







SOUTH ASIAN ARID HABITATS

THE 12 threatened species of this region are found in a variety of arid and semi-arid habitats in the Indian subcontinent, many of which have been greatly modified by centuries of human usage. They have here been divided into five groups (see coloured outlines on map) according to their habitat requirements and distributions: (G03A) three *Gyps* vulture species which roam over all types of forest and open country; (G03B) four species which inhabit semi-arid plains (rolling short grasslands, open deserts and low shrublands), including two migrants from Central Asia; (G03C) Lesser Florican, which breeds in moderately high grasslands in arid to semi-arid areas; (G03D) three species restricted to dry forests and scrub; (G03E) Green Avadavat, which inhabits rough grasslands, agricultural land and orchards. The conservation needs of each of these five groups is discussed in separate sections below.

- **Key habitats** Grassland, arid and semi-arid woodland and scrub, semi-desert, cultivation and other open habitats.
- **Altitude** 0–c.1,000 m.
- **Countries and territories** **Pakistan; India** (Himachal Pradesh; Punjab; Haryana; Delhi; Rajasthan; Gujarat; Uttar Pradesh; Madhya Pradesh; Maharashtra; Goa; Karnataka; Andhra Pradesh; Kerala; Tamil Nadu; Bihar; Orissa; West Bengal; Sikkim; Arunachal Pradesh; Assam; Meghalaya; Nagaland; Manipur); **Nepal; Bhutan; Bangladesh.**

	Threatened species			Total
	CR	EN	VU	
	2	2	4	8
	2	—	—	2
	—	—	2	2
Total	4	2	6	12

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

Vultures play an important role as cleansers, but following the recent crash in their numbers in South Asia they are being replaced by packs of feral dogs as the main scavengers of carcasses. PHOTO: ASAD RAHMANI



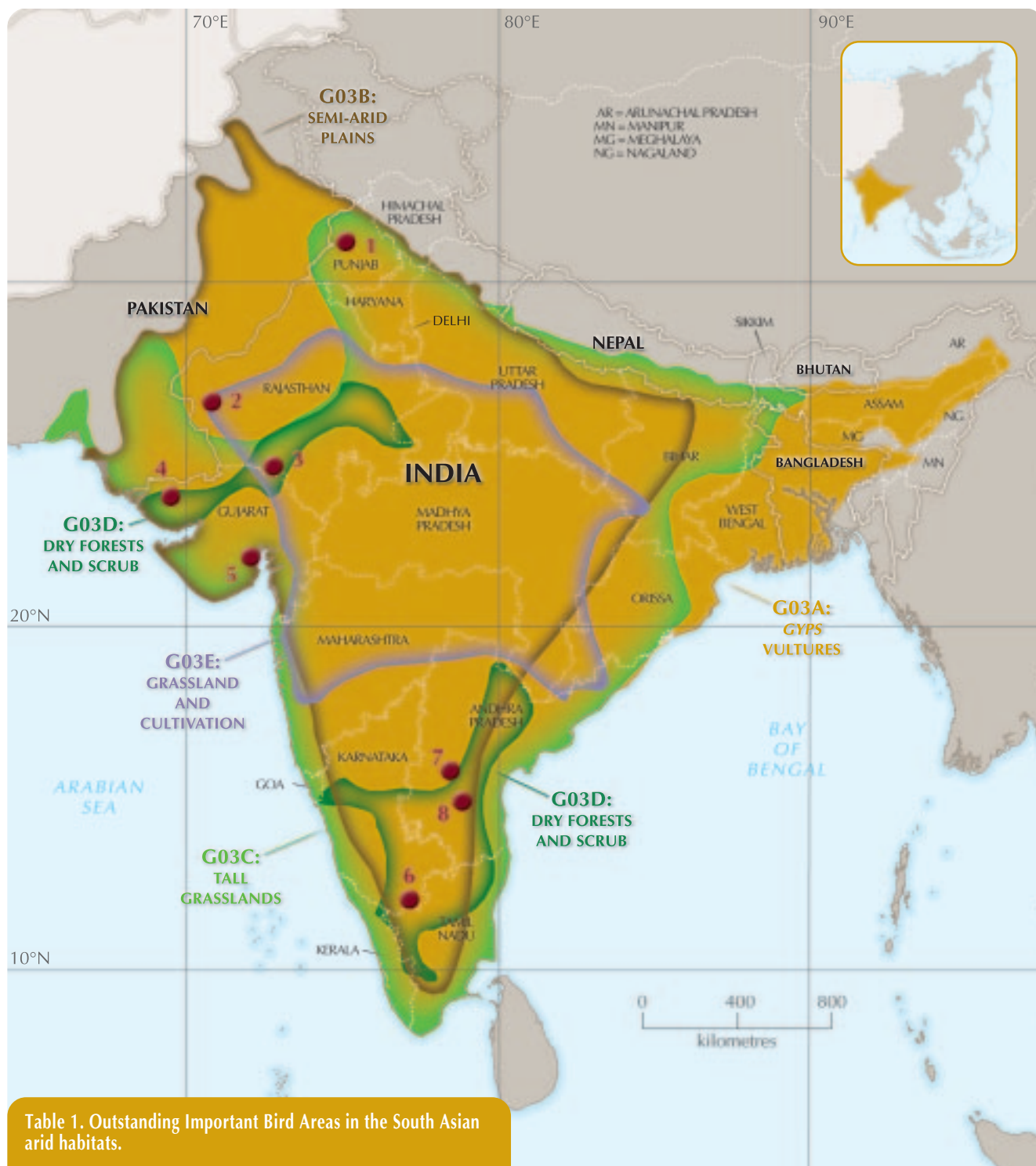


Table 1. Outstanding Important Bird Areas in the South Asian arid habitats.

