

INDO-BURMESE FORESTS

THE Indo-Burmese region includes the moist tropical and subtropical forests which extend from north-east India and southern China across the lowlands and isolated mountains of South-East Asia, as well as the Andaman and Nicobar islands. The forests in this region support 24 threatened bird species, 18 of which breed nowhere else; the other six include four which also occur in the Sundaland forests (F07) and two from the South-east Chinese forests (F03). Seven threatened species are relatively widespread within this region (Table 2), and 17 are confined to one of the region's six Endemic Bird Areas and two Secondary Areas. Nine species of this region are Endangered, including three low-density species which inhabit forested wetlands, and six restricted-range species affected by deforestation.

- **Key habitats** Lowland evergreen and semi-evergreen tropical rainforest, moist deciduous forest and hill evergreen forest, and associated wetlands.
- **Altitude** 0–2,400 m.
- **Countries and territories** **China** (Yunnan, Hainan); **India** (Arunachal Pradesh, Assam, Meghalaya, Nagaland, Manipur, Andaman and Nicobar islands); **Bhutan**; **Bangladesh**; **Myanmar**; **Thailand**; **Laos**; **Cambodia**; **Vietnam**.

	Threatened species			Total
	CR	EN	VU	
☉	—	7	11	18
☾	—	2	3	5
✈	—	—	1	1
Total	—	9	15	24

Key: ☉ = breeds only in this forest region.
 ☾ = also breeds in other region(s).
 ✈ = non-breeding visitor from another region.

The Indo-Burmese forests region corresponds closely to Conservation International's Indo-Burma Hotspot (see pp.20–21).

Much of the original forest in Thailand has been cleared, and most of the remaining forests are inside protected areas such as Nam Nao National Park. PHOTO: MIKE CROSBY/BIRDLIFE



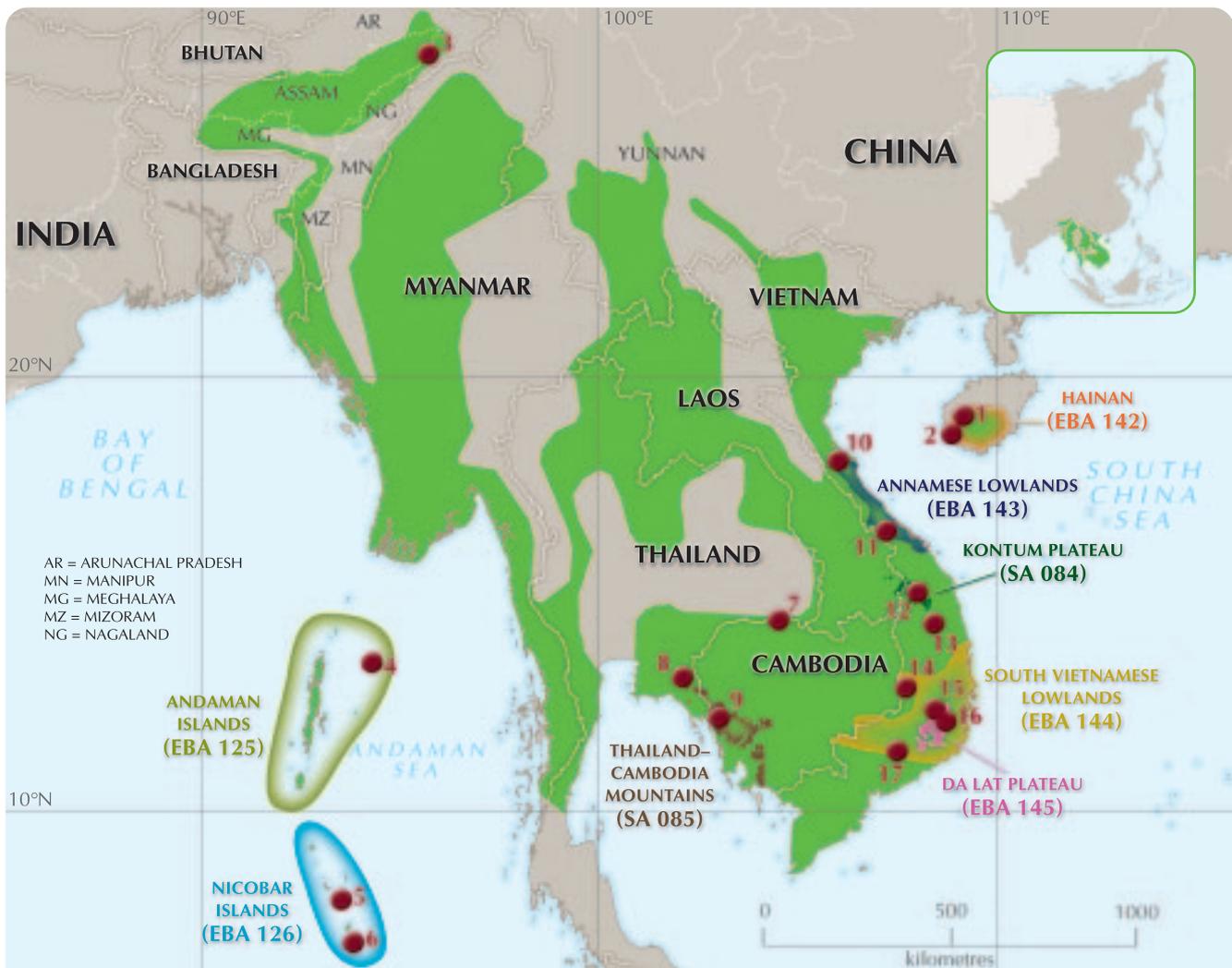


Table 1. Outstanding Important Bird Areas in the Indo-Burmese forests.

