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Some important birds and forests in Nepal

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A table is provided of 122 bird species with restricted breeding distributions and for which Nepal may hold significant populations. Habitat threats and population changes are detailed for 33 species for which Nepal may be especially important. Threats to some upland forests which are particularly species-rich are described. The vital importance of forests to Nepal's avifauna is emphasised.

Nepal is a small country, only about 800 km long and covering roughly the same land area as Greece. About 830 bird species – including 609 which breed or probably breed – have been recorded there, almost a tenth of the total known worldwide.

The exceptional diversity of Nepal's avifauna can partly be attributed to the wide ranges of altitude, climate and vegetation in the country. There are dramatic changes in topography within short distances, Nepal having a unique altitudinal range from the lowlands at 75 m above sea level to the summit of Sagarmatha (Mount Everest) at 8,848 m only 145 km away. There are tropical lowland forests with rainfall up to 4,000 mm per year, mixed temperate broad-leaved and coniferous forests higher up, almost treeless steppe vegetation in the rainshadow of the Himalayas where rainfall is less than 500 mm per year, and alpine flora in the high altitude zone. The other major factor contributing to Nepal's species richness is its position of overlap between the Palearctic realm to the north and the Oriental realm to the south, encompassing ranges of species which originate in both realms.

Nepal is land-locked and largely situated in the Himalayan range and associated foothills, with only a narrow lowland strip in the south and a small high plateau area in the north-west immediately north of the range. It lies in the centre of the Himalayas and can be conveniently divided at the Kali Gandaki valley into a wetter eastern section and a drier western section (Figure 1). Approximately 584 bird species have been found in the west, and 774 species in the east, with 545 species common to both sections. Although the west is comparatively less studied at present, it is nevertheless poorer in species than the east (Inskipp and Inskipp 1985).

There are 122 bird species whose breeding distribution is restricted to an area encompassing the Himalayas, north-east India, northern South-East Asia and south-west China (Figure 2) and for which Nepal may hold significant populations (these are listed in the Appendix). The boundaries of this area are to some extent arbitrary but do coincide roughly with the mountain ranges contiguous with the Himalayas and their neighbouring lowlands. In the following discussion, every mention of status in Nepal refers to Inskipp and Inskipp (1985) and every mention of status in the Indian subcontinent refers to Ali and Ripley (1984).

Two species, Imperial Heron *Ardea imperialis* and Green Cochoa *Cochoa viridis*, are restricted to the area defined above but have not been recorded in Nepal since last century and are therefore omitted. Nepal is probably important for other more

widely distributed species which are rare wherever they occur, e.g. the Dark-sided Thrush *Zoothera marginata*, which occurs south-east to south Viet Nam. There are other species whose breeding is unknown, so their true status is difficult to determine. The White-vented Needletail *Hirundapus cochinchinensis* is present during its presumed breeding season in south-central Nepal, Meghalaya, south-east Thailand, Kampuchea, southern Laos, south-east Viet Nam, Hainan and Taiwan: its disjunct Nepalese population was described as a separate subspecies *rupchandi* (Biswas 1951) but the variation shown by Indonesian wintering birds suggests that the species may be monotypic (Mees 1973). Some species are endemic to the Indian subcontinent but occur fairly widely in lowland areas, thus reducing the likelihood that Nepal is important for them. The White-rumped Needletail *Zoonavena sylvatica*, for instance, is 'patchy and local, though quite abundant in certain localities' in the Indian peninsula; it has been found in a number of localities in Nepal in recent years. Species in these categories fall outside the scope of this review.

Nearly all the significant species are passerines (106 species, 86.9%), with babblers Timaliidae (32 species, 26.2%), thrushes Turdidae (20 species, 16.4%) and warblers Sylviidae (12 species, 9.8%) the best represented families. Of the non-passerines the Galliformes (6 species, 4.9%) and woodpeckers and allies (5 species, 4.1%) are dominant in the list.

The species may be divided into three groups: (1) 24 entirely confined to the Himalayas, or extending marginally into the hills of Afghanistan in the west (one species just reaches the USSR, where it is rare), into neighbouring Xizang Zizhiqu (Tibet) to the north, or, in the case of two species, also into the hills of north-eastern India; (2) 88 with distributions as above but extending either south-east in the uplands through northern Burma to, in the case of some species, northern Viet Nam, or north-east further into China (four species have disjunct populations in Taiwan and one other has a tiny isolated pocket in south-east China); (3) ten that occur in lowland areas adjacent to the hills referred to in the first two groups.

Most of the species breed in forest habitats (74, 61%), 20 (16%) in forest and scrub, 15 in scrub, five in grassland, three in bamboo, two in forest and bamboo, two in rocky habitats and one in rock and grassland habitats. Many of them are threatened in Nepal by forest damage or destruction. The areas which have suffered the most lie between 1,000 and 2,000 m in the central and eastern parts of the country. Much of west Nepal and other areas above 2,745 m are currently much less affected.

