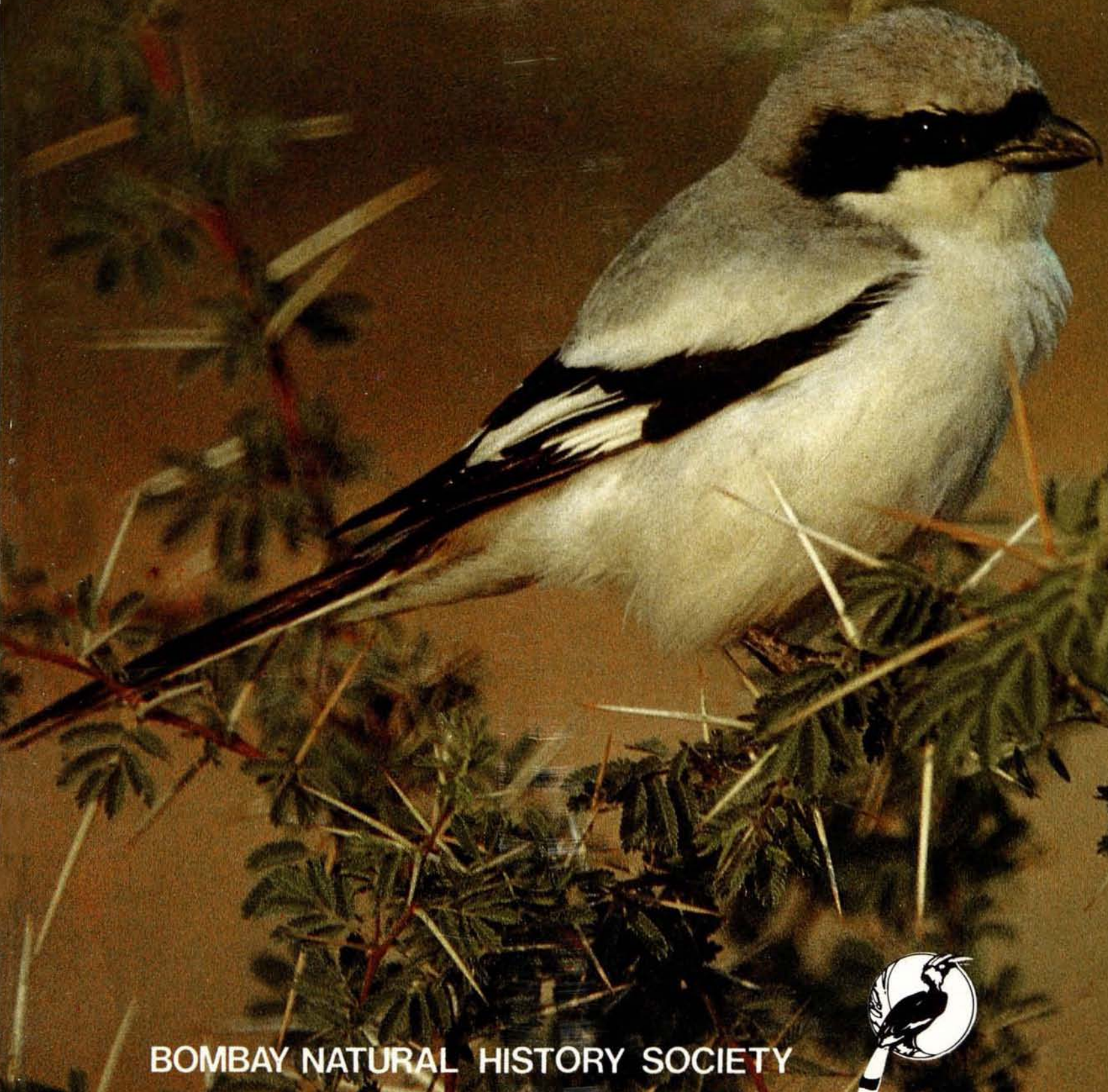


# Hornbill

1991 (3)

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BOMBAY NATURAL HISTORY SOCIETY

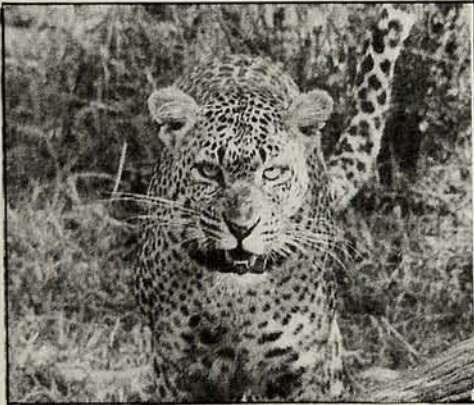




# Hornbill

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# EDITORIAL

## The boundaries of common sense

With land so scarce in India, declaring an area as protected is a step not to be taken lightly. We decide that a particular species needs protection, and, with the best of intentions, declare its habitat a sanctuary. In this process, some important questions are not always answered.

Does the area in question contain enough high-quality habitat *free from encroachment*? Are the boundaries suitable for management of the target species (for example, including breeding grounds that may be some distance away from areas used during the rest of the year)? Can the area be administered effectively? Will local villagers, whose traditional rights of access may be limited or revoked altogether, support the programme or resist strongly? Can local protests be defused, without reducing the sanctuary's effectiveness, by drawing the boundaries differently? These questions must be resolved *before* the boundaries are delineated, not after the problems surface. And surface they will, immediately in smaller sanctuaries, slowly but just as surely in large ones.

India's wildlife managers have done a splendid job, considering the constraints under which they work. But the controversy over the partial denotification of Darlaghat sanctuary in Himachal Pradesh (discussed later in the issue) is a reminder that some lacunae still exist in our wildlife policies. Even when the sanctuary was created, there were doubts that the extent of human ingress would interfere with effective wildlife management. Inevitably, the problem grew more acute over the years; and today the degraded nature of the habitat is a strong point in favour of denotification.

Or take the Great Indian Bustard Sanctuary in Maharashtra: a massive 8,500 sq km in area, most of it under cultivation. Recent studies indicate that the bustards would be *better* served if breeding areas in disjunct grassland patches totalling less than 400 sq km were effectively protected and managed. It is neither possible nor necessary to manage the remainder for wildlife.

Creating a sanctuary is not an end in itself, but only the first step towards conserving a valuable natural area. There is little point in creating protected areas that we cannot, for whatever reason, manage effectively. All too often, sanctuaries in India either become a source of conflict between villagers and the Forest Department, or (especially if they are close to a city or large town) end up as large picnic areas rather than sanctuaries.



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Large grey shrike (*Lanius excubitor*)  
photograph by Ravi Sankaran



# CAPTIVATING CORBETT

A.J.T. JOHNSINGH



*Lord Jim was courting. The mammoth tusk, possibly the largest in Corbett, moved ponderously around a young female half his size. Three young tuskers, one in musth, stayed around the mating pair at a respectful distance.*

A.J.T. JOHNSINGH



**T**HE SETTING WAS WORTHY of the stately giants — the Dhikala *chaur* (grassland) in the Corbett Tiger Reserve on an early summer morning "surpassingly grand and incomparably beautiful," as David Hamilton wrote about the Eravikulam hills in 1854. Beyond the Ramganga valley rose the outer Himalaya, clothed with dense mixed tree jungle. Some of these trees had golden yellow, dying leaves; others, sprouting leaves of various hues. To the south lay the Siwalik hills, largely covered with a thick crop of sal trees, with cream coloured flowers. The grassland had been burnt in winter, and now had a uniform growth of tender, dark green grass, as if the ground had been covered with a green carpet.

Enjoying the warmth of the golden sunlight were many elephant groups feeding peacefully in the *chaur*, and mixed herds of chital and hog deer. The scene was tranquil, but far from silent. The repetitive, ventriloquial calls of the black partridge rang out across the valley. Every few minutes we could hear peacocks trumpeting, and the crowing of a thriving population of red junglefowl from the surrounding forests.

The Corbett National Park has quite a history. During the early part of the 19th century the grasslands in the present park area had patches of cultivation, and tree-felling was rampant. Fortunately, in 1858 one Major Ramsay took the first real systematic steps towards forest conservation. He stopped the cultivation, removed the cattle camps that dotted the area, appointed a regular fire fighting force and prohibited the removal of timber without a license. These steps largely restored the forest to its former health.

Meanwhile, even as early as the turn of the century, the potential of this tract as a wildlife reserve was recognized by the British. In order to stem the rising tide of wildlife destruction sweeping across the country, they decided to declare it a sanctuary. In 1936 it became India's first national park under the United Provinces National Parks Act. Originally named the Hailey National Park (after Sir Malcolm Hailey, governor of the then United Provinces, who was instrumental in developing the area as a preserve), after independence it became the Ramganga National Park, named after the river that flows through almost the whole length of the park.

Finally it was named Corbett National Park in honour of the late Jim Corbett, legendary hunter,

author, and later a consultant who helped demarcate the limits of the proposed national park. On April 1, 1973, India's most ambitious conservation programme, Project Tiger, was inaugurated at the park headquarters in Dhikala.

I have made several trips to Corbett, but all my earlier explorations were confined to areas around Dhikala. This April, however, I accompanied Dr. Cyril Barrette from Laval University, Canada, on a chital census at the park, and found I had time at my disposal. I satisfied a long cherished desire to visit the Kanda Forest Rest House, where Jim Corbett stayed in 1933 when he was in pursuit of the dreadful Kanda man-eating tiger. The rest house, built in 1927, lies on an outer Himalayan ridge which forms the northern boundary of the park. Perched 1040 m above sea level, it commands a magnificent view of Corbett. We drove the first 16 km from Dhikala to Kanda, then walked the last three kilometers with Mr. A.S. Negi, Field Director of the park. Corbett is in safe hands; Mr. Negi has experience, knowledge, and even more important, a humility that allows him to keep learning, even from his forest guards — some of whom, after spending a lifetime in the area, know as much or more than we 'specialists'.

**F**EW NATIONAL PARKS in India can match Corbett for species diversity. Big cats compete; and a high density of tigers often means fewer leopards. But though Corbett has an unusually high density of tigers (one every 5 sq km), leopards are also frequently encountered in the forested tracts and hilly regions. Chital, hog deer, jackals and wild pig (which, as a result of the excellent habitat quality, grow into particularly huge specimens) are common. So are pythons and king cobras. Rhesus macaques frequent the riverine tracts and common langur are found throughout. Sloth bears are seen occasionally, and in winter black bears may visit the upper reaches.

The Ramganga river in Corbett is one of the strongholds of the endangered golden mahseer — in fact, the only place in India where this king of sportfish has a secure future. From High Bank, a vantage point overlooking the river, even today you can see 50 pounders in the crystal clear water. High Bank is also the place to watch gharial, the fish eating crocodile, and the mugger or marsh crocodile.

If you really want to see wildlife, the best way is to walk through the jungle — silently. During our



trek to Kanda we observed that the hills had abundant bamboo (*Dendrocalamus strictus*) on which the elephants had fed during the monsoon. All along the road leopard, barking deer and sambar signs were common. We even saw the elusive goral, a solitary male resting in the shade of a tree. When we stopped it scampered up the slope.

**C**ORBETT IS SITUATED almost in the centre of the Siwalik-terai biotic province in Uttar Pradesh, abutting the Himalayas. In the past, the forests extended in a thick, unbroken stretch from the Yamuna river in the west to the Sarda in the east, close to Nepal. Over the years this continuity has been broken in several places by developmental projects, cultivation and encroachment. Nevertheless, even now there is about 2500 sq km of reasonably continuous elephant and tiger habitat between the Yamuna and the Kosi river, which forms the eastern boundary of Corbett. If there is political will the contiguity of this entire tract can be

strengthened and the area can be effectively managed as one elephant-tiger conservation unit. Such an approach under Project Tiger and Project Elephant is urgently needed to safeguard the wildlife values of this area.

Since Corbett not only lies on the route of migratory birds, but is also extraordinarily diverse in terrain and vegetation, it has always been exceptionally rich in its avifauna. Some 500 species reside or sojourn in the park, and in recent years, with the formation of the Ramganga reservoir, the number of aquatic species has risen dramatically. A Zoological Survey of India survey report lists over 600 species.

Corbett's birds can be broadly classified into Himalayan and plains species. The Siwaliks and the outer Himalayas in Corbett have birds of both habitat types, but these area bear a closer affinity to the Himalayas than to the foothills, and this affinity is reflected in the avifauna. During the walk to Kanda we saw a number of Himalayan birds — red-



**In 1973, Project Tiger was launched at Corbett; today the reserve, with its 90 odd tigers, is a key breeding area for the species.**

Brijendra Singh



### SUREFOOTED ON THE SLOPES

The goral (*Nemorhaedus goral*) is a small, stocky mountain goat, 65 to 70 cm at the shoulder and 20 to 30 kg in weight. Both sexes have horns and a conspicuous white throat patch, and look alike from a distance. There could be 200 goral at Corbett.