IBA name	Status	Territory	Threatened species and habitats
1 Harike Lake WS ^{W12}	PA ^R	Punjab	Large concentration of non-breeding Pale-backed Pigeon
2 Desert NP	PA	Rajasthan	Large reserve with Great Indian Bustard and White-browed Bushchat, and non-breeding Sociable Lapwing
3 Mount Abu	PA	Rajasthan	Important population of Green Avadavat
4 Banni grasslands and scrub	—	Gujarat	Important population of White-winged Tit
5 Velavadar NP	PA	Gujarat	Breeding Lesser Florican, occasional White-browed Bushchat and (at least formerly) Great Indian Bustard
6 Billiranga Temple Hills WS ^{F05}	PA	Karnataka	Important population of Yellow-throated Bulbul
7 Rollapadu S	PA	Andhra Pradesh	Breeding Great Indian Bustard and Lesser Florican
8 Sri Lankamalleswara WS	PA	Andhra Pradesh	The only known site for Jerdon's Courser

White-rumped, Indian and/or Slender-billed Vultures also occur in some of the IBAs above, and in outstanding IBAs listed for regions G02, W11, W12 and W14. 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; S = Sanctuary; WS = Wildlife Sanctuary.

Status: PA = IBA is a protected area; (PA) = IBA partially protected; — = unprotected; R = IBA is wholly or partially a Ramsar Site (see pp.31–32); F05 = also supports threatened forest birds of region F05; W12 = also supports threatened waterbirds of region W12.

Table 2. Threatened birds of the South Asian arid habitats.

Species			Distribution and habitat
G03A: GYPS VULTURES			
White-rumped Vulture <i>Gyps bengalensis</i>		CR	Urban and cultivated areas, light woodland and open habitats in lowland South Asia and South-East Asia
Indian Vulture <i>Gyps indicus</i>		CR	Urban and cultivated areas, light woodland and open habitats in lowland Pakistan and southern India
Slender-billed Vulture <i>Gyps tenuirostris</i>		CR	Cultivated areas, light woodland and open habitats in lowland northern India, southern Nepal, Bangladesh and South-East Asia
G03B: SEMI-ARID PLAINS			
Great Indian Bustard <i>Ardeotis nigriceps</i>		EN	Range now highly fragmented in semi-desert, grassland, scrub and cultivation in western India and eastern Pakistan
Sociable Lapwing <i>Vanellus gregarius</i>		VU	Non-breeding visitor in small numbers to dry plains in Pakistan and north-west India
Pale-backed Pigeon <i>Columba eversmanni</i>		VU	Non-breeding visitor to open and sparsely wooded areas in Pakistan and north-west India
White-browed Bushchat <i>Saxicola macrorhyncha</i>		VU	Local in sandy semi-desert with low scrub in north-west India and (at least formerly) Pakistan
G03C: TALL GRASSLANDS			
Lesser Florican <i>Sypheotides indica</i>		EN	Breeds in grasslands and open fields in north-west India, outside breeding season disperses widely in India, and sometimes in Pakistan and Nepal
G03D: DRY FORESTS AND SCRUB			
Jerdon's Courser <i>Rhinoptilus bitorquatus</i>		CR	Known from dry rocky undulating ground with a thin woodland or scrub cover at a handful of localities in Maharashtra and Andhra Pradesh in southern India
Yellow-throated Bulbul <i>Pycnonotus xantholaemus</i>		VU	Found in sparse thorn scrub interspersed with trees on boulder-strewn inland hills in Karnataka, Andhra Pradesh and Tamil Nadu in southern India
White-naped Tit <i>Parus nuchalis</i>		VU	Occurs in dry thorny woodland and scrub, with disjunct populations in north-west and southern India
G03E: GRASSLAND AND CULTIVATION			
Green Avadavat <i>Amandava formosa</i>		VU	Inhabits grassland and scrub, sugarcane fields and orchards in the lowlands of north and central India

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

OUTSTANDING IBAs FOR THREATENED BIRDS (see Table 1)

Eight IBAs have been selected, which together support populations of almost all of the threatened species of this region. However, most of these birds occur at low densities or have highly fragmented populations, and their conservation is therefore generally best addressed at the landscape level and through the protection of networks of small sites. Many of these will be identified during BirdLife's ongoing regional IBA Project.

reported, with large numbers of sick birds suggesting that a disease or poisoning may be responsible. The implications are grave, as low reproductive rates and high longevity means that only relatively small increases in adult mortality rates can lead to precipitous population declines. If numbers in the Indian subcontinent continue to fall, the remnant populations of White-rumped and Slender-billed Vultures in South-East Asia will become increasingly important for the survival of these species.

CONSERVATION ISSUES AND STRATEGIC SOLUTIONS (summarised in Table 3a)

G03A: GYPS VULTURES

CURRENT STATUS OF HABITATS AND THREATENED SPECIES

White-rumped and Slender-billed Vultures occur in the Indian subcontinent and South-East Asia, but Indian Vulture is found only in India and Pakistan. Early accounts suggest that all three species were once abundant across most of their ranges, having adapted well to modification of their natural habitats by man, although vulture populations declined rapidly in South-East Asia during the twentieth century (see W16 and W18). Vulture numbers remained high in the Indian subcontinent until the last few years of the twentieth century, when an extremely rapid decline was

Habitat loss and degradation

■ **REDUCED NESTING HABITAT**

These vultures have adapted well to modifications of their habitats by man, and an abundance of suitable habitat remains both in the Indian subcontinent and in South-East Asia. However, some localised declines have been noticed in parts of Bangladesh, mainly around cities, apparently linked to a scarcity of mature trees for nesting and roosting. Where possible mature trees should be left standing, and the provision of artificial nest sites considered, especially where shortage of nest sites is a problem.

■ **PESTICIDES**

Large quantities of pesticides are used in agricultural areas of the Indian subcontinent, and high levels have been found (including of DDT) in tissue samples from cattle and pig

carcasses in several parts of India. This may well cause problems to scavengers such as vultures, and there is some evidence that eggs are broken in vulture nests, possibly as a result of eggshell-thinning toxins. However, recent analyses of tissues from dead vultures in India and Pakistan have not found significant concentrations of pesticides; nevertheless, controls on the use of pesticides and other agrochemicals should be tightened throughout the region.

