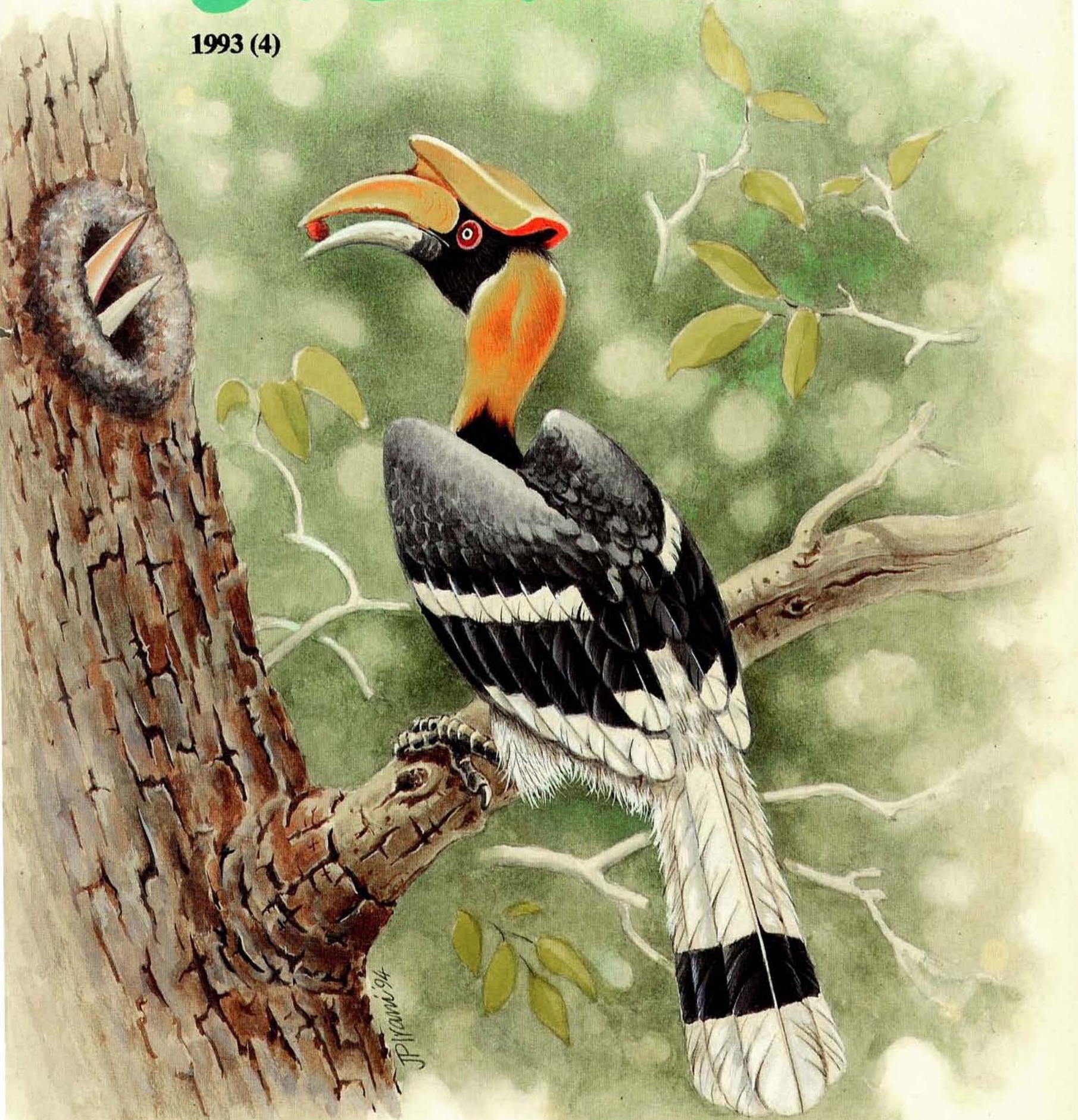


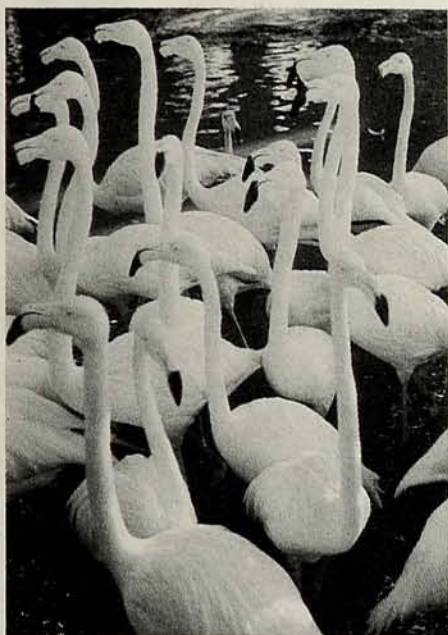
Hornbill

1993 (4)



BOMBAY NATURAL HISTORY SOCIETY

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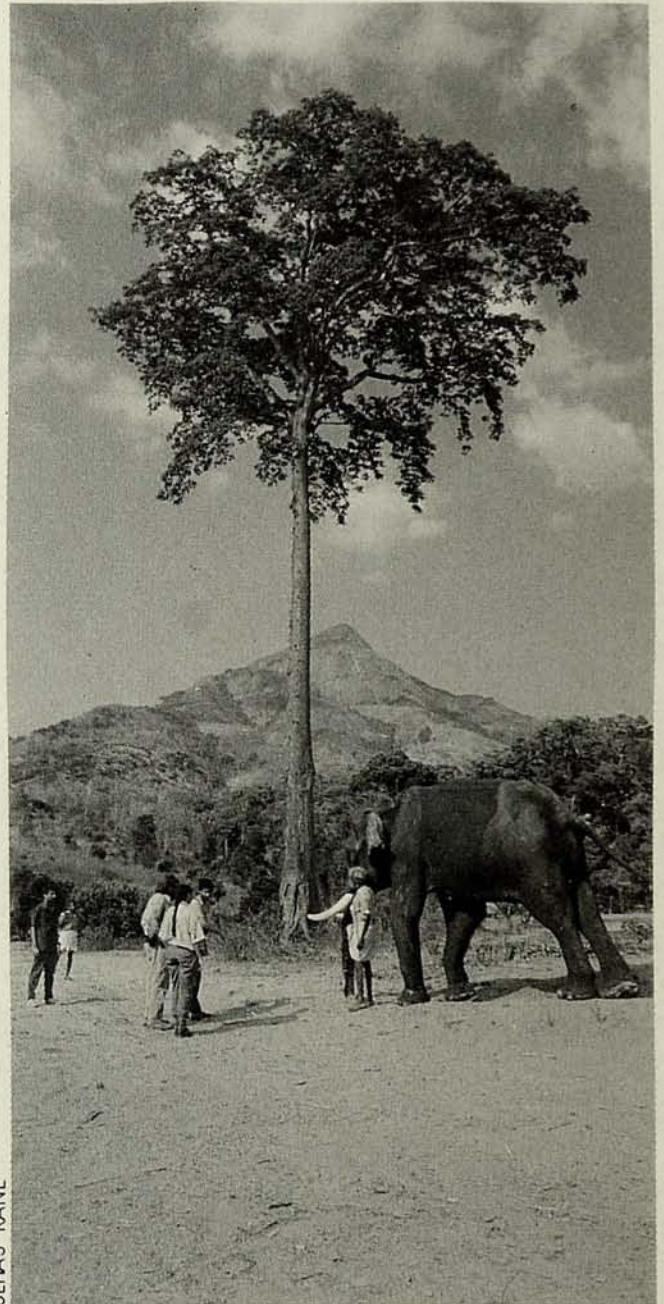
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EDITORIAL

A lone male tree is isolated in a forest fragment a few hectares in size. The nearest female tree of the same species is twenty kilometres away, sharing another forest patch with a few females. The male has flowered and awaits the moths that will carry the pollen to the female. But no moths come. They do not live here any more. The area of the forest, bearing the special vines that provided food to their larvae, has been converted into a millet field. The chemical signals being sent out by the single isolated male are so weak that they do not attract the moths far away in the other patch. The moths visit the females rapidly for the deep draughts of sweet nectar. But no fruit result. The male flowers wither away untouched. Elsewhere in the forest fragment, the flying squirrel is trapped. She cannot share her mother's territory any more and the only large tree hole available to them can no longer accommodate them both. A few neighbouring squirrels have occupied the rest of the patch. Where can she go? The nearest forest is so far away and how can she reach there as there are no intervening trees onto which she can glide? Fiction? No, these are silent tragedies, being enacted every day in the fragmented forests which today is the general condition of forests throughout India. Plants and sedentary animals with limited terrestrial mobility are the most affected and suffer the effects of isolation. Larger birds like hornbills, bats and insects are better equipped to travel from fragment to fragment in search of food, mates or nesting sites. But when the patches become few and far between, even these local migrants cannot cope with the competition from many other displaced individuals seeking the same resources. Another silent unsung tragedy. Who will care and will the meek really inherit the earth?

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SAVING THE GREAT INDIAN HORNBILL

R. Kannan



SHEKHAR DATTAJI

ULHAS RANE

For over a million years, the Great Hornbill has flapped majestically through our rain forests with hardly anything to fear. Until the human encroachment for land and logging started last century has brought this symbol of the rainforests to the brink of extinction.

Of all the pieces of mail I have ever received, this one was unique: it was a soiled and crumpled post card bearing just a barely decipherable scrawl. It had come all the way from the village of Anaipandam in the Chalakudy forests of Kerala. Pencilled in Malayalam across the face of the card were the words, "One nest only, please come". That may not sound too exciting, but for me at the time, it was cause enough for celebration. I was in Top Slip, in the Annaimalai hills of western Tamil Nadu, studying the endangered great Indian hornbill for my Ph.D. degree. One of my major and formidable tasks was discovering nests of this rare bird from all over the ghat states.

Using the generous financial support from the New York Zoological Society, I had widely publicised nest rewards of up to 300 rupees for news of active nests of this bird. I contacted tribals living in remote settlements tucked away amongst the sprawling hills, and distributed self-addressed post cards everywhere my hornbill searches took me. Sure enough, the arrival of that flimsy card last summer heralded the beginning of my large-scale nest surveys. By the end of my study, thanks to the tribals and the big cash awards, I visited and measured twenty-four nests of the great hornbill in several rainforest patches in the southern Western Ghats. For studying a bird whose chief problem seems to be the lack of nest-sites, this deluge of data was not only invaluable, but was downright necessary.

The great Indian hornbill is one of the most spectacular varieties of forest birds in the world. Two disjunct populations exist in India, one in the Himalayas and the other in the wet forests of the Western Ghats. Measuring nearly four feet in length and coloured in brilliant hues of yellow, the bird serves as a flagship ambassador to the rain forest habitat in which it lives. Indeed, my two-year studies on the bird revealed the vital role played by these birds in the very survival of the rain forest ecosystem. Unfortunately, over the past century or so, numbers

of these magnificent birds have dwindled in many areas, attributable to a variety of factors ranging from poaching by tribals to habitat destruction. Many places with records of hornbills in the past are devoid of them today.

Since little was known about the survival requirements of this bird, the first conservation step needed was a detailed study on the bird's biology. So, in 1991, I established a field camp at Top Slip and started my studies of the great hornbill in the evergreen forests of Karian Shola National Park. Since hornbills live largely on fruits, one of the first topics of my investigation was studying the

pattern of production of fruits in the forest. I wanted to determine the main tree species that the bird required for survival, especially the ones that produce fruit at a time when other fruits are not available. I surveyed large areas of the forest and marked trees that produce fruit for the hornbill within these areas. Month after month for two years, I recorded the pattern of fruit production. At the end of two years, I had a clear picture of the food scenario for the hornbill.

My major finding was that fig trees constitute a vital source of food for the hornbills, because they offered fruit throughout the year, including the times when other fruits were relatively low in supply. I observed that hornbills live off an almost exclusive diet of figs for most of the year. The conservation of fig trees in any forest is, therefore, of major importance to their survival. Unfortunately, fig trees have been looked upon with a jaundiced eye by forestry people for more than a century. They were branded as commercially useless, and were accused as killers of economically viable trees owing to their strangling habits. Moreover, all over the country, fig trees have been lopped or cut in several sanctuaries as a cheap source of fodder for camp elephants involved in lumbering operations. In the Top Slip area, for instance, most trail-side fig trees have been regularly cut over the years. Based on my findings about the importance

Direct man-hornbill conflict is a difficult and sensitive problem to tackle.