Taxonomists have placed the goral, along with the takin and serow, in one group popularly known as goat-antelopes, which are said to be the ancestors of today's goats and sheep. The ancestor of the goral evolved in the far east somewhere in China. Gradually the species extended its range north as far as the Amur river in south-eastern Russia, then moved westward along the Siwaliks and southern flanks of the Himalaya, crossing the Indus to the Afghan border. In the south the goral ranges across the densely forested hills of Indo-China and Burma.

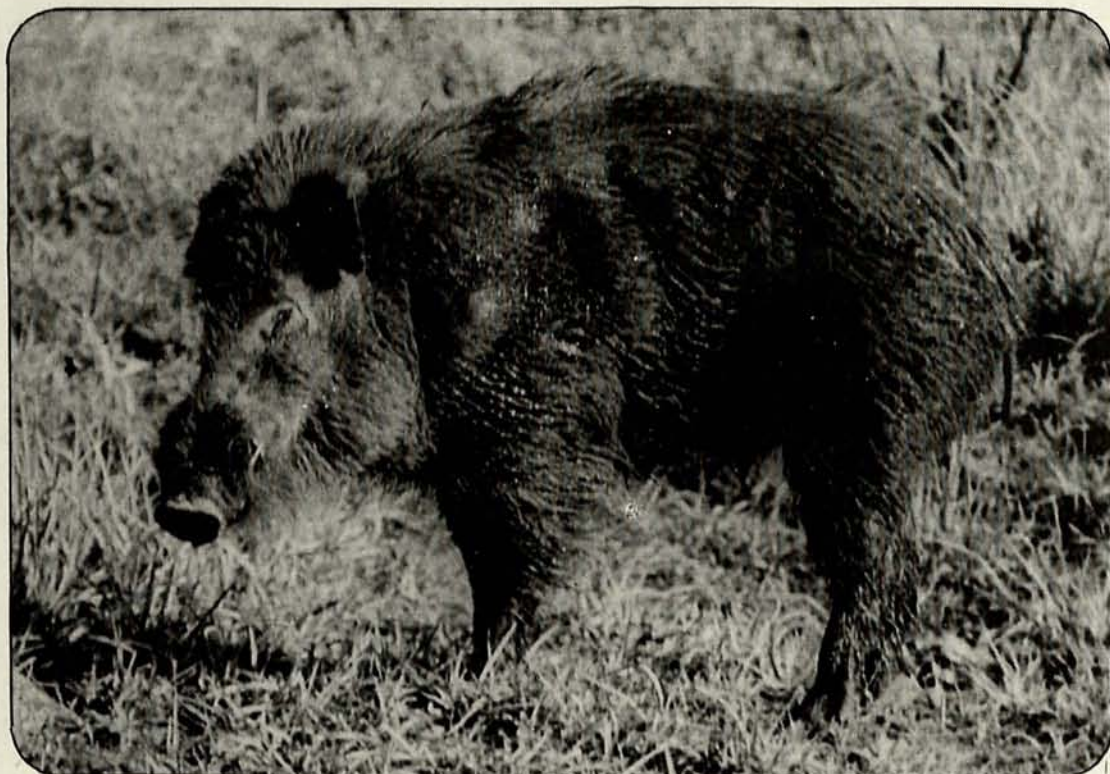
Though considered primarily a mountain goat, the goral has adapted to a wide range of altitude: it is found at sea level in the Ussuri area in Russia and in birch forests at the timberline around 4000 m in Nepal and Bhutan. In the Siwalik hills, for example in Rajaji national park, they come down as low as 500 m. In India the species is found in Kashmir, Himachal Pradesh, Sikkim, West Bengal and Arunachal Pradesh. Goral are primarily grazers and occur either alone or in small groups of 2 or 3, usually in areas of huge cliffs with patches of shrub and tree cover with grass.



A.J.T. Johnsingh

The wild boar (*Sus scrofa*) is probably the most widely distributed and abundant of our larger mammals — and the one most destructive to crops.

They breed prolifically, apparently in all seasons. In many habitats they form the main prey species for the big carnivores. Corbett's boars are larger than those in most other parts of the country—males often tip the scales at an imposing 250 kg.



A.J.T. Johnsingh



headed tits, bluewinged sivas and noisy flocks of whitecrested and whitethroated laughing thrushes — which confirmed the affinity of the Kanda hills to the Himalayas.

**B**ACK IN DHIKALA, while Dr. Barrette counted chital I found time to classify at least 80 elephants (Corbett has between 150 and 200) by sex and under various age categories. The population structure of a species — the ratio of males to females, the percentage of juveniles etc. — is never constant; in elephants it sometimes varies fairly widely, depending on habitat quality and other factors such as poaching. Information on population structure of elephants from different parts of their range is crucial to evaluate and monitor trends in their population dynamics.

The elephants were in superb physical condition, thanks to the quality of Corbett's habitat: abundant tender grass and plenty of cool, clean water in the Ramganga river and the reservoir. This was in marked contrast to what I have observed in the Chilla part of Rajaji national park adjacent to Corbett. Rajaji is subjected to heavy biotic pressures; with their habitat disturbed, elephants, particularly the cows, are in far from good physical condition.

Corbett's grasslands, which are vital to the health of the tiger reserve, are being encroached upon, not by man, but by weeds. The most abundant of these is ganja (*Cannabis sativa*). In 1990 the plants were uprooted before they flowered, and burnt, at a cost of Rs. 2.5 lakhs. But the plant is stubborn and resilient; this year there was a resurgence of *Cannabis*. Mr. Negi opines that this weeding operation

needs to be carried out till all the dormant seeds sprout and the seed stock is exhausted.

**O**NE OF THE major aims of creating tiger reserves is to protect key breeding habitats of tigers so that a variable number of tigers can disperse from the reserves into adjacent areas year after year. Corbett, with its 90-odd tigers, could

be performing this function extremely well. Each year, young tigers disperse in search of new homes and old tigers are forced out of their territories. Corbett would serve the same function for other animals too, such as elephants and leopards.

Conservationists are fast realizing that to ensure the long term survival of wildlife, it is not just breeding centres like Corbett that must be protected, but also the areas around them, where the threats facing wildlife are many and serious. This realisation, surely, should help us plan strategies to mitigate the conservation problems in areas around key wildlife habitats.

Corbett needs the continuous, intense management care it gets today, and should be kept as inviolate as possible. Besides its enchanting scenic beauty, it is one of the very few patches of land in the

country where even today, man has to walk with fear and respect for the wild elephant, the tiger and the king cobra. We may rebuild another Taj, but can never create another wildlife refuge like Corbett.



*Dr A.J.T. Johnsingh is Joint Director of the Wildlife Institute of India, and an authority on Indian mammals. He has also worked on the role of corridors in dispersal of wildlife.*

### *Corbett on Corbett*

**T**he steel blue of the fern fringed pool where the water rests a little before cascading over rock and shingle to draw breath again in another pool more beautiful than the first — the flash of the gaily-coloured kingfisher as he breaks the surface of the water, shedding a shower of diamonds from his wings as he rises with a chirp of delight, a silver minnow held firmly in his vermilion bill.

*The belling of the sambur and the clear tuneful call of the chital apprising the jungle folk that the tiger, whose pug marks show wet on the sand where a few minutes before he crossed the river, is out in search of his dinner.*

*These are things that will live in my memory, the lodestone to draw me back to that beautiful valley, as yet unspoiled by the hand of man.*

*'Man-eaters of Kumaon', 1944.*



# Antlers In The Grass

LIMA ROSALIND



Goutam Narayan

**T**HE RAIN DRENCHED *Ulu* grass swayed in the chill breeze, obstinate drops clinging to the stems. Our jeep crunched to a halt on the gravel path. Peering through the moisture-covered window, we could see a herd of hog deer grazing undisturbed in the open patch, oblivious of the drizzle. There were nearly a hundred of them, stags, does, juveniles, and fawns of all sizes.

We sat almost motionless in the vehicle and, with as little movement as possible, aimed our binoculars at the herd. A large stag watched over a doe and her fawn, his brown coat glistening in the light. Here and there a fawn moved away from its mother, and was promptly nudged back into place. Suddenly the silence was shattered by the sharp call of a doe. Fifty heads looked towards us and seconds later the whole herd had vanished into the tall grass. I felt as Wordsworth would have felt on seeing a field of daffodils swaying in the wind. It was love at first sight.

The hog deer (*Axis porcinus*) belongs to the order Artiodactyla: ungulates with an even number of toes. These first appeared in the early Eocene period, some 36-58 million years ago. Over the millennia

they flourished and diversified, different species adapting to different environmental niches with changes in skeletal structure and physiology. The first artiodactyls carried their weight spread evenly over six toes. Gradually, some of the toes were lost or became rudimentary; in the horse for example, which has evolved for speed, the weight is borne entirely on the first toe; the others are lost completely. Today, there are 171 species in the order, as varied as hippopotami and gazelles, foot high mouse deer and six metre giraffes.

The cervidae (deer and antelopes) are among the most highly evolved of artiodactyls. True antlered cervids appeared in Eurasia during the Miocene era, spreading into north Africa, and in the late Pliocene, over a million years after they first appeared, into the Americas. The 37 species (17 genera) found today share a common, and unmistakable, characteristic — males carry antlers which are shed each year, and are then regenerated, slightly larger each year up to a certain age, in time for the breeding season. (But there are exceptions: both male and female reindeer carry antlers, and in musk deer and



Chinese water deer, neither sex does.) Stags are usually larger than hinds and often maintain harems.

The hog deer shares the genus *Axis* with three other species, the chital (*Axis axis*), the Calamian deer (*Axis calamianensis*) and the Bawean deer (*Axis kuhili*). Two subspecies are recognised: the Indian *Axis porcinus porcinus* and the slightly larger *A. p. annamiticus* of southern Thailand and Vietnam.

**R**EGARDED AS the most primitive member of the Cervini, the hog deer has a much wider distribution than the other three *Axis* species. The chital, though common in many parts of India, is not found east of the Kamrup district in western Assam, along the Indo-Bhutan border. The other two are even more restricted: Calamian deer are found only on Calamian Island in the Philippines, and Bawean deer only on Bawean Island, Indonesia.

The reasons for differences in distribution between species are often a matter of conjecture. Compare the chital and the hog deer, for instance: closely related, but found in distinctly different areas. Chital are essentially inhabitants of secondary forest, or of open forest with a good understorey of grasses, forbs and tender shoots. They tend to avoid the interior of dense or extensive jungle.

The climax forests of Assam remained undis-

turbed until historic times, when patches were cleared for slash-and-burn cultivation. These patches, where woodland turns into grassland as a result of human activity, make good chital habitat. But mammals typically adapt over hundreds of generations; chital probably have not had sufficient time to colonise the newly-available areas.

The range of the hog deer once extended over a far greater area — an arc south of the Himalayan foothills from Pakistan, Sind and Punjab to Bangladesh, Assam and Vietnam. There are also populations that have been introduced by man. The Dutch introduced them into Sri Lanka in the 16th century; in Australia, where herds were released in Victoria, they have spread to many remote parts of the country.

As recently as the previous century the species was found over most of the Indo-Gangetic plain and the Brahmaputra valley. Today it occurs sporadically in the *terai/duar* (foothill) grasslands from Uttar Pradesh to Arunachal and in suitable grasslands on both banks of the Brahmaputra. It is more common in the north-eastern states of India than anywhere else. But even here, the only viable populations are found within protected areas: Corbett and Dudwa national parks in Uttar Pradesh, Jaldapara sanctuary in West Bengal, Kaziranga national park, Manas, Otang and Laokhowa sanctuaries in Assam.

*Chital frequent open forest and clearings, quite unlike the dense grassland that hog deer prefer. They both graze and browse, frequently rearing up to strip off tree foliage. Hog deer, in contrast, are primarily grazers, with a more selective, higher protein content diet.*

M. Krishnan





**T**HE NAME 'hog' deer no doubt originated from their peculiar action when running, which is certainly hog-like. When alarmed or disturbed they go off with a rush, galloping with the head carried well down, and the tail erect. The rapid bobbing of the tail is very often the only visible portion of the animal as it rushes wildly through the long grass. This headlong flight can be dangerous — not to the deer but to anyone in its path, as a forest guard in Manas found out.

During one of his patrols on foot in the grassland area, he unfortunately alarmed a herd of resting hog deer. The animals ran helter skelter; one ran straight into him, almost running him through the abdomen with the hard antlers. He spent the next two months in hospital. One way to avoid such an accident while on foot in the grassland is to beat the grass around you with the help of a stick to scare away any animal lurking nearby.

