

SIKKIM

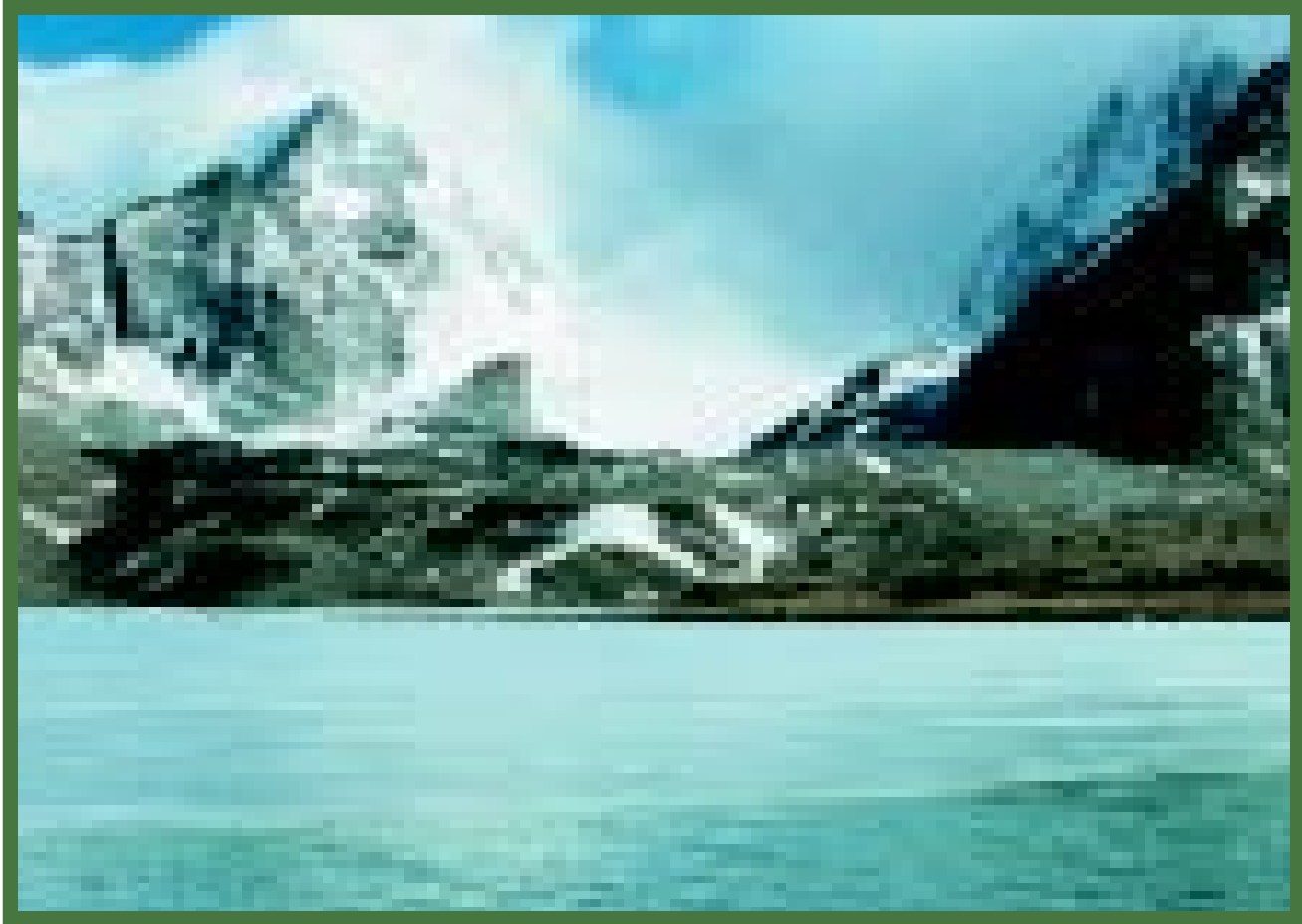


Photo: Asad R. Rahmani

Some high altitude wetlands of Sikkim are important for waterbirds.