Above all, educating the tribal folk about the importance of conserving this spectacular bird is most important.

of these fig trees, the forest department of Tamil Nadu imposed a ban on their removal throughout the state, providing invaluable assistance in the conservation of hornbills and all other creatures dependent on figs. Hopefully, all other forest departments will follow suit and take similar steps to protect fig species, which, as research in other parts of the world has clearly shown, support a wide gamut of wildlife.

Two types of fruits can be recognized in any tropical forest: the small-seeded and watery fruits like figs, and the large-seeded fatty fruits like nutmegs. Unlike fig trees, the latter are mostly found in interior forest. The great hornbill, being a large bird, has an extraordinarily wide mouth which helps it to gobble up the mostly large-seeded deep forest fruits. My research documented the close interdependence of hornbills and these deep forest trees. The trees produce fruits rich in fats and other nutrients essential for the bird, and the bird helps in the dispersal of the trees' seeds over wide areas of the habitat. Coincidentally, these trees fruit during the time when hornbills breed, between February and May, offering critical nutrition at a time when it is most needed by the nest occupants. The hornbills are one of the very few dispersal agents of the large-seeded species owing to the wide gape required to swallow and transport these seeds. It follows naturally that the local extinction of hornbills will almost inevitably

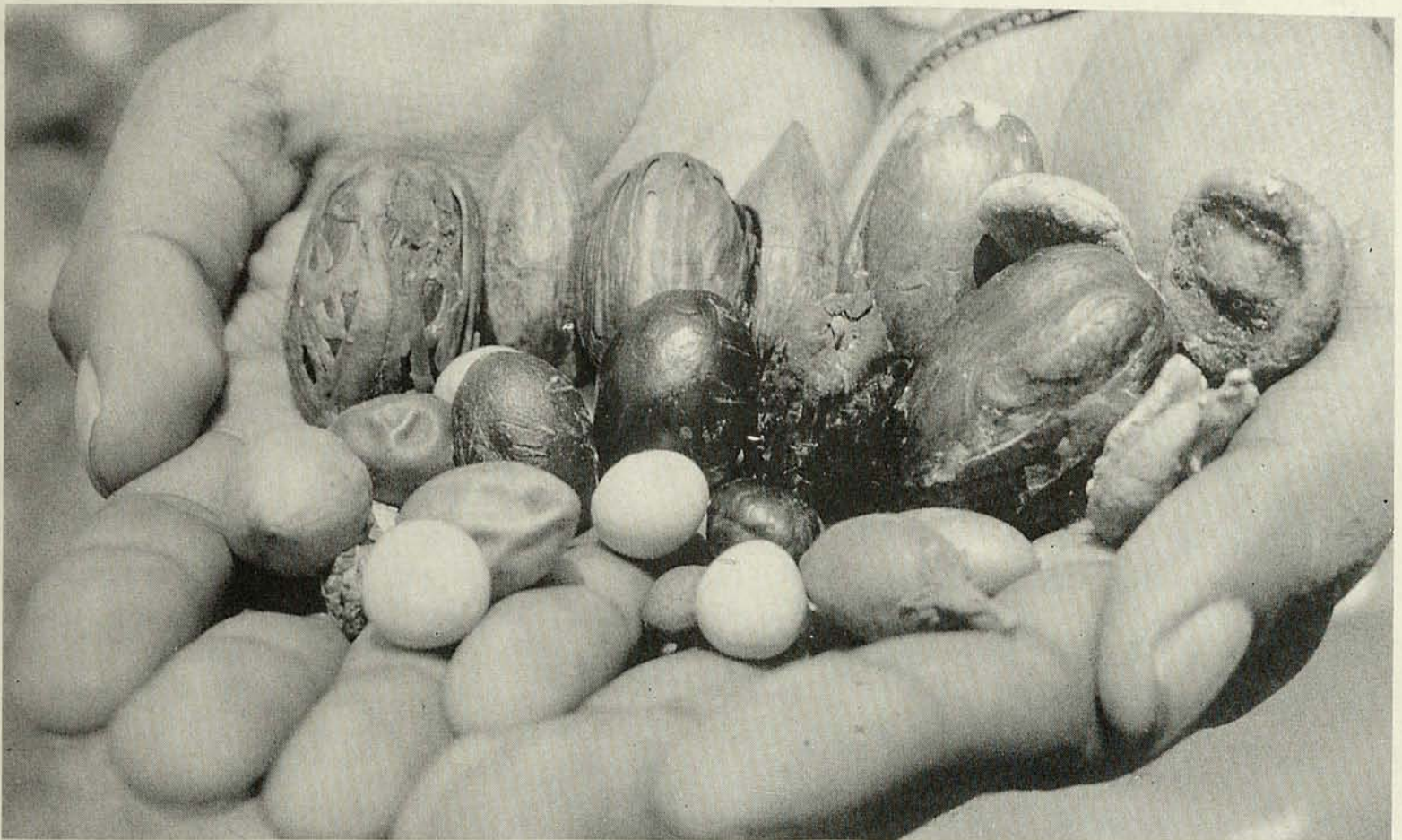
jeopardise the survival of the large-seeded forest trees. Here then is an interesting case of chain-like extinctions: you take away fig trees, you lose hornbills; you lose hornbills, and several interior forest tree species disappear. The further consequence of the disappearance of many deep forest tree species on other wildlife can only be imagined.

The great hornbill has a fascinating breeding cycle. In early February, the female seals herself inside a large natural tree cavity using her own excreta as cement. Inside, she sheds most of her feathers and incubates a single egg for 38 days, during which the male tirelessly feeds her through a narrow slit in the sealed wall. When the nestling is about two weeks old, the female, by now with a complete set of new feathers, comes out of the cavity. The seal is reapplied by the nestling inside. Both the parents now share in the provisioning of the young. The young hornbill comes out when it is about three weeks old, and travels with the parents for the first few months of its life. The same nest cavity is used year after year, if undisturbed.

This highly specialised life cycle, unfortunately, is being indirectly or directly disturbed by people, thereby threatening the very existence of this remarkable bird. The bird needs large trees with natural cavities large enough to accommodate



The author at his study site



Future rain forests

the female and the young. Even in a virgin forest, the density of large trees is rather small and the uncommon occurrence of large cavities in them further imposes a restriction. And above all, these trees must be in remote sites, far from human settlements or constructions. Large-scale forest destruction and selective logging over the past few decades has severely reduced the availability of large forest trees.

To further compound the problem, some tribal communities in the hornbill's habitat relish the meat of the young, which supposedly tastes like chicken. Regular, even small-scale removal of chicks from the nests of a bird that suffers from a severe paucity of nesting sites, and which raises just one young a year, can quickly drive it to extinction. In my travels around Kerala, I found that the Kadar tribals regularly take hornbill chicks for meat. Even in "protected" places like Parambikulam, poaching occurs at a disturbing rate. In fact, in the two years I spent in the Parambikulam area, I discovered not a single active nest in the lush Karimala forests, despite the lure of my big cash awards. Obviously, poaching has extirpated breeding pairs from this otherwise potential hornbill area. I did find old nests that had been poached before and thus abandoned.

For most of the thousands of tribals living in the hornbill forests, honey is a major source of

income. Honey collection is an age-old occupation for these people, and the methods adopted have remained unchanged over the ages. Bamboo pegs resembling daggers are hammered into the trunks of large trees, and a man climbs up these pegs in the dead of night to the large honey combs a hundred feet or more above the ground. Using a burning torch for illumination, as well as to scare away the bees, the man extracts the entire comb, which will later be squeezed for the honey and sent to the plains for further refining. Unfortunately honey collection imposes a direct threat to the survival of hornbills. The reasons are painfully simple: bees nest in the hot season and so do the hornbills; bees choose large trees for nesting and so do the hornbills; both honey and hornbills are relished by the tribals. Honey pegs could also be seen leading to hornbill nest cavities, indicating that poaching is not always incidental.

This direct man-hornbill conflict is a difficult and sensitive problem to tackle. Although honey collection is legally banned in several protected areas, enforcement is either impossible or lax. A realistic solution will be to identify all the traditionally used hornbill nest trees and declare them off-bounds for honey collection. Regular patrolling of these trees during the hornbill breeding season could help in discouraging poachers. Above all,

educating the tribal folk about the importance of conserving this spectacular bird is most important. After all, hornbill meat is only a small part of a tribal's diet, but spells life or death to this beautiful bird.

One of the most fascinating phases of my study of the great hornbill was the breeding. For a total of nearly two hundred hours, I hid inside a camouflaged ground-hide placed near a hornbill nest-tree in deep forest, and I recorded all the events of the bird's strange nesting habits. Apart from the desire to clarify numerous aspects of the improperly known life cycle, my aim was to augment the data on the bird's diet. It being a very rare and shy bird, I had very little opportunity to follow it in the forest and observe its food and feeding habits. Hence my strategy was to hide by the nest and spy on the information I needed.

Apart from observing what food the parent delivers to the nest, I had another equally productive means of getting the food data I wanted. The female and the young practise impeccable nest sanitation by squirting out their excreta through the narrowed nest opening. Since most of the diet is fruit, the excreta is largely composed of seeds. I spent several hours a week crawling on all fours beneath nests, collecting the hundreds of seeds from the heap of accumulated excreta. All these seeds were dried, catalogued and identified. The seeds posing difficulty in identification were air-mailed to the Kew Botanical Gardens in England. The thousand-odd seeds of more than twenty types of forest trees, together with my visual observations of food delivered at the nest, has given me a clear picture of the bird's dietary requirements.

The great Indian hornbill takes a wide variety of animal food to supplement its fruit diet, which is relatively poor in protein. The proportion of animal food is especially high in the breeding period, because of the importance of animal protein to the growing young. Some of my findings were unique. For instance, I had no less than six records of the male bringing in Travancore flying squirrels to the nest. This forest animal is a small, nocturnal mammal, measuring about a foot in length. There are few sight records of this animal in the Western Ghats, and it is believed to be rare and threatened. The fact that the hornbill delivered this animal regularly to its nest indicates that the squirrel may not be as rare as

believed. More relevant to my research, it indicates that the hornbill goes actively hunting for these squirrels as they sleep in tree cavities! Indeed on two occasions, I had the rare instance of actually observing a male parent actively hunting for animals in bare trees far from the nest. The bird would hop from branch to branch, tear away large flakes of dead bark from the boughs and examine the exposed surfaces on the branch for lurking animal food. Now and then, his methodical searches would flush a gecko or a spider, which he would grab, thrash against the boughs to incapacitate, and gobble down with a quick upward flick of the bill. Much of the captured food was doubtless later regurgitated at the nest.

For over a million years, the great hornbill has flapped majestically through our rainforests with hardly anything to fear, until the human encroachment into its domain started in the last century. Being a large bird, the hornbill has a large home range and needs vast tracts of forests, wherein it can roam freely to garner its fruit resource. Fruits, as a rule, are available only in patches, and any fruit-eating creature must travel continuously in quest for it.

With the deforestation we have seen in the Western Ghats in recent times, this kind of movement has become increasingly difficult for wildlife. Also, forest fragmentation not only reduces the area of forest cover, but actually destroys the integrity of the forest by encouraging alien species and by thinning out the shade-dependent interior forest trees. The ultimate recommendation to protect hornbills is, therefore, to stop further removal of forests, and to protect the integrity of the remaining forest patches. Of course, the more immediate solutions to the hornbill conservation problem will be to protect existing nest sites, curb poaching and stop removal of fig trees. But no conservation attempt will be successful in the long run without the large-scale mobilisation of favourable local public opinion. If, by the judgement of most of the people of south India, wild animals like the great Indian hornbill could be allowed to become extinct, so it will be. But our forests will not be the better for it, and will not survive this loss. □

R. Kannan is a Ph.D. student at the University of Arkansas, and has been studying hornbills mainly at Top Slip, Annamalais, for his doctoral degree.

NEWS NOTES AND COMMENTS



RIO DECLARATION ON ENVIRONMENT AND DEVELOPMENT (Courtesy *Forest News* Vol. VI: No. 2, 1992)

The following is the text of the Rio Declaration on Environment and Development, adopted by world leaders at the final session of the U.N. Conference on Environment and Development (UNCED).

The United Nations Conference on Environment and Development,

Having met at Rio de Janeiro from 3 to 14 June 1992,

Reaffirming the Declaration of the United Nations Conference on the Human Environment, adopted at Stockholm on 16 June 1972, and seeking to build upon it,

With the goal of establishing a new and equitable global partnership through the creation of new levels of cooperation among states, key sectors of societies and people,

Recognizing the integral and interdependent nature of the Earth, our home,

Proclaims that:

Principle 1: Human beings are at the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature.