Hog deer are heavily built, long of body and short of leg. The relative shortness of the forelimbs gives them a peculiar, skewed appearance; the head carried distinctly lower than the rest of the animal, and the hind legs well under the body. This posture is accentuated when they move through grass cover, grazing. When in open ground, the head is held more erect.

Many small ungulates have hind limbs shorter than forelimbs. The reason is interesting. The shorter the animal, the less the chance of its being seen by a predator — in other words, to escape predation

they improved their ability to hide, rather than their ability to run. These animals evolved in areas with dense undergrowth, or in areas where the ground was scattered with obstacles (boulders or fallen tree trunks, for instance). Particularly in smaller animals, a gallop with a long extended phase makes it easier to clear the obstacles, and a rapid, bounding gait is the quickest way to manoeuvre in dense undergrowth, where the vegetation in many places can be so thick as to be impenetrable. Hence the powerful, relatively long hind legs, which thrust the animal off the ground, and the short forelegs, which are folded into the body between leaps.

The general colour is paler than a sambar's coat, but not quite as pale as a chital's — dark brown with a more or less yellowish or chestnut tinge, with splashes of white under the tail and on the inside of the thigh. The spots on a hog deer's coat usually give it the appearance of a small chital. But curiously enough, it sometimes resembles another, quite different animal — the tiger.

When walking through the tall grass in search of florican nests, we would suddenly see a vague shape crouched practically at handshaking distance. With the outlines not clearly visible, and the knowledge that we were in tiger country, the effect can be quite terrifying. Only when the animal bolts to safety does the heart begin to beat again.

At Manas, the grasslands are burnt every winter, as part of a successful management technique known as wet burning. At this time the grass still



*A jungle myna picks out ticks from a hog deer's ear — food for one, hygiene for the other. Mynas, like other birds that follow herbivores to pick up flushed insects, also act as early-warning systems against potential predators.*

Goutam Narayan



retains some greenery. This green grass acts as a fire line; and as a result only disjunct pockets are burnt, never the entire grassland. The unburnt areas continue to provide food and cover for both predators and prey, and as the practice has persisted for centuries (earlier for agriculture, now for wildlife management), there is no reason to believe that it does any harm.

In December and January new grass sprouts in the burnt areas, and with it come the deer, for they are partial to sprouting grass. When new grass is not available, they forage on ferns, forbs flowers and fruits of some grassland trees.



M. Krishnan

**H**OG DEER, it is sometimes believed, are solitary animals. Perhaps they are, in some areas, but certainly not in Manas and Dudwa. Groups at Manas usually number 25 to 30, and sometimes up to 50 around small patches of nutritious sprouting grass. Apart from availability of food, the group size is apparently related to the height and density of grass — larger groups in short grass, and smaller ones in areas like the Kapur-pora/Sidhajhar grassland with its dense, 2-3 m high elephant grass.

Some early morning and early evening sightings at Manas were breathtaking, with 500-600 animals milling around cultivated area. Food, and safety, draws smaller groups together temporarily to form these 'super herds': in a big herd, an individual animal is much safer than when alone.

These herds were fascinating to watch. To us (we were obviously guilty of anthropomorphism, or attributing human feelings to animal behaviour) it seemed that the normally alert and wary deer let their guard down to such an extent that the gathering took on the appearance of a *mela*. There was noise and bustle, and an unusually high level of interaction between individuals. Subadult hinds would often mock-mount juvenile does or engage each other in semi-playful battles.

And, like at any *mela*, there was the inevitable

problem of lost children. Fawns, being more inquisitive than the others, would wander off, before being rounded up and returned to their original groups amidst much bleating. One aspect of this lost-fawn sequence was curious. It is difficult to know for sure, but we believe that the fawns were rescued not by the mother but by other females in her immediate group.

#### HEADGEAR WITH A DIFFERENCE

In a sense, the seasons are measured by the antlers that males carry. Not as long or as imposing as those on sambar or barasingha (shown above) — antlers of the three species differ not only in size but also in shape and structure — they are nevertheless effective for display and battle. When stags are about 15-months old they shed their spike antlers, the small outgrowths that precede proper antler formation. Prongs develop in the second year, and in another two years the three-tined antlers of the adult are fully developed.

Hog deer shed their antlers every year, in a regular, clearly defined cycle that lasts about four months. The previous season's antlers are cast off. New ones grow, and the stags rub against tree trunks and woody shrubs till the last of the 'velvet' is scraped off to uncover the fresh, hard antlers. Most hog deer at Manas shed their velvets between March and June, but both hard-antlered and velvet stags are seen throughout the year.

The longest recorded antlers for a hog deer measured 61 cm along the curve. The record for the much larger sambar, in contrast, is 130 cm, and for a barasingha, 104 cm.



**H**OG DEER are especially adapted to living in open grassy glades near the banks of rivers and streams; we never saw them enter the forest. They are usually active during the early morning and early evening, resting in the tall grass during mid-day and going to water just before or shortly after dark. Our work at Manas meant long walks through the grasslands, and frequently we would scare them in their hide-outs during the hottest part of the day. They rarely graze away from cover, keeping to small hidden glades or depressions found among patches of tall grass.

We came across several of their 'bedding sites', which form another curious aspect of the species' behaviour. These sites are constructed from fallen grass stems, usually close to foraging areas. The does fashion the stems into compact caves that look as if the grass has been scooped out of the earth. Nearly undetectable even at very close range, these bedding sites are found in clusters, with most of the herd bedding down close together.

Poachers use this clustering to their advantage, trapping a number of deer in one swift, nocturnal operation. The sites also make ideal hiding places for new-born fawns. And when inside the 'cave', the normally active fawn keeps still and unmoving even when you approach to within touching distance; presumably a highly effective means of avoiding

predators. If a site is disturbed or even approached by a suspicious-looking intruder, the does shift their fawns elsewhere.

**J**ULY SIGNALS the beginning of romance — and aggression between rival males. The rutting season lasts from July through November, peaking in September and October. Males develop a pair of dark lines on the face, resembling a moustache. Receptive females are actively courted, and males brook no competition. Territory demarcation, and once that is completed, announcement of ownership, are accompanied by aggressive displays. Heads down, antlers thrashing the air, the males paw the ground furiously, the grassland echoing with their bellows. If the display is not sufficient to deter a rival, battle is joined.

Fights usually last 3-5 minutes and only hard antlered males are involved. But once we saw two large stags going hammer and tongs at each other for 35 minutes. They paid no attention to us, to the pouring rain, or to the other males watching. Twice we had to move our jeep out of the way; and when we left, with darkness falling, they were still at it. The next day we visited the area but found no sign of the vanquished deer. But the victor strutted round the site of battle, no less proudly for having chipped off precious pieces of his antlers.



*Raptor populations are a good indication of the health of a grassland ecosystem. The changeable hawk eagle (Spizeatus limnaeetus), found in both forest and grassland areas, preys on small mammals that share openings in the grassland with hog deer.*

Goutam Narayan



Though we saw fawns throughout the year, the majority were dropped between December and March. This is the period when the availability of high protein food (fresh grass sprouting after the winter burning) is highest. Man-induced fire has been a component of the hog deer's environment for so long that the deer have apparently evolved to time their breeding cycles to coincide with the burning season.

Almost invariably, we saw the largest herds in the Bansbari /Kasimdaha grasslands in the north-west corner of the sanctuary. This is the edge of the core area of Manas Tiger Reserve, with villages on one side and a tea garden on the other. Like chital and sambar, hog deer also raid crops. At dusk, most of the Kasimdaha population emerges from the grasslands, crosses the reserve boundary and grazes either in the fallow fields or the thatch field of the tea garden.

We would often wait near the road dividing the reserve and the tea gardens, about an hour after sunset, counting the animals as they passed — 500 or more within the space of half an hour was not unusual. As it becomes more dark, the deer in the tea garden drift towards the fallow field. When day breaks, they all return to the reserve. And every night fewer return to the reserve than left it; they are regularly killed for meat by the locals.

Other than man, the main predator is the tiger. Leopards, though they would find the hog deer a prey animal of a convenient size, never enter the grassland; and the deer never venture into the forest. The Bodo agitation has taken a substantial toll of the deer. Hundreds of people (both militants, and innocent tribals who feared police persecution) took shelter in the precincts of the sanctuary and subsisted on the deer, wild boar and other animals.

S. Deb Roy, the then Director of Project Tiger, Manas, put the hog deer population five years ago at 12,000. Today, perhaps 2,000 remain. The killings continue unabated, because the forest department has neither arms nor anything beyond token police protection, and patrolling by forest guards has been for all practical purposes suspended for over a year.

**T**HE HOG DEER is part of an ecosystem about which we know very little. A number of ungulates coexist in the grasslands of Manas — elephants, rhinos, swamp and hog deer, wild buffaloes. Each occupies a slightly separate niche, and

requires a different type of habitat. The larger animals can, in a sense, create their own habitat, and in the process may improve (or sometimes degenerate) the habitat for the smaller ones.

The rhino, for example, clears patches of tall grass into 'lawns' by grazing and trampling. Once a lawn is created, hog deer move in to share it with the resident rhino. Along with the hog deer come swamp deer, buffaloes and smaller herbivores like the hispid hare. For the deer, and to a lesser extent the buffalo, the lawns also provide a measure of safety, because a predator must cross a clearing, in full view, rather than being able to stalk within close range through the tall grass.

These inter-relationships, evolved over aeons, are delicate, and still very poorly understood. Typical hog deer habitat, for example, is a river flood plain or an area near a watercourse. Because such areas are prone to flooding, primary succession is initiated. Tall grasses like *Saccharum* species immediately colonise the area.

Other species like *Imperata cylindrica*, for example, need plenty of bright sunshine, and because the taller invaders block part of the light, entire stands of *cylindrica* have been replaced by fire resistant grasses, perennial forbs and woody species. This reduces the food availability but increases the escape cover for ungulates, and thus their chances of avoiding predators.

The effect of fire on the hog deer habitat is another area that needs further study (one, fortunately, where a large body of data and anecdotal evidence is already available). The net effect on the deer population can be determined only by studying the factors in combination rather than in isolation.

The hog deer as a species does not face any immediate threat of extinction, but that is no guarantee of its survival. It is not found outside protected areas, and populations are concentrated in the north-east. Unless we not only strengthen protective measures but also simultaneously try to understand how the species functions as a cog in a large, complex grassland ecosystem, there is every chance of this once plentiful deer going the way of its larger cousin, the swamp deer.



*Lima Rosalind is a field biologist at the BNHS. Over the past six years, she has worked on a number of species — kites, the Bengal florican at Manas, blacknecked crane in Ladakh, and migratory waterfowl at Pt. Calimere.*



# LETTERS

Sir,

The picture of the peacock on the cover of *Hornbill 1991(1)* was fantastic. But there was nothing by way of a story to make it interesting to children. Children learn natural history faster through stories, folklore and legends. And the peacock also has a legend associated with it, because with India's fighting cock, it must have been the earliest bird to be taken by bird lovers to Europe, long before Christ was born. All over the world a peacock feather is thought to be unlucky. I am always discouraged by elders from possessing one. And why it should be unlucky I ask, and I am told that:

Long, long ago Ostris was the king of Egypt. When he left on an expedition to India, he made his queen Isis his regent. He called his chief minister, Argus, and ordered him to take care of the queen in his absence and help her in ruling Egypt. But Argus was a wicked man. He wanted to cheat the queen out of her kingdom. So he appointed 100 spies, known as 'eyes', to watch the queen.

After some time Argus captured the queen, imprisoned her in a strong castle, and took the kingdom for himself. Argus's treachery angered Mercury. So Mercury marched against the evil regent and captured him. He then cut off Argus's head.

But Juno, the ox-eyed wife of the supreme god Jupiter, took pity on Argus, and brought him back to life as a peacock. But Juno knew that Argus's 'eyes' could do evil to others. So she placed these eyes not in his head, but in the peacock's train feathers. For this reason, peacock's train feathers are thought to be unlucky all over the world.

**Chaitra Bhat**  
Bombay

Sir,

Twelve hours with a short-eared owl — it began at 10 a.m., when I noticed an unusual numbers of crows gathered at the maidan about 50 metres from my house in Vikhroli, Bombay. There were also a few boys, throwing stones at a light brown, round-headed bird. The victim flew up and sat on a wall nearby, but was followed by the crows and the crowd. It was a shorteared owl. Before it was hit by a stone, I caught it from behind. The frightened bird offered no resistance.

I brought it home and kept it inside a large carton. Every now and then I could hear it clicking its beak loudly, obviously unhappy inside the box. So about an hour later, I released it within the room (not outside, because I feared for its safety in daylight). It flew to the reading table and sat close to the wall, on a pile of books. It continued clicking its beak and, if someone approached near, it would produce a strange hissing sound and fluff out its head feathers.

After an hour and a half the owl seemed to be satisfied that we meant it no harm. It flew to the top of the cupboard, then to the adjacent kitchen door and few minutes later onto a drinking water pot. Still nervous, it flew into the bathroom and perched on a tap in a corner, and there it spent the rest of the day.