Sikkim (27° 05' - 28° 09' North and 87° 59' - 88° 56' East) is one of the smallest and the least populous states in India. It covers an area of 7,096 sq. km, extending approximately 114 km from North to South and 64 km from East to West. Wedged in between the Himalayan kingdoms of Nepal in the west and Bhutan in the east, Sikkim is bounded by the Darjeeling District of West Bengal in the south and a stretch of Tibetan Plateau in the north. There are four districts in Sikkim, namely North Sikkim, West Sikkim, South Sikkim and East Sikkim.

Sikkim is classified as part of the biogeographic province of Central Himalayas, which in India includes the Darjeeling District of West Bengal with a Temperate-Broadleaf forest. The north of Sikkim is a biogeographic province of Trans-Himalaya-Tibetan plateau (Rodgers et al. 2002) with biota of Palaearctic affinity.

Sikkim is the wettest region in the entire Himalayan chain as it receives the unobstructed inflow of the southwest monsoon winds from the Bay of Bengal, which then precipitate in this region (Ali 1962). It is surrounded by (i) the Singalila mountain chain culminating in the mighty Khangchendzonga peak which at over 8,598 m is the world's third highest, (ii) the Chola range and the Chumbi Valley on the Bhutan-Tibet side and (iii) the main Himalayan axis across the North. This forms a gigantic horseshoe catchment of the River Tista, the lifeline and the main river of Sikkim, and all its feeder streams, viz., Lhonak, Zemu, Lachung, Tolung, Great Rangit, Rongni and Rangpo. The Rangit and the Tista rivers form the main channels of drainage and run nearly North-South. These perennial rivers are rain-fed and snow-fed. The valleys cut by these rivers and their streams are very deep and mostly forested.

According to human population census of 2001, the State has a population of about 5,40,500, with the density of 76 persons per sq. km. Almost 92% of the population lives in rural areas. Literacy rate is about 70%. East Sikkim is the most populous district (2,44,790) among the four districts while the lowest population is found in North Sikkim (41,023).

The average annual rainfall ranges between 210 mm to 2,500 mm. The rainfall varies widely between sheltered valleys, foothills and high mountains (alpine region). Temperature varies with the altitude and the slope. In lower altitudes, the temperature is between 4.5 °C to 18.5 °C, whereas at higher altitude, it varies from 1.5 °C to 9.5 °C. Still higher up, the temperature can go down as low as -30 °C.

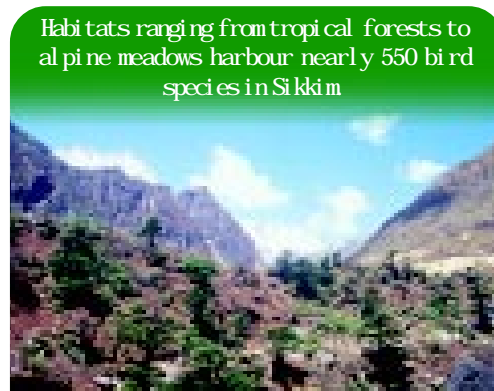
Forestry is the major land use in the State and nearly 80% of the total geographical area of the State is under the administrative control of the State Forest Department. This proportion is one of the largest in the country. There is one high altitude national park (and also biosphere reserve) and six wildlife sanctuaries, which together constitute over 30% of the total geographical area of the State.

### Vegetation

Covering just 0.2% of the geographical area of India, Sikkim shows great biological diversity. In a land of vast variation in altitude within very short distances, ranging from around 300 m to 8,598 m, elevation plays a prime role in fashioning the ecoregions of the State. This is evident from the presence of Sal forests in the Rangit Valley in the south, to the temperate fir forests in the north, beyond which lie the Trans-Himalayas and the cold desert of the Tibetan plateau.

Broadly speaking, there are five altitudinal zones of vegetation, not clear-cut at their boundaries as they merge into one another.