Principle 2: States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental and developmental policies, and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other states or of areas beyond the limits of national jurisdiction.

Principle 3: The right to development must be fulfilled so as to equitably meet developmental and environmental needs of present and future generations.

Principle 4: In order to achieve sustainable development, environmental protection shall constitute an integral part of the development process and cannot be considered in isolation from it.

Principle 5: All States and all People shall cooperate in the essential task of eradicating poverty as an indispensable requirement for sustainable development, in order to decrease the disparities in standards of living and better meet the needs of the majority of the people of the world.

Principle 6: The special situation and needs of developing countries, particularly the least developed and those most environmentally vulnerable, shall be given special priority. International actions in the field of environment and development should also address the interests and needs of all countries.

Principle 7: States shall cooperate in a spirit of global partnership to conserve, protect and restore the health and integrity of the Earth's ecosystem. In view of the different contributions to global environmental degradation, states have common but differentiated responsibilities. The developed countries acknowledge the responsibility that they bear in the international pursuit of sustainable development in view of the pressures their societies place on the global environment and the technologies and financial resources they command.

Principle 8: To achieve sustainable development and a higher quality of life for all people, states should reduce and eliminate unsustainable patterns of production and consumption and promote appropriate demographic policies.

Principle 9: States should cooperate to strengthen endogenous capacity building for

sustainable development by improving scientific understanding through exchanges of scientific and technological knowledge, and by enhancing the development, adaptation, diffusion and transfer of technologies, including new and innovative technologies.

Principle 10: Environmental issues are best handled with the participation of all concerned citizens, at the relevant level. At the national level, each individual shall have appropriate access to information concerning the environment that is held by public authorities, including information on hazardous materials and activities in their communities, and the opportunity to participate in decision-making processes. States shall facilitate and encourage public awareness and participation by making information widely available. Effective access to judicial and administrative proceedings, including redress and remedy, shall be provided.

Principle 11: States shall enact effective environmental legislation. Environmental standards, management objectives and priorities should reflect the environmental and developmental context to which they apply. Standards applied by some countries may be inappropriate and of unwarranted economic and social cost to other countries, in particular developing countries.

Principle 12: States should cooperate to promote a supportive and open international economic system that would lead to economic growth and sustainable development in all countries, to better address the problems of environmental degradation. Trade policy measures for environmental purposes should not constitute a means of arbitrary or unjustifiable discrimination or a disguised restriction on international trade. Unilateral actions to deal with environmental challenges outside the jurisdiction of the importing country should be avoided. Environmental measures addressing transboundary or global environmental problems should, as far as possible, be based on an international consensus.

Principle 13: States shall develop national law regarding liability and compensation for the victims of pollution and other environmental damage. States shall also cooperate in an expeditious and more determined manner to develop further international law regarding liability and compensation for adverse effects of environmental damage caused by activities within their jurisdiction or control to areas beyond their jurisdiction.

Principle 14: States should effectively cooperate to discourage or prevent the relocation and transfer to other states of any activities and substances that cause severe environmental degradation or are found to be harmful to human health.

Principle 15: In order to protect the environment, the precautionary approach shall be widely applied by states according to their capabilities. Where there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation.

Principle 16: National authorities should endeavour to promote the internalization of environmental costs and the use of economic instruments, taking into account the approach that the polluter should, in principle, bear the cost of pollution, with due regard to the public interest and without distorting international trade and investment.

Principle 17: Environmental impact assessment, as a national instrument, shall be undertaken for proposed activities that are likely to have a significant adverse impact on the environment and are subject to a decision of a competent national authority.

Principle 18: States shall immediately notify other states of any natural disasters or other emergencies that are likely to produce sudden harmful effects on the environment of those states. Every effort shall be made by the international community to help states so afflicted.

Principle 19: States shall provide prior and timely notification and relevant information to potentially affected states on activities that may have a significant adverse transboundary environmental effect and shall consult with those states at an early stage and in good faith.

Principle 20: Women have a vital role in environmental management and development. Their full participation is therefore essential to achieve sustainable development.

Principle 21: The creativity, ideals and courage of the youth of the world should be mobilized to forge a global partnership in order to achieve sustainable development and ensure a better future for all.

Principle 22: Indigenous people and their communities, and other local communities, have a

vital role in environmental management and development because of their knowledge and traditional practices. States should recognize and duly support their identity, culture and interests and enable their effective participation in the achievement of sustainable development.

Principle 23: The environment and natural resources of people under oppression, domination and occupation shall be protected.

Principle 24: Warfare is inherently destructive of sustainable development. States shall therefore respect international law providing protection for the environment in times of armed conflict and cooperate in its further development, as necessary.

Principle 25: Peace, development and environmental protection are interdependent and indivisible.

Principle 26: States shall resolve all their environmental disputes peacefully and by appropriate means in accordance with the Charter of the United Nations.

Principle 27: States and people shall cooperate in good faith and in a spirit of partnership in the fulfilment of the principles embodied in this declaration and in the further development of international law in the field of sustainable development. ■

A WHITER SHADE OF PINK

The Caribbean flamingos at the Wildfowl and Wetlands Trust at Slimbridge, south-west



Fading for a cause

England, are fading from their characteristic pink colour in a unique experiment to explore their pigmentation.

In the wild the birds derive the pink pigment from their diet of shrimps, molluscs and algae, but breeding birds lose their colour when they produce "crop milk" (a substance which is regurgitated to feed the young).

Since these foodstuffs are not readily available to the many zoos and sanctuaries around the world which keep these ever-popular birds, their rosy hue is maintained by the addition to their feed of an artificial pigment – canthaxathin.

This pigment was for many years fed to poultry bred for human consumption in order to give the flesh an appetizing colour, but has now been banned by the World Health Organisation. Fears that it may also be detrimental for the flamingos have led scientists at Slimbridge to search for a safe alternative.

The flock was divided before the programme began, when 31 birds were relocated at another sanctuary in Llanelli, south Wales. These will act as a control group.

The Slimbridge flock is currently following a pigment-free diet in order to use up all their reserves of pigment (which are stored in the liver and fat tissue). When these are fully depleted and the birds become white, it will be possible to accurately monitor the effect of a different diet. It is thought that dried blue or green algae may provide the solution — if it supplies sufficient pigment, as it is a natural food which can be grown quickly and inexpensively. ■

INSA MEDAL FOR YOUNG SCIENTISTS - 1995

Instituted by the Indian National Science Academy in 1974, the medal is awarded annually in recognition of outstanding work of scientists below the age of 32 (as reckoned on the 31st of December preceding the year of award). Only those born on or after January 1, 1963 are eligible for consideration in 1995. The work done in India by the nominee will be taken into consideration for the award.

The awardee is presented a medal and a cash award of Rs. 10,000. In addition, the recipient is considered for a research grant by the Academy not exceeding Rs. 40,000 per year.

Nominations for the awards for 1995 may be made by Fellows of the Academy, and also by established scientific societies of national standing, University faculties and departments, or research institutions. The last date for the receipt of nominations is November 15, 1994.

Nomination proforma can be obtained from the Indian National Science Academy, Bahadur Shah Zafar Marg, New Delhi 110 002 by sending a self-addressed envelope of 25 cm x 12 cm size. ■

HOW VULNERABLE IS VULNERABLE?

Every day we learn through newspapers, books or television about threatened species, endangered species, vulnerable species, rare species and critical species. But truly, how vulnerable is vulnerable? Is threatened the same as vulnerable and are both these more endangered than endangered?

To sort out this confusing jumble of words and to promote general uniformity in the description of the status of a species vis-a-vis its chances of extinction, two conservation biologists, Georgina Mace and Russell Lande, in a paper in the journal

Conservation Biology, suggest the use of only three categories — Critical, Endangered and Vulnerable — in decreasing order of seriousness. Mace and Lande's criteria, which we summarise below are now being considered for adoption by the International Union for the Conservation of Nature and Natural Resources (IUCN). The criteria are still under review but, they are unambiguous, simple to understand, and should soon find widespread usage.

In the following explanation, N_e refers to the genetically effective population size which is calculated from the number of breeding males and breeding females in the population according to the formula

$$N_e = \frac{4 \times \text{number of breeding females} \times \text{number of breeding males}}{\text{Number of breeding females} + \text{Number of breeding males}}$$

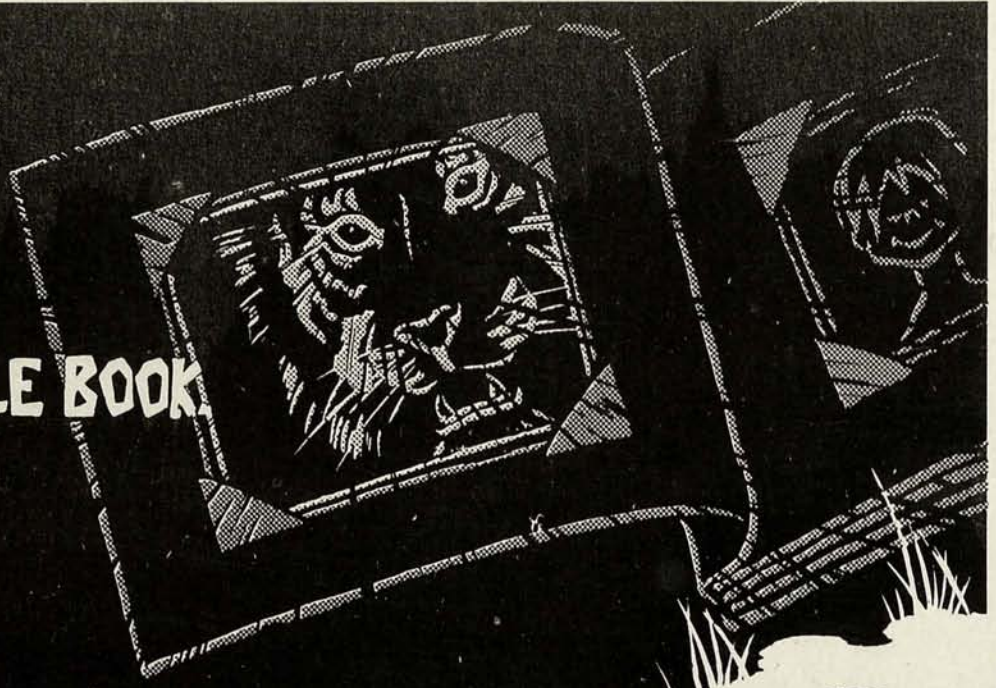
N refers to the total population size. For example, within a total population of 200 individual deer, only 100 deer may be reproductively mature and capable of breeding (80 females and 20 males). The total N_e of such a population is only 64 while the total N is 200.