During the afternoon, a number of people from the neighbourhood visited my house to look at our feathered guest. Several of them, especially children, wanted to be photographed with it. Unfortunately my camera was loaded with B&W film, but I took the photographs anyway. One old couple said it was a bad omen, but later agreed that it was only a superstition. Two young ladies said, it doesn't look as ugly and horrible as it is described in the stories.

After sunset the owl became more active. It emerged from the bathroom and flew from one room to another, perching on different objects, but returned every time to the pot in the kitchen. The pot seemed to be its favourite perch. Even after switching on the tubelight the owl continued its activity. At 10 p.m., I caught the owl with some difficulty. It clicked its beak twice and then fell silent, watching me with its head raised. I took it to the maidan and released it, and seconds later my shorteared owl vanished into the dark.

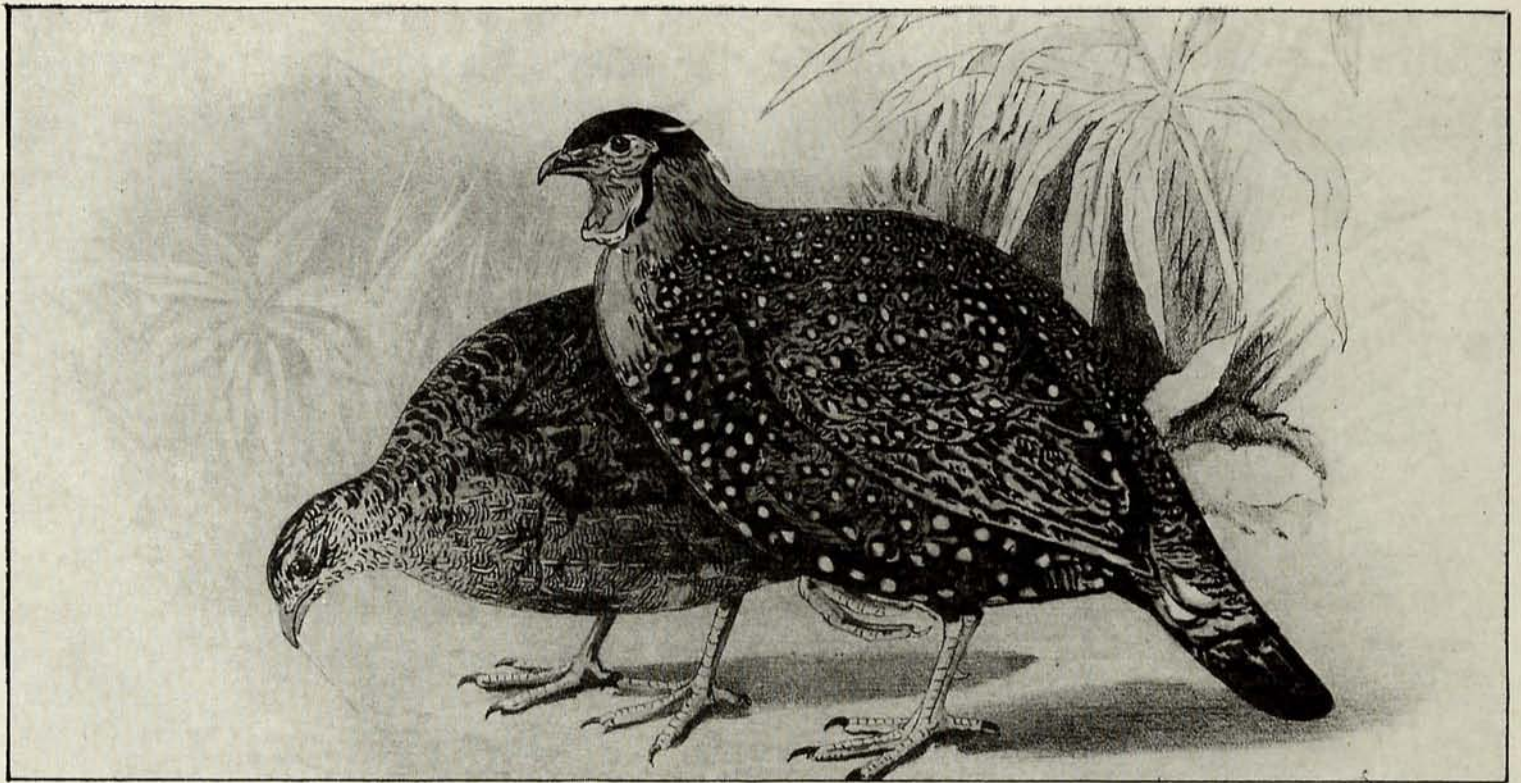
**Anil B. Patel**  
Bombay

Sir,

This is with reference to the note on the western tragopan (*Tragopan melanocephalus*) published in the News, Notes and Comments section in *Hornbill 1990(2)*

Realising the threatened status of the species (with under 5,000 birds all over the world), several surveys have been undertaken in the last 2-3 years. Surveys in Pakistan by Guy Duke and others have





**Western tragopan pair — once not uncommon in parts of the Himalaya, but now seriously threatened, with very few viable populations remaining.**

Illustration by W. Foster

revealed two important areas with good concentration of tragopan: the Machiara Game Reserve with a population of 100 birds, and the Mid-Palas Valley with 400 (the single largest known population anywhere in the world).

On the Indian side we have found some good tragopan sites, the most promising being the Limber Notified Area in Jammu & Kashmir. I have twice surveyed this area in 1988 and 1989 with my colleagues for the elusive tragopan. Our conservative estimate is about 70 birds in the area, but there are likely to be more, as we could not cover all the good tragopan habitats due to inaccessibility. Similar surveys found tragopans at three more sites in Himachal Pradesh (the south-easternmost limit). These surveys have highlighted the need for more surveys of those areas where the bird has been reported in the past.

The populations of Mid-Palas, Machiara, and Limber are large, but it is premature to assess their viability just by the numbers, particularly considering the lack of scientific information on these birds. The magic figure of 50, considered to be the minimum viable population size, cannot be applied for every species, and for a K-selective species like the tragopan this number is likely to be higher. Viability of a population cannot be assessed in isolation, but only in conjunction with other factors such as genetic fitness, age composition and structure of the

population; heterosity, habitat loss, fragmentation and size of the reserve — all these are crucial for the long-term survival of the species.

Several immediate steps need to be taken for tragopan conservation:

1. Extensive surveys in the areas from where they have been reported in the past, and exploration of other potential areas.
2. Detailed studies on their ecology.
3. Strict implementation of wildlife protection laws and involvement of local people and the army.
4. Socio-economic studies in the areas, so as to find out the human factors crucial for conservation. The locals can be involved by giving them jobs in the Forest Department and providing them some alternative if we are limiting their access to such areas. They should be educated about the importance of protection of the environment, and how their welfare is linked with the health of the forest and its inhabitants. The need for rational use of resources should be highlighted.

**Salim Javed**

Dudwa National Park

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**Lakshadweep:** The article 'Lakshadweep — The Coral Paradise' in the previous issue was written by Dr B.F. Chhapgar and Manoj Muni. Dr Chhapgar, former Director of the Taraporewala Aquarium in Bombay, is one of India's leading marine biologists. Manoj Muni is a researcher at BNHS, specialising in the taxonomy of mammals and shells.





R. Whitaker

Photo: Romulus Whitaker

MERIND — IN SUPPORT OF CONSERVATION



# Sustainable development

*Giving earth a chance*

M.S. SWAMINATHAN



E.P. Gee

*Sustainable development—economic growth without harm to the planet's life support systems—will be the theme for the 1992 U.N. Conference on Environment. The problem facing us now is not so much to discover what must be done to ensure sustainability but, more importantly, to learn how to achieve it.*



**I**N POPULATION-RICH but land-hungry countries like India, China and Bangladesh, enduring food security will depend greatly on strategies to enhance crop yields. At the same time, the onward march of the green revolution will have to be on the basis of 'green' or environmentally friendly technologies. If productivity-enhancing methods do not spread to more areas and farming systems, the poverty of small farm families will persist, since they will have very little marketable surplus and thus will not be able to profit from the remunerative output-pricing policies of governments. Nor will it be possible to prevent the further expansion of cultivated area at the expense of forests, and the degradation of soils, through erosion or other means.

An important cause of deforestation in most countries is the spread of agriculture into forest lands. At the same time, population increase and growth in purchasing power make a more rapid advance in agricultural production necessary. India's cereal production will have to increase by at least 7 million tons per year through the '90s to meet demand, as against the average annual increase of 3.5 million tons of food grains achieved during the last two decades.

In sub-Saharan Africa, food production will have to be more than tripled during the next 25 years to meet the needs of a population that is growing at 3.5 percent a year. Can such advances be achieved without over-exploiting land and ground water resources and increasing the problems created by biotic and abiotic stresses?

Agencies in the developed world are working to ensure the long-term sustainability of their *current* production levels. In contrast, the priority in developing countries is to raise yields. For example, the average yield of paddy in California is about 8.5 tons per hectare, as against 2.5 tons in India. Unless rice yields are doubled within the next 20 years, it will be difficult to manage the national food security system without food imports. The same situation prevails in wheat, sorghum, pulses, oilseeds, and other food crops.

The solution lies in ecological agriculture — which itself is in many ways a paradox. On one hand, several of the components associated with tradition-

al green revolution or land-saving technologies, particularly those involving the use of high doses of mineral fertilizers, chemical pesticides and heavy farm machinery, can damage the environment.

On the other hand, a continuous growth in terrestrial and aquatic productivity is a must in countries where agriculture provides not only food but also a livelihood to rural families. We need a combination of frontier technologies and traditional methods to help us to face this situation.

**S**USTAINABLE AGRICULTURE has several dimensions — social, cultural and economic, besides ecological. For example, when in the mid-eighties the European Community subsidized sugarbeet sugar heavily, a thriving sugarcane industry in the Negros island of the Philippines collapsed, leading to great human misery in the rural areas. In commodities of international trade, the agricultural policies of industrialized nations tend to determine the economic sustainability of the cultivation of those crops in developing countries.

At the same time, national economic policies have a profound impact on the sustainability of land and water use patterns. High price incentives could lead to the cultivation of water-loving plants in low rainfall areas, resulting in an unsustainable exploitation of the aquifer and in the abandoning of scientific crop rotations. High export subsidies, often necessitated by heavy debt servicing burdens, lead to the cutting down of forests and to soil and water mining. Thus, technology and trade both need attention if the principle of ecological sustainability is to be integrated with that of economic efficiency.

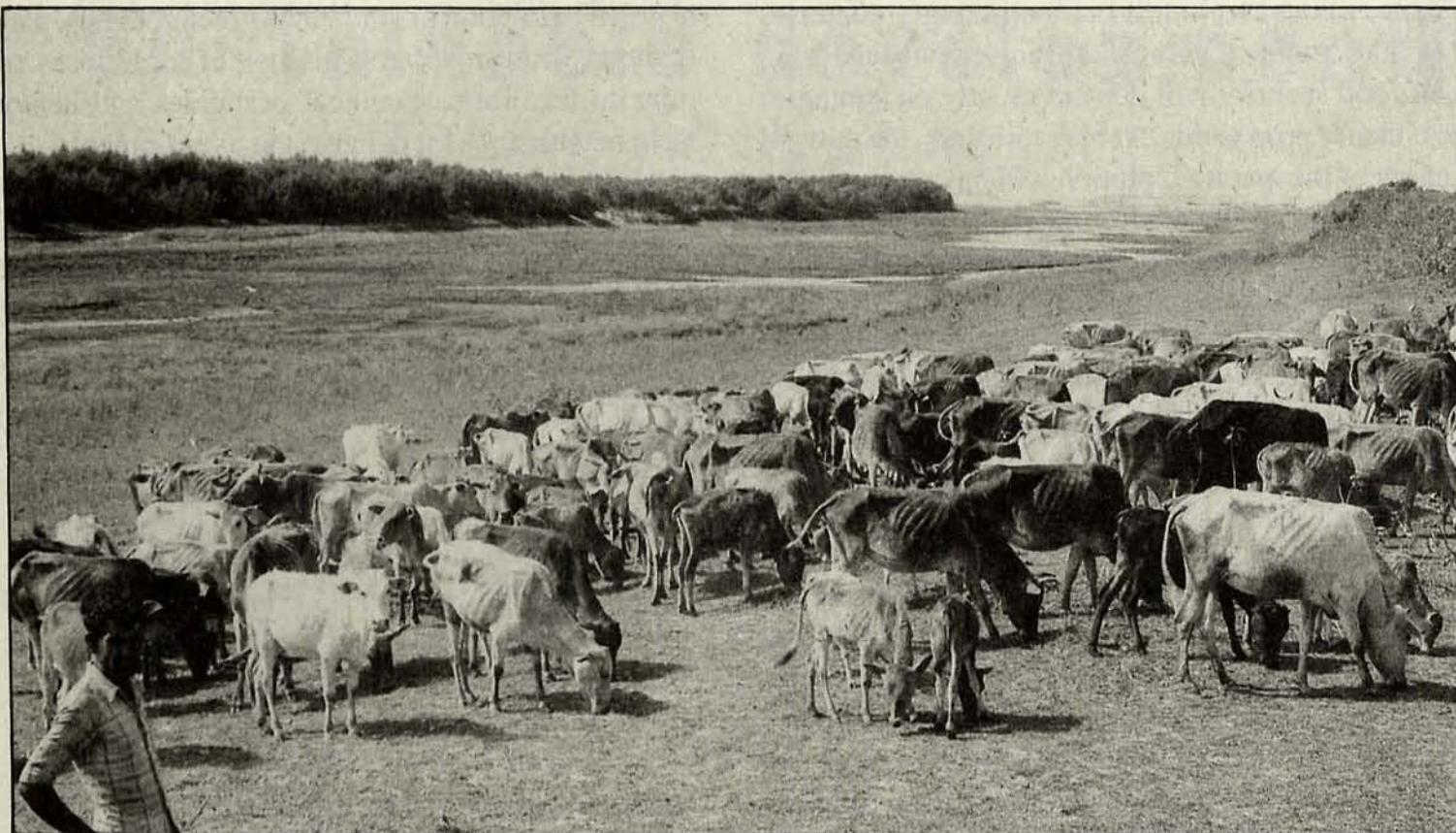
There are now probably about two million farmers in the United States and ten million farmers in the countries constituting the European community. In contrast, in India, the number of operational farm holdings is presently about 100 million. Ecologically sound technologies like integrated pest management, integrated nutrient supply and the sustainable management of ground water resources can be applied to small holdings only if all the farming families in a village or watershed cooperate.