The Tropical Ecoregion extends roughly from the foothills of the Outer Himalayas to an altitude of about 1,200 m. It contains steep-sided valleys and gorges with well-drained flanking slopes. Various species of orchids, Rhipidophora, wild banana, Pandanus, nettles and giant bamboo are characteristic of the region. In the region of Rangit Valley, Sal *Shorea robusta* shows a unique association with the Chir Pine *Pinus roxburghii*. In patches of protected forest, it is possible to see the weak Sal being slowly dominated by the Pine. These patches are relatively poor in bird life. However, the lowland forests of Sikkim are home to several threatened species of birds such as the Rufous-necked Hornbill *Aceros nipalensis*, the Great Pied Hornbill *Buceros bicornis*, locally called 'Hongraio', the Chestnut-breasted Partridge *Arborophila mandelli*, the Black-breasted Parrotbill *Paradoxornis flavirostris*, the Grey-crowned Prinia *Prinia cinereocapilla* and the Ward's Trogon *Harpactes wardi*. Other lowland fauna includes the introduced Peafowl *Pavo cristatus*, python, geckos, porcupines, Assamese Macaque *Macaca assamensis* and Barking Deer *Muntiacus muntjak* and a host of butterflies and other invertebrates, fish, frogs and toads. Several species of migratory waterbirds use the river systems during transit. A representative area of the Kitam Reserve Forests is proposed to be notified as a bird sanctuary.



Habitats ranging from tropical forests to alpine meadows harbour nearly 550 bird species in Sikkim

Photo: Asad R. Rahmani

The Sub-Tropical ecoregion extends from about 1,800 m to 3,000 m. The rainfall in this zone is very heavy and conditions remain humid throughout the year. The upper-storey mainly consists of *Castanopsis hystrix*, *Machilus* spp., *Rhododendron* spp., *Symplocos spicata*, *S. theifolia*, *Michelia excelsa*, *Quercus lamellosa*, *Q. lineata*, *Q. pachyphylla* and *Leucosceptrum canum*. In the underwood are *Engelhardia spicata*, *Eurya japonica*, *Rhododendron arboreum* and *Viburnum* spp. In the middle storey, *Symplocos theifolia* is the main species and *Litsea* spp. and *Bucklandia populnea* are other associates. Dense tall evergreen forests with oaks and *Rhododendrons* predominate. The undergrowth consists of *Arundinaria maling*, dwarf *Rhododendron*, ferns, epiphytic mosses and orchids. This area is also rich in birds including the Rusty-bellied Shortwing *Brachypteryx hyperythra*, Lesser Shortwing *Brachypteryx leucophrys*, Kaleej Pheasant *Lophura leucomelanos* and Satyr Tragopan *Tragopan satyra*; reptiles such as *Japalura* lizards *Japalura* sp., *Cobra Naja naja*, *Krait* and *Himalayan Pit Viper Gloydius himalayanus*; *Himalayan Bullfrog Paa leibigii*; butterflies and leeches. *Fambong Lho Wildlife Sanctuary* in East Sikkim and *Maenam Wildlife Sanctuary* in South Sikkim are the two protected IBAs in this ecoregion.

The Temperate ecoregion extends from 3,000 m to 4,000 m, with mixed coniferous forests of Hemlock, Spruce, Pine, Fir and Junipers and with shrubby undergrowth of *Rhododendron* and *Arundinaria*. *Red Panda Ailurus fulgens*, *Common Langur Semnopithecus entellus* and *Asiatic Black Bear Ursus thibetanus*, *Goral Nemorhaedus goral*, *Serow Nemorhaedus sumatraensis*, *Himalayan Monal Lophophorus impejanus*, *Fire-tailed Sunbird Aethopyga ignicauda*, and some species of reptiles and amphibians are characteristic of this region. The *Brown Trout Salmo trutta fario* has been introduced in high-altitude lake and river systems. *Wild Seabuckthorn Hippophae* sp. is collected for medicinal properties and also to make a dye.

The Alpine forests and scrub extend up to 4,500 m with small crooked trees and large shrubs interspersed with fir and pine. The stunted forest is mainly of *rhododendron* of many species. Dominant wild fauna include the *Musk Deer Moschus chrysogaster*, the *Himalayan Tahr Hemitragus jemlahicus*, the *Blue Sheep Pseudois nayaur*, the *Blood Pheasant Ithaginis cruentus* and the *Ibisbill Ibidorhyncha struthersii*. River systems harbour some (introduced) *Trout Salmo trutta fario*. Most of the flora of this region attracts interest for medicinal purposes. Dwarf *rhododendron* leaves are used for burning as incense. This region has a very small resident human population, mainly *Bhutias* and mostly pastoral, herding livestock such as *Yak*, *Dzo* (cow-yak hybrid) and domestic cattle.