IBA name	Status	Territory	Threatened species and habitats
1 Bawangling NNR	PA	Hainan	One of the largest remaining forest areas in the Hainan EBA
2 Jianfengling NNR	PA	Hainan	One of the largest remaining forest areas in the Hainan EBA
3 Upper Dihing PNP	—	Assam	Supports the largest known population of White-winged Duck
4 Narcondam Island WS	PA	Andaman islands	The only site for Narcondam Hornbill
5 Nancowry group	(PA)	Nicobar islands	The only site for Nicobar Bulbul, and Nicobar Sparrowhawk recorded on Katchall
6 Great Nicobar NP	PA	Nicobar islands	The only known site for Nicobar Scops-owl, with a large population of Nicobar Megapode
7 Phanom Dongrak range	PA	Thailand	A cluster of protected areas supporting an important population of White-winged Duck
8 Khao Soi Dao WS	PA	Thailand	Population of Chestnut-headed Partridge, non-breeding Silver Oriole
9 Phnom Samkos WS	PA	Cambodia	Population of Chestnut-headed Partridge
10 Ke Go NR and Khe Net	(PA)	Vietnam	Only known site for Vietnamese Pheasant, also Crested Argus
11 Phong Dien and Dakrong NR	(PA)	Vietnam	The most important known area for Edwards's Pheasant, also Crested Argus
12 Ngoc Linh NR	PA	Vietnam	Crested Argus, Golden-winged Laughingthrush and Black-crowned Barwing
13 Kon Ka Kinh NR	PA	Vietnam	Population of Chestnut-eared Laughingthrush
14 Yok Don NP ^{W18}	PA	Vietnam	Population of Green Peafowl, Masked Finfoot may breed
15 Chu Yang Sin NP	PA	Vietnam	Germain's Peacock-pheasant, Grey-crowned Crocias and Collared Laughingthrush
16 Bi Dup-Nui Ba NR	PA	Vietnam	Crested Argus, Pale-capped Pigeon and Collared Laughingthrush, possibly Grey-crowned Crocias
17 Cat Tien NP ^{W18}	PA ^{BR}	Vietnam	Orange-necked Partridge, Germain's Peacock-pheasant and Green Peafowl

Several of these more widespread forest birds of this region occur in the IBAs listed in regions F04 (Namdapha NP for White-bellied Heron and White-winged Duck; Mehao WS for White-winged Duck; Hponkanrazi WS for White-bellied Heron; and Nakai-Nam Theun for Crested Argus), F07 (Huai Kha Khaeng WS for Green Peafowl), G02 (D'Ering Memorial WS for White-winged Duck; Manas NP for White-bellied Heron; Dibru-Saikhowa NP for White-bellied Heron, White-winged Duck and Pale-capped Pigeon; and Kaziranga NP for White-bellied Heron and Pale-capped Pigeon), W15 (Sundarbans for Masked Finfoot) and W18 (Xe Kong plains and Dong Khanhung for White-winged Duck, Green Peafowl and Masked Finfoot; Prek Toal and Boeung Chhmar / Moat Khla for Masked Finfoot, Western Siem Pang and Upper Stung Sen catchment for Green Peafowl, Lomphat WS for White-winged Duck and Masked Finfoot, and Chhep for White-winged Duck and Green Peafowl).

Note that more IBAs in this region will be included in the *Important Bird Areas in Asia*, due to be published in early 2004.

Key IBA name: NP = National Park; NR = Nature Reserve; NNR = National Nature Reserve; PNP = proposed national park; WS = Wildlife Sanctuary.

Status: PA = IBA is a protected area; (PA) = IBA partially protected; — = unprotected; BR = IBA is wholly or partially a Biosphere Reserve (see pp.34–35); W18 = also supports threatened waterbirds of region W18.

Green Peafowl is widespread in mainland South-East Asia, but it is now very thinly distributed because of deforestation and other pressures.