Nepal may be especially important for the 33 species described below. They either have particularly restricted ranges within the general area considered or have been described as uncommon or rare in the Indian subcontinent. Possible habitat threats and any known population changes are detailed for each species; however, there is little information available for many of them. The great majority of species (28) occur in the uplands and only five in the lowlands and foothills. There are 18 forest species and another four of forest and scrub (see Appendix). Nine inhabit dense forests with thick undergrowth: Wood Snipe *Gallinago nemoricola*, Purple Cochoa *Cochoa purpurea*, Long-billed Thrush *Zoothera monticola*, Rufous-throated Wren-Babbler *Spelaeornis caudatus*, Black-headed Shrike-Babbler *Pteruthius rufiventer*,

Golden-breasted Fulvetta *Alcippe chrysotis*, Hoary-throated Barwing *Actinodura nipalensis*, Fire-tailed Myzornis *Myzornis pyrrhoura* and Gould's Shortwing *Brachypteryx stellata*. Of these the first six also require damp conditions.

SPECIES RESTRICTED TO THE HIMALAYAS

The Cheer Pheasant *Catreus wallichi* has been listed as 'Endangered' in the Red Data Book (King 1978–1979). Its status in Nepal is uncertain but populations there are likely to be significant. Elsewhere in its range, which once extended west to Hazara in Pakistan, there have been local extinctions, mainly due to persecution (King 1978–1979). However, as the species is extremely shy and secretive it is easily overlooked and may be more frequent than assumed. The birds are usually only evident in the early morning when they are heard calling briefly and sporadically. At present there are still large areas of forest within its Nepalese range, which lies in the west between 1,800 and 3,050 m. Small-scale felling does not affect the Cheer Pheasant as it is a bird of scrub and stunted trees or secondary growth; clear-felling would, however, eliminate the species and may already have affected it in some areas (Lelliott 1981).

The Wood Snipe is a montane species inhabiting swampy areas among thick vegetation in woods. Last century it was apparently more frequent in Nepal, being described as not uncommon in the Kathmandu valley (Hodgson 1831), but it has not been reported there since about 1948 (Ripley 1950).

The Rufous-breasted Bush-Robin *Tarsiger hyperythrus* is a rather enigmatic bird. There had only been four Nepalese records up to 1978 but since then, for reasons unknown, it has apparently increased and spread to west-central areas. The only breeding records for the species come from Nepal since 1979, but the nest and eggs are still undescribed.

The Pied Thrush *Zoothera wardii* can withstand some tree-felling as it occurs in well-wooded ravines and small patches of forest in open country. However, it is likely to have been affected by some habitat loss as its summer altitudinal range, between 1,500 and 2,400 m, mainly lies within the most severely deforested areas of Nepal.

In contrast, the breeding habitat of the Smoky Warbler *Phylloscopus fuligiventer* is not threatened as it summers between 3,900 and 5,000 m in rocky alpine pastures and low scrub. The total range of this species is, however, very small: from central Nepal east to Bhutan and south-east Xizang Zizhiqu.

The apparently local Spiny Babbler *Turdoides nipalensis* has the distinction of being the only bird species endemic to Nepal. It is probably under-recorded, however, because of its skulking nature, and may well occur over the western border in India. It is one of the few species which has probably benefited from deforestation as it inhabits secondary growth, being commonest in the thickest scrub which mainly grows well away from cultivation (Proud 1959).

Although described as common, the Hoary-throated Barwing seems worthy of mention because of its very limited range, which extends from west Nepal (82°E) to Bhutan (92°E) and in Pome district, south-east Xizang Zizhiqu (Meyer de

Schauensee 1984). It frequents forests of oak or of mixed oak, conifer and rhododendron, and like the other eight species found in forests with thick undergrowth it is presumably affected adversely by loss of or damage to the understorey. Degradation of forests has taken place in many parts of Nepal, owing to local people collecting foliage for their animals or allowing their stock to graze under the trees.

The Rufous-throated Wren-Babbler occurs in dense forests from east Nepal (88°E), where it is limited to the upper Mai valley, to western Arunachal Pradesh (92°30'E). Along with the other five species of damp forests it is probably affected by the selective removal of trees and other vegetation, which has resulted in forests gradually drying out. Its breeding habits are unknown.

The White-throated Tit *Aegithalos niveogularis* occurs from the Kagan valley (74°E) east to central Nepal (85°E). The overlap in range with the Black-browed Tit *A. iouschistos* (Inskipp and Inskipp 1985), although sympatric breeding has not been proved, tends to support treatment of the two forms as separate species (Ali and Ripley 1984) not one, as in Vaurie (1959).

MORE WIDESPREAD UPLAND SPECIES

The distribution of the little-known Orange-rumped Honeyguide *Indicator xanthonotus* is linked to nests of wild bees as one of its main food items is beeswax. The males are largely sedentary, polygynous, and defend a territory around a particular nest against other individuals of the species (Cronin and Sherman 1976). The bird may be overlooked as it is drab and unobtrusive.