Exploitation of birds

■ **HUNTING AND PERSECUTION**

In the Indian subcontinent vultures are generally regarded as unclean and are not often hunted, and are valued for their role as cleansers. However, efforts have been made to eliminate vulture populations near to some airports to reduce the risk of air-strikes. Vultures are generally unpopular in Asia, a factor that hinders conservation action, and awareness campaigns are required to improve understanding of their current plight, and of the crucial role that they play in the disposal of carrion. In some areas where vultures have declined they are being replaced by

packs of feral dogs as the main scavengers of carcasses, which could lead to an increased rabies problem.

■ **POISONING**

Deliberate poisoning of carcasses (e.g. with strychnine), normally to defend against mammalian livestock predators (e.g. leopards), has long affected vultures in Asia. Vultures are communal feeders, meaning that an entire population can be exterminated by feeding at a single poisoned carcass. The use of poisoning baits to control carnivore populations should be prevented throughout.

Gaps in knowledge

■ **INADEQUATE DATA ON THREATENED BIRDS**

Traditionally, very little attention has been paid to the identification, importance and conservation status of vultures. The Indian Vulture and Slender-billed Vulture were considered a single species until recently, and this has hampered any appraisal of recent changes in their distribution and abundance. However, since the vulture crisis began in the late 1990s, numerous surveys and studies of nesting colonies and vulture pathology have been initiated, in India under the coordination of Bombay Natural History Society. This research should be continued and extended, with the most immediate priority to continue laboratory studies to identify the causes of vulture declines in the Indian subcontinent, and to devise appropriate measures for its control. Detailed, standardised surveys are required to monitor the status (including breeding success and incidence of mortality) of the three vulture species in the Indian subcontinent, with survey teams armed with new identification criteria to distinguish Indian Vulture and Slender-billed Vulture; in India, the vast manpower of the Forest Department could facilitate surveys.

Other conservation issues

■ **INCREASED MORTALITY**

Until recently, it was thought that the most likely cause of the recent rapid declines in the numbers of vultures in the Indian subcontinent was infectious disease. Post-mortem studies of vulture carcasses from across India and Pakistan have found evidence of visceral or renal gout, and dying birds in all areas have shown similar clinical signs of sickness, such as neck-drooping. It appears that only vultures of the genus *Gyps* are affected, and it is known that some infectious diseases, especially viral, can exhibit this

Gyps vultures in South Asia have suffered a mass mortality in the past decade, but the precise cause is not yet understood.



PHOTO: OTTO PFISTER

Table 3a. Conservation issues and strategic solutions for the South Asian arid habitats: *Gyps* vultures.

Conservation issues	Strategic solutions
Habitat loss and degradation	
<ul style="list-style-type: none"> ■ REDUCED NESTING HABITAT ■ PESTICIDES 	<ul style="list-style-type: none"> ➤ Retain mature trees in areas where a lack of suitable nest and roost sites may be a problem ➤ Tighten controls on the use of pesticides and other agrochemicals
Exploitation of birds	
<ul style="list-style-type: none"> ■ HUNTING AND PERSECUTION ■ POISONING 	<ul style="list-style-type: none"> ➤ Conduct awareness campaigns to improve understanding of the current plight of Asia's vultures, and their importance as removers of carrion ➤ Ban the use of poisoned baits to control carnivore populations
Gaps in knowledge	
<ul style="list-style-type: none"> ■ INADEQUATE DATA ON THREATENED BIRDS 	<ul style="list-style-type: none"> ➤ Continue research to identify the cause of the vulture decline in the Indian subcontinent, and to devise appropriate measures for its control ➤ Monitor vulture status and distribution using standard survey techniques, including breeding success and mortality at nesting colonies
Other conservation issues	
<ul style="list-style-type: none"> ■ INCREASED MORTALITY 	<ul style="list-style-type: none"> ➤ Rapidly implement measures to combat the current cause of decline once these are available ➤ Initiate captive breeding programmes to maintain healthy populations of all three vulture species

type of genus specificity. However, dead birds from three colonies in Pakistan were recently found to contain a drug, Diclofenac, which is used in veterinary medicine, and it is speculated that this could be the main cause of the observed sickness and mortality. Laboratory and field studies need to be continued to confirm whether this drug or another factor, or a combination of factors, is killing vultures. If the drug is confirmed to be the main source of the problem, urgent measures are required to prevent vultures ingesting it with their food, possibly including the development and provision of alternative treatments for sick animals, with awareness campaigns to promote their use. A captive breeding programme has been proposed, to try to maintain healthy captive populations of all three vulture species; until a solution has been found to the problem affecting wild populations, efforts should be continued to breed from any healthy birds in zoos, and construct facilities to hold and breed captive vultures in the Indian subcontinent.

G03B: SEMI-ARID PLAINS

CURRENT STATUS OF HABITATS AND THREATENED SPECIES

Much of eastern Pakistan, and north-western, central and south-eastern India was once a vast expanse of savanna, but this habitat is now much reduced and fragmented. Huge areas have been converted to agriculture over recent decades (often involving large-scale irrigation projects) to meet the demands of a growing human population, while increasing numbers of cattle have caused widespread overgrazing. Both Great Indian Bustard and White-throated Bushchat avoid intensively cultivated areas, so their ranges and numbers have been greatly reduced, and the wintering populations of the other two threatened species have presumably also been negatively affected.

CONSERVATION ISSUES AND STRATEGIC SOLUTIONS (summarised in Table 3b)

Habitat loss and degradation

■ IRRIGATION AND CONVERSION TO AGRICULTURE

Until the early twentieth century, the semi-arid plains of India and eastern Pakistan were of limited value for agriculture, but a succession of irrigation schemes has led to the conversion of vast areas to intensive cultivation. This continuing loss and fragmentation of grassland and semi-desert habitats, together with associated increases in pesticide use and disturbance, are seriously affecting the populations of threatened birds, particularly Great Indian Bustard. The planned Indira Gandhi Nagar Project (IGNP) will directly irrigate 11% of the Thar Desert, and its canals will bisect the already heavily disturbed Desert National Park; and it could therefore affect large areas of semi-desert habitat. It is vital that irrigation schemes and associated agricultural developments are modified (possibly through environmental impact assessments) near the most important areas for Great Indian Bustard and other threatened birds, to prevent large-scale conversion of their habitats, particularly inside protected areas. Irrigation should be avoided in Desert National Park (and other known centres of bustard populations) by re-routing the IGNP canals, or by prohibiting any irrigation of land (via these canals) within the park boundaries.