PHOTO: SMITH SUTIBUT

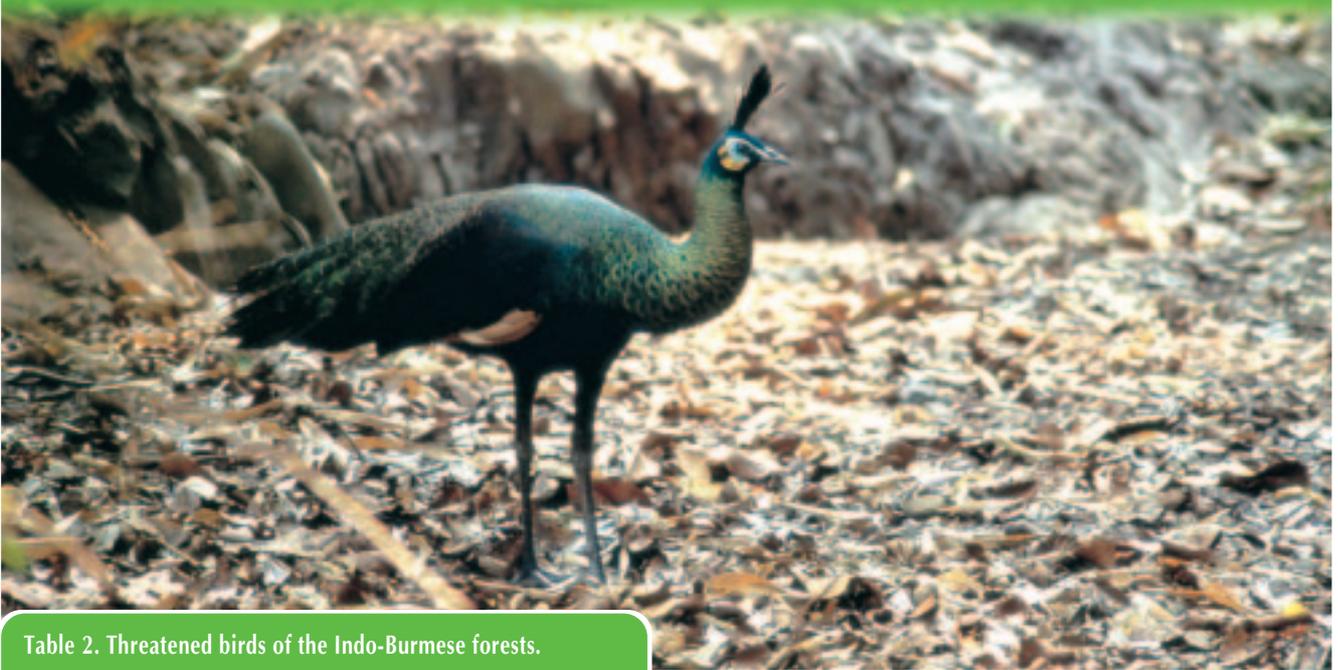


Table 2. Threatened birds of the Indo-Burmese forests.

Species		Distribution and habitat
White-bellied Heron <i>Ardea insignis</i>	☉ EN	Forested rivers and swamps at up to 1,500 m in India (Arunachal Pradesh, Assam, Nagaland), Bhutan and Myanmar, non-breeding birds sometimes in non-forest habitats
White-winged Duck <i>Cairina scutulata</i>	☉ EN	In this region, widespread but very local in forested wetlands at up to 1,400 m from north-east India to mainland South-East Asia
Crested Argus <i>Rheinardia ocellata</i>	☉ VU	In this region, found in lowland and hill forests from the level lowlands to 1,900 m in Vietnam and adjacent parts of Laos
Green Peafowl <i>Pavo muticus</i>	☉ VU	In this region, widely but thinly distributed in open forest, mainly in lowlands but sometimes above 2,000 m, from north-east India and Yunnan to mainland South-East Asia
Masked Finfoot <i>Heliopais personata</i>	☉ VU	In this region, widely but thinly distributed in forested wetlands in the lowlands, from north-east India to mainland South-East Asia
Pale-capped Pigeon <i>Columba punicea</i>	☉ VU	Widespread but very local and irregular in forest at up to c.1,600 m, from north-east India and southern China to mainland South-East Asia
Silver Oriole <i>Oriolus mellianus</i>	☉ VU	Non-breeding visitor to evergreen forest at c.450–1,300 m in Thailand and Cambodia
ANDAMAN ISLANDS (EBA 125)		
Narcondam Hornbill <i>Aceros narcondami</i>	☉ VU	Confined to the forests on tiny Narcondam island (6.82 km ²)
The Data Deficient Andaman Crane <i>Rallina canningi</i> is known only from forested wetlands on Middle and South Andaman islands		
NICOBAR ISLANDS (EBA 126)		
Nicobar Sparrowhawk <i>Accipiter butleri</i>	☉ VU	Forest, only definitely known from Katchall (in the Nancowry group) and Car Nicobar
Nicobar Megapode <i>Megapodius nicobariensis</i>	☉ VU	Occurs throughout the forests of the Nicobars (other than Car Nicobar), but concentrated near the coast
Nicobar Bulbul <i>Hypsipetes nicobariensis</i>	☉ VU	Found in forest and man-modified habitats only in Nancowry group of islands
The Data Deficient Nicobar Scops-owl <i>Otus alius</i> is known only from coastal forest at a single locality on Great Nicobar		
HAINAN (EBA 142)		
White-eared Night-heron <i>Gorsachius magnificus</i>	☉ EN	Forest in the hills in the centre of the island
Hainan Partridge <i>Arborophila ardens</i>	☉ VU	Forest in the hills in the centre and south of the island
Hainan Leaf-warbler <i>Phylloscopus hainanus</i>	☉ VU	Forest in the hills in the centre and south of the island
ANNAMESE LOWLANDS (EBA 143)		
Edwards's Pheasant <i>Lophura edwardsi</i>	☉ EN	Tropical evergreen forest up to c.600 m, found to the south of the core range of Vietnamese Pheasant
Vietnamese Pheasant <i>Lophura hatinhensis</i>	☉ EN	Tropical evergreen forest up to c.300 m, in the northern part of the EBA
Imperial Pheasant <i>Lophura imperialis</i> , which is known only from the Annamese lowlands, is currently listed as Data Deficient, but new research has shown it to be of hybrid origin, and it will therefore be removed from the 2004 Red List.		