Three representatives of the thrush family could be suffering from deforestation. The very local Gould's Shortwing summers in dense undergrowth at about 3,500 m, the only breeding record being from the upper Arun valley in Nepal (Cronin 1979). The Purple Cochoa breeds in dense humid evergreen forests at about 2,150 m, a habitat much reduced now in Nepal. The only recent records are from the Mai valley in the far east. The Long-billed Thrush frequents damp dense forests from 2,285 to 3,850 m in summer.

Although the Chestnut-crowned Bush-Warbler *Cettia major* is described as scarce in both Nepal and the rest of the subcontinent, it could easily be under-recorded because of its secretive behaviour. As it summers at forest edges over 3,550 m it is probably not threatened by habitat loss within its breeding range.

There are three species of parrotbill in this group: Great *Conostoma aemodium*, Fulvous *Paradoxornis fulvifrons* and Brown *P. unicolor*. The scarcity of all three can probably be attributed to the disappearance of their favoured bamboo habitat. Bamboo is extensively cut as it is a useful material for building, making baskets and various other purposes.

Two babblers, the Golden-breasted Fulvetta and Black-headed Shrike-Babbler, are likely also to have suffered from loss of their preferred forest habitat, the former frequenting ringal bamboo and other thick undergrowth and the latter occurring in dense, damp, mossy forests. The Nepalese distribution of the Golden-breasted Fulvetta is limited to the southern slopes of Annapurna and the upper Mai valley.

The Fire-tailed Myzornis, Rusty-flanked Treecreeper *Certhia nipalensis* and Yellow-bellied Flowerpecker *Dicaeum melanoxanthum* all occur at fairly high altitudes which must be affected to some degree by the deterioration of forests. The Myzornis, a vivid green and red bird of uncertain affinities that is partly dependent on nectar, summers locally in mossy forests of juniper or rhododendron and bamboo thickets between 2,135 and 3,950 m. The Treecreeper inhabits oak and mixed forests between 2,550 and 3,660 m and the Flowerpecker, whose behaviour, calls and seasonal movements are poorly known, is found locally in tall trees in open forest between 2,400 and 3,000 m.

Although the Crimson Rosefinch *Carpodacus rubescens* has not been recorded in Nepal since 1949, it could be overlooked and its presence there could be significant, as it has a very restricted range. The Vinaceous Rosefinch *C. vinaceus* is interesting as it has an unusual and disjunct distribution. It occurs in Taiwan, where it is common (Severinghaus and Blackshaw 1976), in a limited area in southern China (Meyer de Schauensee 1984) and locally in Burma (Smythies 1953), but has only been recorded once in the Himalayas outside Nepal. It was first noted in Nepal in 1952 and has been seen there more frequently in recent years. The reason for this increase in sightings is unknown, but is unlikely to be merely better observer coverage, as the areas where the species has been seen have been frequently visited since about 1950. The Spot-winged Rosefinch *C. rhodopeplus* is probably more frequent and widespread in Nepal than elsewhere in its range. Its habitat is probably still intact as it occurs in scrub near the tree-line, as does the Crimson-browed Finch *Pinicola subhimachala*. The latter is partial to juniper and occurs locally from central Nepal east to Arunachal Pradesh, in Xizang Zizhiqu and north to Sichuan.

Finally the Scarlet Finch *Haematospiza sipahi* and Spot-winged Grosbeak *Mycerobas melanozanthos* may suffer to some degree from deforestation as they occur in forests over 2,400 m. They are locally distributed in Nepal, the former in conifers and the latter in mixed coniferous and broad-leaved forests.

With the exceptions of the Purple Cochoa and the Long-billed Thrush breeding of all the species mentioned in this group is little or poorly known.

LOWLAND SPECIES

The Bengal Florican *Houbaropsis bengalensis* is the rarest and most threatened of all bustard species (Inskipp and Collar 1984). It has a limited and disjunct distribution and if it survives at all outside northern India and Nepal it can only be in tiny numbers. The spread of agriculture into its grassland habitat has reduced its Nepalese population almost entirely to protected areas. Even there it is threatened by the deterioration of the grasslands through an increase of coarse grasses and the colonization of saplings (Inskipp and Inskipp 1983).

Another species suffering from agricultural encroachment is the Swamp Francolin *Francolinus gularis*, which frequents tall grasses, swamps and other wet areas. Apart from a record of a single bird in the Kosi marshes, the only recent records are from the Royal Sukla Phanta Wildlife Reserve.

The Pale-footed Bush-Warbler *Cettia pallidipes* and Grey-crowned Prinia *Prinia*

cinereocapilla both have fairly limited distributions and have probably suffered from habitat loss. Both are fairly common in the Royal Chitwan National Park, which holds abundant scrub and thick undergrowth, but only a few reports exist from elsewhere in Nepal where conditions are generally much less favourable. However, the former is probably under-recorded as it is shy and skulking.

