothills which are marshy and have tall elephant grass and forest (Stattersfield *et al.* 1998). The Assam Plains support some of the most threatened bird (and mammal) species of the world. The Assam Plains also support some of the restricted range birds associated with the remaining grasslands and wetland habitats found below 1,000 m of elevation. The Assam Plains adjoining the mountains of the Endemic Bird Areas of Eastern Himalayas, have many species with overlapping distribution. Three species breed in this EBA and are found in



## Important Bird Areas in India – Avifauna of India

grassland, scrub and wetland habitats on the plains, often along rivers, and in the foothills (Stattersfield *et al.* 1998). The Manipur Bush-Quail *Perdica manipurensis* is confined to the foothills, and is supposed to have a stronghold in the Manipur basin, but no bird has been seen since 1932. The Black-breasted Parrotbill *Paradoxornis flavirostris* sometimes ranges to well above 1,000 m, but is much scarcer in the hills than the plains (Ali and Ripley 1987). The Marsh Babbler *Pellorneum palustre* needs proper study to know its distributional range and breeding habitat.

### Restricted range species of the Assam Plains Endemic Bird Area

Species Name	Scientific Name	IUCN Category	Number of IBAs
Manipur Bush Quail	<i>Perdica manipurensis</i>	VU	1*
Marsh Babbler	<i>Pellorneum palustre</i>	VU	8
Black-breasted Parrotbill	<i>Paradoxornis flavirostris</i>	VU	8

VU = Vulnerable, \*Likely to occur in at least one IBA

### Secondary Bird Areas of Northern Myanmar lowlands

The Northern Myanmar lowland is important for the Chestnut-backed Laughingthrush *Garrulax nuchalis* which is found in the foothills of the eastern part of Arunachal Pradesh, Nagaland and Manipur but this bird has also recently recorded from Upper Dihing (East Complex) in Tinsukia, Assam.

## 10. ISLANDS

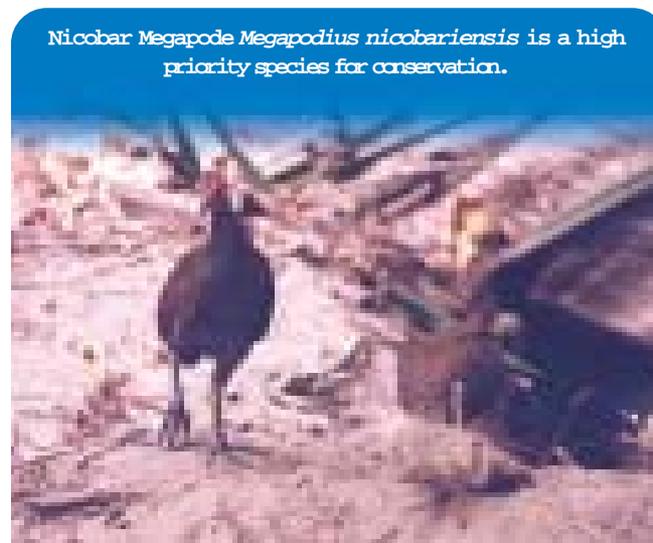
The Andaman and Nicobar Islands, consisting of over 560 islands and rocks, covering about 8,249 sq. km, are the peaks of a submerged mountain range, arching from Myanmar to Sumatra. The vegetation is mainly tropical evergreen, with some grasslands in the inland areas. The coastline of 1,962 sp. km is mainly covered by mangrove. About 270 species and subspecies of birds have been recorded from the Andaman and Nicobar by various workers, of which 105 are endemic species and subspecies (Sankaran and Vijayan 1993). Of the 142 endemic bird species of the Indian subcontinent, 17 are found in Andaman and Nicobar. Thus, while the islands form only 0.25% of the landmass of the subcontinent, they have 12% of the endemic avifauna of the region (Sankaran 1998), making the islands priority areas for conservation.

The highest conservation priority species are the Nicobar Megapode or Scrubfowl *Megapodius nicobariensis*, Edible-nest Swiftlet *Collocalia fuciphaga inexpectata* and Narcondam Hornbill *Aceros narcondami*. There are two subspecies of the Nicobar Megapode: North Nicobar Megapode *Megapodius nicobariensis nicobariensis* and South Nicobar Megapode *M. n. abboti*. For a long time, the Nicobar Megapode was considered as a rare species (Tikadar 1983) but recent studies show that both the subspecies are quite common (Sankaran 1995a). Sankaran (1998) estimates that there could be between 600-2,100 breeding pairs of the North Nicobar Megapode and 3,400-6,000 of the South subspecies. The species is not endangered but is under pressure of habitat loss and poaching with airguns and snares. Egg collection is apparently not a problem (Sankaran 1995a).