☉ = breeds only in this forest region; ☉ = also breeds in other region(s); ☉ = non-breeding visitor from another region.

... continued

Table 2 ... continued. Threatened birds of the Indo-Burmese forests.

Species			Distribution and habitat
KON TUM PLATEAU (SA 084¹)			
Golden-winged Laughingthrush <i>Garrulax ngoclinhensis</i>	☉	VU	Recorded in primary evergreen forest at 2,000–2,200 m on Ngoc Linh massif and Mt Ngoc Boc
Chestnut-eared Laughingthrush <i>Garrulax konkakhensis</i> ²	☉	VU	Recently described species recorded in evergreen forest above c. 1,000 m on Mt Kon Ka Kin and Mt Ngoc Boc
Black-crowned Barwing <i>Actinodura sodangorum</i>	☉	VU	Evergreen forest at c. 1,000–2,400 m, known from Ngoc Linh massif in Vietnam and the Dakchung plateau in Laos
¹ The description of the three restricted-range species listed in the table means that the Kon Tum plateau now qualifies as an EBA, according to the criteria used by Stattersfield <i>et al.</i> (1998). ² This species was described by Eames and Eames (2001) after the publication of the <i>Threatened birds of Asia</i> ; its status was subsequently evaluated, and it was added to the 2002 IUCN Red List as Vulnerable.			
SOUTH VIETNAMESE LOWLANDS (EBA 144)			
Orange-necked Partridge <i>Arborophila davidi</i>	☉	EN	Forest and secondary habitats on low hills (of up to 400 m), very small known distribution in Vietnam and eastern Cambodia
Germain's Peacock-pheasant <i>Polyplectron germaini</i>	☉	VU	Tropical evergreen and semi-evergreen forest at 0–1,200 m or higher, widespread in southern Vietnam and recorded in eastern Cambodia
DA LAT PLATEAU (EBA 145)			
Collared Laughingthrush <i>Garrulax yersini</i>	☉	EN	Dense undergrowth in evergreen forest at 1,500–2,300 m
Grey-crowned Crocias <i>Crocias langbianis</i>	☉	EN	Closed-canopy evergreen forest at 900–1,700 m
THAILAND-CAMBODIA MOUNTAINS (SA 085)			
Chestnut-headed Partridge <i>Arborophila cambodiana</i>	☉	EN	Evergreen forest above c. 400 m

☉ = breeds only in this forest region; ☉ = also breeds in other region(s); ☉ = non-breeding visitor from another region

OUTSTANDING IBAs FOR THREATENED BIRDS (see Table 1)

Seventeen IBAs have been selected, which together support populations of all of the region's threatened forest birds, and include some of the largest and richest forests that remain. Several of these IBAs are unique, as they support the only (or by far the largest) known populations of one or more threatened species, for example Narcondam Island Wildlife Sanctuary for Narcondam Hornbill and Ke Go Nature Reserve (together with Khe Ket forest) for Vietnamese Pheasant. Several of the more widespread species in this region occur at low densities and are migratory or nomadic, such as Masked Finfoot and Pale-capped Pigeon, and require extensive networks of sites to ensure their survival. Many other forest sites with significant populations of these and other threatened forest birds will be documented during BirdLife's ongoing IBA Project.

CURRENT STATUS OF HABITATS AND THREATENED SPECIES

Vast expanses of lowland and hill rainforest once extended from north-east India and southern China to most of mainland South-East Asia. However, extensive forest loss and degradation has occurred in this densely populated region, particularly in recent decades, through logging, conversion to agriculture, development and overexploitation of forest products. The remaining forests (and their populations of threatened birds) are highly fragmented, and under great pressure from conversion and exploitation, as well as hunting. Many protected areas have been established, including some that are large and relatively well protected, but also many that are small, isolated and gradually being eroded by illegal encroachment. The following sections give an overview of the status of lowland and hill forests throughout the region; although the

condition of forests is generally poor, there are still some large unprotected areas that remain intact and available for conservation.

China: The area of natural tropical forest has decreased considerably on Hainan. Estimates of the extent of this decline are from 16,920 km² of forest in 1943 to 3,000 km² in 1994, or from 8,630 km² (25.7% of the island) in 1949 to about 2,420 km² (7.2%) in 1991. Much of the remaining forest is disturbed and unlikely to support many threatened forest birds, but some blocks of higher-quality forest are protected in nature reserves. In Yunnan, forest cover declined from c. 55% to c. 30% between the early 1950s and 1975; subsequent loss of habitat in China has, if anything, been even more rapid, but logging was banned in 1998 (see F03: South-east Chinese forests). However, some tracts of lowland and hill forest are protected in nature reserves.