The Spot-winged Starling *Saroglossa spiloptera* is known with certainty only from Kangra (76°E) to east Sikkim (89°E), but may also breed somewhat further east. It has an unusual east-west post-breeding migration along the base of the Himalayas.

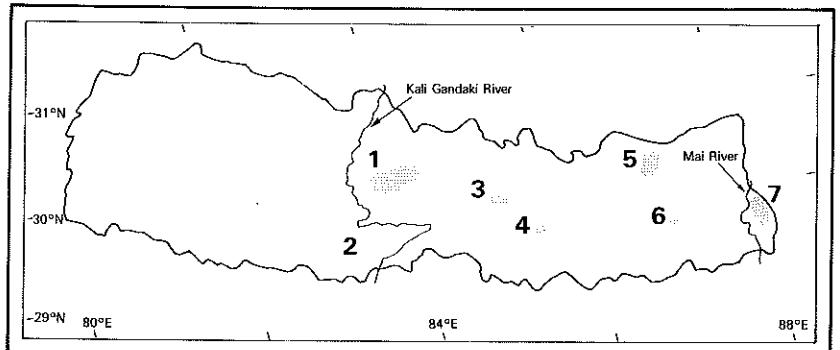
SOME IMPORTANT FORESTS

Some upland forests which are particularly species-rich and therefore of national importance can be identified. These areas have exceptionally high rainfall as a result of local topographical features. The following have been studied ornithologically: the Mai valley; the southern slopes of Annapurna, including the Modi Khola valley, Pipar and Ghorepani; the south-east corner of the Kathmandu valley, especially Phulchowki; and the upper Arun valley. Bioclimate and annual rainfall maps indicate other little-known areas with similar rainfall which may also be of importance if topographical features are favourable (Figure 1).

None of these species-rich forests is protected as a national park or wildlife reserve, although there are proposals for an Annapurna Conservation Area (Sherpa *et al.* 1985) and a wildlife reserve at Pipar (Forster and Lelliott 1982).

Seventeen of the 33 bird species for which Nepal may hold significant breeding populations are recorded from these forests (14 from the upper Mai valley, 13 south of Annapurna and 12 from the upper Arun). Three of these, the Purple Cochoa, Rufous-throated Wren-Babbler and Golden-breasted Fulvetta, only occur in these

Figure 1. Some important forests in Nepal.



1. Southern slopes of Annapurna
2. Tansen area
3. South-east corner of Kathmandu Valley
4. Bagmati Valley
5. Upper Arun Valley
6. Lower Arun Valley
7. Mai Valley

forests within their Nepalese ranges. The latter could therefore be of international importance to the future of these species.

The best known forest, on the northern slopes of Phulchowki (1,525–2,760 m) is famous for its varied fauna and flora. A total of 219 bird species have been recorded there and 165 of these breed or probably breed. As many as 79% of the total are forest-dependent. This area is the most severely threatened of all the species-rich forests mentioned here. Its importance and plight have been well described by Martens (1982). Local wood-cutting parties daily remove large quantities of firewood either for their own use or for sale in Kathmandu. Large amounts of foliage are also collected for animal fodder. In 1982 the track which runs to the summit was surfaced. As a result vehicles can now easily be used to remove timber and the upper slopes are being increasingly threatened. Since about 1975 the lower slopes have been extensively quarried for stone and only bare rock remains over large sections. Many workers' homes have been erected below the quarry on land which was forest only a few years ago.

If Phulchowki's forests are to survive, the quarry must be closed and protection of the forest enforced. Visits to the mountain could become a tourist attraction and bring an additional income to the people of Godaveri, a village at the base of the mountain. This could provide an incentive to the villagers not to cut down the forest; alternative sources of fuel and animal fodder would then be necessary.

A list of 190 bird species has been recorded at Pipar (N. Picozzi *in litt.* to M. Green), most of which are listed by Forster and Lelliott (1982). A species list is not available, however, for the Modi Khola valley nor for the whole species-rich forest area south of Annapurna. Good habitat still remains but the cutting of trees to supply tourist trekkers with fuel is causing concern in the Modi Khola valley, near Ghorepani and along the Ghandrung ridge. The number of trekkers in the proposed Annapurna Conservation Area has markedly increased in the last eight years. The use of kerosene by trekkers as an alternative to wood has been recommended (Sherpa *et al.* 1985). There is little or no tourist activity at Pipar but adjacent to settlements and summer pastures the forest floor is intensively grazed and timber is collected. The harvesting of bamboo, which grows abundantly in the area, may now be exceeding regeneration (Forster and Lelliott 1982).

Present threats in the upper Mai and upper Arun valleys are less well documented. A total of 222 bird species so far reported in the upper Mai valley (1,990–3,050 m) is similar to that found on Phulchowki, and a similar percentage (77%) is forest-dependent. In 1981 local people appeared to be detrimentally affecting the forests by removing wood and foliage and allowing their stock to graze the understorey (pers. obs.). In about 1974 the forests of the upper Arun valley were little affected by human interference; the most damaging impact came from shepherds who used the forests for grazing sheep *en route* to and from the alpine pastures (Cronin 1979). Good forests still remained in 1981 (Krabbe 1981). About 200 bird species have been recorded there (Inskipp and Inskipp 1985). A more exact figure cannot be given as an unknown number of these species were found outside the forests.