The Temperate and Alpine ecoregions are protected in four wildlife sanctuaries at *Shingba* (North), *Kyongnosla* (East), *Pangolakha* (East) and *Barsey* (West) and one national park namely *Khangchendzonga National Park* (North and West). They harbour a representative biodiversity of these ecoregions.

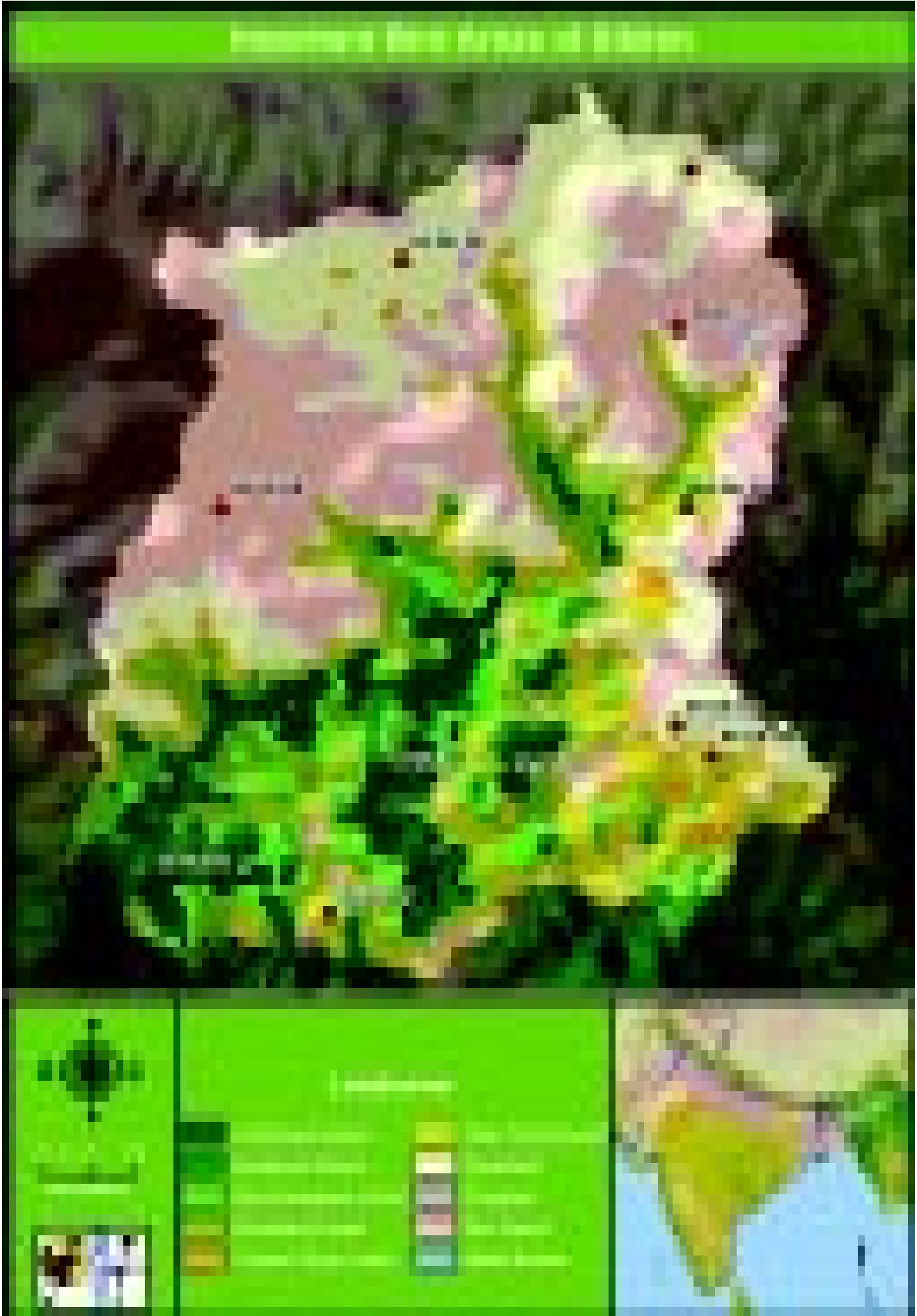
*Shingba Rhododendron Sanctuary* is home to the endemic *Rhododendron niveum* which has been designated the State Tree of Sikkim. The *Kyongnosla Alpine Sanctuary* has sheltered the *Takin Budorcas taxicolor*, which wandered over from *Bhutan* in 1999 through the newly declared *Pangolakha Wildlife Sanctuary*, which itself is contiguous with *West Bengal's Neora Valley National Park*. The 104 sq. km *Barsey Rhododendron Sanctuary* with its pure stands is contiguous with the *Singhalila National Park* in *West Bengal*.