	Critical	Endangered	Vulnerable
Probability of extinction:	50% within 5 years or 2 generations	20% within 20 years or 10 generations	10% within 100 years
Total population N_e : N :	Less than 50 Less than 250	Less than 500 Less than 2,500	Less than 2,000 Less than 10,000
Subpopulations:	2 or fewer subpopulations with $N_e > 25$	5 or fewer subpopulations with $N_e > 100$; or 2 or fewer subpopulations with $N_e > 250$	5 or fewer subpopulations with $N_e > 500$; or 2 or fewer subpopulations with $N_e > 1,000$
Rate of population decline:	>20% annual population decline in last 2 years or > 50% decline in the last generation	>5% annual population decline in last 5 years or > 10% decline in past 2 generations	> 1% annual decline over past 10 years

Species that do not fit into these categories are either safe or extinct. The causes for population decline are many. Degradation of habitat, habitat loss or fragmentation, and commercial exploitation are the

major threats. Species of predators, parasites, pathogens and competitors introduced into a new ecosystem can also contribute to slow or sudden population crashes. ■

YOUR VERY OWN JUNGLE BOOK

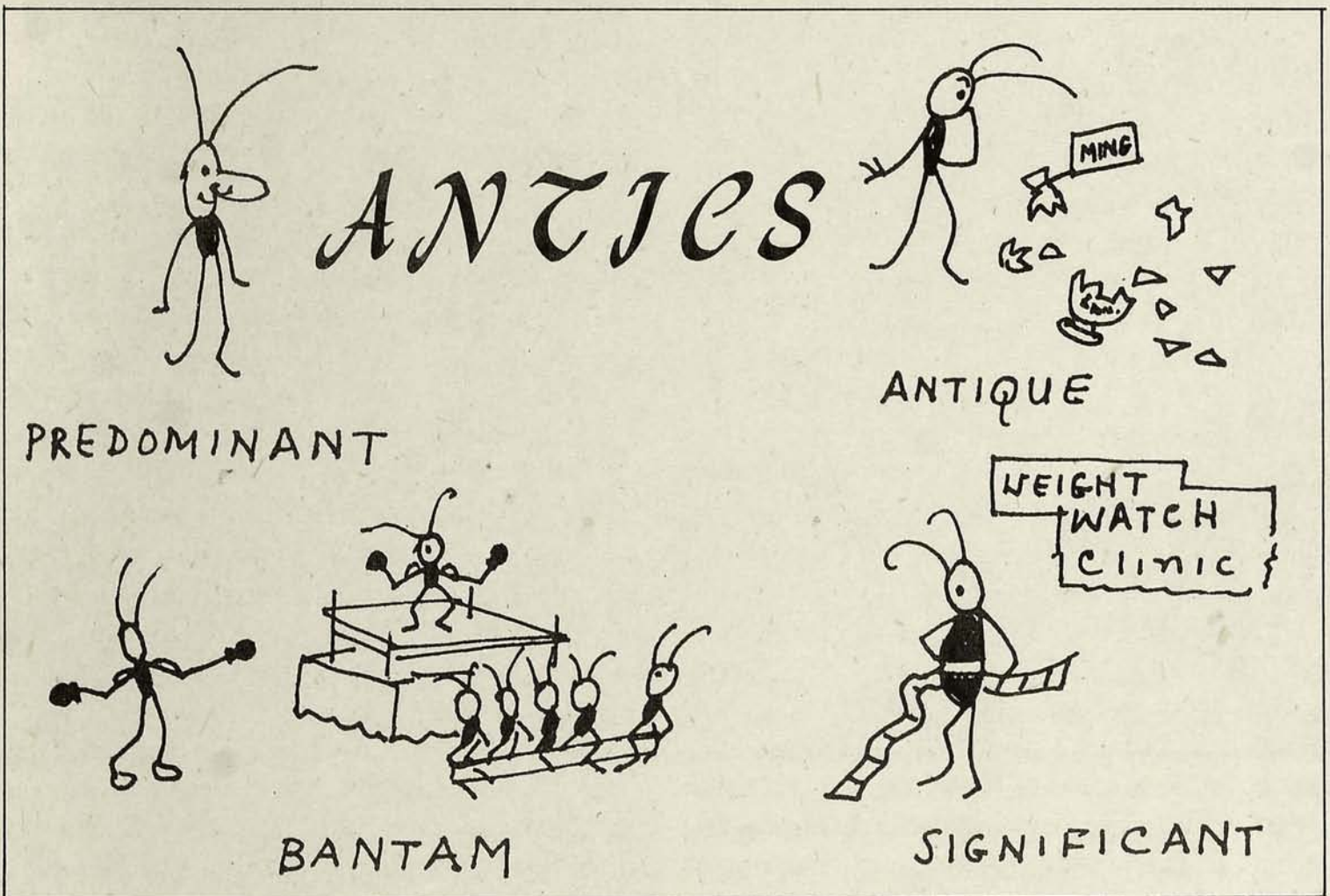


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<i>Tiger Moon Resort</i> Ranthambhor National Park	<i>Wild Venture Camps</i> (for nature clubs & students)	





For the last two or three years I have been observing the grey hornbill visiting Delhi city in spring and autumn. When I heard its squeaky call for the first time, and after much perseverance was able to locate and confirm the species, I was astonished to find that it was a grey hornbill at our home at Chattarpur Mehrauli. At that time I thought that somewhere near our area in Bhatti or Dera villages, which had good forest cover, some forests must have been cleared for mines or urbanization. This stray bird must have come from there in search of a new home, because after two or three days it vanished. And for the next two years in succession, in the same season, I came upon this bird again, always solitary and never in the company of others of its species.

I was even more surprised when I heard the same call next year in spring while sitting in my office at Connaught Place. On searching the nearby peepul, jamun and neem trees, I was able to see a grey hornbill. After a few minutes, it flew over and crossed over to another building. I sighted a pair again recently, perched on top of a neem tree near Parliament House.

I am unable to understand this behaviour of the grey hornbill. According to Hugh Whistler in his book 'Popular Hand Book of Indian Birds', the bird is essentially a species of well-timbered open country, frequenting gardens and avenues in small parties, flying from bough to bough eating wild figs, fruits and seeds, and selecting old peepul and cotton trees for breeding.

Further in 'The Book of Indian Birds', Salim Ali states that the bird is common in fig-laden banyan and peepul trees along roadsides or near villages, feeding in company with green pigeons and other frugivorous birds. Nowhere do these two ornithologists mention that the species is also found in a metropolis like Delhi.

This point is to be seriously noted as we know that what these two authors have written about was true several years back, when our towns (especially Delhi) were much greener and the surroundings were well forested. Why is it now found in Delhi when not only is the habitat unsuitable, but its food is also scarce because other than wild figs and other fruits,

its food includes animals like insects, lizards and young mice? It is surprising how a diurnal bird like the hornbill can hunt for these in a metropolis where even walking is hard for human beings during the daytime!

K.D. Singh
New Delhi

It was a typical mid-May afternoon in the Nagzira Wildlife Sanctuary of Vidarbha. Even the crows had ceased to caw and the world had come to a standstill. Kiran Purandare and I were walking through the forest on the lookout for animals approaching waterholes. The scorching sun and the hot ground were making us very uncomfortable. We would soon be back in the cool interior of our Guest House. But what about the birds, we wondered. How did they survive the intolerable heat at above 45°C? Just then we noticed a golden-backed woodpecker land on a huge peepul tree.

We approached it to have a closer look. This particular tree had a deep vertical hollow about four inches deep, eight inches wide and about four feet long. The bird settled itself in at the top of the hollow. While we were guessing at the variety of insects that would be available for the bird in the hollow, some spotted grey creepers climbed down the trunk in Spiderman fashion to the lower end of the hollow. No sooner had they settled when a Mahratta woodpecker also hopped in.

Soon, a tailor bird also appeared and found the hollow already occupied. However, it managed to squeeze itself in just below the creepers. All this happened within five minutes, leaving us spellbound. We noticed that none of the birds were feeding, but had their mouths open. The hollow faced away from the hot breeze blowing across the forest. It was protection from the heat that brought about this strange congregation, which normally would not have occurred because of the overlapping feeding interests of three out of the four species. Reassured that the other birds must have found similar shelters, we returned to our Guest House.

Anirudh Chaoji
Pune

Editor's note: While keeping their mouths open, the birds were losing heat by "panting".

PARTNERS IN CONSERVATION

ARMY ENVIRONMENT AND NATURE CONSERVATION WORKSHOPS

Until recently, the Bombay Natural History Society had been organising environmental education courses for the Army on an ad hoc basis. However, in the Annual Meeting of the Indian Army's Environment and Wildlife Committee held at Lucknow in November 1991, BNHS formally agreed to start a series of environmental workshops. After the visit of General Rodrigues, Chief of Army Staff, to BNHS on December 20, 1991 and meetings with Lt. Gen. Baljit Singh and Col. M.T. Rao at the Society, it was decided to develop a close association with army and paramilitary personnel.

Initially, it was decided to conduct environmental conservation courses only for commissioned officers as they could spread the message of nature conservation among the rank and file, creating a multiplier effect. The Armed Forces Cell was therefore formed at BNHS which collaborates with the Army Adventure Cell of the Military Training Directorate, Army HQ.

A draft course manual was prepared by BNHS which will be refined to form the basic instruction manual for future Environment Courses in the Indian

Army. To date, five workshops have been organised.

□ 16 to 23 June 1992, Southern Command, at the National Defence Academy, Khadakvasla (Maharashtra): Attended by thirty-six officers from different units of the Southern Command. The highlight of the course was a trip to Ralegan Siddhi where Anna Hazare took the participants around. Use of non-conventional energy was demonstrated by the Maharashtra Energy Development Agency (MEDA) and NDA authorities.

□ 15 to 21 October 1992, Northern Command, Palampur (Himachal Pradesh): Attended by 45 officers. The resource team included scientists from the Agricultural Research Institute, CSIR station, and the Army units.

□ 13 to 19 November 1992, Western Command, Kota (Rajasthan): Attended by over 40 officers, the highlights of the Kota workshop were visits to Ranthambore Tiger Reserve, field work around Abhera lake and the Army's Abhera training centre on the banks of the Chambal. The resource team included some BNHS members as well as



The prominent environmentalist Anna Hazare leading the way

scientists and lecturers from local institutes, besides serving and retired Army officers.

□ 12 to 18 April 1993, Central Command, Dehra Dun (U.P.): Attended by officers from different units and from the Indian Military Academy. The resource team mainly consisted of scientists from the Wildlife Institute of India, Forest Research Institute and Wadia Institute of Himalayan Geology. The Ecological Battalion of the Territorial Army demonstrated their work in the field. Trips to the Rajaji National Park and degraded hills in Mussoorie were other

highlights of the workshop.

□ 25 to 28 November 1993, Eastern Command, Missamari (Assam): Attended by over 40 officers from various units under 4 Corps and the Eastern Command, including eminent generals from the Corps and Division headquarters. Resource persons included BNHS members, college teachers associated with BNHS from Tezpur, and senior Army officers. Field trips to the Kaziranga National Park and foothills of Arunachal Pradesh, including a visit to the Tipi orchidarium, were arranged.

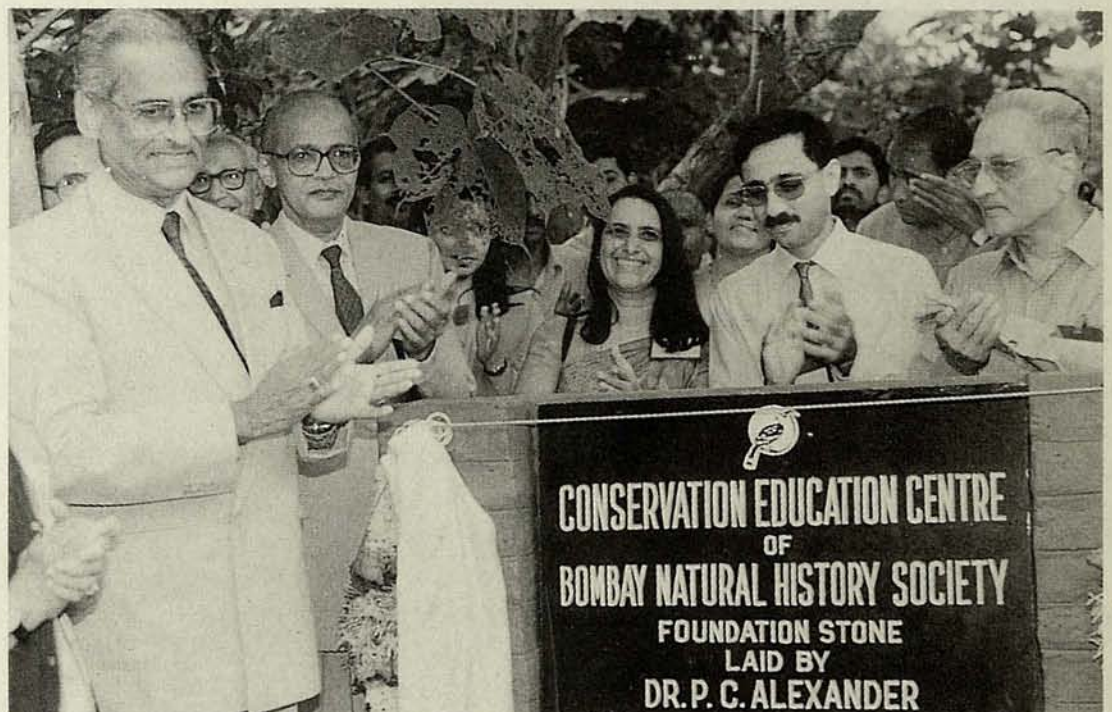
CONSERVATION EDUCATION PROJECT

It is now well known that conservation efforts will not gain ground unless local communities are taken into confidence and made partners in the effort. Many of the wildlife and forest protection measures have in fact alienated local people.