By 1980 less than a third of Nepal was still forested. Wood provides 87% of the nation's energy requirements, and as the population is increasing rapidly so are the

pressures on remaining forests in both protected and unprotected areas (Anon. 1983).

More work is urgently needed in the species-rich forests described above and in other forests which are likely to be of similar importance.There are undoubtedly other species-rich forests which need to be identified, especially in the lowlands. Present threats must be determined and the extent of their effects assessed. Up-to-date lists of bird species need to be compiled within each species-rich forest. The conservation status of all species for which Nepal may be important needs to be determined. All species which appear to be at risk must be identified.

About 65% of all Nepal's breeding birds (Inskipp and Inskipp 1985) and 79% of those for which the country may hold significant breeding populations utilise forests. Therefore to ensure the future of the Nepalese avifauna, including those species for which the country may be important, conservation of the country's forests is vital. Nepal now has a National Conservation Strategy for the rational use of resources, aiming to strike a balance between the needs of the growing population and those of nature conservation (Anon. 1983).

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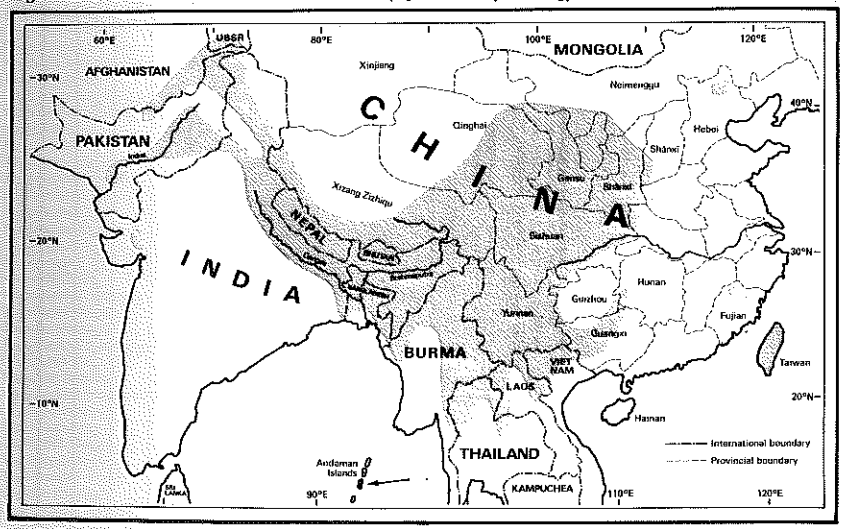
Figure 2. The distribution of birds under review (represented by shading).



APPENDIX
122 BIRD SPECIES FOR WHICH NEPAL MAY HOLD SIGNIFICANT POPULATIONS.

Status

+	Occurs as a breeding bird but abundance unknown	U	Uncommon
C	Common	S	Scarce
FC	Fairly common	R	Rare
LC	Locally common	VR	Very Rare
LFC	Locally fairly common	Ex	Extinct
O	Occasional	+?	Probably breeds
		?	Possibly breeds

Habitat

F	Forest
S	Scrub
B	Bamboo
G	Grassland
R	Rocks
*	Lowland species

References

Nepal=Inskipp and Inskipp (1985). Western Himalayas (east to Kumaon)=Ali and Ripley (1984). Eastern Himalayas (Sikkim to Arunachal Pradesh)=Ludlow and Kinnear (1937), Ali and Ripley (1984). North-eastern India (Assam, Meghalaya, Manipur, Nagaland, Mizoram, Tripura)=Hume (1888), Ali and Ripley (1984). Bangladesh=Khan (1982), Ali and Ripley (1984). Northern Burma=Smythies (1953). Northern Thailand=Lekagul and Cronin (1974), Round (in press). Northern Laos=King *et al.* (1975). Northern Viet Nam=King *et al.* (1975). Xizang Zizhiqu=Ludlow (1944, 1951), Zheng (1976), Li *et al.* (1978), Zheng *et al.* (1980). Southern China (Yunnan, Sichuan, north to eastern Qinghai and southern Neimenggu, east to Hunan)=Zheng (1976), Peng *et al.* (1979). Taiwan=Severinghaus and Blackshaw (1976).