The Edible-nest Swiftlets are widely distributed on the islands with a population estimation of 2,500 to 3,600 breeding pairs (Sankaran 1995b). The major threat is excessive and unregulated nest collection. This species belongs to the 'white nest swiftlet' group, whose nests are made entirely of agglutinated saliva, and are of a very high commercial value in the international market. At Port Blair, a kilogram of nests (one kg normally consists of between 70-125 nests) fetches between Rs. 15,000 and Rs. 20,000 or more. Dr. Sankaran found that virtually all colonies are exploited, and nests are collected irrespective of whether there are eggs or chicks in them, with serious impact on the species.

Another endemic species of serious concern is the Narcondam Hornbill. This species is found only on the 7.5 sq. km Narcondam Island. In 1972, Mr. S. A. Hussain of the Bombay Natural History Society had estimated a population of about 400 birds (Hussain 1984). Unfortunately, in 1976, goats were introduced to supply meat to the policemen posted there. Recent studies conducted in 1998 by Dr. Ravi Sankaran have indicated that the introduced goats are having a negative impact on the regeneration of natural vegetation. The goat population has increased to 130-150 in the police camp, and some have escaped and now number about 250 in the wild. These feral goats are the major problem as they eat saplings of trees and prevent regeneration. The hornbills nest in the hollows of old trees and every year, many old trees die or fall down due to storms which are prevalent in the area. If there is no regeneration of trees, then there is a probability that in another 60-80 years, when all the old trees are gone, the Narcondam Hornbills will face a problem of scarcity of nesting holes. This is a long-term problem which can be solved by eliminating the feral goats, and keeping only male goats for food so there is no further chance of a feral population developing. However, the immediate problem is poaching of Hornbills by policemen. Dr. Sankaran, during his three-month stay on Narcondam Island, found that 8-10 birds were shot. He thinks that the annual loss of Hornbills due to poaching could be as high as 40 birds. This illegal hunting could be reduced considerably by environmental education and strict enforcement of the Wildlife Protection Act.

According to Rodgers *et al.* (2000), the Islands which constitute only 0.25% of India's geographical area, have eight national parks and 94 wildlife sanctuaries, covering a total area of about 1,529 sq. km. This is about 18.54% of the land surface. It should be noted that many of the larger PAs are tribal areas and not strictly free from human occupation. Nevertheless, as the tribal pressure is low and sustainable, some of the finest forests of India are seen in the Andaman and Nicobar Islands.



Nicobar Megapode *Megapodius nicobariensis* is a high priority species for conservation.

Photo: K. Sivakumar

### Restricted Range species in the Andaman and Nicobar Islands

There are 13 restricted range species in Andaman and nine in the Nicobar Islands. All of them are mostly forest-dwelling species but a few appear to be quite common in disturbed forest also. Some of the species could be seen near the capital, Port Blair, in South Andaman (Curson 1989). Many islands in Middle and South Andaman have limited access so information is lacking. The Narcondam Hornbill *Aceros narcondami* has an extraordinarily small range, being confined to the small, isolated island of Narcondam with an area of 6.82 km (Stattersfield *et al.* 1998). Four species are shared with the Nicobar Islands indicating the affinity between the two EBAs (*see* Ripley and Beehler 1989; Stattersfield *et al.* 1998).

#### Restricted Range species of Andaman Islands

Species name	Scientific Name	IUCN Category	Number of IBAs
Andaman Serpent-Eagle	<i>Spilornis elgini</i>	NT	15
Nicobar Megapode*	<i>Megapodius nicobariensis</i>	VU	2
Andaman Crane	<i>Rallina canningi</i>	VU	13
Andaman Wood-pigeon	<i>Columba palumboides</i>	NT	16
Andaman Cuckoo-dove	<i>Macropygia rufipennis</i>	NT	
Andaman Coucal	<i>Centropus andamanensis</i>	NT	12
Andaman Scops-Owl	<i>Otus balli</i>	NT	11
Andaman Hawk-Owl	<i>Ninox affinis</i>	NT	16
Narcondam Hornbill	<i>Aceros narcondami</i>	VU	1
Andaman Black Woodpecker	<i>Dryocopus hodgei</i>	NT	13
White-headed Starling	<i>Sturnus erythropygius</i>	NT	
Andaman Drongo	<i>Dicrurus andamanensis</i>	NT	15
Andaman Treepie	<i>Dendrocitta bayleyi</i>	NT	13