The semi-desert habitat of Great Indian Bustard has been rapidly lost and fragmented over recent decades through large-scale irrigation projects and conversion to agriculture.



PHOTO: ASAD RAHMANI

■ AGRICULTURAL INTENSIFICATION

More intensive forms of agriculture have recently become widespread, linked to the large irrigation schemes. Great Indian Bustards can persist in agricultural areas where the farmers use non-intensive traditional practices, but not in intensively cultivated areas. Even the use of new crops may make a difference, with the substitution of groundnuts for millet and cotton affecting the bustards because this new crop does not provide cover for young. The retention of some areas of farmland where non-intensive traditional agricultural practices are used and bustard-friendly crops are grown should be encouraged, and strictly imposed in buffer zones to reserves. This type of landscape-scale measure is vital as Great Indian Bustards range widely and cannot be conserved within protected areas alone, however important these may be as havens to maximise breeding success.

■ LIVESTOCK GRAZING AND GRASSLAND MANAGEMENT

Vast numbers of livestock roam Indian semi-deserts and grasslands, chiefly cattle, although sheep- and camel-breeding operations are spreading. Grazing animals may cause disturbance, degrade habitat and destroy the nests of ground breeding birds, although limited grazing is beneficial, preventing vegetation becoming unsuitably tall. At present, many grasslands are poorly managed and hence of limited value for threatened birds, either because excessive grazing or burning has damaged the grasslands and created denuded plains, or because the removal of these factors—as has occurred in some protected areas—has allowed the vegetation to rapidly regenerate into dense scrubland. A balance is needed between these extremes. In general, the perpetuation of traditional grassland management and the introduction of rotational grazing under controlled conditions would be of great benefit, and should be promoted among local communities in and

Grassland reserves such as Rollopadu require careful management of grazing and burning to develop ideal habitat for nesting bustards.



PHOTO: ASAD RAHMANI

Table 3b. Conservation issues and strategic solutions for the South Asian arid habitats: semi-arid plains.

Conservation issues	Strategic solutions
Habitat loss and degradation	
<ul style="list-style-type: none"> ■ IRRIGATION AND CONVERSION TO AGRICULTURE ■ AGRICULTURAL INTENSIFICATION ■ LIVESTOCK GRAZING AND GRASSLAND MANAGEMENT ■ DISTURBANCE ■ PESTICIDES 	<ul style="list-style-type: none"> ➤ Modify planned irrigation schemes and agricultural developments to avoid large-scale conversion of biodiversity-rich semi-desert and grassland ➤ Avoid developing irrigation within Desert National Park (and other protected areas), possibly by re-routing the IGNP canals ➤ Retain traditional agricultural practices and bustard-friendly crops, especially in and around key reserves for Great Indian Bustard ➤ Continue traditional grassland management, and introduce rotational grazing practices to maintain patches of suitable habitat ➤ Promote the concept of fewer but better-quality livestock, particularly near protected grasslands ➤ Establish 'safe havens' on Great Indian Bustard nesting grounds, where disturbance is minimised during the breeding season ➤ Restrict access by all-terrain vehicles to grassland and desert areas, especially inside protected areas and during the breeding season ➤ Improve controls on the use of pesticides and other agrochemicals
Protected areas coverage and management	
<ul style="list-style-type: none"> ■ GAPS IN PROTECTED AREAS SYSTEM ■ WEAKNESSES IN RESERVE DESIGN AND MANAGEMENT 	<ul style="list-style-type: none"> ➤ Increase coverage of threatened birds by establishing new protected areas and extending existing ones ➤ Redemarcate the boundaries of Desert National Park, and redevelop core areas in this and other reserves for breeding Great Indian Bustards ➤ Increase the resources available for protected area management and training of reserve staff, particularly at key sites for threatened species
Exploitation of wildlife	
<ul style="list-style-type: none"> ■ HUNTING 	<ul style="list-style-type: none"> ➤ Improve enforcement of hunting legislation, by developing an anti-poaching task force, regular patrolling of protected areas, and controls on gun ownership
Gaps in knowledge	
<ul style="list-style-type: none"> ■ INADEQUATE DATA ON THREATENED BIRDS ■ LACK OF AWARENESS 	<ul style="list-style-type: none"> ➤ Study the movements of Great Indian Bustard, possibly using satellite-tracking ➤ Survey White-browed Bushchat (especially in Pakistan), and wintering Sociable Lapwing and Pale-backed Pigeon, to help identify key sites for their conservation ➤ Launch 'Project Bustard', to raise awareness of the plight of India's bustards and to coordinate conservation measures for these birds and their grassland habitats

around important areas for threatened birds. The concept of fewer but better-quality livestock could also be promoted, particularly to reduce grazing pressure near protected grasslands.

■ **DISTURBANCE**

Great Indian Bustards are extremely shy and easily disturbed, especially on their breeding grounds, and the scarcity of secure nesting areas is a significant threat to the species. People, cattle or other ungulates such as blackbuck are often abundant in its nesting habitat, posing a serious risk of disturbance and trampling of nests. Moreover, irrigation projects are set to increase the already considerable human use and disturbance of once-pristine

areas such as Desert National Park. The spread of roads and the improvement of all-terrain vehicles has allowed access to even the remotest portions of the Thar desert, leading to increased disturbance and hunting pressure. 'Safe havens' are needed on bustard nesting grounds inside protected areas, where disturbance is minimised during the breeding season, with patrolling by park staff to control human activities. Measures to limit disturbance where bustards nest outside protected areas could be agreed with farmers and landowners, possibly involving payment of compensation if this affects their economic activities. The use of all-terrain vehicles should be restricted in grassland and desert areas, especially inside protected areas and during the breeding season.

