

Nepal fauna and flora : comments on present status

by Robert L. Fleming, Jr., Khatmandu, Nepal

Nepal encloses the Central Himalaya and a strip of the Ganges Plain. Its approximate 54,000 square miles may be divided into the following ecological belts: 1) Tarai, 2) Bhabar, 3) Churia, 4) Duns, 5) Mahabharat Lekh, 6) Middle Hills, 7) Coniferous-Ericaceous zone, 8) Himalayan zone and 9) North-Himalayan Desert. The present status of Nepal's flora and fauna varies considerably depending upon which zone is examined.

The *Tarai*, ranging from 100 to 200 meters elevation, is a strip south of and parallel to the Himalaya. Here the fertile alluvium and the nearly level topography form the best agricultural lands outside the Kathmandu Valley. Originally the Tarai was covered extensively with tall grasses (in damp depressions) and broad-leaved trees. This was the habitat of the pink-headed duck, *Rhodonessa caryophyllacea*, and the pigmy hog, *Sus salvanius*, both now probably extinct.

In 1969 the eastern half of the Tarai was almost entirely under cultivation, but to the west considerable forest remained. It is inevitable, and I feel rightly so, that eventually most of the Nepal Tarai will be used for food production. Officials, on the other hand, have long had an appreciation for game mammals and this has resulted in the formation of the Kanchanpur Sanctuary in far western Nepal. We first visited this area in 1952 and were amazed at the number of ungulates and tiger. Recent reports are still favorable (see G. Caughley, 1969, Surveys and Demonstration for the Management and Development of Trisuli Watershed: Wildlife and Recreation, UNDP and HMG, Kathmandu). If this Sanctuary can be developed and managed properly, it could preserve a section of the famous Tarai and also be of great economic advantage to Nepal, for visitors will be able to reach the Sanctuary easily from an airstrip already partly constructed nearby.

The *Bhabar*, although ecologically distinct, has often been linked with the Tarai; many Nepalese call it the *Charkosijhari*. Bhabar soil is not very fertile; large stones and pebbles are conspicuous. Outside the monsoon season, virtually no surface water is available, for foothill streams disappear underground only to reappear in the Tarai. Obviously the Bhabar is not suitable for intensive agriculture and may be used best for forest crops. The extensive Bhabar forests of the present day are largely stands of Sal, *Shorea*, in which vertebrate populations are relatively low, due in part to the homogeneity of the habitat and also to the lack of suitable water.

The outer and lowest range of the Himalaya, the *Churia* (Siwaliks), is forested with tropical and subtropical trees. In the humid micro-climates of the gullies one often finds wild bananas and numerous climbers. The soil composition of the Churia is unstable, erosion rapid, and ridge crests very sharp. Accessibility is a major problem facing any extensive forest utilization program in the Churias. Several mammals in Nepal, including the gaur, *Bos gaurus*, are found primarily in the Churia.

In places, the Churia Hills do not abut directly against the next mountain range so that *Dun* Valleys are formed between them. The Chitwan Dun is the largest in Nepal and owing to a virulent form of malaria, was virtually uninhabited until about fifteen years ago. Now that malaria has been controlled, nearly half the Dun has been settled.

Much forest still remains in the Dun and here the Mahendra National Park and a Rhino Sanctuary have been established. The rhino, *Rhinoceros unicornis*, in Nepal however, appears to be in serious trouble not so much from poaching (200 armed guards are maintained by the government), but from the devastating forces of habitat reduction and competition with domestic

livestock, especially water buffaloes. Although forest-related species are still prevalent in the Dun, those animals and plants adapted to the tall grass and marsh conditions once so wide-spread in the Ganges Plain, are definitely threatened.

The *Mahabharat Lekh*, an outer range of the Himalaya, reaches altitudes of up to 3,000 m. Slopes between 500 and 1,000 m. elevation are often covered with dense subtropical forests of mixed species, while slopes between 1,000 and 2,000 m. are likely to be so steep that there is little room for forest growth or agricultural activity. Ridge crests above 2,500 m. usually are covered with heavily-lopped oaks.

The *Middle Hills* is a broad term encompassing the mountain country between the Mahabharat Lekh and the main Himalayan ranges. Altitudes vary from about 750 m. in the valleys up to about 3,000 m. on the ridges. Except for far western Nepal, the forests of this region are nearly universally devastated. One sees scattered villages and whole slopes covered with laboriously constructed terraces. Remnant forests, such as the Srinagar Ban just north of Tansen, Palpa, have disappeared within the last fifteen years and new terraces are being carved continuously. Much of the soil in these hills is marginal, at best, and after a few years good yields are hard to secure. A certain erosion rate is expected in young mountains but in the Middle Hills much top soil is carried off after each heavy rain and erosion is rampant. Concurrently the siltation rate of rivers, especially the Kosi in Eastern Nepal, is high. Eventually it would seem that much land now under cultivation should be turned into soil stabilizing forest cover or horticultural activities. As expected, species associated with the middle-altitude forests such as the Nepal kalij, *Lophura l. leucomelana*, and the spotted scops owl, *Otus spilocephalus*, have become quite rare over much of Nepal.