\*Presumably extinct in the Andaman group of Islands

VU = Vulnerable, NT = Near Threatened

#### Restricted Range species of Nicobar Islands

Species Name	Scientific Name	IUCN Category	Number of IBAs
Nicobar Serpent-Eagle	<i>Spilornis minimus</i>	NT	3
Nicobar Sparrowhawk	<i>Accipiter butleri</i>	VU	3
Nicobar Megapode	<i>Megapodius nicobariensis</i>	VU	2
Andaman Wood-pigeon	<i>Columba palumboides</i>	NT	16
Andaman Cuckoo Dove	<i>Macropygia rufipennis</i>	NT	16
Nicobar Parakeet	<i>Psittacula caniceps</i>	NT	1
Andaman Hawk-Owl	<i>Ninox affinis</i>	NT	16
Nicobar Bulbul	<i>Hypsipetes nicobariensis</i>	VU	1
White-headed Starling	<i>Sturnus erythropygius</i>	NT	17

VU = Vulnerable, NT = Near Threatened

The Lakshadweep (8° 15' to 11°45' N and 72° 00' to 74° 00' E) archipelago is the smallest Union Territory and has a geographical area of 3,200 ha. It consists of a group of 36 coral islands covering 12 atolls, three reefs and the rest periodically submerged sand banks. Only 11 islands are inhabited which are the Agatti, Amini, Andrott, Bangaram, Bitra, Chetlat, Kadmat, Kalpeni, Kavaratti, Kiltan and Minicoy. Minicoy is the southernmost island of this archipelago and is separated from the rest of the islands by a 9° Channel, about 180 km in width, and from the neighbouring Maldives in the south by a 8° Channel of about 120 km. These islands are irregularly scattered in the south Arabian sea and are about 280 km to 480 km west of Kochi (=Cochin) on the Kerala coast (Das 2002).

Minicoy (4.37 sq. km) is the largest island, with a very high human population density of 1513 humans/sq. km. Unlike the Andaman and Nicobar Islands which are continental, the Lakshadweep Islands are oceanic, thus the biodiversity is not so rich. Habitat diversity is also poor. According to Daniels (1991), till now only 67 species of birds have been authentically reported. Fifty per cent of these are migratory waders and the typically oceanic birds such as terns, skuas, petrels and boobies. Of the 34 species of land birds and inland waterbirds, only 14 are possibly resident in one or more of the islands (Daniels 1991). The uninhabited Pitti Island is a bird sanctuary where a very large colony of the Sooty Tern *Sterna fuscata*, Great or Large Crested Tern *Sterna bergii* and Noddy Tern *Anous stolidus* is found. Another colony is present in Cherbaniani Island. On some of the islands of the archipelago, Wedge-tailed Shearwater *Puffinus lherminieri* and boobies *Sula* species could be breeding.

Pitti Island is one of the most important congregatory sites for seabirds.



Photo: M. Zafar-ul-Islam

## 11. COASTS

The coastline of India, excluding the Andaman and Nicobar Islands, is about 7,500 km. The coasts are perhaps the most neglected biogeographic zone of India, mainly because charismatic species are not found here. Nonetheless, the coasts do have fabulous bird concentrations, as seen in the Chilika Lake (IBA) and Bhitarkanika in Orissa, Point Calimere Wildlife Sanctuary (IBA) in Tamil Nadu, Sunderbans (IBA) in West Bengal, Sewri mudflats (IBA) in Maharashtra and Kori Creek in Gujarat.

Not much information is available about the birds of the coastline, except for a recent study of the Maharashtra coastline conducted by Mr. Prakash Gole. He reported 123 bird species along the coastal regions of Maharashtra. There are two additions: Snipe-billed or Asian Dowitcher *Limnodromus semipalmatus* and Crab Plover *Dromas ardeola* from the Maharashtra coast.

Besides the sand beaches and rocky outcrops which are important as foraging sites for many waders, the mangroves serve as breeding ground for many species such as egrets, herons, storks, warblers and raptors. A checklist of some birds associated with the mangroves of Ratnagiri has been prepared by Samant (1985). Deshmukh (1990) has identified 147 species of birds from the mangrove swamps of Vikhroli, near Mumbai.

According to Rodgers *et al.* (2000), the Coasts Biogeographic Zone covers about 83,000 sq. km, 2.52% of India's geographical area. There are five national parks covering an area of 1,731 sq. km, and 21 wildlife sanctuaries totalling about 3,888 sq. km. The total coastal area under some legal protection is about 5,600 sq. km.

The wintering habitat requirements of the Endangered Spoon-billed Sandpiper *Calidris pygmeus* needs to be studied for effective conservation measures.



Photo: Shimpel, Watanabe/BirdLife International

### Globally Threatened species found in the Coasts Biogeographic Zone

Species	Scientific Name	IUCN Category	Number of IBAs
Masked Finfoot	<i>Heliopais personata</i>	VU	1
Spotted Greenshank	<i>Tringa guttifer</i>	EN	2
Spoon-billed Sandpiper	<i>Calidris pygmeus</i>	VU	3

EN= Endangered, VU = Vulnerable