		Nepal	W. Himalayas	E. Himalayas	N.E. India	Bangladesh	N. Burma	N. Thailand	N. Laos	N. Viet Nam	Xizang Zizhiqu	S. China	Taiwan	Habitat
Snow Partridge	*Lerwa lerwa*	FC	+	C							+	+		R
Swamp Francolin	*Francolinus gularis*	S		+	+	R								G*
Blood Pheasant	*Ithaginis cruentus*	LFC		LC			C				+	+		F
Satyr Tragopan	*Tragopan satyra*	U	+	+							+			F
Himalayan Monal	*Lophophorus impejanus*	C	+	C			?				+			S
Cheer Pheasant	*Catreus wallichi*	+	+											S
Bengal Florican	*Houbaropsis bengalensis*	S	+	+	+	Ex?								G*
Wood Snipe	*Gallinago nemoricola*	S	+	+	?						+	?		F
Speckled Wood-Pigeon	*Columba hodgsonii*	O	+	FC	+		+				FC	+		F
Ashy Wood-Pigeon	*Columba pulchricollis*	O		+	+		R	R			+	+	+	F
Slaty-headed Parakeet	*Psittacula himalayana*	FC	C	+										F
Orange-rumped Honeyguide	*Indicator xanthonotus*	S	VR	VR	+		VR							F
Brown-fronted Woodpecker	*Picoides auriceps*	FC	LC											F
Himalayan Woodpecker	*Picoides himalayensis*	FC	+											F
Darjeeling Woodpecker	*Picoides darjellensis*	FC		C	+		LC			+	FC	+		F
Crimson-breasted Woodpecker	*Picoides cathpharius*	O		S	+		C	R	+	+	+	+		F
Blue-naped Pitta	*Pitta nipalensis*	S		+	+	R	+		+	+		+		F
Nepal House-Martin	*Delichon nipalensis*	FC	+	LC	+	R	+			+	+	?		R
Striated Bulbul	*Pycnonotus striatus*	O		+	LC		LC	U	+	+		+		F
Rufous-breasted Accentor	*Prunella strophiata*	FC	C	C							C	+		F/S
Robin Accentor	*Prunella rubeculoides*	FC	C	C							C	+		S
Gould's Shortwing	*Brachypteryx stellata*	S	+	S			?			+	C	+		F/S
Indian Blue Robin	*Erithacus brunneus*	FC	C	S	+		+				+	+		F/S
Golden Bush-Robin	*Tarsiger chrysaeus*	FC	U	FC	+		+			?	FC	+		F/S
White-browed Bush-Robin	*Tarsiger indicus*	O	+	LC	+		?			?	LC	+	FC	F
Rufous-breasted Bush-Robin	*Tarsiger hyperythrus*	O		S							+	+		F
Blue-fronted Redstart	*Phoenicurus frontalis*	C	C	C			+				FC	+		S
White-throated Redstart	*Phoenicurus schisticeps*	O		LC							C	+		S
White-bellied Redstart	*Hodgsonius phoenicuroides*	O	LC	LC			R	?	+	+	C	+		S
Grandala	*Grandala coelicolor*	LC	LC	LC							LC	+		R/G
Purple Cochoa	*Cochoa purpurea*	S	+	R	+		R	R		+		+		F
White-tailed Stonechat	*Saxicola leucura*	LFC	+	+	LC	+	LC							G*
Blue-capped Rockthrush	*Monticola cinclorhyncha*	O	FC	C	+									F/S
Pied Thrush	*Zoothera wardii*	U	U		+									F
Plain-backed Thrush	*Zoothera mollissima*	FC	S	C	+						+	+		F
Long-tailed Thrush	*Zoothera dixoni*	O	+	FC	+					?	+	+		F
Long-billed Thrush	*Zoothera monticola*	O	S	S	+	?	U			+				F
Tickell's Thrush	*Turdus unicolor*	O	C	?										F
White-collared Blackbird	*Turdus albocinctus*	FC	C	C	+		+?				C	+		F
Grey-winged Blackbird	*Turdus boulboul*	C	C	C	+				+	+		+		F