India: The plains and foothills of north-east India originally had extensive tracks of rainforest, but most plains forest was lost during the nineteenth century, and in recent years the foothill forests have been rapidly cleared, at a rate of at least 1,000 km² annually during the 1970s and 1980s. However, some relatively large areas survive with important populations of several threatened birds, and logging and timber export was recently banned in Arunachal Pradesh and other north-east Indian states. Forests on the Andaman and Nicobar islands have been widely logged, but remain relatively intact, although a few islands have suffered significant forest loss and degradation through unsustainable commercial logging and conversion for agriculture and plantations.

Bangladesh: The forests of Bangladesh are now reduced to a few small, mostly highly disturbed fragments, as a result of logging and conversion to agriculture and settlements. By the 1960s, only c. 16 km² of primary forest remained in Sylhet, previously one of the strongholds of forest in the country, and virtually no primary forest now remains in the Chittagong Hill Tracts.

Myanmar: In the 1980s the rate of forest clearance in Myanmar was estimated at up to 6,000 km² per annum, one of the highest deforestation rates in the world. By the early 1990s, the area of forest remaining was estimated to cover 47.4% of the country, 39.1% being intact forest and 8.3% degraded forest. Much of the remaining forest is montane, although some extensive areas of lowland and hill forest suitable for the birds of this region may remain.

Thailand: Forest cover apparently fell from an estimated 70–80% of total land area in the 1940s to well under 30% in the 1980s. Logging was officially banned in 1989, but forest has continued to be rapidly cleared and degraded through conversion to plantations and illegal logging.

Laos: Although level lowland forest has been cleared in most parts of the country, relatively large areas of foothill and hill forest remain, notably in Xe Pian NBCA. However, the remaining forests are under intense pressure from commercial logging operations, and some large areas of forest are scheduled to be submerged by hydropower projects.

Cambodia: Large areas of forest in Cambodia have been degraded or cleared in recent decades because of unsustainable logging and conversion to agriculture. Some vast tracts of lowland dry-deciduous forest remain in the north of the country, and support populations of White-winged Duck and Green Peafowl, as well as a selection of threatened waterbirds (see W18).

Vietnam: More than 80% of the original area of closed-canopy forest in Vietnam has been cleared. There is some evidence that the rate of loss of natural forest has slowed in the past decade, but the quality of that which remains continues to decline. Absolute forest cover may be increasing because statistics include plantations of exotics for pulp and commodity tree-crops like coffee and cashew as well as natural forests.

CONSERVATION ISSUES AND STRATEGIC SOLUTIONS (summarised in Table 3)

Forest loss and degradation

■ FORESTRY AND ILLEGAL LOGGING

Commercial clear-felling and selective logging have been major factors in the loss of large areas of lowland forest in this region, but logging has now ceased in many areas. Excessive timber extraction was a major problem on Hainan until, in 1994, logging of primary forest was officially banned, although some illegal logging is reported to continue. A national logging ban was enacted in China in 1998. In north-east India, logging has depleted forests over much of lowland Assam; however, logging and timber export was recently banned in north-east Indian states, although some illegal logging takes place and it is still legal to cut timber for local plywood and veneer factories. Large-scale logging operations continue in Myanmar, to produce timber for export to Thailand and China (where logging is now banned). In Cambodia, despite a total ban on the export of sawn logs and timber in 1995, there are major logging operations (including in national parks), illegal trade continues and most forest remains under concession. Commercial timber extraction is also a threat at lower altitudes elsewhere in Indochina.

Given the massive reduction in lowland forest in this region, existing bans on logging should be enforced (and similar bans promoted elsewhere), and reforestation programmes (using native species of trees) adopted. Where legal logging continues, sustainable forestry practices need to be promoted, including allowing natural regeneration,

Together with nearby Ke Go Nature Reserve, the forests at Khe Net are vital for the survival of the endemic Vietnamese Pheasant.



PHOTO: J. C. EAMES

lower timber quotas and preservation of old-growth patches, and low-impact logging practices to reduce structural damage to the forest and allow more rapid regeneration. Measures are needed to minimise illegal logging, particularly in protected areas and other sites of high biodiversity value, and to control illegal trading of timber.

■ CONVERSION TO AGRICULTURE AND PLANTATIONS

The clearance of forest for cultivation and plantations is a continuing threat, linked to human population growth and the movement of people into formerly remote regions. In north-east India areas of forest are being converted to tea gardens, paddyfields and teak plantations, and on the Nicobar islands forests have been converted into rice paddy and plantations (including cashew nut, coconut and rubber). In Vietnam, forest is being lost to plantations of cash crops, such as coffee and cashew, even inside Cat Tien National Park (where conversion to fishponds has posed an additional threat), which stems in part from politically motivated settlement programmes. The large areas of open dry deciduous forest habitat that remain in Dak Lak province are likely to suffer from agricultural development, as it has the highest immigration rate of any province in Vietnam.

There is a general need to control encroachment into forest for agriculture and plantations in protected areas and at other key sites for threatened birds and other biodiversity. This means investigating the underlying causes behind the movements of people into forest areas and forest conversion to cash crops, including the effects of global commodity prices; the conservation community needs to influence these policies, to minimise the pressures to convert natural forests. The establishment of new nature reserves may be required at some key sites, with effective legislation and patrolling to prevent encroachment. The development of more efficient agriculture (through the introduction of improved and

Local people use forests as a source of timber and other products, but management is required to prevent forest degradation.