Above 3,000 m. on the flanks of the main Himalayan peaks there is a belt that might be termed the Himalayan *Coniferous-Ericaceous* zone. Here the forests are relatively dense throughout Nepal with conifers predominating in the west, ericaceous species in the east. At 3,500 m. in Central Nepal, firs, *Abies*, dominate with a dense *Rhododendron* and bamboo, *Arundinaria*, understorey. Mammals such as the serow, *Capricornis sumatraensis*, and the red panda, *Ailurus fulgens*, are relatively common here but remain well hidden.

Above the treeline some mountain faces are too steep for much plant growth; others are covered with grasses, sedges and herbaceous plants. Scattered *Juniperus* reach about 5,000 m. Accessible valleys are grazed heavily during the summer months but most high altitude species such as the snow cocks, *Tetraogallus tibetanus* and *T. himalayensis*, and snow partridges, *Lerwa lerwa*, seem not to be affected greatly by man's activities. Large mammals, as usual, are the most threatened.

Nepal also includes within its diverse habitats part of the desert or semi-desert country to the north of the main Himalayan range. Here, in north Thakkhola and Mustang, one may find grasses and sedges with procumbent bushes such as *Caragana* present below 5,000 m. Trees are virtually non-existent. The position of large mammals again appears precarious in these regions. We have talked with *shikaris* who recall seeing herds of up to 50 blue sheep, *Pseudois nayaur*, as late as the forties; six years ago we saw only a few groups of half-dozen or less. Now, we understand, blue sheep are hard to find. What natural vegetation there is, however, appears fairly secure as do the desert species of birds and other animals.

Great Britain: plant-a-tree-day

The first week-end in November is "plant-a-tree-day" in Great Britain this year. Thousands of motorists will drive into the countryside to plant more than 11,000 trees. The Automobile Association have organised the scheme, under the sponsorship of H.R.H. Prince Philip, whereby members have been invited to plant one or more trees, at £1 a time, in one of 35 counties. Certain authorities have become concerned at the wholesale destruction of trees and hedges in some parts of Britain in the name of land consolidation. The above scheme is one of several which are attempting to brake the escalation.

Whilst appreciating the sheer economics of a faster and higher output from a large, easily cultivated and harvested field, it is nevertheless sadly true that a tree-less Britain means a Britain devoid of wildlife. As a compromise, the Natural Environment Research Council of Great Britain is attempting to persuade farmers to 'cut their corners' when cultivating, spraying and harvesting so that the untouched areas can be left to trees and shrubs. Whilst much agricultural engineering research is geared to maximum utilisation of the land, including minimising the 'turning circle' of agricultural equipment, and whilst farming has largely become an exercise in economics, most farmers are still sufficiently countrymen to be willing to sacrifice those few extra pounds squeezed from the last square inches of land for the sake of a healthy faunal population.

Natal: Zoos Control Ordinance, 1969

A new ordinance about to become law in the Province of Natal, South Africa, provides for the preservation of certain mammals threatened with extinction, the protection of wild mammals kept in captivity and the regulation and control of the keeping of wild mammals for display to the general public in zoological gardens.

No mammals listed in IUCN's *Red Data Book* may henceforth be purchased, sold, possessed or handled by anyone in the Province, apart from the Natal Parks, Game and Fish Preservation Board. In addition, permits will be required for the possession of any wild mammal or exotic wild mammal and for the sale, purchase or exchange of such animals.

Prior approval of the provincial Administration must be sought and a licence received before any zoo can be established or maintained. This licence is subject to annual renewal. The Administrator reserves the right to confiscate any wild mammals or exotic wild mammals if the Ordinance has been contravened and can impose fines ranging from R 50-200 (\$ 70-280).

Philippines: more tamaraw news

Professor Harrison reported to the recent meeting of the IUCN Survival Service Commission that President Marcos had extended the Mount Iglit Sanctuary for the tamaraw by a further 8,000 hectares. General Lindbergh had attended the opening ceremony and had spent a further ten days touring the Philippines and generating conservation interest.

A research team has begun an investigation into the habitat requirements of the tamaraw in the Sanctuary and four regular Parks and Wildlife patrols have been seconded to the area to prevent illegal hunting and disturbance. The two further tamaraw habitats have also been provided with regular patrols. In addition, radios, purchased by the Philippine Conservation Foundation, now provide contact in inaccessible areas.

In a letter to President Marcos, the director of the tamaraw conservation programme, Mr. Sixto Roxas, called for "a presidential ban on hunting on the Island of Mindoro for a period of not less than five years. With such a ban, law enforcement would be easier".

Guatemala: the giant pied-billed grebe

A recent report from Dr. Anne La Bastille Bowes indicates that the world population of the Lake Atitlan grebe, *Podilymbus gigas*, has increased by 65 per cent from its low point of 80 to 85 birds in 1965 to 130 birds in May 1969. This encouraging information resulted from a three-day census undertaken this year by two Cornell University Professors and Dr. Bowes herself at the invitation of the Guatemalan Government. The last census was made in February-March 1968 when the population stood at 116 individuals (see IUCN Bull. 2(9) : 68). It was felt that the control of reed cutting, the enforcement of poaching and hunting restrictions and conservation education account for the increase of this unique, flightless waterbird. The conservation programme, initiated by Dr. Bowes under the name of "Operation Protection Poc" is successfully continuing under the guidance of the Guatemalan Government.