This task is made complex in large countries like India and China not only by the numbers involved, but by the pressures of competing needs. Unless there is equity in sharing the benefits, there will be no cooperation. For example, in semi-arid rainfed areas, cooperation in water saving is seen only in

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**Trees, soil and water — if man is to continue to live off nature's bounty, nature herself must be conserved, and her bounty used wisely.** E.P. Gee





**All skin and bones — India has over 20 percent of the world's farm animal population, but beef and milk yields are poor. Overgrazing has degraded once fertile pastures (just across the river the same soil, being almost undisturbed, supports healthy forest).**

Goutam Narayan

places where there is equity in the sharing of the harvested water. Today, 'water lords' who have access to ground water resources often exploit them with only a short term profit motive.

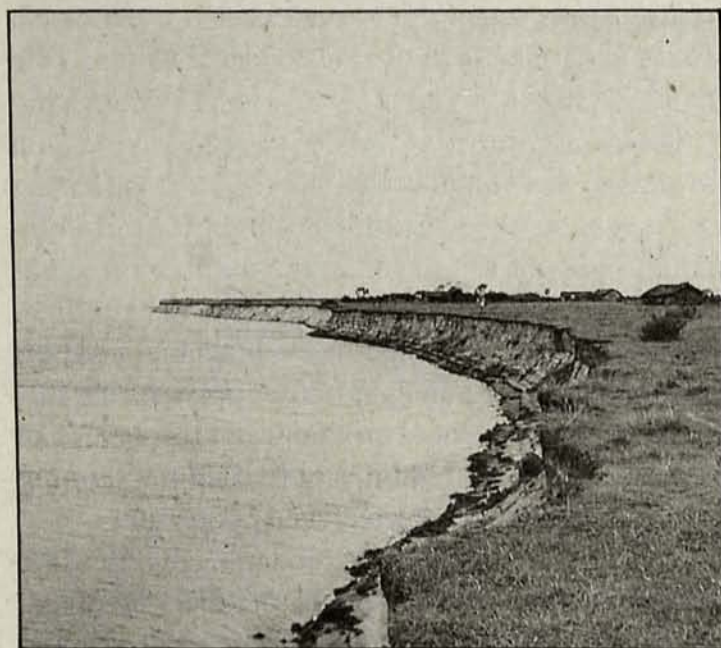
Development which is not equitable cannot, in the long run, become sustainable. This is true both within and among nations. We therefore need a new

paradigm of agricultural research and development consisting of three interacting components — ecological sustainability, equity-based economic efficiency, and convergence and synergy among the efforts of the government, non-governmental and corporate sectors.

**T**HE NEW TECHNOLOGIES which can help to make such a paradigm an operational reality are in the areas of biotechnology, space and information technologies, new materials and management technology. Space and information technologies enable the integration of meteorological and marketing data with land and water use plans. A computer-aided extension system can help to spread such integrated information in rural areas with speed and accuracy.

Current and emerging biological technologies offer opportunities for pyramiding of genes conferring tolerance to a wide spectrum of biotic and abiotic stresses. Management technologies can help to optimize the benefits from the available land, water, energy and credit resources. They can help to promote the conjunctive use of surface and ground water resources more effectively.

Successful genetic engineering — the key to sig-



**The rage of a river — thanks to severe afforestation, floods in the Brahmaputra valley are growing more frequent and widespread.**

Goutam Narayan



nificant productivity increases in agriculture — needs access to a wide range of genetic resources of crops and animals. About 1.5 million species have been described by taxonomists so far. Perhaps 30 times that number may exist, if we take into account the prevailing genetic variability in invertebrates and micro-organisms.

But hardly 3 percent of the terrestrial ecosystems and 1 percent of marine ecosystems have been designated as 'protected areas'; and even of these, 91 sites in 57 countries (which include both developing and industrialized countries) are threatened due to anthropogenic pressures and unsustainable development. In developing countries, the threat to national parks, biosphere reserves and reserve forests comes from human communities who perceive the protection as a threat to their economic survival. This is a sad reflection on the quality of our management of biological wealth.

The loss of ecosystems, species and genes is occurring at a time when new gene combinations may be essential for adaptation to potential changes in climate and sea levels and to a higher incidence of ultraviolet  $\beta$  radiation and when genetic engineering has opened up the possibility of moving genes across sexual barriers.

**C**OASTAL AND MARINE ecosystems with their rich biological diversity, are often among the most seriously threatened. Coastal mangroves, sea grasses, coral reefs and associated flora and fauna are being destroyed, and with them, genes that will be of value in the breeding of new strains of plants that can, for example, better adapt to potential changes in sea levels.

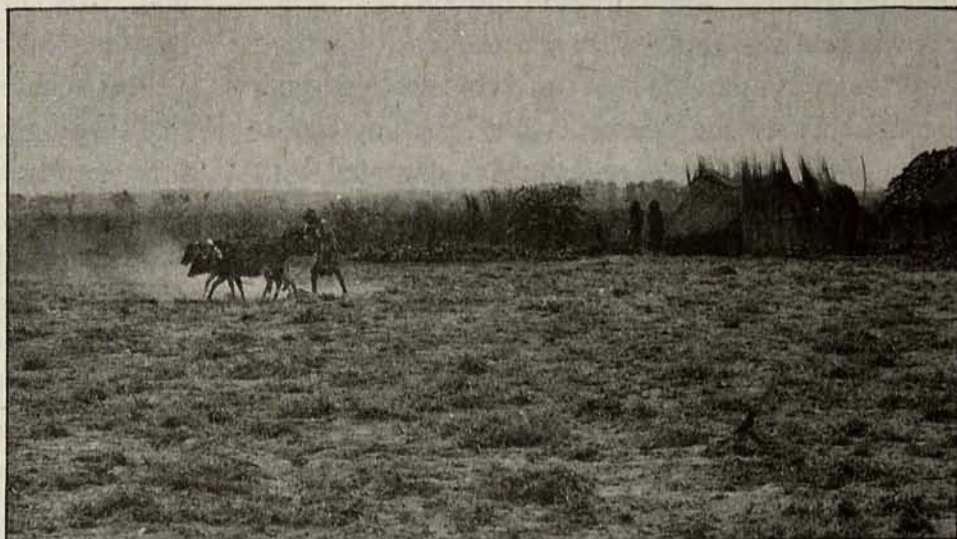
Recently, my colleagues and I at the Centre for Research on Sustainable Agricultural and Rural Development, in collaboration with the Tamil Nadu Forest Department, have established near Chidambaram, a Genetic Resources Centre for Adaptation to Sea Level Rise. We have also developed a programme, jointly with the International Tropical Timber Organization, for establishing a global grid of genetic resources centres in mangrove species.

Mangrove forests are rapidly being destroyed for

a variety of reasons — tourism, pollution, industrial requirements, the spread of coastal aquaculture and the extension of human settlements right up to the coast. Both the ecological security of coastal regions and the livelihood security of coastal communities will be adversely affected if coastal flora and fauna are lost.

We also need methodologies for an ocean capability classification on the model of land capability studies. As much carbon is fixed in the ocean as on land, and we need techniques to derive greater food yield from such aquatic carbon fixation.

The task of achieving sustainable advances in biological productivity is thus a formidable one. The progress made so far through changes in plant architecture and physiological responses is largely due to a higher allocation of the total biomass to the part of economic value. Further progress will



**One fourth of the world's farmers are Indians. This field, till recently a 'protected' grassland, is fairly fertile; but crop yields will be difficult to sustain without technology inputs.** Goutam Narayan

depend on our ability to improve total biomass production per unit of land and water.

Molecular biology techniques like recombinant-DNA experiments are largely being perfected in the private sector in industrialized nations and will thus be covered by patent protection. Mechanisms for the speedy dissemination of environmentally friendly technologies are essential if the needs for planet protection and patent protection are not to become antagonistic.



*Dr M.S. Swaminathan is synonymous with the green revolution in India. He has worked for many years on the development of new technologies for agriculture and conservation. This article is an extract from his speech on the acceptance of the Tyler Award.*



# NEWS NOTES COMMENTS



## **The White House v/s wetlands**

Wetlands cover nearly 40 million hectares in U.S.A. (excluding Alaska). But not for much longer. A change in the official definition of a wetland could result in at least one third of this area being lost to farmers and oil and natural gas drillers.

What really is a wetland? Confusion prevailed till 1989, with contradictory statements even from agencies that monitored the environment. Eventually a wetland was defined as any depression where water accumulates for seven consecutive days during the growing season, where certain water-loving plants are found, and the soil saturated with enough water that anaerobic bacterial activity can take place. To get permission to drain or develop a wetland, one had to prove that there was no practical alternative to destroying it.

Now the government proposes to considerably relax the rules. The new definition: areas with 15 consecutive days of inundation during a growing season or 21 days in which the soil is saturated with water up to the surface. Moreover, it redefines the growing season to be shorter and reduces the variety of plants that qualify an area as a wetland. The provision requiring proof of no viable alternative to filling in a wetland will apply not to all wetlands, but only to a small percentage deemed (on the basis of criteria to be defined later this year) the most valuable.

Perhaps the most controversial change is the decision to permit more extensive 'mitigation banking,' which requires land-owners to restore lost wetlands or create new ones in exchange for destroying an existing site. Wetlands are complex, little-understood systems, with a multitude of variables that together create species diversity and ecological balance. A man-made wetland can be viable under certain circumstances (for example, the Keoladeo National Park at Bharatpur), but is usually no substitute for the real thing.

The wetlands most at risk under the new disposition are marginal wetlands. The smallest of these glacier-carved features, known as prairie potholes, are under water for only a few weeks in the northern spring. During periods of low rainfall, they are almost indistinguishable from any other farmland. But when the frozen ground warms in early spring, the depressions swarm with crustaceans and insects on which migrating waterfowl feed. The waterbodies also make prime territories for breeding pairs of some waterfowl.