PHOTO: GERRY GOMEZ/BIRDLIFE

appropriate techniques) to help alleviate poverty, if carefully implemented, also has the potential to reduce the pressure on remaining areas of natural habitat. Plantation managers should retain forest patches along streams and in peripheral areas, and minimise their use of agrochemicals. These measures should be promoted through conservation awareness work, stressing the ecological services that forests provide (e.g. maintenance of water supplies) as well as their value for biodiversity.

■ SHIFTING AGRICULTURE

The habitats of some of the region's higher-altitude species, such as the species endemic to the mountains of Vietnam, are affected by shifting agriculture (see F04 for further details). This is increasingly causing forest degradation, as the numbers of shifting cultivators increase and the area of forest decreases. Measures to control unsustainable shifting agriculture could include: provision of sustainable economic alternatives to shifting cultivation, including improved agricultural practices and agro-forestry, enabling farmers to settle in established clearings; rehabilitation of abandoned land, including through the development of community forestry plantations; and projects at selected key sites that integrate conservation and land-use development, and work in collaboration and participation with the local people.

■ EXPLOITATION OF FOREST PRODUCTS

The forests of this region face increasing pressure from exploitation as human populations grow and natural habitat diminishes. The areas around many reserves are densely populated; for example, over 100,000 people live in the buffer zone of Cat Tien National Park in Vietnam, and a large town separates Cat Loc (stronghold of Orange-necked Partridge) from the other sectors. Local people use forests as a source of timber, fuelwood (including charcoal) and rattan; these activities cause severe degradation, and disturbance to wildlife. Human access to and exploitation of forests need to be controlled in protected areas and other important sites for threatened birds. Some reserves may need to be redesigned, with broad buffer zones to absorb human needs, and rigorously patrolled core areas to prevent forest exploitation. The establishment of community forests should be promoted, to provide a sustainable source of forest products for local people, and their management improved through training in forestry techniques. At some sites, alternative livelihoods could be developed (e.g. fish-farming, ecotourism, floriculture, cultivation of medicinal plants, etc.) to reduce local dependence on forest products.

These should be promoted through conservation awareness work, stressing the ecological services that forests provide, for example maintenance of water supplies.

■ DEVELOPMENT (URBAN, INDUSTRIAL, ETC.)

Habitat is threatened by the region's expanding network of new roads, which allow access by loggers and settlers to once-remote regions, and often result in near-total forest loss. For example, the ongoing construction of the Ho Chi Minh highway in Vietnam, and the associated human settlement, are causing habitat loss and placing increased pressure on forest products at numerous key sites for threatened birds, including Khe Net and Phong Dien / Dakrong. Numerous hydropower developments are planned for South-East Asia, for example in the Mekong catchment, especially in Yunnan and Laos; these dams threaten enormous stretches of riverine forest, especially in the Mekong basin (see W18), and cause a suite of problems by improving access for loggers and hunters, and displacing people from inundated areas. The Andaman and Nicobar islands are also threatened by development. Forest is being lost through the establishment and expansion of settlements with associated roads, airstrips and defence installations, as well as a hydroelectric project. The most alarming threat lies in a proposal to develop Great Nicobar as a free-trade port and to create a dry dock and refuelling base for international shipping at the mouth of the Galathea river. Environmental impact assessments should be conducted for development projects that have the potential to damage forested areas, with appropriate mitigation plans. Wherever possible, new developments should be avoided near protected areas and other sites of high biodiversity value. The proposed developments on the Andaman and Nicobar islands need to be assessed with particular care, because of the vulnerability of the endemic biodiversity on these often small oceanic islands.

■ DISTURBANCE

This region has a large and rapidly growing human population, with a high proportion of these people live in rural areas, meaning that most natural habitats are affected by human disturbance. Lowland forests and their accessible valleys and waterways are particularly susceptible. Species such as White-winged Duck, Green Peafowl and Masked Finfoot are strongly tied to pools and rivers within or near forest, and it is precisely these areas that are cleared and colonised first, or visited most frequently by people; they are seriously threatened with extinction in many areas as lowland wilderness disappears. Networks of protected areas need to be developed and managed, through the modification of existing reserves and the establishment of new areas, to protect extensive river systems and networks of forest pools from human disturbance, habitat loss and other threats. Some potentially suitable large areas of relatively intact forest wetlands still exist, for example in Assam and Cambodia.