■ PESTICIDES

The use of pesticides has increased in India in recent decades, linked to irrigation schemes and intensified agriculture. This may directly harm insectivorous birds such as Great Indian Bustard through food-chain toxin accumulation, and indirectly by reducing prey abundance. The use of these chemicals should be carefully controlled, and fodder and crop development schemes that rely on pesticides and fertilisers avoided. In key areas for threatened species, low-intensity traditional agricultural practices, with a low input of pesticides and other agrochemicals, should be promoted, possibly involving compensation schemes.

Protected areas coverage and management

■ GAPS IN PROTECTED AREAS SYSTEM

There are many protected areas which contain suitable habitat for Great Indian Bustard and other threatened species, including some very large ones such as Desert National Park in Rajasthan. However, the bustards roam over large areas and make seasonal and nomadic movements, and the only practical plan for their long-term protection is to maximise the area (and the effectiveness of management) of suitable habitat within protected areas, whilst taking measures to improve conditions outside protected areas (see above). Wherever possible, new protected areas are needed to protect important populations of Great Indian Bustard and other threatened species, and some existing reserves need to be enlarged. For example, the Naliya grasslands in Gujarat, which support good populations of Great Indian Bustard and Lesser Florican, are proposed for establishment as a Community Conservation Area (a new category created by a 2002 amendment to the Indian Wildlife Protection Act).

■ WEAKNESSES IN RESERVE DESIGN AND MANAGEMENT

Given the pressures on natural habitats, management of protected areas must maximise the value to Great Indian Bustard and the other threatened species. However, in the past there has been inappropriate habitat management in several reserves, for example in Karera Bustard Sanctuary in Madhya Pradesh, where grazing animals were removed from a plot of grassland, which consequently became overgrown and entirely unsuitable for bustards, while protection within a larger area caused the number of blackbuck to increase, which trampled bustard nests and caused considerable damage to villagers' crops. In the huge Desert National Park, the main hope for the fauna of arid India, park authorities have only two vehicles, and inadequate management has allowed hunting and disturbance to take place in core areas.

Improvements in protected area management are therefore needed. Grazing and burning regimes must be carefully managed in protected areas (and ideally also in adjacent lands: see above) to develop ideal bustard habitat, which will require close cooperation with local communities; in some reserves, it may be necessary to control blackbuck populations (through culling or, preferably, translocation). In general, the habitat for Great Indian Bustard can best be protected through the use of large buffer zones where only traditional agriculture and moderate grazing is permitted, surrounding much smaller core areas which are protected from all interference in the breeding season; the boundaries of some reserves, e.g. Desert National Park, may need to be redemarcated and the core areas redeveloped to achieve this zonation. Improved funding is required to manage reserves, increase their

staffing levels, and provide better equipment and training. The enforcement capacity of governmental departments responsible for environment and forestry needs to be improved through increased resources and better training.

Exploitation of wildlife

■ HUNTING

Hunting of Great Indian Bustards has been a problem for decades, if not centuries, and may also affect wintering Sociable Lapwing and Pale-backed Pigeon. The impact of hunting on the bustard increased greatly during the twentieth century as firearms and (particularly) jeeps became widely available, causing a major decline. Poaching continues in many areas, involving city-dwelling 'sport-hunters', military and police personnel, and local pastoralists; until recently this threat had not affected the species's last stronghold in the interior of the Thar desert, but recent improvements in all-terrain vehicles have made all these areas accessible. The low reproductive rates (only a single egg is laid per clutch) and high longevity of bustards mean that relatively small increases in adult mortality rates lead to significant population declines. The problem of hunting needs urgent attention, and should be tackled through improved enforcement of existing legislation. An anti-poaching task force has been called for to counter persistent local hunters and city-based poachers. Protected areas need to be regularly patrolled to detect hunters, by well-equipped and trained staff, and gun ownership should be more strictly controlled.

Gaps in knowledge

■ INADEQUATE DATA ON THREATENED BIRDS

The movements of Great Indian Bustards are poorly understood and require further study, possibly including through satellite-tracking, a project that could potentially be used to raise awareness of the species. Recent studies have improved understanding of White-browed Bushchat in parts of India, but similar work is needed elsewhere, particularly in areas of potential habitat in Pakistan. The distribution and numbers of wintering Sociable Lapwing and (especially) Pale-backed Pigeon, should be investigated to identify key areas for protection.

■ LACK OF AWARENESS

There is general ignorance of the plight of Great Indian Bustard in India, and most local people are unaware that it is protected. Given the severe and complex problems facing

White-browed Bushchat has been surveyed in India, but it needs to be looked for in areas of potential habitat in Pakistan.



PHOTO: OTTO PFISTER

this species, Bengal Florican (see G02) and Lesser Florican (see G03C below), an integrated national 'Project Bustard' has been proposed, along the lines of Project Tiger and Project Elephant. This would aim to establish more bustard sanctuaries, to upgrade existing closed areas, to coordinate the management of sanctuaries, to undertake research on the species and their habitats, and to integrate grassland conservation with national grazing policy. Semi-arid habitats are generally considered a low conservation priority in India, and 'Project Bustard' could raise the profile and effectiveness of national grassland conservation, and would benefit a whole suite of other threatened and endemic grassland animals.

G03C: TALL GRASSLANDS

CURRENT STATUS OF HABITATS AND THREATENED SPECIES

Grasslands were once extensive in the main breeding and wintering ranges of Lesser Florican in Gujarat, Maharashtra, Andhra Pradesh and other areas of the Deccan plateau southward to Tamil Nadu, but they have been degraded and fragmented over recent decades. Huge areas have been claimed for agriculture to meet the demands of a growing human population, and the increasing number of cattle has led to widespread overgrazing. Rainfall is crucial to the breeding success of Lesser Florican: in good monsoon years grass regrows strongly after grazing, but in drought years it does not, resulting in habitat inadequate for breeding and dramatic dips in population size. The species appears capable of rapid recovery after drought as long as sufficient habitat is available to support a large enough overall population.