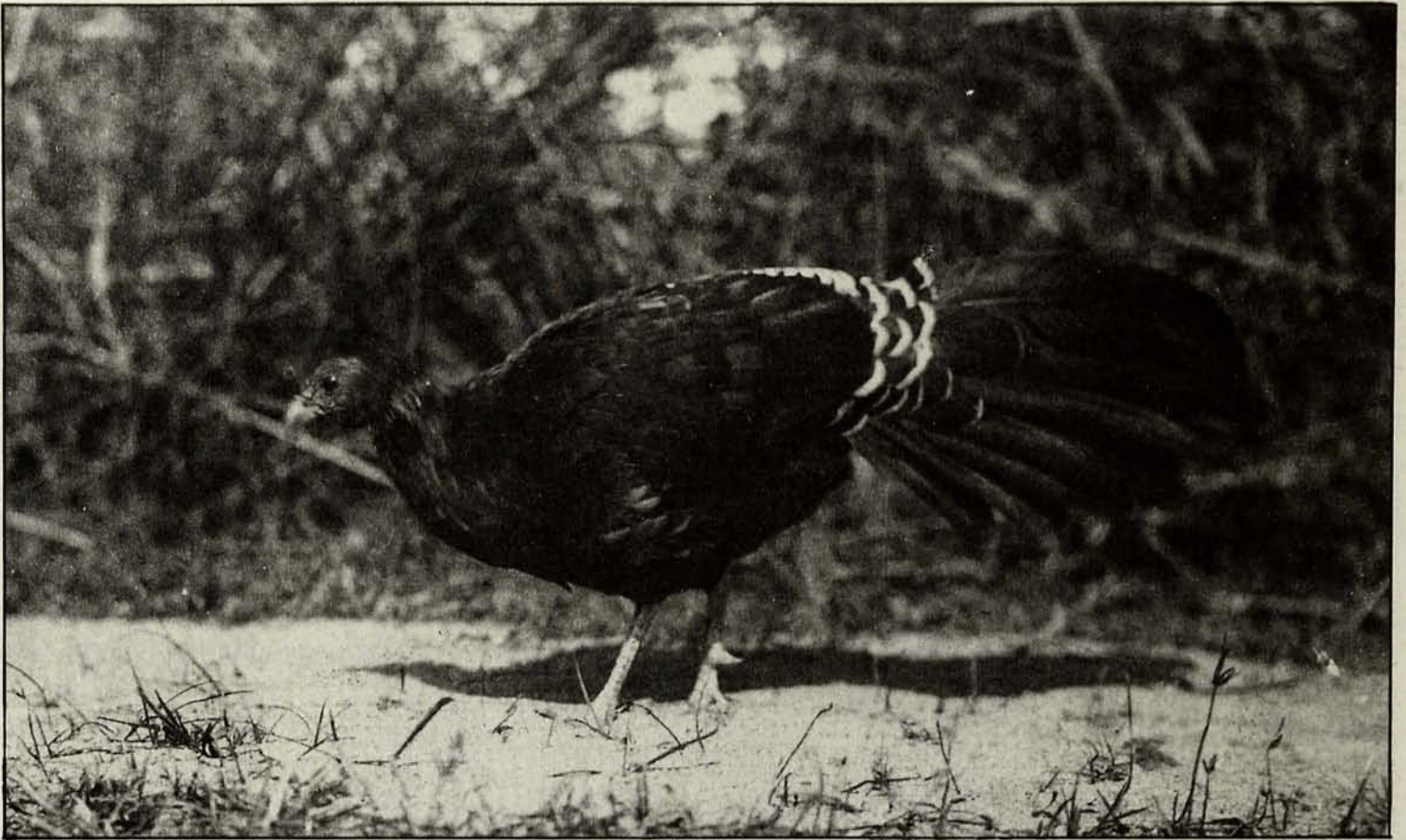
But seasonal wetlands and seemingly dry areas like the edges of lakes, rivers and swamps that are actually water-logged below ground level are also potential moneymakers for farmers, land developers and oil and gas drillers. High stakes, persistent lobbying, and eventually a death blow to most of the continent's small or marginal wetlands.

The new definitions will not become official until after a 60-day period of public comment and a subsequent review by the Environmental Protection Agency. Environmental groups are gearing up to comment loudly, but so are their opponents. As with so many other resources, America's marginal wetlands may not be fully appreciated until they are gone.

## **Sanctuary or cement factory?**

The Darlaghat Wildlife Sanctuary, some 35 km from Shimla, is the centre of a rapidly building controversy that pits environment against industry. Round one went quite clearly to industry. Darlaghat was notified as a sanctuary in 1962, and renotified in 1974 under the Wildlife (Protection) Act of 1972 by the Himachal Pradesh government. This year, however, the state government has decided to denotify part of the sanctuary to allow the construction of a cement factory. Depending on how you look at it, the decision is either a sell-out to big business or a breath of common sense into the frequently emotional issue of conservation v/s development.





**Dispossessed — the Kaleej pheasant, once fairly common in Darlaghat, is already on the decline. Large scale disturbance of its forest habitat is now inevitable.**

E.P. Gee

One certainly can — and should — take issue with the way the decision was made, without (in our view) adequate debate. But there are strong points to be made both for and against the denotification. First, the conservationists' view:

Sanctuaries should be inviolate. That is the only basis on which any meaningful wildlife conservation can take place. Unless there are compelling reasons to the contrary — and there are none at Darlaghat — access to protected areas should be strictly limited. We have been so profligate with our natural resources that any further losses can be disastrous.

Cement plants, as a rule, are highly polluting. A visible cloud, consisting of fine particles of cement and limestone, hangs over most factories, and being dispersed over a wide area, pollutes both air and water. Surely, even if a cement plant were considered essential, it could have been located elsewhere. Most important would be the precedent that such a denotification would set; perhaps the next year, a larger, more vital area would be destroyed at the stroke of a pen.

Now for the other side. The sanctuary measures 92 sq km in area, which, if undisturbed, should be sufficient to support large populations of birds and

moderate but stable ones of some larger mammals. But Darlaghat is far from being undisturbed. There are 141 villages *within* the sanctuary — some 15,000 permanent residents — plus a substantial number of Gaddi nomads who are permitted to graze their livestock inside the sanctuary. Then there are the seasonal visitors who attend an annual religious fair inside the sanctuary in April-May.

One third of Darlaghat is already under cultivation and habitation. Except for some patches closed for plantations, most of the remaining area is used by villagers (with permission from the Forest Department) for livestock grazing and collection of fodder, fuelwood and other forest produce. A part of the sanctuary is also a traditional burial ground. It is not practicable either to revoke these privileges or to resettle villagers on a large scale.

All in all, while there are still healthy forest pockets left, the habitat as a whole is badly degraded. Darlaghat is part of an economically deprived area, and the factory does offer the promise of jobs. (Though skilled workers will most likely come from outside the area, casual labour will be needed, and indirect employment will increase.)

Conservation in today's context frequently means choosing the lesser of two evils. With strict



supervision, the level of pollution could be considerably reduced (but obviously not eliminated).

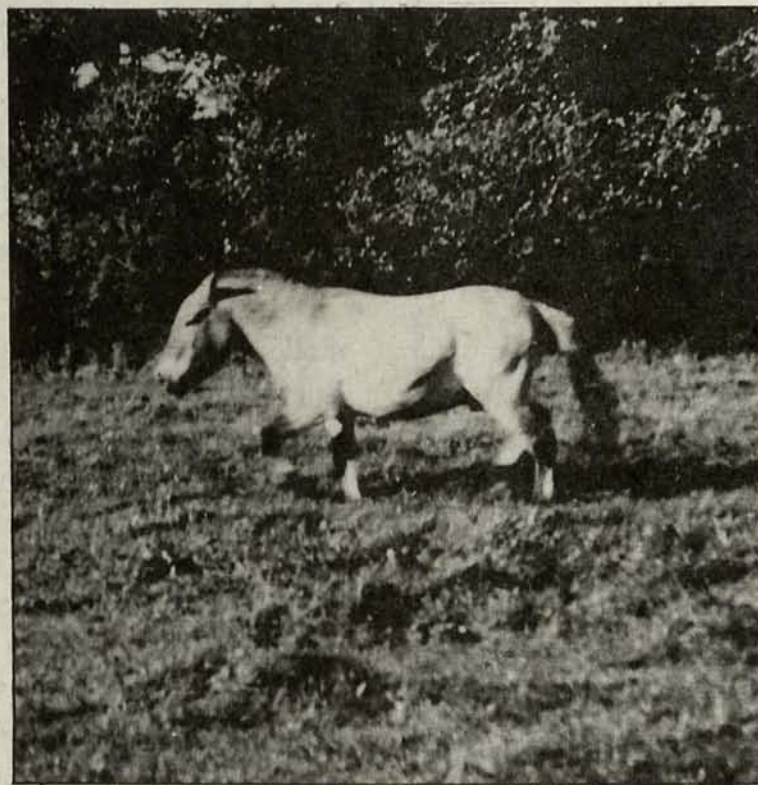
Is it worth fighting the denotification as hard as we can, at least to prevent future denotifications? Or do we accept it as a *fait accompli* and concentrate on firstly, monitoring pollution levels at Darlaghat, and secondly, ensuring that the loss in area is compensated by skillful management of the remainder of the sanctuary? Using this case as a precedent, there will no doubt be more applications for similar projects in sanctuaries and reserved forests. We would do well to discuss the matter in suitable fora at every chance we get, and decide how we should respond.

### Just deserts for Przewalski's horse

Of the many species of wild horses that roamed the world's plains millennia ago, only one survives today — Przewalski's horse (*Equus przewalskii*) of Mongolia. Its natural habitat is the dry, saline, high altitude steppe of the Gobi desert. Hunting, and increasing competition for the few available pastures and waterholes from domestic livestock, caused horse populations to fall rapidly in the early 1900s, until the species became extinct in the wild.

About 400 horses now survive in zoos, mainly in Europe and the U.S.A. These have descended from foals captured from the wild at the turn of the century. The methods of capture were crude, usually involving shooting the dominant stallion in the herd in order to trap the others more easily. There were also heavy losses in transit. Eventually, 39 foals ended up in Europe, 11 at a new park in Askania Nova in Ukraine and 28 in Hamburg Zoo in Germany.

IUCN specialists on captive-breeding are convinced that the horse can be reintroduced into parts of the Mongolian steppe. Last May the Przewalski's horse Global Management Plan Working Group



**Hooves on the steppe — wild horses will soon begin recolonising parts of the Gobi desert.** E.P. Gee

(GMPWG) was constituted at a symposium in Leipzig. The GMPWG plans to provide, at no cost to Mongolia, all the necessary horses required to re-establish a sufficiently diverse gene pool for self-sustaining, free-ranging populations within the historic range of the species. To this end, several reintroduction and release programmes of captive-bred animals have been planned for different areas.

There are two reintroduction sites in Mongolia: one at Hustain nuuru, 60 km from the capitol, Ulan Bator, and the other in a section of the Great Gobi National Park. Apart from the logistics, there are several other factors on which the success of the programme depends. Animals must be carefully selected; diseased or even slightly unhealthy

animals could ruin months of planning. The age and sex structure of released groups must match natural conditions as closely as possible. The scheme is still being fine-tuned, but by the end of the year, the first herds of takhi, as Przewalski's horses are known locally, will begin reclaiming their own.

### Conservation in Nepal

The Shey-Phoksundo National Park is Nepal's largest. Spread over 3500 sq km of the Tibetan plateau in north-western Nepal, this high altitude desert (annual precipitation less than 500 mm) is a rich, but delicately balanced, ecosystem. A preliminary survey this year recorded 29 species of butterflies, 121 birds and more than 16 species of big mammals.

Sharing the area with them are 2500 people of Tibetan origin, who eke out a meagre living from animal husbandry and trade with Tibet. Until 1989, the Dolpa region, which included the park area, was closed to tourists. Now, the southern parts of the park are being opened for tourism, amidst fears that the increased levels of disturbance could degrade the park. It is always difficult to balance the need for



cash (and therefore tourists) against the damage that inevitably goes with it. And in such an area, which is ecologically extremely fragile, the penalties for getting the balance wrong are quick and severe.

Nepalese biologists, with funding and technical assistance from WWF, have begun collecting baseline information on a variety of subjects — the status of habitats and species populations, grazing pattern of domestic livestock, pastureland management, the possible impact of tourism on both the local economy and the wildlife — with a view to preparing a detailed management plan for the park.

Reports say that the area is still in more or less prime condition; and with human ingress still well within manageable limits, there is sufficient time to chalk out a pragmatic management plan. Nepal has successfully combined tourism and wildlife management in other sanctuaries (notably at Chitwan National Park, which boasts possibly the world's highest density of tigers). There is no reason why Shey-Phoksundo should not do equally well.

What is particularly heartening is the fact that the Himalayan deserts, which we once feared would be cleared of wildlife by tree felling and waves of settlers, is now the focus of attention in several countries. Pakistan and China have announced plans to strengthen wildlife protection in their deserts. India has its own protected areas in Ladakh, with successful conservation programmes for the black-necked crane and Tibetan wild ass. With Nepal following suit, perhaps there is still time to save the bulk of the species that graced the upper reaches of the subcontinent two centuries ago.

### **Public hearing in Bombay**

The 'Earth Summit', a United Nations Conference on Environment and Development, will be held in June 1992 in Brazil. As part of the preparations, public fora are being organised by NGOs in different countries. At the Indian forum last September, the Peoples Commission on Environment and Development (PCED) was formed to mobilise public opinion on conservation issues and provide a clear basis for the discussions at the conference.

PCED, with support from the Freidrich Naumann Foundation, is organising public hearings in various parts of India in collaboration with other NGOs and the Ministry of Environment and Forests. The two-day hearing in Bombay, held last month, was organised by the BNHS. The nearly 150 participants

included representatives from NGOs (mainly from western India, though several other states were also represented), government and industry, as well as individuals interested in conservation. The discussions focused on issues which had not been covered in other sessions — wildlife and nature conservation, policies and framework for sustainable development, urban development and industrialisation, and the concept of big dams with specific reference to the Sardar Sarovar Project.