A new threat exists, however. A vast hydro-electric plant is planned for the 1970's which will lower the lake level by 30 to 40 feet. As partial compensation, four mountain rivers will be diverted into this lake. It is superfluous to add that no ecological impact study has been undertaken or is apparently planned by the Guatemalan National Electrification Institute. Pre-development scheme ecological studies are rare at any level anywhere.

Effects feared are the drastic reduction or elimination of Lake Atitlan's shoreline aquatic vegetation which will destroy the grebe's natural nesting habitat; a derangement of the aquatic ecosystem through introduction of undesirable aquatic life or bacterial contamination; and the influx of turbid, silted or polluted water which will degrade the now crystal-clear water and could cause hardship to the resident population of 50,000 Indians and to the tourist value of this spectacular lake.

In view of this prospective danger to the sole remaining habitat of the pied-billed grebe and the overall need for the protection and study of certain exploited animal species, it is hoped that a small number of interested private persons in Guatemala will shortly organise a nature conservation group, whose major concern would be the preservation of rare and endangered species and unique natural areas.

Dr. Bowes points out "It is possible to see stacks of skins of several animals being shipped out of the Petén, to encounter big game hunters afield at any time of year, or to purchase live wild birds, iguanas and turtle eggs in many markets. At present, as far as is known to the writer, no legal seasons, hunting laws, or game protection exist in Guatemala other than the specific decrees for the quetzal, giant grebe, one species of cayman and the manatee. Conservation efforts and financing by the Government are extremely limited."

Ecuador: new legislation

In April, the Government of Ecuador promulgated two new laws of conservation importance: the first prohibited the export of all endangered fauna and flora from the Galapagos Islands, except for scientific purposes. The second declared the strip of land between the sea and the new highway from Baltra to Puerto Ayora a special Nature Reserve.

More recently, further stringent measures have been taken in an attempt to retain the integrity of Ecuadorian faunal resources. As from August 27th this year, the exportation of all wild animals and their products is to cease for a period of five years, during which time it is hoped to establish national parks and to conduct population surveys as a basis for new hunting and exportation legislation. Fines ranging from 1,000 to 20,000 sucres (\$ 46 - \$ 920) will be imposed upon any person infringing this law.

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The Prime Minister of India

Conservation message to the Chief Ministers of States

The Prime Minister of India, Mrs. Indira Gandhi, addressed the following letter to her Ministers after participating in the June meeting of the Indian Board for Wild Life.

I have been greatly concerned at the increasing decimation of our wild life. The recent meeting of the reconstituted Indian Board for Wild Life has confirmed my impression that the situation is far more serious than official circles are sometimes prepared to admit. Although wild life and forests are State subjects, they are an Indian national heritage, and what we do in the next five or ten years will determine the future and how the future will judge us. I am writing to enlist your active cooperation, because it is only when leaders take a personal interest that things get done.

The proceedings and recommendations of the Indian Board for Wild Life will soon be circulated to all States. I hope you will ensure that they are implemented as early as possible. The carnage of the recent past can be ended only if wild life legislation, on the pattern of the Maharashtra Wild Birds and Animals Protection Act, is passed in each State, and lacunae within this Act for each State's peculiar wild life problems are plugged. To implement this legislation, and to enforce it in the field, each State Forest Department should have within it a Wild Life Department which might be strengthened where it exists already, and made to function effectively. Specialists should be trained and retained by the Wild Life Departments to give them expertise.

I think it would be useful for a State Wild Life (Advisory) Board to be constituted on the pattern of the

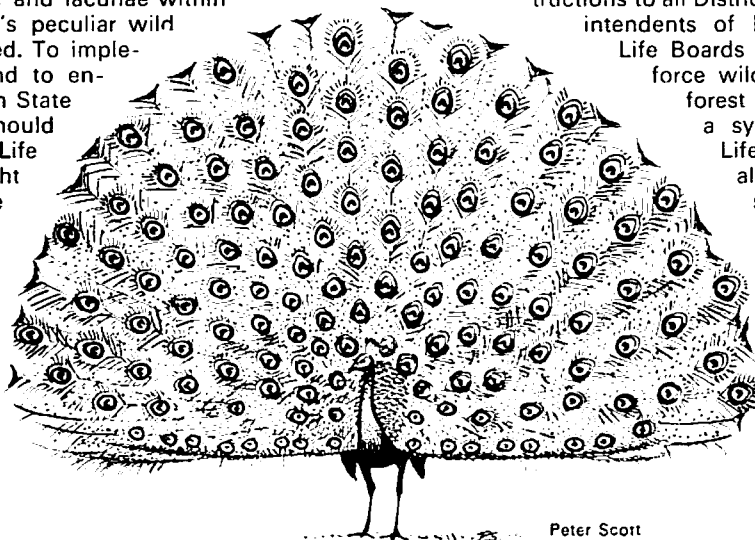
Indian Board for Wild Life, with official and non-official members, which should meet regularly at least once a year, with more frequent meetings of its Executive Committee. The State Wild Life Boards could, among other things, consider the recommendations of the Indian Board for Wild Life and with their own special knowledge, recommend what needs to be done to the Forest and Wild Life Departments.