CONSERVATION ISSUES AND STRATEGIC SOLUTIONS (summarised in Table 3c)

Habitat loss and degradation

■ CONVERSION TO AGRICULTURE

Tall grassland, the habitat favoured by Lesser Florican, is a highly threatened biome in much of India. In Gujarat, one of the main strongholds of the species, it continues to be encroached illegally by immigrants, who are ploughing up tracts of land and causing the loss of habitat for floricans and local herds. Further conversion to agriculture of

Velavadar National Park in Gujarat supports an important breeding population of Lesser Florican.



PHOTO: ASAD RAHMANI

traditional fodder-producing grasslands (*vidis*), the main hope for breeding floricans, needs to be minimised, through improved protection and management as outlined below.

■ GRASSLAND MANAGEMENT

The area of habitat available to Lesser Floricans is declining, because *vidis* are diminishing in number and extent, and because many surviving grasslands are poorly managed. The perpetuation of traditional grassland management and the introduction of rotational grazing under controlled conditions would be of great benefit to both floricans and people, as *vidis* are the most economically and ecologically viable land use in this part of India.

■ LIVESTOCK GRAZING

Vast numbers of livestock, chiefly cattle, roam Indian grasslands, causing disturbance, habitat degradation and nest loss in ground breeding birds. While too much grazing or burning creates denuded plains, the removal of livestock or burning regimes allows dense scrubland to develop. Controlled or rotational grazing regimes are required, especially in core areas of reserves and other florican breeding areas. The number of grazing animals should be managed, involving the promotion of cattle camps (to reduce indiscriminate grazing pressure) and the concept of fewer but better-quality livestock.

■ DISTURBANCE

Lesser Floricans are shy and easily disturbed, especially on their breeding grounds. People, cattle or other ungulates such as blackbuck are often abundant in their nesting habitat, posing a serious risk of disturbance and trampling of nests. Disturbance should be minimised on florican nesting grounds during the breeding season by the exclusion of livestock and control of human access and activities; in protected areas this could be achieved through patrolling by park staff, and outside protected areas through management agreements with farmers and landowners.

■ PESTICIDES

The use of pesticides has increased in India in recent decades, which may harm insectivorous birds such as Lesser Florican directly through ingestion with prey, and indirectly by reduced food availability. The use of these chemicals should be more carefully controlled, and fodder and crop development schemes that rely on pesticides and fertilisers avoided.

■ INVASIVE SPECIES

The introduced and invasive mesquite tree *Prosopis* poses a serious threat to florican habitat, devaluing grasslands for both birds and fodder production. The Indian Forest Department has recently begun eradication programmes in Rajasthan, and similar initiatives need to be developed in other states.

Protected areas coverage and management

■ GAPS IN PROTECTED AREAS SYSTEM

The distribution of Lesser Florican varies annually with rainfall, with birds migrating to the best-watered grassland areas. It is therefore necessary to protect and manage many grasslands within its large potential breeding range in western India, through a combination of secure protected areas and sympathetic grassland management elsewhere. New protected areas should be established (e.g. the proposed Community Conservation Area at Naliya grasslands in Gujarat: see G03B) to increase protection and

Traditional fodder-producing grasslands or vidis are ideal habitat for Lesser Florican, but are diminishing in number and extent.

PHOTO: ASAD RAHMANI



Table 3c. Conservation issues and strategic solutions for the South Asian arid habitats: tall grasslands.

Conservation issues	Strategic solutions
Habitat loss and degradation	
<ul style="list-style-type: none"> ■ CONVERSION TO AGRICULTURE ■ GRASSLAND MANAGEMENT ■ LIVESTOCK GRAZING ■ DISTURBANCE ■ PESTICIDES ■ INVASIVE SPECIES 	<ul style="list-style-type: none"> ➤ Minimise further conversion of traditional fodder-producing grasslands (<i>vidis</i>) to agriculture ➤ Promote the traditional management of <i>vidis</i> ➤ Introduce rotational grazing to maintain patches of florican habitat, and promote the concept of fewer but better-quality livestock at key grasslands ➤ Control access by livestock and people to grasslands where floricans are nesting ➤ Improve controls on the use of pesticides and other agrochemicals ➤ Develop programmes to eradicate mesquite from grasslands
Protected areas coverage and management	
<ul style="list-style-type: none"> ■ GAPS IN PROTECTED AREAS SYSTEM ■ WEAKNESSES IN RESERVE DESIGN AND MANAGEMENT 	<ul style="list-style-type: none"> ➤ Establish new protected areas and extend existing reserves to improve coverage of Lesser Florican habitat ➤ Redemarcate the boundaries of reserves to produce large buffer zones, and develop core areas to provide safe havens for breeding floricans ➤ Increase the resources available for protected area management and training of reserve staff, particularly at key sites
Exploitation of wildlife	
<ul style="list-style-type: none"> ■ HUNTING 	<ul style="list-style-type: none"> ➤ Improve enforcement of hunting legislation, by developing an anti-poaching task force, regular patrolling of protected areas, and controls on gun ownership
Gaps in knowledge	
<ul style="list-style-type: none"> ■ INADEQUATE DATA ON THREATENED BIRDS ■ LACK OF AWARENESS 	<ul style="list-style-type: none"> ➤ Study the migratory movements of Lesser Florican, possibly using satellite-tracking ➤ Launch 'Project Bustard', to raise awareness of the plight of India's bustards and to coordinate conservation measures for these birds and their grassland habitats

improve management of its specialised habitat, and existing reserves enlarged to include additional areas of grassland.

WEAKNESSES IN RESERVE DESIGN AND MANAGEMENT

Many reserves where Lesser Florican occurs are inadequately protected, being poorly demarcated and advertised, with minimal infrastructure and administrative presence; hence (e.g.), large areas of grasslands in Sailanor Kharmor Sanctuary in Madhya Pradesh were converted to agriculture or leased to graziers during the 1990s. Stricter management of protected grasslands is required, with grazing and burning regimes carefully regulated. The semi-nomadic nature of the Lesser Florican, coupled with the intense pressure on land in India, means that reserves for the species can best be achieved through the development of large buffer zones, surrounding much smaller core areas which are protected from all interference in the breeding season. Improved

funding is required to manage reserves, increase their staffing levels, and provide better equipment and training. The enforcement capacity of governmental departments responsible for environment and forestry needs to be improved through increased resources and better training.