We, at the Bombay Natural History Society, while working on several Wildlife Conservation Projects, have always felt the need to raise the awareness of the local population, so that conservation efforts are well received. An innovative programme exclusively for conservation education is all set to take off, made possible by a grant of Rs. 2.3 crore from the Overseas Development Administration, Government of the United Kingdom, for 3 years. The BNHS, with the technical cooperation of the Royal Society for the Protection of Birds (RSPB) will build participative support for the conservation of important natural habitats in India. The Society's Director, Dr. Jay Samant, will be co-ordinating the project. David Elcome and Kenneth Smith from the RSPB are the technical consultants and Ramesh Dandekar is the Field Manager from the British Council Division. To start with, three mobile field education units will work in and around the Sanjay Gandhi National Park, Bombay, the Nilgiri Biosphere

Reserve at Gudalur, Tamil Nadu in the Western Ghats and in the world famous wetland, Keoladeo National Park in Bharatpur, Rajasthan. A fully equipped Conservation Education Centre will be built on the BNHS land at Goregaon, Bombay.

The specially trained, mobile unit teams, consisting of the Project Manager, a Research Officer, sociologists and environmental scientists will work with the local people through special educational



At the launching of the C.E. Centre, H.E. Dr. P.C. Alexander is flanked by Mr. B.G. Deshmukh, President, and office bearers of the BNHS

programmes. The educational techniques and resources will be designed, field-tested and developed to communicate with the target groups to spread awareness of environmental issues. These will help to develop and implement strategies for conservation and sustainable development in India. □



PHOTO: VIVEK R. SINHA

A gold-fronted chloropsis provisioning its hungry brood

IN THE LAND OF THE MORNING CALM

Asad R. Rahmani

Bird ringing was started to study bird migration, but who would imagine that you could also locate your father by bird ringing! Surprising, isn't it? But, this is how Professor Won came to know that his father, the first Korean ornithologist, was alive in North Korea. Professor Won Pyong-Oh of the Institute of Ornithology of Kyung Hee University of Seoul, South Korea, was separated from his father during the unfortunate Korean war which lasted for three years between 1950 and 1953. His father Won Hong Koo stayed back in North Korea, while the junior Won moved to the south and joined Kyung Hee University as lecturer. Due to international politics and super-power rivalry, North and South Koreans were not allowed to meet or communicate. Professor Won lost track of his father till he captured a bird with his father's bird ring on it. This was the first indication that his father had survived the war. But there was no way he could directly contact his father, so he contacted Russian and Eastern European ornithologists who had been to North Korea and had met his father. But still, politics would not allow the two top ornithologists of neighbouring countries, who also happened to be father and son, to meet. Unfortunately, the senior Won died in 1970 without meeting his son, who had by then become the most famous conservationist of his country.

I met Professor Won during the International Council for Bird Preservation (ICBP) Asian conference in December 1992, at Seoul, South Korea. Professor Won was the Chairman of the Asian section. The ICBP international meeting is held every four years, a few days before the International Ornithological Congress (IOC), generally in the same country. The last ICBP International Congress was held in 1990 in New Zealand. The ICBP has been divided into continental sections to address local needs. The

Asian continental section is very important because one-third of the world's threatened birds are found in Asia.

At Seoul, representatives and ornithologists from eighteen countries were present. Important countries missing were Afghanistan, Bhutan, Myanmar (Burma), Laos, Cambodia, North Korea, Brunei and Papua New Guinea. For five days numerous papers were read, intensive discussions were held and four workshops were arranged. New friendships were developed, conservation achievements and failures shared. All the delegates left with renewed resolve to work harder to protect birds and their habitats. A mid-conference one-day field trip was organised to the Chollwan area in the Demilitarized Zone (DMZ) between South and North Korea, and a three-day field trip to the Pusan area was arranged after the meeting. Professor Won, a very active field man, guided us during the field trips. He and his numerous students were always ready to answer questions.

Before going into the natural history of South Korea, I would like to say a little more about Professor Won, who almost single-handedly has brought conservation on the agenda of the South Korean government, just as Dr Salim Ali did for India.

Professor Won has written more than 200 research papers, a dozen books and nearly 500 articles on Korean wildlife, and was instrumental in establishing the Institute of Ornithology at Kyung Hee University. However, his most important contribution is the creation of general environmental awareness in the country as a result of which 70 per cent of South Korea is now under forest, mostly planted and rehabilitated after the Korean war.

Seventy percent of the land surface of the



Watching swans and ducks at Dongpan reservoir

Korean peninsula is hilly, although the hills are not very high. As a scientific land-use policy, all the steep hills in South Korea were covered with forest to prevent soil erosion. The valleys and plains are intensively cultivated and urbanized in this highly industrialized country of 43 million people. On the other hand, North Korea, which the great communist dictator Kim Il Sung considered to be "paradise on earth", is comparatively bare, with terrace cultivation right up to the top of the hills. Even then, North Korea is barely able to feed herself because the incentive to grow more is absent in this strictly regimented society. Economically, North Korea, like its big brother, the former USSR, is in a mess with people barely able to subsist, while the South Korean economy is booming.

In South Korea, there are 38 national and provincial parks which are totally protected. One national park, Puk'ansen is at the doorstep of the capital Seoul, a large sprawling city of 13 million people. There are also many cultural and nature monuments where wildlife is totally protected. During the ICBP meeting, delegates were taken to three such natural monuments. The Korean peninsula extending southward from the northeast part of the Asian continent between latitudes 33° and 43° North, was divided in 1948 into North (communist) and South (capitalist) Korea. Spanning 1000 kilometres from north to south, the

peninsula is about the size of the United Kingdom. Koreans are a homogeneous ethnic group speaking one language, and like India and Pakistan, were divided into two countries by the fate of history.

Like India, Korea has a long cultural history going back 3000 years but a brief glimpse of the recent past will explain the division of Korea. In 1910 Japan annexed Korea and tried to assimilate Koreans into Japanese culture. Korean schools and Korean language newspapers were closed and great pressure was put on the populace to adopt Japanese culture and ethos. The Japanese gave false historical and archaeological evidences to prove that Korea was closely related but inferior to Japan. Predictably, the proud Koreans never accepted this enslavement, and thus the freedom movement was launched. After the defeat of Japan in the Second World War, another tragedy awaited the Koreans. They became the victims of super-power rivalry: the Soviet Union in the north and the United States in the south. On the 15th of August, 1948, after free elections south of the 38° parallel, the Republic of South Korea came into being, while a communist regime was set up in the north under Kim Il Sung, who was in total control of that unfortunate country. Considering it a sacred duty to free the South Koreans from "American imperialists", North Korea invaded South Korea on the 25th of June, 1950. The war lasted three years

in which millions of people died or were displaced. A UN-sponsored cease-fire was signed in July 1953 and a Military Demarcation Line was established at the 38° parallel. Except for a few skirmishes, both countries have since avoided confrontation and the DMZ is peaceful.

Before the division, people lived happily in the DMZ. Interestingly, the town of Panmunjon, where the cease-fire treaty was signed in 1953, is right on the DMZ. Most of the valleys falling in the DMZ are cultivated, but agriculturists are allowed to work in their fields only during the day. Special permits are required to go to the border zone, with numerous checks by military personnel. As human movement is restricted and the military is under strict orders not to hunt animals, wildlife finds a safe haven in the DMZ.

On December 9, we went to the Cholwan area which is in the DMZ and is famous for bean geese and cranes. A few years ago, even the extremely rare Japanese crested ibis *Nipponia nippon* was photographed there. Geese and cranes are attracted to this undisturbed area to feed on fallen grains in the crop fields. According to Professor Won, 10,000 to 15,000 bean geese *Anser fabalis*, 250 red-crowned cranes (*Grus japonensis*) and up to 300 white-naped cranes (*G. vipio*) winter in this area. Professor Won found this rich area in the late 1970s and since that time

it has become a regular study site for his numerous students.

It was a very cold morning and after a comfortable 100 km ride in a bus from Seoul, we reached Cholwan at about 10.30 a.m. Professor Won and his students had already arranged our permits, so it did not take much time to pass through the various military checks. Interestingly, this is probably the only border area between two supposedly warring nations which is frequented by tourists. Even a curio shop and a restaurant are present right on the border. The restaurant is located on the third floor, with big glass windows, so tourists can literally 'look down' at North Korea.

According to Professor Won, till now 395 species of birds have been identified from South Korea. Two species – the pink-footed booby and the Siberian crane – were added to the list only this year. After the ICBP conference, we went to Pusan, the second most important town of South Korea. On the way we stopped many times for refreshments and quick bird watching, but except for the magpie *Pica pica*, carrion crow *Corvus corone*, rufous turtle-dove *Streptopelia orientalis* and tree sparrow *Passer montanus*, I did not see many birds. It was very cold (0° C) and most trees were bare and the ground snow-covered, so there was not much food for the birds. Professor Won invited me to come in spring and summer to enjoy the profusion of bird life in



Korea's most eminent ornithologist Won Pyong-Oh

his country.

Near Pusan we went to Nakdong estuary where 140 species of birds have been observed, including 96 species of waterfowl. This area is visited by most of the ducks, geese and shorebirds known to occur in South Korea. There were hundreds of common pochards *Aythya ferina*, European wigeons *Anas penelope* and spotbill ducks *An. poecilorhyncha*, sprinkled with mallards *An. platyrhynchos*, gadwalls *An. strepera*, little grebes *Podiceps ruficollis* and coots *Fulica atra*. New species for me were the whooper swan *Cygnus cygnus*, Golden-eye *Bucephala clangula*, smew *Mergus albellus*, black-tailed gull *Larus crassirostris* and grey starling *Sturnus cineraceus*. The next day we came again to Nakdong and I added the horned grebe *Podiceps auritus* to my life list.

Nakdong estuary and adjoining marshes are one of the most important wetlands in South Korea. Being close to the expanding city of Pusan (population 4 million), Nakdong has seen many changes in its hydrology and water quality due to dams, barrages, channels, pesticide pollution from nearby crop fields, and sewage disposal. Its importance as a waterfowl refuge has been recognised for a long time and the Office of Forestry (equivalent to our Forest Department) prohibited hunting on Nakdong River in 1962, while in 1966 the Office of Cultural Properties designated it as a natural monument for migratory birds. Presently, 9560 hectares are protected, but there is always pressure to reclaim some of the protected area for land development.

From Nakdong we went to Dongpan, Sannam and Chunam reservoirs to see the Baikal teal *Anas formosa*. This site now has the world's largest concentration of Baikal teal, holding up to 50 percent of the known population. Since 1987, about 20,000 birds have been noted in these reservoirs during winter. They use the reservoir for day roosting and fly to rice fields to feed on fallen grains. At the turn of the century, the Baikal teal was considered the most abundant duck in north-east

Asia in winter. As the bird is relatively tame, lives in huge monospecific flocks, and is regular in its movements, it was easy to shoot and trap. In south-western Japan in 1947, 3 trappers caught nearly 50,000 teals over the course of just 20 days. About 10,000 were caught in a single day! We were not fortunate to see such large flocks; only 500 to 1000 birds were present in Dongpan and Chunam reservoirs. However, there were 5000-6000 bean geese, and 100-150 whooper swans and whistling swans *Cygnus columbianus*. Among the geese was a lone swan goose *Anser cygnoides*, another rarity of South Korea and the world. My most memorable

sight was an incoming flock of about 1500 whitefronted geese *Anser albifrons*, a rarity in India but common in Korea, Japan, China and Russia. I have seen it only twice in Bharatpur, among flocks of greylag geese *Anser anser*. Interestingly, the greylag is a vagrant in Korea, and Professor Won fondly remembered his memorable sightings of hundreds of greylags in Bharatpur.

Korea, with its scenic beauty and rich cultural and historical heritage, is poetically called 'The Land of the Morning Calm'. Despite the bitter experience of

Japanese occupation for almost 45 years, 3 years of the savage Korean Wars and finally the partition of their country, the resilient Koreans have rebuilt their country from the ashes. They appear to have forgotten their past and to have forgiven their former enemies. Every new day begins with a morning calm. I wish I could say the same thing about the Indian subcontinent where we are digging up our medieval past, when we have so many problems of poverty, ignorance and environmental catastrophes. Whom will we blame when we enter the 21st century with the largest population of destitutes in the world and with a ravaged countryside? □

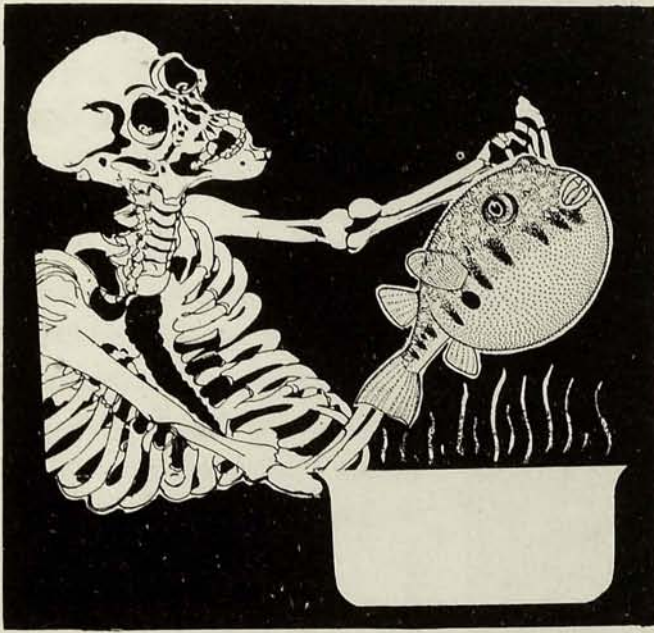
Professor Won lost track of his ornithologist father till he captured a bird with his father's bird ring on it. This winged messenger was the first indication that his father had survived the war.