The response, both in terms of attendance and the quality of discussions, was gratifying. The proceedings of the meeting are being collated, and will be published shortly. For details, contact Goutam Narayan at the BNHS.

### **Smiting poachers hip and Thai**

Trade in wildlife is big business; and much of it is illegal. The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES) is meant to regulate the trade, ensuring that endangered species are not exploited, and that the trade in more common species is strictly controlled. But enforcement is rarely easy, and a combination of corruption and lack of specialized knowledge (are the bristles in a consignment of brushes taken from domestic pig or wild boar?) among customs officials frequently makes a mockery of the law.

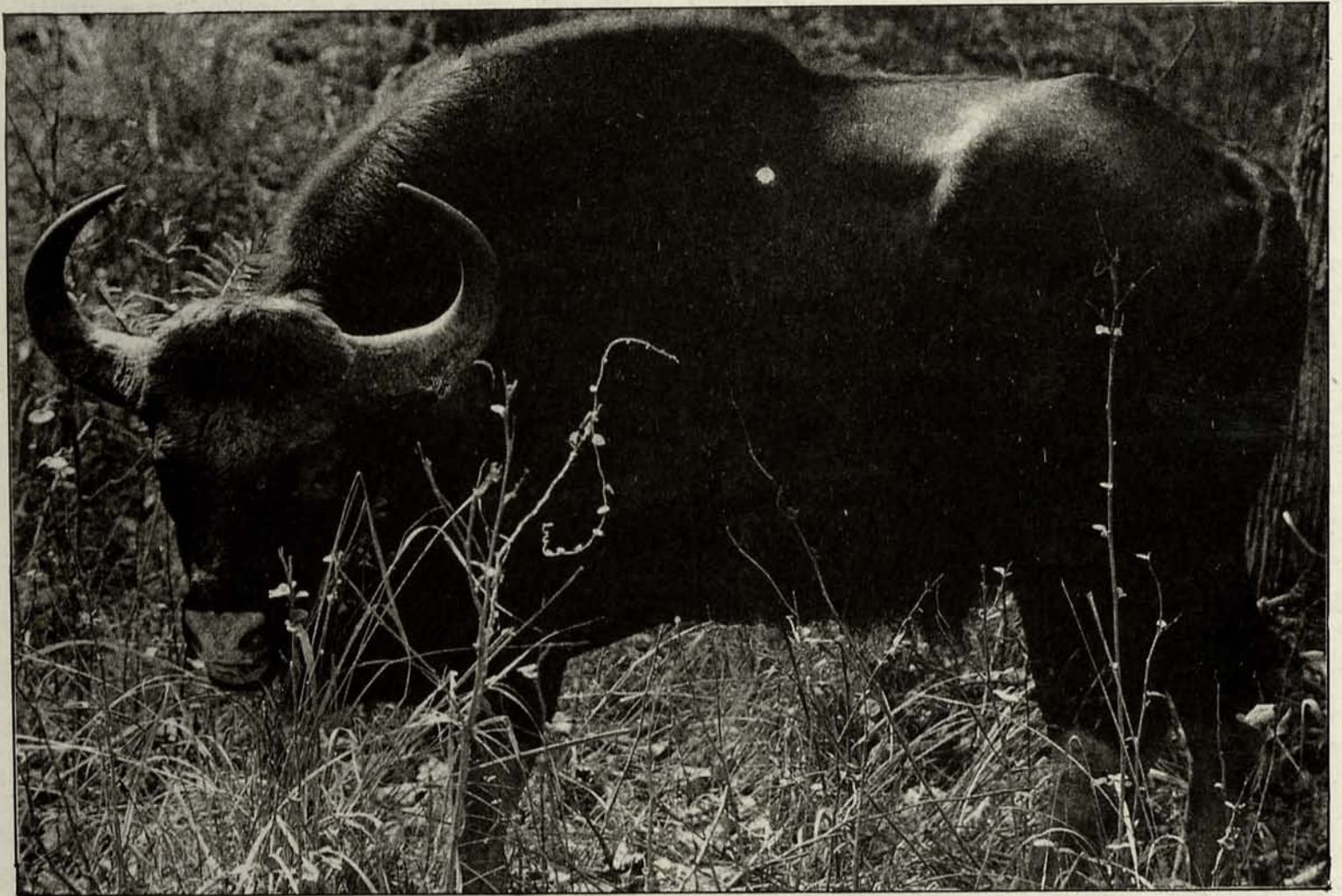
This April, the CITES Secretariat sent a notification to all members, urging a ban on trade with Thailand, because of inadequate laws, ineffective enforcement and a consequent lack of control over the wildlife trade. Action followed quickly. The U.S.A., which imports nearly \$ 18 million worth of wildlife products each year from Thailand, has announced a complete ban on both exports and imports with effect from 30 July 1991. 12 European countries have also taken steps to restrict wildlife trade with Thailand, and Japan may follow suit.

Thailand is a staging point for shipments of live cheetahs, tigers, bears, orangutans, and gibbons. Last year, for example, the U.S. Fish and Wildlife Service seized illegal Thai shipments of ivory jewelry, sea turtle products, leopard and tiger parts and products, and a wide range of reptile products such as shoes and belts. Under the U.S. ban, no shipments of CITES-protected wildlife that originate in Thailand or are re-exported to or through that country will be cleared for import, regardless of the documentation provided.





# Nature Alive



M. Krishnan

**T**HE GAUR (*Bos gaurus*) is the tallest (and after the wild buffalo of Assam, the heaviest) of our wild cattle. A large bull may stand six feet at the shoulder, and weigh close to a ton; cows are about 10 cm shorter, on the average.


Gaur are essentially creatures of hilly forests, ranging at altitudes of up to 2,000 m in some areas, coming down to lower levels only seasonally in search of pastures. The distribution is along the Western Ghats from Maharashtra southwards, and the hill forests of central and south-east India and West Bengal, eastwards to Burma and the Malay peninsula. The Mudumalai and Bandipur sanctuaries contain the best gaur habitat in the sub-continent.

Herds traverse large areas, feeding on grasses, ground herbs and shrubs, and the fruits and soft twigs of some trees. Bamboo foliage and culms, especially when tender, are a favourite food. They cannot usually reach the culms of the giant bamboo, but when elephants (the two species often feed together) have pulled down a clump the gaur wait

till they leave and then feed on the remains.

Their sense of smell is acute: when the wind is right, gaur can smell a man half a kilometre away. Their vision is less acute, and being noisy in their own movements, they depend little on sound to warn them.

Gaur are closely related to domestic cattle, and therefore susceptible to bovine diseases transmitted through livestock. Periodic epidemics are in fact a major factor in the population dynamics of the species. In 1968, a rinderpest epidemic killed off virtually the entire population at Mudumalai and Bandipur; it was two years before even small herds were seen again in the area.

Thanks to their size, gaur have few natural predators. Calves and sometimes cows are taken by wild dogs, leopards and tigers, but healthy adult bulls are almost never attacked. The response of a herd to a predator is characteristic of some large bovinds, and highly effective. They do not run away but mass together with the young in the centre and the bulls and big cows on the periphery. 



# Of Ghosts and Eagles

AJAY DESAI AND C. CHANNA

ONE EVENING as I was sitting at a tribal (Kuruba) camp at the Mudumalai sanctuary, I heard the call of a crested hawk-eagle. In the still evening air with night just approaching it seemed to have an eerie, haunting tone to it, almost like a lost soul calling out to someone. What surprised me was the haste with which some of the tribals put out the fires they had just lit. When I questioned Channa, my tracker, he told me this story.

The Jenu Kurubas have always been honey collectors (*jenu* = honey). Long ago there were two Kuruba brothers. The elder one was extraordinarily good at gathering honey, and the villagers never tired of singing his praises. The younger brother grew steadily more jealous, and finally he decided to get rid of this paragon of industry.

One day, deep in the forest, the brothers located a very tall tree with many hives on its branches. They made a bamboo ladder and the elder one climbed the tree to collect the honey. The sight of his elder brother about to gather yet another rich harvest goaded the younger man beyond reason. He removed the ladder and went away, leaving his brother up in the tree. There was no way he could climb down, and they were too far away from the village for anyone to hear his calls for help. The villain returned home with the story that they had got separated in the jungle and that his brother was lost.

The villagers sent out search parties, and finally, several days later, found the missing man on the tree. He told them of his brother's treachery, and added that he had no wish to return to the village, because his brother disliked him so intensely. The Kurubas pleaded and pleaded, but he refused to stir from his perch. They asked him what they could do for him, and he asked for two *chaatais* (the flat cane baskets used to winnow rice).



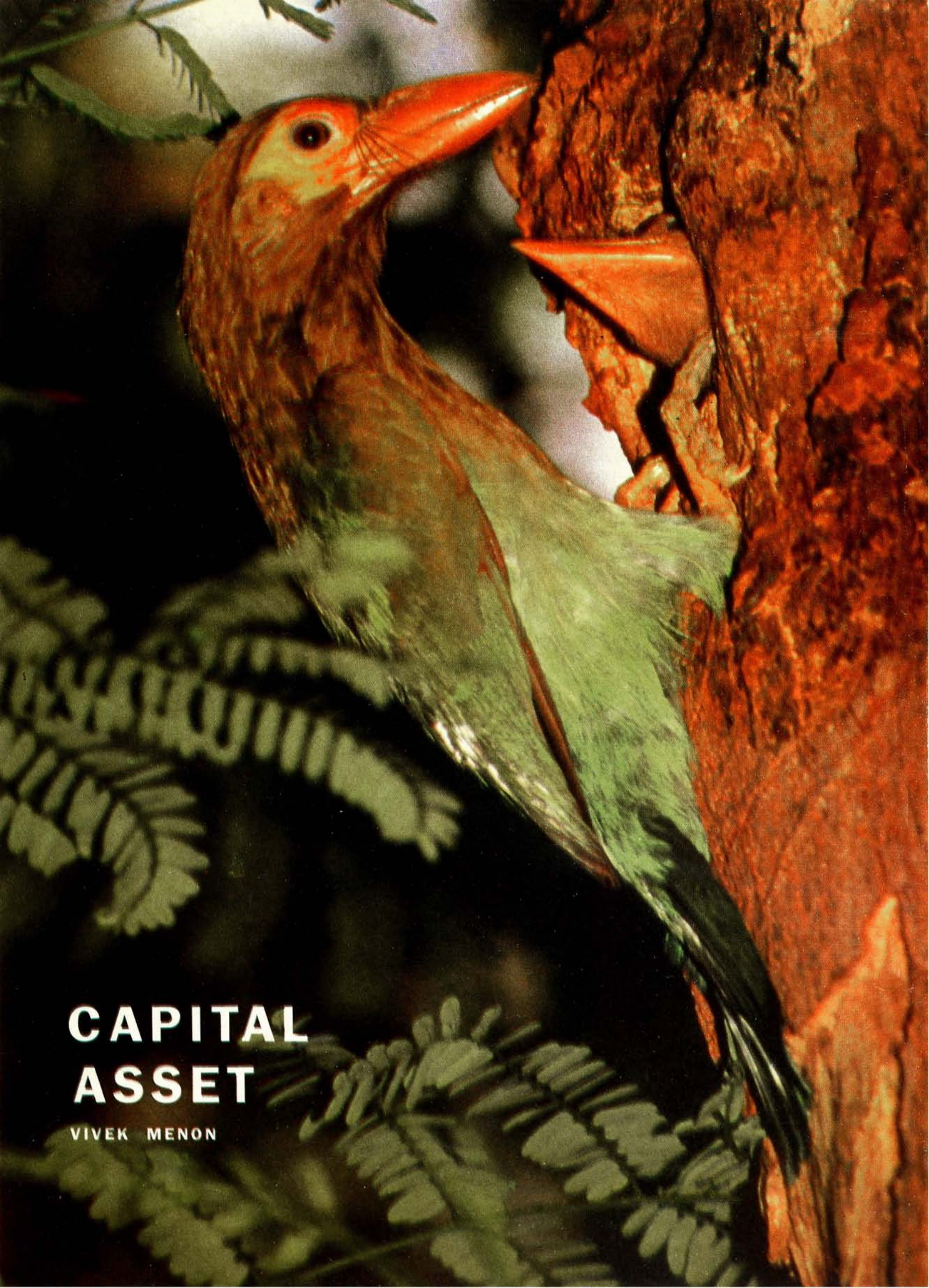
T.N.A. Perumal

WHEN these were brought to him, he held them in his arms like wings and turned himself into a crested hawk-eagle. All his life, he said, he had returned home every evening. But now he never again wanted to see a village at dusk, because it would bring back painful memories. With that, he flew off into the evening light, giving the haunting call of the crested hawk-eagle.