Exploitation of wildlife

HUNTING

The major historical decline in numbers and range of Lesser Florican is linked to severe hunting pressure, and hunting with guns and snares is still widespread. This needs to be addressed through improved enforcement of existing hunting legislation. An anti-poaching task force has been called for to counter persistent hunters in India (see G03B: *Hunting* above). Protected areas should be regularly patrolled by well-equipped and trained staff, and gun ownership strictly controlled.

Gaps in knowledge

■ INADEQUATE DATA ON THREATENED BIRDS

The movements and non-breeding range of Lesser Florican are poorly understood and require study, possibly through satellite-tracking; this would help identify key non-breeding sites, where conservation action may be required.

■ LACK OF AWARENESS

Given the severe and complex problems facing this species, Bengal Florican (see G02) and Great Indian Bustard, an integrated national 'Project Bustard' has been proposed, along the lines of Project Tiger and Project Elephant (see G03B: *Lack of awareness* for further details).

G03D: DRY FORESTS AND SCRUB

CURRENT STATUS OF HABITATS AND THREATENED SPECIES

Dry forests and scrublands were formerly extensive in Gujarat, Rajasthan and southern India, but have been widely cleared and degraded by a combination of localised clearance for agriculture, villages and other developments, and overgrazing and unsustainable exploitation of forest products. The remaining habitat is now severely fragmented in many areas, and is under continuing pressure from development and exploitation.

CONSERVATION ISSUES AND STRATEGIC SOLUTIONS (summarised in Table 3d)

Forest loss and degradation

■ CONVERSION TO AGRICULTURE

Given the semi-aridity and often rocky nature of this habitat, clearance for agriculture is only a localised threat, but has caused significant losses. For example, the Shevaroy hills in Tamil Nadu are almost entirely covered with coffee plantations, confining the Yellow-throated Bulbul to escarpments, and some former sites for White-naped Tit in Gujarat have been cleared for agriculture. Further habitat

conversion at key sites for threatened birds needs to be controlled, involving the establishment of a network of dry forest reserves.

■ EXPLOITATION OF FOREST PRODUCTS

Throughout this region, especially near settlements, gathering of fuelwood and foliage (for fodder) is heavily degrading or even clearing dry forests and scrub. In Gujarat, wood is collected for illegal charcoal-making and bakeries, removing old trees used by nesting White-naped Tits, and *Acacia* twigs are collected in large numbers to make disposable toothbrushes. In Andhra Pradesh, the habitat of Jerdon's Courser may be threatened by collection of fuelwood, timber and thatch by local villagers, although moderate levels of wood-cutting and livestock grazing may benefit the species by maintaining the open nature of the forest. At key sites for threatened species, social forestry initiatives should be developed, including village forests with communal management, and the regeneration of dry forest on wastelands. Measures are also required to alleviate local demands on forest resources, including the introduction of fuel-efficient stoves to reduce wood-fuel consumption.

■ LIVESTOCK GRAZING

Browsing of vegetation by cattle, goats and other livestock is causing localised degradation of dry forests and scrub. At some Yellow-throated Bulbul sites, the hills have been almost totally denuded by intense browsing, and livestock damage the shrubs which provide the bulbul's food. Grazing needs to be more effectively managed, especially in protected areas.

■ DEVELOPMENT (URBAN, INDUSTRIAL, ETC.)

Some areas of dry forest are being cleared or fragmented by the expansion of villages and towns, or by quarrying for granite and gypsum. The Somasilla dam caused 57 villages to be relocated within the range of Jerdon's Courser in Andhra Pradesh, and the settlers in the Lankamalai area may pose a serious threat to the species's habitat. Suitable habitat (in excellent condition) for White-winged Tit at the Narayan Sarovar Chinkara Sanctuary has been threatened

Jerdon's Courser habitat in Sri Lankamalleswara Wildlife Sanctuary.



PHOTO: ASAD RAHMANI

by proposed cement factories. Large development projects that could damage important areas of dry forest should be modified (possibly through environmental impact assessments) to minimise loss of habitat, particularly inside protected areas. The biodiversity and economic value of dry forests and scrubland needs to be brought to the attention of government and civil society in India, to reduce the damage to these habitats from development and exploitation.

■ INVASIVE SPECIES

The introduced mesquite tree *Prosopis* is thought to be having a serious effect on dry habitats in India. Programmes are needed to eradicate it where it is reducing the quality of dry forest and scrub habitats at important sites for threatened birds.

Protected areas coverage and management

■ GAPS IN PROTECTED AREAS SYSTEM

Three wildlife sanctuaries have been established in and around the single known site for Jerdon’s Courser. However, Yellow-throated Bulbul and White-winged Tit are both known from very few protected areas, reflecting the low priority that has been given to the conservation of dry forest and scrub. There is an urgent need to establish a network of new sanctuaries (or expanded existing ones) to protect healthy populations of these two species, following surveys to locate their best habitats. These conservation efforts could include sites where habitats exist in good condition owing to religious practices (e.g. temple forests in Pali districts in Rajasthan).

■ WEAKNESSES IN RESERVE MANAGEMENT

Stronger protection is likely to be required in many dry forest reserves, because of inadequate infrastructure and administrative presence. Improved funding is required to manage reserves, increase their staffing levels, and provide better equipment and training. The enforcement capacity of governmental departments responsible for environment and forestry needs to be improved through increased resources and better training. The purpose and regulations of protected areas need to be publicised in adjacent communities.



Efforts are underway to locate further sites for Jerdon’s Courser, including through analysis of satellite images and field surveys.

PHOTO: SIMON COOK

Gaps in knowledge

■ INADEQUATE DATA ON THREATENED BIRDS

Efforts are currently underway to locate further sites for Jerdon’s Courser, including through surveys using knowledge of calls and searches for footprints, together with analysis of satellite images to identify potential habitat. These should be continued, together with studies to investigate the courser’s habitat requirements, and to clarify how grazing and wood-cutting can be managed to maintain optimum habitat.