Poaching has become a lucrative profession in many areas. To curb this, all commercial transactions in game meat, the netting and snaring of birds and the poaching of animals for furs, meat and skins must be stopped. The immediate need is to prohibit, under threat of severe penalties, the sale or service in shops and restaurants of game meat. I would also suggest that the somewhat liberal grant of crop protection licences, especially within the vicinity of sanctuaries and parks, should be revised.

A Special Committee of the Indian Board for Wild Life will soon conduct a survey of national parks and sanctuaries. It would be helpful if the States could, on their own, conduct surveys of their wild life resources and increase the area under sanctuaries. Grazing and forestry operations should be minimised, if not altogether eliminated, in sanctuaries and parks.

A heavy toll has already been taken of wild life outside the forest areas and many species are under grave threat of extinction. You might like to consider issuing instructions to all District Magistrates and Superintendents of Police to organise Wild Life Boards at district level, and enforce wild life legislation in non-forest areas, preferably under a system of honorary Wild Life Wardens which has already been worked with some success in a few States.

I have written to you at some length, not only because I love animals, but also because our parks and sanctuaries could, in the long run, become great tourist attractions and thus more than repay the care and investment which they now demand.



Peter Scott

Role of Renewable Resources in Planning and Development in India

by B. Venkatappiah, Member of the Indian Planning Commission

India has recently launched its Fourth Five-Year Plan for economic development. This plan, like its predecessors, was formulated by the Planning Commission in close consultation with the Union and State Governments. One of the functions of the Planning Commission is to "make an assessment of the material, capital and human resources of the country, including technical personnel, and investigate the possibilities of augmenting such of these resources as are found to be deficient in relation to the Nation's requirements". Among the resources thus assessed from time to time, an important place is occupied by renewable natural resources. The major items in this category are fisheries, forests and wild life. It follows that programmes to conserve, augment and utilise these resources occupy a significant position in the Fourth Plan.

A few general observations may be pertinent. India is trying to reconcile planned development with a democratic form of government and the implementation of a national plan with a system of decentralisation of authority. The Constitution is federal. Some of the authority conferred on State Governments is in turn devolved on local bodies at the district and other levels. While the endeavour as a whole is sought to be centrally co-ordinated, all the items with which we are presently concerned – fisheries, forests and wild life – pertain primarily to the States' sphere of legislation and administration. This indeed is a characteristic shared by a wider category which includes agriculture, animal husbandry, cooperation community development. The relevant programmes of the Fourth Plan, therefore, while given cohesion of purpose by a central body, are the summation of the programmes of the State Governments and Union Territories besides those of the Union Government itself.

The cohesion is also imparted in other ways. One of these is through central financial assistance which plays an important part in plan finance. Another is through the meaningful relationship which obtains at different levels between the State authorities and those who run the administration at the Centre. An important equation is that between the Prime Minister of India and the Chief Ministers of States. Much is expected, for example, from an exhortation which the Prime Minister made to the Chief Ministers as recently as July this year asking them to take personal interest in preserving the national heritage of forests and wild life.* The Chief Ministers, for their part, have a difficult task to perform in their own States where popular pressures tend to promote rather than check the constant encroachment of man on forests and wild life. It is one of the great pities of democracy that trees have no votes and wild animals no constituency. A bright ray of hope, however, comes from agriculture. The intensive use of high yielding seed and fertiliser is fast bringing about the transformation of Indian farming. The main search is no longer for more and more land but for more and more production from the same land. If successful, this could well lead to a cessation – and to some extent even planned reversal – of the age-old process of annexation of forest and banishment of wild life in the ruthless competition for survival.

Forests are among the most important natural resources of the country. They occupy about 75 million hectares, or a little less than one-fourth of the land area of India, and play a vital role in the country's economy. They reduce the extremes of temperature, induce local rainfall, regulate the flow of streams and conserve soil. They also supply wood and forest products for use in industries such as pulp, paper, newsprint and plywood. The National Forest

Policy enunciated in 1952 aims at maintaining one-third of the country's area under forests. It has not been possible to achieve this; there has, however, been a 6% increase during 1952-67 in the area technically classed as forest. About 95% of the forest area belongs to the State, 3% is community owned and 2% is private. In the development of forests, the emphasis of planning has hitherto been on higher productivity, better extraction techniques and more extensive forest communications. A vigorous programme of economic plantations for industrial and commercial uses has been pursued during 1961-69. India's Fourth Plan envisages further efforts at creation of large plantations and rational utilisation of existing forest resources. Forest surveys and programmes of research are to be intensified. Special attempts will also be made to afforest areas between reserved forests and arable lands so as to keep the local communities supplied with fodder and fuel from the minor and village forests thus brought into being.

The Indian Board for Wild Life was set up in 1952. Its main functions are to advise the Central and State Governments on ways and means of conservation of wild life, to sponsor the setting up of national parks and sanctuaries and to promote public interest in wild life and its preservation in harmony with the total environment, natural and human. Among the activities already undertaken by the Board are the organisation of State Wild Life Boards, the laying down of policy for the management of National Parks and Wild Life Sanctuaries, the preparation of necessary draft legislation and the declaration of different varieties of animals and birds as protected species. It is proposed to make determined efforts to render the Board an effective instrument for Wild Life conservation and protection. The task of preserving the country's rich fauna is of growing urgency and complexity. The management of wild life everywhere, and in the national parks and sanctuaries in particular, could be greatly improved by the key personnel being trained in ecology, conservation and management. Special courses for this purpose have been instituted at the Forest Research Institute, Dehra Dun. Every attempt will be made to maintain the integrity of the existing national parks and sanctuaries and to create new ones for rare, valuable or threatened species.