The Kurubas say that whenever they hear the eagle in the evenings, they immediately put out their fires, lest the flames attract the bird's attention to the village. It might be the missing brother calling, and they do not want to hurt his feelings.

*Ajay Desai is a field biologist at the BNHS. He has been based in the Mudumalai sanctuary for the past eight years, working on elephant ecology and population dynamics. C. Channa, who belongs to the Jenu Kuruba tribe, is a tracker with the elephant project.*





# CAPITAL ASSET

VIVEK MENON



I HAD NOT KNOWN Delhi in the year 1807, but it must have been a beautiful place to live in. The river Jumnah was at that time the eastern limit of the city and, branching off at Okulla, it had wound its way past Shek Saraee, where I live today. The Mewat branch of the Aravallis once extended like a pointing finger right up to the Jumnah at Wuzeerabad. Most people lived in the alluvial triangle created by the meeting of the Ridge of the Aravallis and the Jumnah.

The Ridge was then an unbroken chain of *kohis* or hillsides characterised by the thorny vegetation that is predominant in the region. Janti (*Prosopis spicigera*), dhak (*Butea monosperma*) and rong (*Acacia leucophloea*) with its fragrant pale blossoms were the major trees.

Fifty years later, in 1857, the British took to planting trees in the region. Keekar (*Acacia nilotica*) and neem (*Azadirachta indica*) were planted extensively and the ber and karil undergrowth grew in thick profusion. The Ridge was a verdant wedge, filtering out from the nascent city the hot summer 'loos', the dust winds of the north. Wolves, hyenas and leopards roamed the thorny scrub, and the nilgai, blackbuck, hog deer and the crested porcupine formed their prey. The city, it seemed, was a happy admixture of the urban and the wild.

WHEN MY STUDIES on the birds of this charming urban wild started a few years ago, the city had changed loyalties. Nearly two centuries had passed, and Delhi was as flourishing an example of modernity as any capital in the world. Amidst the symbols of a changing world, however, there were splashes of green. Apart from the tree-shaded avenues a selection of semi-woodlands, wetlands and park systems have been preserved, in the process breeding complacency about the state of Delhi's health. What was being overlooked was the fact that along with a change in the spellings of city landmarks, the green legacy was changing as well.

The Yamuna no longer constituted a boundary and the city had long ago straddled the river in a prosperous manner. The Najafgarh jheel, long since dry, was better known as the site where the largest

**Large green barbet — though dependent primarily on the Ridge for nesting trees, this species has adapted to roadsides and parks as well.**

Mohit Aggarwal

housing colony in Asia would be built. Instead of living by the river, I find myself in a dry, arid part of the city. What was once a rivulet is today a drain that flows past Sheikh Sarai, ingeniously lined with gulmohars and Parkinsonias that screen the drain from sensitive eyes. The same exotics have crept into the Ridge, and partly converted it into an exoticised park. The vilayati keekar (*Prosopis juliflora*), introduced into India only a century ago, is no longer considered an exotic but a 'naturalized' citizen of the Ridge, colonising it ruthlessly at the expense of all other trees.

The large mammals have vanished. Only a small population of nilgai remains, unpersecuted because superstitious locals consider it a dyed version of the holy cow. Sardar Bazaar and Jhandewalan, the two nerve centres of the capital's business, owe their existence to the blasting away of the middle of the Ridge. The green backbone of the capital lies shattered and in four measly bits, groaning from the pressures put on it by the city dwellers.

FOR THE DELHI-ITE, the scrublands are as unsightly as three-day old stubble on his otherwise handsome visage. The scrublands of the world are rarely fully appreciated, because they do not harbour the big and the magnificent. Within a city where the need for land is paramount and respect for the wild almost absent, it is a miracle that the Ridge has survived at all. The predominantly shrubby area, bristling with thorns and unproductive from the human point of view, has been systematically cleared and constructed upon. Satellite stations, religious places and open-air auditoriums have sprung up where a tangle of thorn and furze once stood.

The most far-sighted of the planners have been less heavy handed, instead converting scrub into parkland. The shrubby portions are cleared and the trees left standing. Lawns and rose beds are laid out and a medieval gargoyle fountain placed in the middle to create a recreational centre. The old and the young can now utilise what was once a wasteland.

But many other citizens are displaced, without space even for a dignified retreat. The same undergrowth which hinders the progress of the morning jogger provides three feet of altitudinal space for the ground dwellers of the scrub. Hares and field mice, partridges and peafowl require these three feet to breed and raise their young. Here ioras construct





The almost entirely arboreal white-eye is now rarely seen in the Ridge. The bill and tongue are specially adapted for nectar-eating, and the bird is responsible for cross-pollinating a wide variety of flowers.

Mohit Aggarwal



Whitecheeked bulbul — found naturally in scrub jungle, and hence has adapted to changing conditions in the Ridge.

Loke Wan Tho

their lovingly cupped nests, and wren warbler chicks fledge, protected by the thorny *Capparis*. When the *Zizyphus* with its interlocking thorns comes into fruit, babblers and parakeets descend on it with unconcealed glee. Rhesus monkeys leave their perches to collect the ripening ber. The undergrowth provides food and shelter to a multitude of animals, and to expect them to adapt to the Japanese style lawns, and to munch roses for breakfast, is short-sighted and intolerant.

Even now, the Ridge harbours an amazing bird and insect life. Were it to be restored to its full capabilities it will still never rival most national parks in terms of mammalian fauna — to conserve the Ridge for that reason would be farcical. For its avifauna, however, it certainly deserves protection. And if the functions of oxygen provider, noise and dust filter and city cooler were added, the urban wild would certainly merit large scale conservation.



**F**OR TWO YEARS and more I have wandered this tiny bit-forest, binoculars in hand, estimating whether the bird population within it was large enough and impressive enough to spearhead action. What I saw has only strengthened my earlier beliefs. If the jungle, large grey and common babblers cackle plentifully in gardens and roadsides, it is only within the Ridge that their more musical relative resides. The yellow-eyed babblers whistling their tri-notes to each other scramble about only in thick undergrowth. Their even more elusive cousin, the striated babbler, occurs only when the scrubland has a patch of water next to it.

When a scrubland is converted into a park, some species are lost and others substituted. The koel may be plentiful in a garden but it is in the scrub that the furtive figure of the green sirkeer can be seen scurrying for cover. The crested serpent eagle and the spotted eagles among the raptors, the rufousfronted wren warbler among the warblers and the great horned owl among the nocturnal birds can be found only in the scrublands. Delhi is fortunate in having parks adjoining scrub, which were carved out of the Ridge.

Today the places seem teeming with birds; but in reality the species are only those that have adapted to the garden. Parakeets and orioles, some bulbuls and mynas, white-eyes and sunbirds are attracted to the heavily planted gardens, and if the occasional honey buzzard is seen it is most certainly a resident of the nearby patch of woods.

Although the scrubland birds pay furtive visits to the garden they do not stay for very long; and if the garden is all that there is, these species would disappear. The requirements of whitecheeked, redvented and redwhiskered bulbuls are not all the same, just as a spotted dove differs in habitat choice from other doves. When the planners of the city convert one habitat into another in its entirety, only the species that can adapt survive. Delhi may soon find only lesser whitecheeked bulbuls and red turtle doves if that occurs.

**O** THER THAN THE type of habitat preferred by various birds, an interesting aspect of the study was the enormous number of migrants. During midwinter waterfowl censuses it has been noted that a wide variety of waterfowl visit Delhi's waterways and canals, making it almost eligible for six-month sanctuary status to protect the

migrants. Among the terrestrial birds that pass through the city are both passage and winter migrants. While the former are more interesting, the winter migrants stay longer, and the cocky redstart and the perpetually chuck-chucking lesser whitethroat are the ones that most birdwatchers are familiar with.

The beautifully bibbed bluethroat and the equally handsome stonechat, the buzzards, the elusive falcons and the absolutely confusing leaf warblers — all these move in after mid September. During March the passage migrants pass through Delhi and most of them can be seen again in August on their way back. They include the flocks of rosy pastors, bluetailed bee eaters, common swallows, reed warblers and the rare buntings.

Many migrants prefer parklands, but most interesting of all is their preference for the scrubland that adjoins a wetland. Among the various scrubs, these patches have received the least attention, obviously because they are prime land (on the riverside) and perhaps marshy land. It is this that attracts migrants which would otherwise have to swing away from the city that once gave them shelter during passage.

Over the years many birds seem to have deserted the Delhi scrublands, and the group most affected are the raptors. From the 30 odd species recorded in Delhi (a high count for any city) the falcons and the



**Bad biology, good conservation — nilgai escape persecution because people believe they are related to the cow.**

Rupin Dang



fish owls, along with birds such as the redheaded merlin and the imperial eagle, seem to have forsaken the city. The pied wheatear is seen no more and the Bonelli's does not nest in Delhi as it used to. The Indian pied hornbill and the whitebellied minivet are also today on the unseen list, joining mammals such as the leopard cat and the civet, the fox and the hog deer in the list of local extinctions.

**T**HE MAIN CHUNK of the Ridge is today a Reserved Forest. Small bits (Sanjay Van and Jahanpanah) are City Forests under the Delhi Development Authority. The roughly 8,200 acres that was estimated in 1982 to constitute the Ridge is splintered and in various hands. To preserve it from large scale encroachments and petty wood pilfering as also from the pressures of grazing and human interference as a whole, new and bold measures must be taken.

The Asola Wildlife Sanctuary (derogatorily called the sanctuary for rocks) is an example. Although nothing exists by way of significant flora or fauna at a point where the Aravallis originally entered Delhi, WWF and the Delhi administration have looked to the future. If left undisturbed, the area might regenerate; planting jamun, dhak, janti and babul might also help to attract long lost fauna.

Along with this, however, the smaller pockets of Jahanpanah and Sanjay Van and the large chunks of the New and the Old Delhi Ridge must also be conserved and the city provided with its own version of the Central Park of New York or the Bois-de-Bouil-



**Stone chat — breeds in the Himalaya; found in summer as far south as Karnataka** Loke Wan Tho


### GOING .... GOING .... gone ?

Local extinctions are a part of evolution. In response to habitat changes such as vegetative succession, birds colonise new habitats, and others move into the areas vacated. But the slow pace of change, typically over many generations, allows species to find their optimum population levels. But recent, rapid man-induced changes in the environment have drastically altered population structures of bird communities in many places, almost always for the worse.

Every species has a minimum population size below which genetic diversity is irretrievably lost. It is then only a matter of time before the species becomes locally extinct. This limit, while not known precisely in most cases, is probably being approached for many birds in many unprotected areas. Several species that were once part of Delhi's bird list are now rarely, if ever, seen in the Ridge — the redheaded merlin (*Falco chiquera*), imperial eagle (*Aquila heliaca*), pied wheatear (*Oenanthe oenanthe*), Indian pied hornbill (*Anthracoceros malabaricus*), whitebellied minivet (*Pericrocotus erythropygius*), and the brown fish owl (*Bubo zeylonensis*).

logne of Paris — a selection of scrubland systems, a network of woodland parks.

Another novel, and sadly untried, method would be to hand over chunks of scrubland to the University Grants Commission. The universities use the Northern Ridge in any case for insect collections and group outings, botanical surveys and nature walks. What better open-air laboratory can they have? Along with institutions such as the Indian Agricultural Research Institute, the universities may succeed where traditional conservation methods have failed. They have enough reason to protect the ridge, and enough volunteer manpower, year after year, to implement conservation schemes.

**I**F THIS MAN-LOCKED oasis is preserved, the green lung of the city, its only natural pollution filter and the harbourer of a thousand forms of life, may be saved. Green interiors — artificially created — are now a craze. If the task of saving our green exteriors were given as much priority, the role of civilised man in the ecosystem might turn positive. The urban wilds of Delhi could serve as an example. And one day its residents would sit up in wonder as a spotted eagle swooped on its prey, and ask, "What! did we have this all along ....?" 

Vivek Menon is studying the birds of Delhi Ridge for his M.Sc. He has recently joined a WWF project to monitor the substantial (illegal) wildlife trade in India.



Support Conservation

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The Bombay Natural History Society was formed 108 years ago, as a forum for exchanging information on natural history. Over the years, its members and scientists have helped document India's diversity of wildlife, studied little-known and highly endangered species, providing critical data for conservation projects, and produced a series of books on natural history, many of which have become standard works of reference. Today, the BNHS is Asia's premier conservation organisation, with members in over thirty countries and an international reputation as an authority on Indian wildlife.

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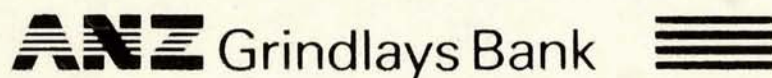


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