		Nepal	W. Himalayas	E. Himalayas	N.E. India	Bangladesh	N. Burma	N. Thailand	N. Laos	N. Viet Nam	Xizang Zizhiqu	S. China	Taiwan	Habitat
Black-backed Forktail	*Enicurus immaculatus*	O	+	+	C	U	+	U						F*
Chestnut-headed Tesia	*Tesia castaneocoronata*	FC	+	FC	+	+	C	R			+	C	+	F
Pale-footed Bush-Warbler	*Cettia pallidipes*	FC	LC	LC	+		+	R				?		F*
Chestnut-crowned Bush-Warbler	*Cettia major*	S	+	U	+			?			+	+		S
Aberrant Bush-Warbler	*Cettia flavolivacea*	C	+	LC	+		+	?	+	+	+	+		S
Grey-sided Bush-Warbler	*Cettia brunnifrons*	C	C	C			R					C	+	F/S
Grey-crowned Prinia	*Prinia cinereocapilla*	FC	+	FC	+									F/S*
Black-faced Warbler	*Abroscopus schisticeps*	FC	+	LC	+		R			+	+	+		F
Grey-hooded Warbler	*Seicercus xanthoschistos*	C	LC	C	C		+				+			F
Grey-cheeked Warbler	*Seicercus poliogenys*	S		S	C	+	+			+	+	+		F
Large-billed Leaf-Warbler	*Phylloscopus magnirostris*	O	U	FC			+					C		F
Buff-barred Warbler	*Phylloscopus pulcher*	C	C	C	+		+			+	+	C		F
Smoky Warbler	*Phylloscopus fuligiventer*	U		LC								+		S
Rufous-bellied Niltava	*Niltava sundara*	C	FC	C	+		C					FC	+	F/S
Rufous-tailed Flycatcher	*Muscicapa ruficauda*	U	C											F
Sapphire Flycatcher	*Ficedula sapphira*	S		FC	+		?			+?		+	+	F
Ultramarine Flycatcher	*Ficedula superciliaris*	C	C	U	LC		?					+	+	F
Slaty-backed Flycatcher	*Ficedula hodgsonii*	S		LC	+		+					+	+	F
Yellow-bellied Fantail	*Rhipidura hypoxantha*	C	C	C	+	R	LC	R	+	+		C	+	F
Slender-billed Scimitar-Babbler	*Xiphirhynchus superciliaris*	S		LC	+	R	S?					+	+	F/B
Scaly-breasted Wren-Babbler	*Pnoepyga albiventer*	FC	+	C	S		U					C	+	F
Rufous-throated Wren-Babbler	*Spelaeornis caudatus*	U		S										F
Black-chinned Babbler	*Stachyris pyrrhops*	FC	C											F/S
Great Parrotbill	*Conostoma aemodium*	U		U			+					+	+	B
Brown Parrotbill	*Paradoxornis unicolor*	U		U			+					+	+	B
Fulvous Parrotbill	*Paradoxornis fulvifrons*	U		U			+					+	+	B
Spiny Babbler	*Turdoides nipalensis*	O												S
Slender-billed Babbler	*Turdoides longirostris*	LFC		LC	LC	+	FC							G*
White-throated Laughingthrush	*Garrulax albogularis*	C	C	C	+					+		LC	+	F/S
Striated Laughingthrush	*Garrulax striatus*	LC	+	LC	+		FC					C	+	F
Variegated Laughingthrush	*Garrulax variegatus*	C/S	C									?		F/S
Rufous-chinned Laughingthrush	*Garrulax rufogularis*	O	U	LC	+	+	+			+			+	F
Spotted Laughingthrush	*Garrulax ocellatus*	LFC	+	FC			LC					+	+	F/S
Grey-sided Laughingthrush	*Garrulax caerulatus*	O		+	+		FC					U	+	F
Rufous-necked Laughingthrush	*Garrulax ruficollis*	LFC		FC	LC	R	C					+	+	F*
Blue-winged Laughingthrush	*Garrulax squamatus*	S		U	FC		S			+			+	F
Scaly Laughingthrush	*Garrulax subunicolor*	LFC		LC			FC			+		+	+	F/S
Black-faced Laughingthrush	*Garrulax affinis*	C		C			LC			+		C	+	F/S
Fire-tailed Myzornis	*Myzornis pyrrhoura*	O		+			R					LC	+	F/S
Black-headed Shrike-Babbler	*Pteruthius rufiventer*	S		U	+		FC			+			+	F
Green Shrike-Babbler	*Pteruthius xanthochloris*	O	U	LC	+		R					C	+	F
Rusty-fronted Barwing	*Actinodura egertoni*	S		C	+		C					+	+	F
Hoary-throated Barwing	*Actinodura nipalensis*	FC		C								+		F
Red-tailed Minla	*Minla ignotincta*	C		C	LC	+	+			+		C	+	F
Golden-breasted Fulvetta	*Alcippe chrysotis*	S		S	S		FC			+			+	F/B
White-browed Fulvetta	*Alcippe vinipectus*	C	LC	C	+		+			+		+	+	S
Nepal Fulvetta	*Alcippe nipalensis*	C		C	C	U	C					+		F
Rufous Sibia	*Heterophasia capistrata*	C	+	C								+		F
Whiskered Yuhina	*Yuhina flavicollis*	C	LC	C	LC	+	C	R	+	+		C	+	F
Stripe-throated Yuhina	*Yuhina gularis*	C	U	C	+		+		+	+		C	+	F
Rufous-vented Yuhina	*Yuhina occipitalis*	C		C			FC					C	+	F
Black-browed Tit	*Aegithalos iouschistos*	O		LC			FC					C	+	F
White-throated Tit	*Aegithalos niveogularis*	O	U											F/S
Grey-crested Tit	*Parus dichrous*	FC	U	FC			+					U	+	F
Rufous-vented Tit	*Parus rubidiventris*	C	+	C	+		+					C	+	F/S
Spot-winged Tit	*Parus melanolophus*	C	C											F
White-cheeked Nuthatch	*Sitta leucopsis*	+	FC	?								R	+	F
White-tailed Nuthatch	*Sitta himalayensis*	C	+	C	+		FC		+	+	+	+		F
Kashmir Nuthatch	*Sitta cashmirensis*	FC	C											F
Rusty-flanked Treecreeper	*Certhia nipalensis*	FC		U	?		FC					+		F
Fire-capped Tit	*Cephalopyrus flammiceps*	S	LC	R?				?	?			+	+	F
Fire-tailed Sunbird	*Aethopyga ignicauda*	FC	+	C	LC	+	C					+	+	F
Yellow-bellied Flowerpecker	*Dicaeum melanoxanthum*	+	+	S	+		+	R?			?		+	F
Grey-backed Shrike	*Lanius tephronotus*	FC	+	C								C	+	S
Black-headed Jay	*Garrulus lanceolatus*	O	+											F
Gold-billed Magpie	*Urocissa flavirostris*	C	FC	+		R	FC				+	+	+	F
Spot-winged Starling	*Saroglossa spiloptera*	O	+	+?										F*
Black-breasted Weaver	*Ploceus benghalensis*	LFC	+	+	+	U							?	G*
Crimson Rosefinch	*Carpodacus rubescens*	S		S								C	+	F
Dark-breasted Rosefinch	*Carpodacus nipalensis*	FC	U	FC			?				?	C	+	F/S