The *Trans-Himalayan ecoregion* extends from 4,500 m to over 5,500 m with characteristic cold desert vegetation, exclusively restricted to the north of Sikkim. This ecoregion has not yet been included in the protected area network of the State and is perhaps the most threatened. It contains many endangered species such as the *Kiang or Tibetan Wild Ass Equus kiang*, the *Nayan Ovis ammon*, the *Tibetan Gazelle Procacpra picticaudata*, the *Snow Leopard Uncia uncia* and the *Tibetan Wolf Canis lupus chanco*. The *Tibetan Snowcock Tetraogallus tibetanus*, the *Lamergeier Gypaetus barbatus*, *Golden Eagle Aquila chrysaetos* and *Ruddy Shelduck Tadorna ferruginea* are also found here. The region has a short four-month growing season during which grasses, sedges and medicinal herbs spurt abundantly supporting a host of insect fauna as well as wild and domestic herbivores, larks and finches. There are no permanent settlements. The human population consists of a small number of nomadic *Tibetan graziers* or '*Dokpas*' (who herd *Yak*, sheep and goats) and a large number of *Defence personnel*, as the area forms the international border with *Tibet (China)*.

### Forestry Practices: Past and Present

In 1914, the then *Maharajah of Sikkim, Sidkeong Tulku*, the tenth *Chogyal* after completing his studies at *Oxford University* in 1908 was given charge of forests, monasteries and schools. He initiated the demarcation of the forest areas of the then *Kingdom*

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## Important Bird Areas in India - Sikkim

of Sikkim. Forests that were vital to the life support system and required full protection were set apart as Reserve Forests. These forests were to be left in their natural state and heavy penalties were imposed for illegal activities in these areas. Other forest areas that could be worked on a small scale, in order to meet the timber and fuel-wood requirements of the local populace, were carved out in the vicinity of villages. Those forests that were set apart in this manner to meet the wood requirements of the local people were called Khasmal Forests and those that were set apart as grazing grounds for village cattle were called Goucharan Forests. Forest rules and regulations were instituted for the first time during this period. The Chogyal introduced avenue plantation of trees on either side of bridle paths in Sikkim through public participation; he passed regulations for conserving 50 yards on either side of the rivers Rangit, Tista and their tributaries as River/Khola Reserves and for compulsory bench-terracing of the cultivable land of farmers.

Consequently, the system of exploitation of forests by selection felling, leaving the mother stock intact, was adopted. Contracts were given for lifting of forest produce from mature forests and extracted timber was exported with a view to generate revenue to meet increasing expenditure on administration, and to aid natural regeneration. This was supplemented by undertaking plantation work on a limited scale in marginal forests through the Taungyadar system.

In 1975, Sikkim was merged with India as its 22<sup>nd</sup> State and became part of the Indian Union. Developmental activities accelerated, aided by central assistance. Construction activities got a boost, and the lifestyle of the people also improved considerably. The increasing population, coupled with the timber-intensive lifestyle, has mounted pressure on the forest areas, and the requirement of forest produce for internal consumption has also increased considerably.

### IBAs AND IBA CRITERIA

Eleven IBAs have been selected in the State. All of them fulfill A1, A2 and A3 criteria. Although some high altitude wetlands are found, none of them fulfill A4 criteria.