Closely connected with wild life is the other renewable resource of fisheries. India has extensive inland as well as marine fishery resources. There has been perceptible progress in their development during the last ten years. Efforts have been made to organise Fisheries Education and Research. The Fourth Plan target is to increase the present fish production by about 32% by 1973-74 through production and supply of fish seeds, reclamation of derelict water areas for fish farming, development of reservoir and deep sea fishing and a number of other measures, including the provision of facilities for the more extensive use of mechanised boats. Particular mention may be made of the Central Deep Sea Exploratory Organisation and the Indo-Norwegian Project which are carrying out exploratory and experimental programmes in deep sea fishing.

There is full recognition of the importance for planned economic development and for the proper conservation and utilisation of the renewable natural resources of the country. It is to be hoped that, in the years to come, all measures for conserving, enhancing and utilising these resources will be wisely conceived and effectively implemented so that the total process is in the best interests, not only of the human population of India, but also of the wider biotic community which shares with them the Indian environment.

* This appears on p. 101 of the present Bulletin.

The Future of the Indian Elephant

by P. D. Stracey

Few of India's wild creatures face a more dismal future than the elephant – for one reason, more than any other, that it is now *unwanted* where once it was the pride of India. This may seem a surprising paradox in the case of an animal associated with the very warp and woof of Indian mythology, religion and culture but it is nevertheless the sad truth.

This state of 'unwantedness', which has come about comparatively abruptly, has nothing to do with the shrinking of Indian elephant habitat. That aspect of its existence and survival is shared by other animals, notably the rhinoceros and to a lesser extent the tiger. The rhinoceros once ranged as far as modern Peshawar while the tiger was once found in the reed beds of the Indus in Sind. The elephant is recorded to have been captured by Emperor Akbar (1556–1605) and his son Jehangir (1605–1627) in areas which now constitute Madhya Pradesh in the centre of India and Gujarat in western India respectively, localities far removed from its present distribution. All three animals have retreated eastwards with the increasing dessication that came from the northwest. The tiger and the rhino were never domesticated as was the elephant, yet the tiger will never be an 'unwanted' beast for to some its tourism value rivals the sublimity of the Taj and the earthiness of Khajuraho; nor will the rhino because of its extreme rarity.

Neither of these animals had to face competition from the age of the motor car. This competition was intensified by World War II which in the case of the Burma front was based on the very country, Assam, where the elephant might have been expected to hold its ground indefinitely, and accelerated by India achieving her independence soon afterwards. The latter, particularly the merging of the Princes and the abolition of the Zamindars or large landowners – both classes traditional and active patrons of the domesticated elephant – dealt the real death blow in striking at the trade in the animal. This trade, with its close likeness to the human slave traffic of old in its fantastically high mortality rate, was ironically enough its life-line and insurance of survival, for it made it a 'wanted' animal.

Do away with the elephant trade and the animal is doomed, for while the average life expectancy of a newly captured elephant may be about five years there now comes about a situation where, with the high breeding rate of the species and its lack of natural enemies, there is literally 'no room for elephants'.

With the advent of the motor age in India after World War I, the demand for elephants took a downward turn, for the very classes which were its greatest patrons were the first to be able to afford a car – and they took to it with zest. With the slump of the thirties we were selling newly captured elephants at give-away prices while, extraordinarily enough, some of the biggest khedda operations in the history of Assam were being conducted. In five years, up to 1936, a thousand elephants were captured in my departmental kheddas: I was a cub forester at the time, only interested in doing a good job, and had no say in policy yet, looking at the situation from the vantage point of thirty years, I should have

held off such heavy catching. Surprisingly, in the fifties the price for young female elephants – the hallmark and index of the trade – was about the same as that of twenty years earlier in spite of the continued decline for elephants. This was due more to the fact that stockade catching was no longer profitable and *melâ shikâr*, or noosing of elephants in the free state, brought in mainly the young animals, the prices of which always ruled highest. Whatever the reason, the present day elephant

trade, which centres on the four important cold weather *melâs* or religious fairs in north Bihar, is but a pale shadow of its former self. Where in the not-so-distant past a thousand elephants would be up for sale in the largest of the *melâs* at Purnea, today the numbers have dwindled to less than a couple of hundred. And yet, to judge from the annual outcry from the cultivators in Assam, the forests there are bursting at their seams with elephants: a reversed metaphor, really, for it is the jungles that have shrunk! Today the only trade that seems to prosper is that which takes Indian elephants to the zoos and circuses of the world.

So far as the Indian elephant is concerned, its history can be compressed into a few sentences. From its use in ancient warfare, when elephant armies often decided the fate of battles and kingdoms, it was relegated, with the advent of gunpowder and guns, to the status of draught animal for the pulling of artillery pieces and the carriage of army baggage in the British period. Greater emphasis then came to be placed on its use as a civilian aid, rather than as an adjunct of the military arm, for locomotion and transport in road-less country and timber dragging in difficult terrain. Changes in hunting methods also affected its status, from its general use as a mobile shooting box to its present restricted employment for hunting in regions of heavy vegetation, like Assam and the Himalayan *terai* – even in the latter type of country, the Nepal royal tiger shoots have shrunk to a shadow of their former selves, with but a fraction of the numbers of elephants once employed to ring the quarry – and as the occasional aid in the disposal of a wounded tiger or leopard. Only in a few areas of large timber – like Assam, the Andamans and the Western Ghats – is the elephant still used to any extent for forest work, and it is only in Kerala that it plays a prominent part in spectacular temple ceremonies associated with Hindu religious worship.