		Nepal	W. Himalayas	E. Himalayas	N.E. India	Bangladesh	N. Burma	N. Thailand	N. Laos	N. Viet Nam	Xizang Zizhiqu	S. China	Taiwan	Habitat
Pink-browed Rosefinch	*Carpodacus rhodochrous*	FC	U/C	+							+			F
Vinaceous Rosefinch	*Carpodacus vinaceus*	S	?				?				+	+	C	F
Dark-rumped Rosefinch	*Carpodacus edwardsii*	S		U							C	+		F/S
Spot-winged Rosefinch	*Carpodacus rhodopeplus*	FC	S	?			+					+		S
White-browed Rosefinch	*Carpodacus thura*	FC	C	C							C	+		S
Streaked Rosefinch	*Carpodacus rubicilloides*	+	FC	+							C	+		S
Crimson-browed Finch	*Pinicola subhimachala*	U		U	?		?				+	+		F/S
Scarlet Finch	*Haematospiza sipahi*	U	+	U	+		?	R	+	+		+		F
Gold-naped Finch	*Pyrrhoplectes epauletta*	O	+	FC			?				FC	+		F
Red-headed Bullfinch	*Pyrrhula erythrocephala*	FC	FC	FC							+			F
Collared Grosbeak	*Mycerobas affinis*	FC	LC	LC			?				FC	+		F
Spot-winged Grosbeak	*Mycerobas melanozanthos*	SP	U	U	+		?	S	?		+	+		F

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Effects of selective logging on the ecological organization of a peninsular Malaysian rainforest avifauna

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Selective timber logging affects the avifauna in a variety of ways. There is a significant overall decrease in species richness. Families such as Alcedinidae, Trogonidae, Timaliidae, Muscicapidae and Dicaeidae were much reduced, both in species richness and overall abundance. Many species of the Pycnonotidae, and migrant insectivores such as *Hirundo rustica* and *Merops viridis* were observed far more frequently in logged (i.e. selectively logged) forest.

Species that possess a highly specialized diet or foraging behaviour, those exploiting resources that are evenly dispersed and predictable, and those that are physiologically intolerant of microclimatic changes were most often absent from logged forest. Terrestrial and sallying insectivores appear particularly susceptible. These birds tend to be replaced by more robust species, often those able to feed opportunistically on a variety of foods. The presence of some colonizing birds is highly ephemeral, but long-term changes in patterns of species abundance are to be expected in logged forest consistent with long-term changes in habitat parameters.

INTRODUCTION

Tropical rainforests support a high species richness among bird communities. This is partly due to historical factors (Pearson 1982) and partly due to environmental and habitat conditions promoting sympatry through specialization (Karr 1976); other factors may be involved.

Mean abundance per species may be very low in tropical compared to temperate forests (Karr 1971). Species may be rare for a number of reasons, usually because their food resources are rare or because their optimal living space along microclimatic gradients or within the habitat structure is small. Species which exist at very low densities are likely to be susceptible to any form of disturbance that alters features of their environment (Willis 1974, 1979): it is clear that species-rich rainforest communities are less constant (*sensu* Putman and Wratten 1984) in the face of environmental change than are simpler communities (e.g. Michael and Thornburgh 1971, Webb *et al.* 1977). Depending on the form of the disturbance, however, common species can be as seriously affected as rare ones. Abundance alone is not a reliable predictor of susceptibility to disturbance (Karr 1982a,b).

This paper examines the response of a species-rich avifauna to selective timber logging, a prevailing form of habitat disturbance in tropical rainforest. Logging operations in peninsular Malaysia rarely cut more than 5% of total stems for their timber, but incidental damage is considerable; destruction of less than 40% of the stand is unusual. The remnant is often left to regenerate, either naturally or with certain management procedures designed to promote the re-establishment of commercially important trees (see UNESCO 1978). The level of damage is sufficient to cause considerable change in patterns of resource abundance,