Asad R. Rahmani is Chairman of the Centre for Wildlife and Ornithology, Allgarh Muslim University and is currently leading a joint project between AMU and BNHS on the ecology of Indian grasslands.

SEASHORE LORE

15 — Poison in the pot

Beefsea



Many of the fishes caught in the sea are not seen in fish markets. One kind that you will never see in Indian markets is the puffer fish or globe fish. It is not that they are rare; when they come into fishermen's nets, they are thrown back into the sea.

The puffer fish has a globular body without scales. When harassed or threatened, it literally puffs up by gulping water which is retained in an offshoot of the stomach. The blown-up body will remain distended for some time, during which the fish floats upside-down on the water surface. When thrown ashore, it swallows air instead of water, accompanied by a noisy grinding of the teeth.

The reason why you will not see puffer fish in our markets is because of their deadly poison. The flesh can be eaten, but their skin, liver, roe and gut contain a very potent poison. Death may occur in a few hours, and there are no antidotes. Soon after eating, there is a tingling sensation in the lips and tongue, developing into a numbing of the extremities and then of the whole body. This is accompanied by lowered body temperature, profuse sweating and saliva flow, low blood pressure, headache, extreme weakness, nausea and anxiety. Vomiting, severe stomach ache and diarrhoea follow. After some time, the breathing becomes shallow and rapid, the lips and fingertips turn blue, muscular twitching, trembling, slurring of speech and respiratory

*These ye shall eat of all that are in the waters;
All that have fins and scales shall ye eat;
And whatsoever hath no fins and scales
ye may not eat;
It is unclean unto you.*

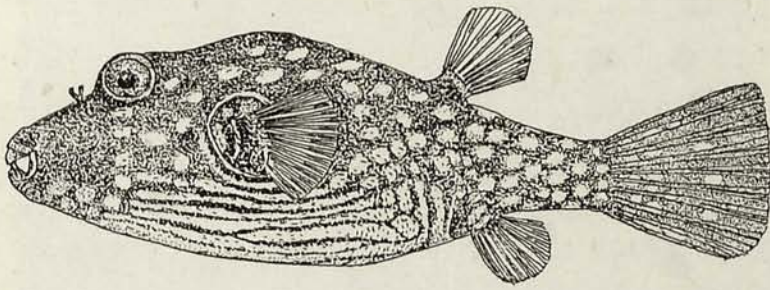
Deuteronomy 14:9-10

paralysis set in, the last resulting in death in six to twenty-four hours.

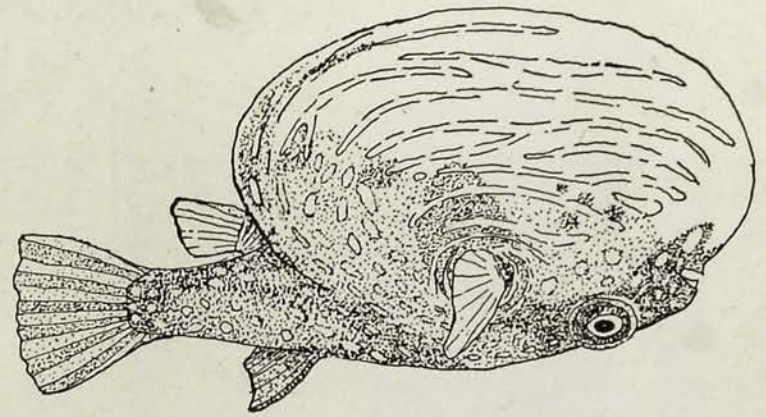
The poison is called tetrodotoxin, from the scientific name of the puffer fish (*Tetrodon* or *Tetraodon*, meaning four teeth). By a rare coincidence, the same poison is also found in the eggs and embryos of the California newt (*Taricha torosa*).

Surprisingly, the Japanese eat puffer fish, which they call "*fugu*" and consider an epicure's delight. In Japan there are catering colleges where chefs are trained to dress *fugu* carefully so that not even a trace of the poisonous parts of the fish's body gets into the dish. Only after passing a tough examination and earning a diploma can a chef prepare *fugu* in specially licensed restaurants. The only way to inactivate the poison is to cook puffer fish in a strong solution of baking soda, but then the flavour of the fish is destroyed and the fish is hardly worth eating.

Why do the Japanese hold the puffer fish in such high esteem? Perhaps because of the state of exhilaration akin to imbibing alcohol, composed of a sensation of warmth, flushing of the skin and a feeling of euphoria, which are the mild effects of the small amount of poison still remaining after preparation. A Japanese sage, Hosetsu Namba, aptly said over a hundred years ago: "Although there are many occupations in the world, some people engage in stealing instead of entering one of them. Although there are many women in the world, there are some men who become adulterers instead of marrying them. Although there are many kinds of food in the world, some people like to eat



Puffer fish (normal appearance)



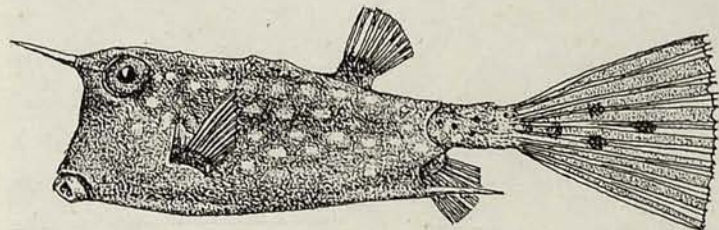
Puffer fish which has swallowed water or air and puffed up.

poisonous *fugu* instead. These three groups of people make up an extremely stupid trio.”

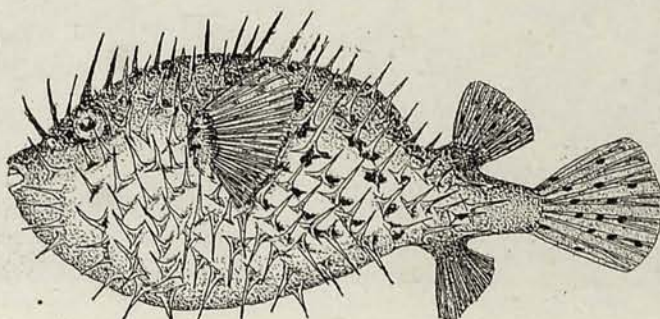
Closely related to puffer fishes is the spiny puffer fish or burr fish (*Diodon hystrix*). Its body is beset with many spines. These normally lie flat against the body, but when the fish puffs up its body, the spines are erected, posing a formidable deterrent to its enemy. In the far east, burr fishes are blown up and dried, and a candle is placed inside so that they serve as lanterns.

Distant cousins of the puffer fish are the sharpnosed puffer fish or toby (*Canthigaster*) and the box fish. In the latter, the body is encased in a hard bony armour, with holes only for the mouth, fins and tail. One kind of box fish has two spines on its head, and is aptly called the cow fish (*Ostracion cornutus*).

In the tropics, and especially in coral reefs, there are many fishes which are edible. However, in some places or at some times, these become poisonous to eat. This kind of poisoning is called ciguatera, derived from a Spanish word. Fishes may be safe to



Cow fish



Porcupine fish or burr fish

eat on one side of an island, but are poisonous just half a kilometre away on the other side. Or fishes on an island which have been eaten over many years may suddenly become poisonous to eat.

Ciguatera poisoning should be distinguished from ptomaine poisoning, which is caused by eating stale (spoiled) fish that has been tainted with bacteria. Almost every fish-eater has, at some time or the other, suffered from this. Ciguatera-causing fishes will affect humans and other mammals even when they are fresh. It is believed that such fishes accumulate this poison, called ciguatoxin, in their bodies after grazing on certain kinds of algae or seaweeds. Freshwater fishes do not cause ciguatera. The fish does not suffer any ill effects. It may be eaten by another fish, such as snapper, grouper, barracuda or moray eel. These too will not suffer illness, but the poison from their prey will accumulate in their bodies. Such large predatory fishes are especially dangerous to eat. Islanders readily eat small barracudas but will shun a large one. There is no test to determine if a fish will cause ciguatera except to observe its effects on other creatures.

A person suffering from ciguatera will experience a sudden onset of stomach ache, dryness of mouth and metallic taste, nausea, vomiting, abdominal cramps and liquid motions. There is also body ache, a feeling of exhaustion and extreme weakness; the victim is unable to walk. The teeth feel loose and painful in their sockets. In severe cases, there may be a loss of hair and nails. Some twelve out of a hundred affected people may die. But the classic symptom of ciguatera poisoning is a reversal of the feeling of heat and cold. Thus a victim may complain that icecream is burning his tongue or that a cold shower bath is scalding his skin! □

THE GUESTS OF A JHEEL VILLAGE

Jugal Kishor Tiwari

We were wading in knee-deep water, and underfoot it was very tricky, with thorns, pits, slippery clay and dry stumps. Saving our heads from the formidable thorns of mesquite *Prosopis chilensis*, we were progressing towards a heronry to observe the first reported breeding colony of the glossy ibis in Gujarat. In India, the glossy ibis has previously been known to breed in Assam, Manipur, Oudh (Uttar Pradesh) and Orissa. But all these are old records and for a long time no new reports of the nesting of the glossy ibis had come in. The glossy ibis is also known to breed in Sind.

How I came to know about the glossy ibis heronry is interesting and worth mentioning. Fulay village is on the edge of the Banni Grassland in Kutch district, Gujarat, where I am working presently in the grassland project of the BNHS. It happened when we were following the Caspian terns, which were carrying fish in their bills and always flew in the same direction. These terns were catching fish from the nearby wetland of Chhari-Dhand and were flying towards Luna village in the Great Rann of Kutch.

While searching for the possible nesting colony of the Caspian terns near the Great Rann, we were informed about this heronry.

Along with Muhammad, a local assistant on the grassland project, I visited Luna on the 30th of September, 1992. We took a bus from Nakhtrana to Hajipir, the famous place of pilgrimage, then we walked about five kilometres to reach Luna. On our way, the rain quails were calling. Several males were vocalising, hidden behind the grass tussocks. The air was full of resonating double "which-which" whistle calls, that ended loudly from soft beginnings.

Luna is called a jheel-village in local parlance. Due to its low-lying position, Luna, like many other villages in the Banni Grassland, remains inundated for about four to five months of the year. Such jheel-villages are vacated during the rains. Under such watery conditions, reeds and coarse grasses grow and water-lilies sprout. Aquatic life is rich here. Absence of human activity, remoteness of the area, ample food and the trees standing one to



Glossy ibis in silhouette at the Luna heronry



The author braves his way to the heronry

two metres deep in water, are all favourable factors for the heronry birds to nest. The nesting trees at the Luna heronry are mostly the mesquite, which has spread to weed-like proportions in the Banni Grassland. Other trees utilised for nesting are a few khezri *Prosopis cineraria* and desi babool *Acacia nilotica* trees, but these uncommon trees are heavily chopped by graziers to feed their ever-hungry eating machines, the sheep, especially during the drought.

The Luna jheel is packed with mesquite. This exotic plant was introduced into Kutch to check the ingress of the Ranns. How useful this species was in the control of the expanse of the Ranns is still not clear, but it has certainly invaded the better portions of the once-verdant Banni Grassland. This alien plant forms avenues in many places at the Luna jheel.

Protecting my camera and binoculars, accompanied by Muhammad and a local man Jacob Jeeja, I was wading in waist-deep water. Jacob's dog also followed us into the water, but as the water depth increased, the dog left us midway. We were now encountering several cattle egrets, little cormorants, night herons and their nests. Jacob said the heronry was still far off and we had reached only half-way. We had to wade through the water for about twenty minutes to reach our destination. I half-jokingly asked my companions if they knew how to

swim. Fortunately, we had Jacob as our guide, for without him it would have certainly been suicidal in the unknown waters of Luna jheel. Protecting our heads from the thorns above and with our feet in the water, we were moving carefully. I fell once, but managed to save my camera.