Table 3d. Conservation issues and strategic solutions for the South Asian arid habitats: dry forests and scrub.

Conservation issues	Strategic solutions
Habitat loss and degradation	
<ul style="list-style-type: none"> ■ CONVERSION TO AGRICULTURE ■ EXPLOITATION OF FOREST PRODUCTS ■ LIVESTOCK GRAZING ■ DEVELOPMENT (URBAN, INDUSTRIAL, ETC.) ■ INVASIVE SPECIES 	<ul style="list-style-type: none"> ➤ Control agricultural expansion at key sites for threatened birds ➤ Develop social forestry initiatives to improve management of dry forests, and promote the regeneration of dry forest on wastelands ➤ Introduce fuel-efficient stoves to reduce wood consumption ➤ Improve the management of grazing, especially inside protected areas ➤ Modify planned development projects to avoid large-scale clearance of dry habitats ➤ Conduct campaigns to raise awareness of the biodiversity and economic value of dry forest and scrub ➤ Initiate programmes to control mesquite
Protected areas coverage and management	
<ul style="list-style-type: none"> ■ GAPS IN PROTECTED AREAS SYSTEM ■ WEAKNESSES IN RESERVE DESIGN AND MANAGEMENT 	<ul style="list-style-type: none"> ➤ Develop a network of protected areas for Yellow-throated Bulbul and White-winged Tit, and their dry forest and scrub habitats ➤ Increase the resources available for protected area management and training of reserve staff, particularly at key sites for threatened species
Gaps in knowledge	
<ul style="list-style-type: none"> ■ INADEQUATE DATA ON THREATENED BIRDS 	<ul style="list-style-type: none"> ➤ Continue studies of Jerdon’s Courser, to locate additional key sites and to improve understanding of its habitat and management requirements ➤ Survey Yellow-throated Bulbul and White-naped Tit, to help clarify the network of sanctuaries required for their protection

Recent surveys of Yellow-throated Bulbul and White-naped Tit have provided a clearer picture of their distribution and abundance, and should be continued to help design the network of sanctuaries required for their protection.

G03E: GRASSLAND AND CULTIVATION

CURRENT STATUS OF HABITATS AND THREATENED SPECIES

The natural habitats of Green Avadavat in central India have been (and continue to be) greatly modified, mainly through conversion for (and intensification of) agriculture. The effects of these changes on the species are unclear, but by far the most important threat that it faces is large-scale trapping for the wild bird trade.

CONSERVATION ISSUES AND STRATEGIC SOLUTIONS (summarised in Table 3e)

Habitat loss and degradation

■ **AGRICULTURAL INTENSIFICATION**

Green Avadavat occurs in a broad range of regenerating and open habitats, and therefore may not be greatly threatened by the continuing conversion of grasslands (that are presumably its natural habitat). However, in some areas cultivation is so intensive (i.e. mustard fields in parts of Rajasthan) that populations of most passerines have

declined significantly, probably including Green Avadavat. It eats seeds, and may also be affected by increasing pesticide use, although there is no direct evidence for this. Traditional low-intensity farming practices should be promoted at key sites for the species, especially in and around protected areas.

Protected areas coverage and management

■ **WEAKNESSES IN RESERVE MANAGEMENT**

Green Avadavat has been recorded in several protected areas, but it appears to be semi-nomadic, and conservation measures within these reserves alone are therefore unlikely to be adequate to ensure its continued survival. However, the protected areas within its range should be managed to provide suitable low scrub and rough grassland, and bird trapping must be prevented, with reserve staff trained and equipped to improve patrolling and law enforcement.

Exploitation of birds

■ **WILD BIRD TRADE**

Green Avadavat is a popular cagebird and is captured in substantial numbers, usually using nets or funnel traps. Several thousand birds were estimated to be traded within India each year during the 1990s, despite a national ban on trapping and trade, and the species still appears in international trade despite being on CITES Appendix II. Strict enforcement of existing laws is therefore needed, including the policing of bird markets, with improved training for enforcers. However, traditional bird-trappers are often severely impoverished, and a rehabilitation programme is perhaps required, including wherever possible the provision of alternative livelihoods. Awareness campaigns are needed to publicise the plight of Green Avadavat and dissuade aviculturists from purchasing it, and governments should be lobbied to strengthen the legislation protecting it from national and international trade.

Gaps in knowledge

■ **INADEQUATE DATA ON THREATENED BIRDS**

The conservation status of Green Avadavat is poorly known, and surveys are required to clarify which are the key sites for its protection, with studies to improve understanding of its habitat requirements, movements and the impact of trade. Monitoring of numbers in trade needs to be continued and improved, to help guide efforts to reduce trapping levels. Socio-economic research is needed into the wild bird trade, to help identify potential alternative livelihoods for trappers.

Several thousand Green Avadavats are traded annually within India, despite a national ban.



PHOTO: GERHARD HOFMANN

Table 3e. Conservation issues and strategic solutions for the South Asian arid habitats: grassland and cultivation.

Conservation issues	Strategic solutions
Habitat loss and degradation	
■ AGRICULTURAL INTENSIFICATION	➤ Promote traditional low-intensity farming practices at key sites for Green Avadavat
Protected areas coverage and management	
■ WEAKNESSES IN RESERVE MANAGEMENT	➤ Maximise the availability of Green Avadavat habitat inside key protected areas ➤ Increase resources for protected area management and staff training, particularly to counter the wild bird trade
Exploitation of wildlife	
■ WILD BIRD TRADE	➤ Improve enforcement of laws banning trapping and trade of Green Avadavats, with policing of bird markets and improved training for law enforcers ➤ Develop an awareness campaign to dissuade aviculturists from purchasing Green Avadavats
Gaps in knowledge	
■ INADEQUATE DATA ON THREATENED BIRDS	➤ Survey Green Avadavat, to locate key sites for its protection and to improve understanding of the impact of trade on its wild populations ➤ Use socio-economic research of the wild bird trade to help identify potential alternative livelihoods for trappers