### Number of IBAs and IBA criteria

A1= Threatened species; A2 = Restricted Range species; A3= Biome species; A4=Congregatory species

### IBAs of Sikkim

IBA site codes	IBA site names	IBA criteria
IN-SK-01	Barsey Rhododendron Sanctuary	A1, A2, A3
IN-SK-02	Dombang Valley – Lachung – Lema – Tsungthang	A1, A2, A3
IN-SK-03	Fambong Lho Wildlife Sanctuary – Himalayan Zoological Park – Ratey Chu Reserve Forest	A1, A2, A3
IN-SK-04	Khangchendzonga National Park and Biosphere Reserve	A1, A2, A3
IN-SK-05	Kyongnosla Alpine Sanctuary - Tsomgo - Tamze - Chola Complex	A1, A2, A3
IN-SK-06	Lhonak Valley	A1, A2, A3
IN-SK-07	Lowland Forests of South Sikkim	A1, A2, A3
IN-SK-08	Maenam Wildlife Sanctuary – Tendong Reserve Forest	A1, A2, A3
IN-SK-09	Pangolakha Wildlife Sanctuary - Zuluk - Bedang Tso - Natula Complex	A1, A2, A3
IN-SK-10	Tso Lhamo Plateau - Lashar - Sebu La - Yumesamdong Complex	A1, A2, A3
IN-SK-11	Yumthang-Shingba Rhododendron Wildlife Sanctuary	A1, A2, A3

### AVI FAUNA

'This abrupt telescoping of the terrain – from the hot steamy foothill valleys to the arctic cold of the snow capped peaks – which has produced the marked altitudinal zonation in the rainfall, humidity, climate and vegetation, is also responsible for the great variety and numerical abundance of the resident bird life, making Sikkim perhaps the richest area of its size anywhere in the world' (Ali 1962). In an area of 0.2% of India, the old tally of around 550 bird species represents around 30% of the aggregate bird species and subspecies found in the entire Indian subcontinent. This region of the Central Himalayas lies within the Eastern Himalayas Endemic Bird Area (EBA) and for several bird species such as Chestnut-breasted Hill Partridge *Arborophila mandelli*, Rusty-bellied Shortwing *Brachypteryx hyperythra* and White-naped Yuhina *Yuhina bakeri* this EBA is very important. It also has globally threatened species such as the Black-necked Crane *Grus nigricollis* and Lesser Kestrel *Falco naumanni*.



## Important Bird Areas in India - Sikkim

### List of threatened birds with IBA site codes

Critically Endangered		
Oriental White-backed Vulture	<i>Gyps bengalensis</i>	IN-SK-03, 07
Slender-billed Vulture	<i>Gyps tenuirostris</i>	IN-SK-03, 07
Vulnerable		
Baer's Pochard	<i>Aythya baeri</i>	IN-SK-04
Pallas's Fish-Eagle	<i>Haliaeetus leucoryphus</i>	IN-SK-01, 04, 05, 09
Greater Spotted Eagle	<i>Aquila clanga</i>	IN-SK-05, 08, 09, 10
Lesser Kestrel	<i>Falco naumanni</i>	IN-SK-04, 06, 10
Red-breasted Hill-Partridge	<i>Arborophila mandellii</i>	IN-SK-03, 07, 08, 09
Blyth's Tragopan	<i>Tragopan blythii</i>	IN-SK-08
Black-necked Crane	<i>Grus nigricollis</i>	IN-SK-06, 10
Wood Snipe	<i>Gallinago nemoricola</i>	IN-SK-02, 05, 06, 09, 10, 11
Rufous-necked Hornbill	<i>Aceros nipalensis</i>	IN-SK-03, 07, 08, 09
Rusty-bellied Shortwing	<i>Brachypteryx hyperythra</i>	IN-SK-01, 03, 07, 08
Slender-billed Babbler	<i>Turdoides longirostris</i>	IN-SK-07, 09
Black-breasted Parrotbill	<i>Paradoxornis flavirostris</i>	IN-SK-01, 04, 07, 09
Hodgson's Prinia	<i>Prinia cinereocapilla</i>	IN-SK-07, 09
Beautiful Nuthatch	<i>Sitta formosa</i>	IN-SK-02, 03, 07
Near Threatened		
Satyr Tragopan	<i>Tragopan satyra</i>	IN-SK-05
Giant Babax	<i>Babax waddelli</i>	IN-SK-06, 10
Endemic Bird Area 130: Eastern Himalayas		
Rusty-bellied Shortwing	<i>Brachypteryx hyperythra</i>	IN-SK-01, 03
Hoary-throated Barwing	<i>Actinodura nipalensis</i>	IN-SK-01, 03, 04, 05, 08, 09, 10, 11
White-naped Yuhina	<i>Yuhina bakeri</i>	IN-SK-02, 03, 04, 07, 08
Red-breasted Hill-Partridge	<i>Arborophila mandellii</i>	IN-SK-03
Black-browed Leaf-Warbler	<i>Phylloscopus cantator</i>	IN-SK-04, 07
Ward's Trogon	<i>Harpactes wardii</i>	IN-SK-07, 09
Rufous-throated Wren-Babbler	<i>Spelaeornis caudatus</i>	IN-SK-07, 08
Wedge-billed Wren-Babbler	<i>Sphenocichla humei</i>	IN-SK-07, 08
Broad-billed Flycatcher-Warbler	<i>Tickellia hodgsoni</i>	IN-SK-08, 09, 10
Giant Babax	<i>Babax waddelli</i>	IN-SK-10
Endemic Bird Area 133: Tibetan Plateau		
Hoary-throated Barwing	<i>Actinodura nipalensis</i>	IN-SK-06
Broad-billed Flycatcher-Warbler	<i>Tickellia hodgsoni</i>	IN-SK-06