One, two, five, then a huge flock of glossy ibis flew across us. I was told by the villagers that the *kala kanera* (the local name for glossy ibis) nests in the Luna jheel regularly after a good monsoon. According to the Jeeja pastoral community living in Luna, these waterbirds have been nesting here for as long as fifty years. Before the mesquite made its appearance in Kutch, the nesting trees for the heronry birds were the desi babool and khezri, which have now almost disappeared from the nesting site.

We were now close to the heronry, for the commotion in the air was growing and as we approached closer my anxiety was also increasing. I was now right in front of the heronry. Several nests of the glossy ibis were in front of me, along with seven other species of water birds. The sight of this huge heronry, about 3650 nests of a total of 8 species and about 6875 nestlings, was an unforgettable experience. The heronry was spread over 2500 sq. m. and seems to be the largest heronry so far reported in Kutch district. We were

as if in a huge carnival of birds, or more precisely in a rural primary school where the teacher is out of the class room and the rambunctious children are having a field day.

I counted about 250 nests of the glossy ibis at Luna, and about 500 nestlings in different stages of development. The birds were very alarmed by our presence, so we did not attempt to measure the clutch size in the nests where incubation was still in progress. The young of the glossy ibis have a brownish black bill, the very characteristic broad blackish band in the middle of the bill and one black band on the tip. On my approaching close to the nests, the young started regurgitating food and became very restless.

Life comes back to Luna in September, when the graziers return with their cattle. However, water still remains at the door of their makeshift houses, called *bhongas*. For about three months, fish is abundant in the water. Most of the nesting birds have grown-up young in the nest at this time. The Jeejas also have fish daily in their diet for about three months. Fish is caught in their locally made gill-nets.

On my next visit to the Luna heronry, I was recording bird calls. Jacob was with me and I heard someone clapping. Many birds flew up from their nests. It was a Jeeja from the Luna village. He said that he was scaring away crows which were trying to prey on the nests. I was very happy to note the

villager's concern but explained to him that he was probably doing more harm unknowingly to the nesting birds, as on hearing the sudden sound, the young birds might start, fall into the water and drown.

Strict protection is given to the heronry by the Luna villagers. They consider the huge nest site of the waterbirds as the pride of their village. Jacob Jeeja complained about the Jaths of Bhitara, a neighbouring village, who had earlier taken the young birds from the nest for the pot, but were now not allowed to do so by the Jeejas.

It was after sunset when I returned from the heronry. After spending about four hours in the water, my skin had developed rashes. I washed myself with fresh water. At dinner, I was served fish caught in Luna jheel. Till midnight I was encircled by the inquisitive locals, gossiping (in the Kutchi language such gossip parties are called *riyans*). I spent the latter half of the night in the company of mosquitoes as the water collected near my resting place was a good breeding ground for the blood-thirsty dipterans.

The next morning after tea with the Jeejas, I returned to my field station at Fulay-Chhari to resume my research on the grasslands. □

Jugal Kishor Tiwari is a field biologist at the BNHS. He has worked in the Bird Migration Project and is presently working in the Society's Grassland Project at Banni, Rajasthan.



The landscape at Luna jheel turns bleak after the nesting birds depart

THE BIOLOGY AND ECOLOGY OF THE NARCONDAM HORNBILL

S.A. Hussain

This article is extracted from a paper by S.A. Hussain which appeared in the Journal of the Bombay Natural History Society (1984), Volume 81(1), 1-18.

Narcondam island (13°30' N; 94°38' E) is situated *c.* 500 km NW off Mergui archipelago and *c.* 300 km SW of the Gulf of Martaban off the Burmese mainland, and *c.* 125 km east of North Andaman in the Andaman and Nicobar group of islands in the Bay of Bengal. The island has a total area of about 682 hectares and is a part of a submerged chain of mountains in the Andaman archipelago. Narcondam is one of the two off-lying volcanic islands in the eastern sector of the group. It rises abruptly from the sea to a height of *c.* 750 m sloping west-eastwards with a succession of steep spurs emanating from the main summit which is situated on the western portion of the island. The very mountainous nature of the island (there is virtually no continental shelf around the island) provides no landing place except for a small boulder-strewn bay on the southern side, which also provides the only small flat bit of ground for camping. A small spring in the bed of a dry nallah about 25 m above sea level is the only fresh water source in the island known so far.

The highest count of Narcondam hornbills in one day was 72 males and 28 females. These numbers include a point count made on a feeding tree where the hornbills were mobbing a white-bellied sea eagle. My one month long stay in the island gave me the impression that there are more than 200 birds in the island. All the earlier visitors landed there in the months of March-April which happens to be the breeding period when most of the females would have been confined to nest-holes.

The apparent (?) absence of large predators in the island (including until recently, man), abundance

of food resources with perhaps some degree of competition for resources from other frugivores in the island such as the green imperial pigeon (*Ducula aenea*), pied imperial pigeon (*D. bicolor*) and the giant fruit bat, provides an ideal ecological niche for the successful survival of a species like the hornbill. This is borne out by the fact that Narcondam hornbills raise two chicks while most other larger species of *Rhyticeros* are able to raise only one chick. Competition for nesting sites during the breeding season may restrict the actual breeding success as the hornbills do not excavate nest holes. The severe cyclonic storms that lash these islands destroy a great number of older nesting trees, even causing mortality of brooding females/chicks confined in nest-holes. The competition for nesting sites may actually be acute in the island, as evidenced by the fact that two of the nests studied were as low as 2.5 to 2.7 m from the ground.

Where does the Narcondam hornbill stand under the present ecological conditions? It is definitely not facing the danger of extinction as yet but it is vulnerable. Even if one were to make a liberal estimate of the total population of the hornbills to be about 400 it will be perhaps too small a number to cope with ecological disasters like an outbreak of an epidemic or an extensive destruction of habitat. What, then, could be the strategy to ensure the safety of this unique species?

First of all, a complete ecological study of the hornbill is necessary to understand its status. Conservation measures based on such a study will be one of the answers to the question. Captive breeding, which has been successfully carried out with several endangered bird and animal species elsewhere, is a tempting prospect. However, it may not be necessary in the case of the Narcondam hornbill. On the contrary, it would be much better to find out other islands within the Andaman group having similar ecological structure and introduce the birds there. There are



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about 300 islands in the Andaman group of which about 60% are uninhabited. In the north Andaman group, which are close to Narcondam, there are several off-lying islands like Landfall, East, Interview and Barren having close affinities with the ecological conditions in Narcondam. A third alternative is to

provide suitable artificial nesting sites in the island itself. □

S.A. Hussain worked as a scientist at BNHS for many years. He is currently Assistant Director, Asian Wetland Bureau, Kuala Lumpur, Malaysia.

Editor's note: *The Narcondam hornbill poses many conundrums. Why is it restricted only to Narcondam island when there are other similar islands nearby without any hornbills? Is the small size of the Narcondam hornbill, relative to the other species in its group, related to the fact that it inhabits a small island of only 682 ha.? There has been no follow-up after Hussain's 1984 study. We hope someone will take up the challenge.*

MORE ABOUT HORNBILLS

What could be more breath-taking than a party of large black, white and yellow hornbills, in single file, gliding in over the canopy to roost? The air is still, the forest thick and dark below, and the giant-beaked birds clamber in the trees to settle for the night. These are great Indian hornbills and the place is Magod in North Kanara, Karnataka, a forest which is also home to two other species of these beautiful creatures — the lesser pied hornbill and the Malabar grey hornbill. Personality-wise my favourites were the grey hornbills who would cluster about cackling insanely, diving through the trees with their bewitching laughter. Hornbills are found only in the Old World. Ecologically, they are the Old World equivalent of the New World toucans and inhabit both forests and savannas.

In Africa, there are three distinct groups of hornbills. There are the large ground hornbills which spend more than 70% of their time feeding and walking on the ground, and have been known to walk distances up to 11 km. These are largely carnivorous. Then there is a smaller African group which is semi-arboreal and semi-carnivorous and inhabits more open woodland areas, and finally the large arboreal hornbills which predominantly inhabit thick rain forests and feed largely on fruit. The African ground hornbills and the semi-arboreal types have been observed following baboons and army ant columns for the insects they flush while foraging. They also keep track of grass fires in the savannas and prey upon creatures fleeing the blaze. Some hornbills are known to chase eagles to steal away their prey and even scavenge from the nests of raptors.

Except for Africa, hornbills found elsewhere are primarily arboreal though they may come to the ground to feed on winged termites and such other juicy feasts. They are mainly fruit eaters though they will consume animals such as insects, lizards, and even small mammals especially when rearing their young.

The massive structures above the bills of hornbills are called casques. They are usually hollow or filled with a spongy material full of air spaces to make them light. The only hornbill species with a solid casque is the helmeted hornbill of the lowland rain forests of south-east Asia. Its casque produces hornbill ivory which was considered by

the ancient Chinese to be more valuable than either elephant ivory, gold or jade. Consequently, the helmeted hornbill has suffered the evils of ivory poaching. Interestingly, in real life, the casque of the helmeted hornbill is bright red in colour because of a pigment which it smears on itself from a gland above the base of its tail.

The larger hornbills are usually monogamous and are supposed to mate for life. This is why in many south-east Asian and African tribal cultures, the hornbill is considered to be a symbol of marital fidelity, and many tribal peoples have specific taboos against eating hornbills. Except for the African ground hornbills which do not seal up their nests leaving slit-like apertures, all other hornbills have the unique nesting habit described in R. Kannan's lead story. Some of the smaller hornbills are cooperative breeders and non-breeding adults help the mated pair to rear the offspring in the nest.

There are twenty-four species and fifty-two taxa of Asian hornbills (a taxon consists of either a species or a subspecies, e.g., a species with 4 subspecies would constitute 4 taxa, a species with no subspecies would constitute a single taxon). An IUCN report (1992) states that 44 of these 52, i.e. 85%, are either critical (5 taxa), endangered (15 taxa) or vulnerable (24 taxa). Only 8 taxa are considered safe. The status "critical, endangered or vulnerable" is given to a taxon based on the criteria developed by conservation biologists Georgina Mace and Russell Lande (see News, Notes and Comments for more explanation). The most endangered Asian hornbill is considered to be the Sumba hornbill of Sumba Island in the Philippines. Its population is estimated at less than 250. Of the 9 species of hornbills occurring in India, only 2 are safe, considering their world distribution, 4 are endangered and 3 are vulnerable. Included in the endangered category is the Narcondam hornbill.

Hornbills need help. Now a student from the Salim Ali School of Ecology at Pondicherry also plans to study the Malabar grey hornbill in the Annamalais. Research and conservation action must move quickly together to save the hornbills and their habitat.

RENEE BORGES

WILLIAM

THE MASCOT OF THE BOMBAY NATURAL HISTORY SOCIETY

William's profile symbolises the Bombay Natural History Society. Little did H. Ingle of Karwar know, that when in 1884 he gave a young four-month old male great Indian hornbill to the BNHS, the bird would live on for 26 years, dearly loved, and would become the Society's mascot. He was christened William because of his enormous bill and his brilliant yellow beak earned for him the sobriquet of "Office Canary"! William would spend much of the morning painting his beak, casque, neck and wings carefully with the oily yellow secretion from his vanity box, his tail gland. He finished this daily ritual with a dash of colour carefully placed on each wing. He would then settle down to a meal of fruit — plantains swallowed whole, and wild figs — but he preferred live lizards, mice, scorpions, snails, beetles, centipedes and pieces of raw meat. He was a playful fellow and never tired of catching tennis balls in his beak even when thrown from distances of 30 feet. William came to the Society only a year after it was formed. At that time the Society was housed in the offices of Phipson & Co., wine merchants in Bombay. William lived as pet and mascot in a caged enclosure. He loved to bemuse visitors with his antics and came to be

synonymous with the Bombay Natural History Society. H.M. Phipson has been called the Father of the BNHS because he nurtured it in the early stages, first at Forbes Street and then at Apollo Street in Bombay, until the onset of Prohibition when the

flourishing wine business closed down. Although the valuable natural history collections of the BNHS were temporarily shifted to the Prince of Wales Museum, the office and library had no place to go. Generous grants from the Government of Maharashtra and the then Union Ministry of Scientific Research made possible the construction of an independent building for BNHS to house even the natural history collections. Hornbill House (named after William) was formally opened by M C Chagla, Union Minister for Education, on the 13th of March, 1965. And so, the memory of that great bird William lives on. He is fittingly honoured in a case in the Bird gallery in the Prince of Wales Museum which shows the curious nesting habits of

the great Indian hornbill. William is here given the role of paterfamilias, a privilege he did not in life enjoy, and is seen feeding his imprisoned spouse through the narrow slit in the wall which the birds build to close the entrance to the nest hole. □



E. COMBER

CONSERVATION NOTES

Status of the Great Indian Bustard in India

The great Indian bustard *Ardeotis nigriceps* is one of the rarest bustards of the world. It was once fairly common in the short grass plains all over India, but by 1980 it survived only in six states of India. Surveys conducted by the Bombay Natural History Society in the mid 1980s put the estimated population between 500-1500 with half the population surviving in Rajasthan alone (see next page). Most of the data on bustards was collected by Dr. Asad R. Rahmani and his team during the BNHS Endangered Species Project on bustards. At present, BNHS has a project on the ecology of the grasslands of the plains which monitors the grassland fauna including the populations of the great Indian bustard.