Protected areas coverage and habitat management

■ GAPS IN PROTECTED AREAS SYSTEM

Many protected areas have already been established, but there are some important gaps in their coverage of threatened birds; new reserves and the modification of existing ones, are urged by country below. It should be noted that some species are wide-ranging and generally occur at low densities, including ones which make migratory or nomadic movements such as Masked Finfoot and Pale-

capped Pigeon; protected areas alone cannot guarantee the survival of these species, which also require habitat protection and management at the landscape level. *China*: In Yunnan, the existing protected areas support only small numbers of Green Peafowl, and new reserves are required to protect the largest populations, for example in the area where Chuxiong city meets Shuangbai and Lufeng counties. *India*: The protection of the important White-winged Duck populations in eastern Assam needs to be improved through a network of specially protected and managed sites, including gazettement of Upper Dihing (west block) and the adjacent forests of Joypur and Dirok as a new protected area. In the Nicobar islands, protected areas should be established on Camorta and/or Katchall islands. There are two national parks on Great Nicobar, but their boundaries need to be revised to address the following three weaknesses: (1) the coastal forests important for Nicobar Megapode are relatively unprotected and thus most vulnerable; (2) the central road across Great Nicobar and the gap between national parks leaves the habitat open to fragmentation; (3) the current buffer zone covers large tracts of land that are uninhabited, and as such should be fully protected. *Myanmar*: Effective new protected areas need to be established for major areas of lowland forest (and associated wetlands), following surveys to locate suitable sites. *Vietnam*: Proposed changes to the protected areas system include: in the Annamese lowlands, support the establishment of the proposed Phong Dien and Dakrong Nature Reserves, and create a new nature reserve at Khe Net (165 km²) in Quang Binh province; in the South Vietnamese

lowlands, establish and consolidate Lo Go Xa Mat National Park and Bu Gia Map Nature Reserve, and expand Cat Tien National Park to encompass the surrounding old forestry enterprises; on the Kon Tum plateau, upgrade three contiguous sites—Ngoc Linh (Kon Tum) Nature Reserve and Ngoc Linh (Quang Nam) and Song Thanh proposed nature reserves—to a national park, ensure that management regimes in the forest areas between Kon Ka Kinh and Kon Cha Rang Nature Reserves are consistent with the maintenance of habitat corridors, and maintain forest cover between Ngoc Linh, Ngoc Boc and Kon Ka Kinh.

Current protected areas networks do not adequately cover forested rivers and wetlands, with riverine species particularly poorly represented because of their linear distributions. For species such as White-winged Duck and Masked Finfoot, improved reserve design and management is necessary, involving: (1) use of ridges rather than rivers to delimit protected areas; (2) conservation programmes targeting entire river systems and networks of pools, which aim to protect and manage forest wetlands both inside and outside the protected areas. Education campaigns are needed to promote these proposals, particularly to highlight the importance of natural river systems, for example as spawning grounds for fish.

■ INADEQUATE LEGISLATION

In several countries the laws designed to protect habitats are weak or ambiguous, or newly introduced and unfamiliar to the officials who must enforce them. National Protected Areas in Laos, for example, had their legal status clarified

Table 3. Conservation issues and strategic solutions for birds of the Indo-Burmese forests.

Conservation issues	Strategic solutions
Forest loss and degradation	
<ul style="list-style-type: none"> ■ FORESTRY AND ILLEGAL LOGGING ■ CONVERSION TO AGRICULTURE AND PLANTATIONS ■ SHIFTING AGRICULTURE ■ EXPLOITATION OF FOREST PRODUCTS ■ DEVELOPMENT (URBAN, INDUSTRIAL, ETC.) ■ DISTURBANCE 	<ul style="list-style-type: none"> ➤ Maintain logging bans in Hainan and north-east India, and support similar bans if they are required elsewhere ➤ Promote sustainable forestry, including low-impact logging practices and replanting with native tree species ➤ Develop measures to control illegal logging and trading of timber ➤ Investigate the underlying causes of forest conversion to cash crops, and seek to reduce this pressure by influencing relevant government policies ➤ Promote sustainable forms of upland agriculture in the mountains of Vietnam that do not result in net loss of natural forest ➤ Reduce local dependence on forest products by establishing sustainable community forests and developing alternative livelihoods ➤ Assess the environmental impact of development projects in forested areas, and minimise development at key sites for threatened birds ➤ Reconsider proposed development projects on the Andaman and Nicobar Islands
Protected areas coverage and management	
<ul style="list-style-type: none"> ■ GAPS IN PROTECTED AREAS SYSTEM ■ INADEQUATE LEGISLATION ■ WEAKNESSES IN RESERVE MANAGEMENT 	<ul style="list-style-type: none"> ➤ Establish new reserves, and modify existing reserves, to fill gaps in coverage of threatened species in China, India, Myanmar and Vietnam ➤ Develop conservation programmes for selected river catchments ➤ Review and improve protected areas legislation in Laos, Myanmar and Cambodia ➤ Strengthen reserve management through improved funding, infrastructure and staff training
Exploitation of birds	
<ul style="list-style-type: none"> ■ HUNTING AND TRAPPING 	<ul style="list-style-type: none"> ➤ Improve enforcement of hunting laws, including through education programmes, control of gun ownership and more effective patrolling of protected areas ➤ Survey wildlife markets to monitor hunting pressure on threatened species
Gaps in knowledge	
<ul style="list-style-type: none"> ■ INADEQUATE DATA ON THREATENED BIRDS 	<ul style="list-style-type: none"> ➤ Locate and survey lowland forests in Myanmar, to identify priority sites for conservation action ➤ Survey poorly known species in the Andaman and Nicobar islands ➤ Continue surveys in the Kon Tum plateau of Vietnam and adjacent parts of Laos ➤ Study the movements of Masked Finfoot and Pale-capped Pigeon
Other conservation issues	
<ul style="list-style-type: none"> ■ INTRODUCED SPECIES 	<ul style="list-style-type: none"> ➤ Investigate the impact on Nicobar Bulbul of competition with Red-whiskered Bulbul, to help develop a strategy for its conservation ➤ Completely eradicate feral goats from Narcondam Island

only in June 2003. Protected areas in both Myanmar and Cambodia lack strict protective legislation. For reserve networks to be successful they need to be supported by well-defined laws and the manpower (with high-level political support and motivation) to enforce them.