To revert to the comparison with the tiger: while it is true that this animal has been facing a double threat to its existence through the shrinking of the forested areas which constitute its habitat and through decimation of its natural prey, deer and wild pig, because of man's increasing encroachment on both these essential requirements for its existence, the tiger has at least a substitute food species to fall back upon – the increasing number of domestic cattle which roam the fringes of the forests, where these meet the cultivation zone, or which sometimes penetrate deep inside. In fact, the tiger may be said to perform a useful function in culling the numbers of unwanted scrub cattle which Hindu orthodox sentiment will not allow to be removed. The elephant faces the same threat of a shrinking habitat



A herd of wild elephants, Mysore Forests, India (1963).
Photo: K. N. S. Dyer.

and, in addition, the growing dangers of encroachment on its grazing areas from an intensified and progressively commercially oriented forest management but with no substitute for its food species which, in many cases, are being eliminated by large expanses of plantations of exotics.

This problem of threat to its habitat in the shape of increasing areas of 'man-made' forests, which are the obsession of forest administrations and the refuge of economic planners faced with increasing demands for wood and wood-based products, is very real. The sub-Himalayan *terai* forests in Uttar Pradesh between the Ganga and the Sarda river bordering Nepal, where the elephant problem is the most severe in India, and the rolling hills of the Periyar Sanctuary in Kerala where elephant herds have roamed from time immemorial, are being overwhelmed by a sea of *Eucalyptus* plantations designed as future raw material for rayon and paper pulp manufacture.

In addition, the elephant displays a marked economic weakness in that it is not wanted for its meat value (as in Africa) except in certain tribal areas of the north eastern zone. The reverse factor of its claim to consideration by reason of sentiments that are part cultural and part religious really constitutes a drag on its status, for it is difficult to persuade public opinion as a whole that the elephant has to be controlled in the interests of its own future and that possibly there is no means of doing so except by a bullet.

Let us study an imaginary aerial photograph of the Indian elephant's present distribution and scan the individual trouble spots: 1) the *terai*, between the Ganga and the Sarda, where several hundred elephants roam with nothing but natural decimating factors of old age and disease to control them, since elephant catching has not been practised here for more than a quarter of a century; 2) the greatest repository of elephants, Assam, in which a shrinking elephant market, combined with a lop-sided catching regime whereby stockades, which automatically looked after the age and sex composition of the herds, have virtually been eliminated; 3) the Mysore plateau and the adjoining hilly country which spills over from the Western Ghats where the spectacular Mysore *khedda*, introduced by Sanderson in British times but borrowed from the old Dacca-based elephant catching operations run by the Government to provide draught elephants for the army, is to be abandoned because of the imminent submersion of the best elephant country by a projected dam; 4) the Western Ghats, which ring the Arabian Sea side of peninsular India, where the indigenous pitting method has from time immemorial served to provide elephants for the timber dragging and temple worship of Kerala, at the same time culling the wild herds. Here the demands for land in forested areas by an increasingly hungry population supported by an increasingly Communist-minded administration has drastically eaten into elephant habitat; 5) Orissa, which has also a sizeable elephant population that is becoming a problem with the cessation of catching operations by the old Feudatory States of Korea, Mayurbhanj and others which were merged after 1947; and 6) though in a much more minor key, the Nepal *terai* which was once the home of many elephants.

No serious study of the environmental and biotic pressures to which the elephant is being subjected in the Indian sub-continent – or for that matter in the adjoining East Pakistan areas of Tipperah and the Chittagong Hill Tracts – has as yet been undertaken, whereas in neighbouring Ceylon, where the problem has assumed a different if more alarming form in that the elephant has been rapidly dwindling in numbers, a full scale ecological survey is in progress under the aegis of the Smithsonian Institution of the USA. Attempts made to offer solutions to these individual trouble spots have as their basis *ad hoc* conclusions rather than scientific enquiry and research. India has only recently begun to receive the benefits of scientific study of her wildlife: Africa, with

Fairfield Osborn

A great loss to IUCN was caused by the death at 82, on September 16, of the Union's loyal friend, Fairfield Osborn, for 38 years President of the New York Zoological Society, founder of the Conservation Foundation and author of "Our Plundered Planet".

"Fair", as he was affectionately called by many of his friends, was an early leader of American conservationists who realized sooner than most how mankind was degrading his environment. He played an active role in awakening many in the U.S., and indeed throughout the world, to the seriousness of the population problem and the urgency of taking avoiding action to prevent the inevitable catastrophe that is looming ahead. I think of him as a veritable Paul Revere sounding the alarm through his writings, his speeches and his selfless, dynamic personal leadership that had a profound influence on those whose lives he touched in one way or another.