### THREATS AND CONSERVATION ISSUES

Despite the fact that about 80% of Sikkim is under forest cover and the human population is relatively low, the State suffers from many conservation problems. Out of the 11 IBAs, in eight, firewood collection is a problem, at least at fringes, and six suffers from agricultural expansion and intensification. Hunting is not a major problem in any IBA but general unsustainable exploitation is seen in four IBAs.

#### Threats to IBAs

A=Agriculture intensification/expansion; B=Dams/Dykes; C=Disturbance to Birds; D=Firewood Collection;  
E=Industrialisation/Urbanisation; F=Unsustainable exploitation; G=Others; H=Natural Events

## Important Bird Areas in India - Sikkim

In the tropical Ecoregion at lower elevations, *Lantana camara* and *Mikania sp.* are the major weeds. Forest fires are generally reported from this zone and there is an occasional problem of illegal removal of Sal and Teak trees. New hydroelectric projects have also been taken up in this zone. This ecoregion is not yet represented in the protected area network, though a representative area of the Kitam Reserve Forest is proposed to be notified as a bird sanctuary.

In the Sub-Tropical Ecoregion *Eupatorium spp.* is a major weed competing with *Artemesia* and other secondary growth. Large Cardamom, under-planted in forest patches and a tea estate at Temi are dominant features of the landscape, as much as naturalized exotic *Cryptomeria japonica* patches.

The Temperate and Alpine and Trans-Himalayan ecoregions are home to about 90% of the Yak population of Sikkim. These ecoregions are also rich in medicinal plants. Trans-Himalayan Sikkim supports the only true alpine grasslands in the State. Closure of the International Border to trans-humance over the last three decades has led to intense grazing pressure by both, domestic and wild herbivores on the land. The area also suffers from the presence of landmines, causing casualties among Yak, Nayan, Kiang, Tibetan Gazelle and Tibetan Wolf. The existence of feral dogs around army camps is a major hazard in this region.

The Trans-Himalayan ecoregion with its lakes and glaciers urgently needs to be represented in the protected area network of the State. At present the area suffers from a host of biotic pressures, which are urgently in need of mitigation. There is a lack of awareness, the undecided status of the last 23 families of nomadic shepherds or 'Dokpas', increase in numbers of feral dogs, collection of medicinal and aromatic plants, poaching of wildlife and various defence priorities including minefields and migrant labour camps in charge of road construction and maintenance. It is also the only area, which cannot be patrolled regularly without proper transport and communication facilities due to its extremely high altitude (over 5,000 m), inhospitable weather and inaccessibility. Interference in this fragile ecosystem is damaging the area irretrievably.

Perhaps the greatest irreversible damage looming ahead is from a plan to build hydroelectric dams on the Tista river. These projects would threaten many IBAs, especially the Khangchendzonga National Park and Biosphere Reserve. Sikkim has innumerable number of rivers and streams flowing down the glaciers, which provide abundant potential of hydroelectric power projects. It is estimated that Sikkim has potential to generate 8,000 MW seasonally and about 3,000 MW power during winter months (Rajvanshi et al. 2000). The river Tista has potential to generate huge hydroelectric power, as it descends from an elevation of about 5,000 m to about 300 m, within a distance of 175 km.

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