Decline in Great Indian Bustard population in Madhya Pradesh

The great Indian bustard faces a bleak future in Madhya Pradesh, mainly due to management problems. From around 50 bustards recorded in the mid 1980s from four protected areas, the population may have dropped to less than 10 in 1993, according to Dr. Rahmani.

Degradation of breeding areas, habitat alterations or disturbance caused by human beings and livestock are the predominant reasons for the decline in the bustard population of

Karera and Ghatigaon. Unrestricted movement of people and livestock through bustard breeding plots identified by BNHS scientists has resulted in breeding failures. With the possible exception of Turkani in Karera the other areas received inadequate protection. Earlier, BNHS had made a recommendation that an area of 10 sq. km out of the 202 sq. km Karera Sanctuary should be made out of bounds for people and cattle during the breeding season. Protecting only adult birds and ignoring the breeding habitat has resulted in this conservation disaster.

Although all bustard areas in our country are inhabited by human populations and the grasslands suffer from livestock overgrazing, these problems are particularly acute in Madhya Pradesh. Precious little is being done to mitigate these and other threats to the areas in the form of construction of canals (Karera and Ghatigaon), railway lines (Ghatigaon) or gas pipelines (Pohri). It has been reported that vehicle-borne poachers have again started appearing in Karera and Ghatigaon mainly to shoot blackbuck and chinkara, but there is no evidence that they will spare the bustard. The blackbuck population of Karera has gone up from about 80 in 1981-82 to 1000 in 1990-91. Increasing crop damage by blackbucks has created resentment among local villagers against the Sanctuary and the Forest Department. Unless a way is found to reduce the artificially protected ungulate population in bustard areas, it will be difficult to convince the locals of the need to conserve the birds.

We may still save the bustard from extinction in Madhya Pradesh. In fact, if the following recommendations are adopted, the bustard should have a bright future in the state.

At **Karera**, a contiguous core area in Turkani, Baigawan and Karrawa area should be developed, if necessary, by acquiring land in continuous stretches of at least 300 ha each. Poaching should be strictly controlled. The proposed canal should be diverted to avoid the Turkani and Karrawa areas.



RAVI SANKARAN

Status of the Great Indian Bustard in India

State & Site	Status of protection	Population	
		Number	Status
Andhra Pradesh Rollapadu-Banaganpalle	Fair	50-70	Stabilised
Gujarat Kowdani Narayan Sarovar	Bad	5-10 ?	Protected area denotified
Maharashtra Great Indian Bustard Sanctuary Nannaj, Karamala etc.	Fair	80-100	Seems stabilised
Madhya Pradesh	Very Bad	(see below)	
Karnataka Ranebennur, Guttal, Bagalkot	Fair	20-30	Current status unknown
Rajasthan Desert National Park	Fair	300-400	Threatened by the Indira Gandhi Canal Project.

Status of Great Indian Bustard populations in Madhya Pradesh

Areas	Past numbers	Present numbers
Karera	20-25 (1983-87)	4-5 (1993)
Ghatigaon	12-15 (1983-85)	3-5 (1993)
Pohri	10-15 (1983-84)	> 5 (1993)
Panna	5-10 (1988)	Unknown

At **Ghatigaon**, there should be no grazing in the bustard breeding season (March to July) and excessive vegetation should be removed from the area. The proposed railway line should be realigned to avoid the area. Hanuman Danda should be developed as a core area. Flat grasslands near Tigra reservoir should be included in the Sanctuary as bustards are seen there. The proposed safari park and zoo project near Tigra dam should exclude this area.

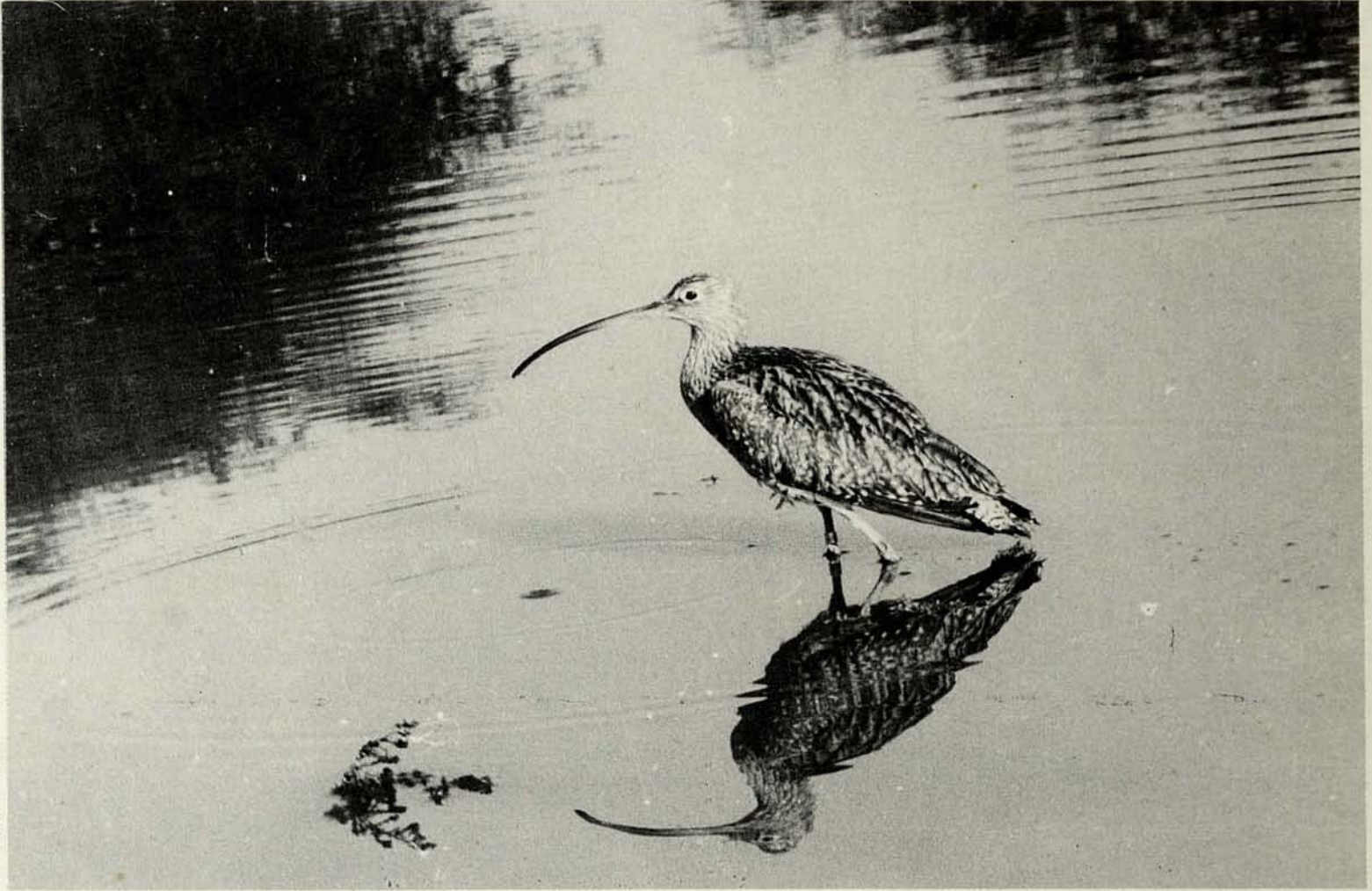
Pohri should be declared a bustard sanctuary with two or three core areas of 200 to 400 ha. Livestock grazing should be regulated and no

grazing should be allowed in the core areas between March and July. Available funds should be utilised only for conservation and eco-development projects. Staff should be trained and posted in Dularo, Muraro and Uncha Barod areas of Pohri.

Potential new areas for bustards such as the Gunnar-Peddu area near Panna and another site between Guna and Shivpuri need special attention.

Compiled by Goutam Narayan, Conservation Officer, BNHS.

NATURE ALIVE



MEHBOOB ALAM

Mehboob Alam is probably the first among the Mir Shikars to have captured this curlew with a camera. Mir Shikars, along with the Sahanis, have been the traditional bird trappers of Bihar. They have formed the backbone of the Society's Bird Migration Project and other projects which involved trapping of birds for ringing and colour banding. The art of bird trapping has been handed down amongst them from generation to generation.

Mehboob's father, Ali Hussain, has been working for the BNHS since the inception of the Bird Migration Project. Ali Hussain is probably one of the last of the great Mir Shikars. Their traditional occupation is now dying out slowly, with most of the professional trappers turning to other means of livelihood, which is a good sign as far as the conservation of wildfowl is concerned. Mehboob Alam drives the Society's project vehicles in the field.

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The Bombay Natural History Society was formed 109 years ago, as a forum for exchanging information on natural history. Over the years, it has helped to shape the course of wildlife conservation in India. Its members and scientists have helped document India's diversity of wildlife; BNHS studies on little-known and highly endangered species have provided the basis for many conservation projects, and indeed for the establishment of some of India's best known sanctuaries and national parks.



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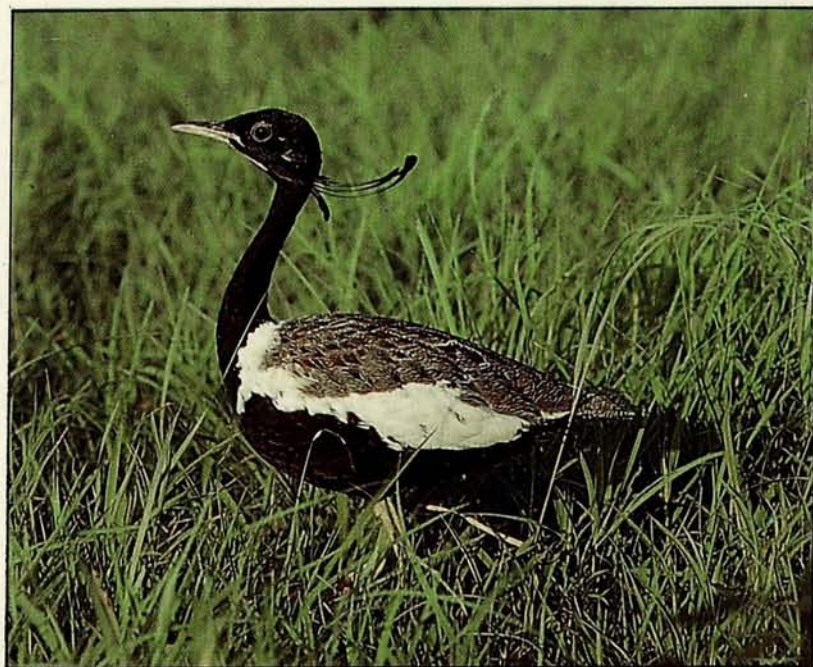
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Today, the BNHS is Asia's premier conservation organisation, with members in over thirty countries and an international reputation as an authority on Indian wildlife.

The Society's work is not restricted to wildlife research. Its publications wing has produced a series of books on natural history, many of which are standard works of reference. It runs a nature education programme of over fifty years' standing, propagating conservation through film shows, lectures and nature camps for students, biology teachers and the Society's members.

BNHS members enjoy a range of activities — film shows and lectures on natural history, regular weekend bird-watching trips, and the opportunity to participate in environmental conservation campaigns, and even field studies in wildlife sanctuaries and national parks.



The lesser florican is one of the world's most endangered birds. BNHS studies have focused on the critical factors involved in the conservation of such species.

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