He had a keen interest in the IUCN and even contributed to its founding principles through his associate, George Brewer, who attended the Brunnen Conference in 1947 that developed the guidelines for our founding at Fontainebleau in 1948. Since that day he had been unswerving in his support of IUCN, often contributing through the New York Zoological Society ideas, funds, and even staff to help the Union in many of its projects. I recall his enthusiasm at our Nairobi Assembly in 1962 and his great appreciation of African animal life when visiting Meru with the Talbots whose field work the New York Zoological Society was helping to support.

He was a great animal lover and inspired all who knew him to share his ideas. He was devoted to his family and friends, and left them a memorable, inspiring legacy, but he will be sorely missed.

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her much more photogenic species and photographically favourable conditions has tended to fill the frame to the exclusion of everything else. Schaller's study of the tiger and the deer in Kanha Sanctuary of Madhya Pradesh is being followed up by a study of the lion in its last stronghold, the Gir Sanctuary of Gujarat, by two other foreign ecologists. Indian naturalists have only just entered the field with the award of a Nehru Fellowship to M. Krishnan, one of the country's best known wildlife publicists, writers and photographers, for an ecological evaluation of the status of the wild mammals of peninsular India.

Elephant control through destruction of unwanted individuals and surplus numbers has nowhere reached the level of the African system, or for that matter the intensity of the elephant control campaign in pre-World War II Burma (which apparently backfired, since there is now said to be a shortage of elephants for timber dragging). The nearest approach is the system in vogue in Assam, where an Elephant Control Scheme Licence is issued to responsible sportsmen for the destruction of really troublesome elephants. This system is not entirely fool-proof, for the rule which permits one to shoot a "mature male elephant wherever found" offers a loophole to the ivory hunter, while the ratio of tusked to tuskless (*makhna*) male elephants in the wild state does not fully endorse the one tusked to one *makhna* rule, by which an equal proportion of the two types is sought to be achieved in the destruction rate. In any case, selective and non-compulsory types of control will have at least one factor unfavourable for their successful implementation, which is that in the Indian elephant only the males, and that about a third of them, carry ivory.

The Indian scene does, however, contain some elements which make the problem more tractable than that of Africa. The forms of vegetation in the forests constituting the present-day habitat of the Indian elephant are not so rigidly selective for elephant feed nor as sensitive to other competing uses as is the case in Africa. Good soil conditions and greater moisture result in a more luxuriant growth in a wider variety of species: the soil disturbance and erosion factors are therefore not as severe as in African habitats where the available range and feed is to be shared by other large herbivores, such as rhinos, buffaloes, giraffes, antelopes and even hippos.

It is not easy to offer a solution on rational lines for the future of the Indian elephant. In one sense there is an analogy with the problem of the surplus cattle of India in that while they are not wanted they are yet tolerated, and for both of them there is no ready answer, only a question: "Whither are you bound?"

Wildlife Preservation in India

by C. D. Deshmukh, President, India International Centre

"Bhoota-daya" (Sanskrit) or compassion for all living beings has for the last 2,500 years been a noticeable strand in the complex thread of Indian religious thought. A numerically small but economically strong sect, the Jains, inspired by the teachings of Mahavir (middle of 6th century, B.C.) are active practitioners of the creed, and their holy men go about with their mouths covered with white muslin cloth calculated to prevent the unwitting destruction of even invisible life through breathing. However, barring this somewhat inappreciable exception, awareness of the importance of preservation of wildlife is, relatively speaking, very recent in India, dating from the establishment of the All-India Forest Service, less than a century ago.

Wildlife, i.e. undomesticated birds and animals, ignoring fresh or sea-water fauna, is, of course, not confined to land surfaces recognised or technically classified as forests. But these last are habitats in which wildlife is popularly expected to be found and from which it is likely to foray into the open lands in the neighbourhood. In the old days, wildlife remained more or less unmolested, except from poachers, owing to lack of communications and fire arms, with still sparse population densities. The problem of its preservation could therefore be handled without much trouble through regulation by the State's Forest officials. On occasions the state even went to the length of licensing firearms for the destruction of species whose depredations posed a threat to agricultural production, (e.g. black buck). But with the growth of population densities in recent decades and the consequent spread of the area cultivated, often at the cost of the forests, the problem of preserving wildlife assumed more and more serious dimensions.

It is not the purpose of this article to narrate the course of the protective measures taken by Authority from time to time. Relevant information in this regard, e.g. in respect of sanctuaries and national parks, controlled issues of shikar permits and licences, can easily be gathered from the forest departments or institutes in the country. But an attempt is made here to draw attention to other factors, not so obvious, but nevertheless vital, for the successful operation of public laws and regulations.

Prominent among these is the interest which the ordinary citizen can be persuaded to take in this matter. The most effective focal point for such efforts is obviously a specialised association for the purpose. It is perhaps symptomatic of the general indifference in this regard that the Bombay Natural History Society has had, through the best part of a century, to struggle hard for a meaningful existence and that the Wild Life Preservation Society was established only about 30 years ago. Recently the press carried the report that this latter society had not even met for some years.

Public apathy in this matter is almost wholly the result of lack of education and instruction, i.e. ignorance. How widespread this can be is illustrated by a report that appeared in April, 1969 in an Andhra Pradesh English Daily that "a hunting party involving two Government Officials was caught red-handed for hunting in a reserved forest area...." The party consisted of the Chief revenue official of a tahsil (constituent of a district), the Block Development Official (block being a constituent unit of a tahsil), a land-lord and four armed special policemen. One can only hope that this kind of misdemeanour by officials in positions of authority is not typical either of Andhra Pradesh or the country at large.