■ WEAKNESSES IN RESERVE MANAGEMENT

Many of the region's protected areas receive little or no active management, and increased resources are required to ensure their long-term security, through improved management planning and training of reserve staff, and hence patrolling, boundary demarcation, etc. Special management is required for the threatened species in some protected areas, for example planting of native fig trees and provision of nest-boxes for Narcondam Hornbill in Narcondam Island Wildlife Sanctuary, and the retention of large old trees and vegetation along the banks of rivers in reserves with nesting White-winged Duck. Governmental departments responsible for habitat conservation in this region often suffer from a shortage of skills, funding and motivation. These issues need to be addressed through exchange programmes and training, supported by appropriate injections of funding.

Exploitation of birds

■ HUNTING AND TRAPPING

Hunting with both snares and firearms is extremely common in the Indo-Burmese forests. In China, Thailand, Laos and Vietnam, some larger-bodied birds have almost been hunted out, and snaring has reduced many forest-floor species to very low densities. The collection of eggs and chicks of birds for food is also frequent. The widespread threatened species include several which are a quarry of hunters because of their size, such as White-winged Duck, Crested Argus and Green Peafowl, and Pale-capped Pigeon is susceptible to hunting when it congregates at fruiting trees. Green Peafowl is often sold in markets for food, and live or dead birds are even traded internationally for their meat and feathers. Nicobar Megapode is subject to heavy hunting and egg collection.

The impact of hunting on forest birds is generally poorly understood, but this appears to be the principal threat to several threatened birds in this region. Protected areas need to be patrolled more effectively, to intercept hunters and remove snares, backed up by firm enforcement

of existing hunting laws. Surveys of wildlife markets should monitor (and provide the basis for control of) hunting pressure on threatened species. The governments of China, Laos and Vietnam are controlling gun ownership, a measure that in Vietnam has apparently already benefited populations of larger-bodied bird species, and this measure could be applied in other countries, particularly near important protected areas. These efforts to reduce hunting need to be promoted through public education programmes concerned with forest conservation, threatened species and the hunting laws.

Gaps in knowledge

■ INADEQUATE DATA ON THREATENED BIRDS

In recent decades intensive survey work has improved knowledge of the status and distribution of habitat and threatened birds in many parts of the Indo-Burmese region. The most important exception is Myanmar, for which there is little current information, as this country could be found to support significant populations of several of the more widespread threatened species, such as White-bellied Heron, White-winged Duck, Green Peafowl and Masked Finfoot. It is therefore a priority to pinpoint any extensive stands of forest in lowland Myanmar, and to determine which of these deserve conservation attention. As an example, the wooded swamps of the Myitmaka river north of Yangon formerly held a large breeding population of Masked Finfoot, but recent information is not available. On the Andaman and Nicobar islands, there is a need to improve understanding of the status and conservation requirements of the poorly known Nicobar Sparrowhawk, and the Data Deficient Andaman Crake and Nicobar Scops-owl. In Vietnam, recent surveys in the Kon Tum plateau have led to the discovery of three bird species, all of which are considered to be threatened, and further surveys are required there and in the adjacent mountains in Laos to improve understanding of their status and to look for any more undescribed species. A study is underway to investigate whether Edwards's Pheasant and Vietnamese Pheasant, both of which are confined to the Annamese lowlands EBA, are conspecific. Two widespread species, Masked Finfoot and Pale-capped Pigeon, are migratory or nomadic and research is required (perhaps using satellite-tracking) to improve understanding of their status and movements, and their tolerance of habitat change.

Other conservation issues

■ INTRODUCED SPECIES

Alien species in the Andaman and Nicobar archipelagos might be affecting some of the threatened species. The Red-whiskered Bulbul *Pycnonotus jocosus* was introduced to the Nicobar islands in the late nineteenth century and has subsequently flourished in the Nancowry group (i.e. throughout the range of Nicobar Bulbul). The population of Nicobar Bulbul appears to have declined substantially on most islands, and it is possible that competitive exclusion is occurring. This needs study, and a strategy to minimise the effects of any competition on the numbers of Nicobar Bulbul. On Narcondam Island, police staff introduced a small population of goats in the 1970s, growing by 1998 to 130–150 domestic animals in the police camp and over 250 feral animals in the forest. As a result, there was very little natural woodland regeneration, posing a serious long-term threat to the Narcondam Hornbill. Most of the goats were recently removed from the island, but this programme should be continued until they are completely eradicated.

In some areas, larger-bodied birds have almost been hunted out, and snaring has reduced many forest-floor species to very low numbers.



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