Occasional and unsystematic instruction and education of the public in regard to the importance of the preservation of wildlife will very likely prove ineffective in the absence of systematic inculcation in the minds of the

young of the pleasure to be derived from the study and observation of nature, aimed particularly at creating an abiding sense of curiosity. It is this element which is almost wholly lacking in Indian education, and is unknown to the adult Indian because it was never introduced to him as a child. The observation of the abundant fauna and flora of the country and an awareness of the phenomenon of ecological balance are matters which are dealt with only as part of formal curricula at an advanced stage of science education. It is this aspect which calls clamorously for attention in any effort that may be made to base education of the young in India on the grass roots of the country's cultural traditions. India's ancient literature abounds in sympathetic references to forests and their denizens, feathered or quadruped.

Children are the same all over the world, and the world's zoological parks, especially in their sophisticated forms, are a source of endless delight to the world's young. This innate curiosity and empathy can be nurtured through the parents or guardians or school teachers with the aid of skilful journalism. The well-situated, well-stocked and well-kept zoo in Delhi has attracted the attention of a few gifted journalists, who chronicle in a most attractive fashion the passing events in this extension to the family of Delhi Citizens. It would be worth somebody's while to train more enthusiasts in this kind of specialised reportage for the purpose of arousing and maintaining in the old as well as in the young, a countrywide interest in wildlife. On this unobtrusive basis, a worthwhile system of encouraging nature study can be built up, perhaps through classrooms in forests for city children, following the new idea of the Waltham Education Committee in Britain. It is only through such fundamental changes in attitude that lovers of wildlife and their associations can hope to ensure a true understanding of the importance of the ecological balance in man's environment.

With this primary task accomplished the further extension of the understanding and practice in regard to wildlife can be accomplished without great difficulty. The Western world is no stranger to the idea that wildlife can largely be regarded as an agricultural crop. In India with its predominant mono-cropping patterns, this idea will perhaps sound absurd. But now that the country is feeling the initial impulses of the green revolution, there is no reason to despair about introducing new notions concerning the possibility of producing wildlife for hunting, watching, or otherwise enjoying it, while lands are farmed for the production of food, fibre and wood products. With the more intensive use of land made possible by modern techniques, the balance of land-use can be restored by the preservation of swamps for wildlife, living fences for small animals and the growth of woodland for fuel and timber, providing a delectable symbiosis, for man, bird and beast.

Two IUCN officers honoured

- Mr. Roelof Jan Benthem, Chairman of IUCN's Commission on Landscape Planning and leading Dutch authority in landscape planning, received the high honour in May of Officer in the Order of Oranje Nassau for services rendered to the Netherlands in the development and practice of landscape planning.
- Dr. Kai Curry-Lindahl is the first non-Romanian to be awarded honorary membership of the Romanian Academy of Sciences' Commission for the Conservation of Nature. The award follows his recent activities in Romania in connection with the Danube Delta. Twice he visited Romania as a guest of the Government, to study the conservation situation in the Delta and the subsequent report has been submitted to the Romanian Government on behalf of IUCN, WWF and IWRB. It is hoped the Government will study the report before drafting long term utilization plans for the Delta.

North Atlantic: ban on salmon fishing

Fishing for salmon on the high seas in the Northwest Atlantic will probably soon be banned. The International Commission for the Northwest Atlantic Fisheries (ICNAF) adopted this proposal at its 19th meeting held near Warsaw from 2-7 June 1969. If ratified by the Contracting Governments, the ban will apply to all methods of fishing for salmon outside national fishery limits. The proposal stems from the findings of a joint ICES*/ICNAF Working Party on the Atlantic Salmon set up at the last ICNAF meeting. Hitherto the effort to maintain stocks has been directed at fish culture, pollution abatement and laddering of waterfalls and dams in a few countries of salmon origin, such as Canada, Norway, Sweden and the British Isles. These measures have been proving grossly expensive and the ban was therefore proposed for economic as much as for scientific reasons.

This ban coincides with a similar recommendation for the northeast Atlantic drawn up at the May 1969 meeting of the North-East Atlantic Fisheries Commission.

Prior to these two meetings, the Atlantic Salmon Research Trust Ltd. had sponsored a two day international conference which also resulted in a recommendation to all governments with salmon interests to suspend fishing for salmon on the high seas of the North Atlantic for a period of ten years.

Such moves have recently been advocated by many people with a concern for the continued existence of plentiful stocks of salmon, notably by Anthony Netboy, in his valuable monograph "The Atlantic Salmon - a Vanishing Species":

"It is clear that while conservation in the river is essential to the species' survival, there must also be conservation in the sea. The next urgent step in the attempt to save what is left of the vast populations of salmon involves oceanic feeding. Some restrictions on the catch during their feeding years is needed if the stocks of Europe and Canada are not to decline even further."

Certain delegates to these meetings, however, wondered whether the feasibility of employing less drastic measures could not be explored. It was pointed out not only that the time for effective action might well pass whilst awaiting the results of such research but that catch limits could not be adequately enforced and closed areas were not effective. Indeed, in 1968, ICNAF prevailed upon Member Governments to prevent an increase in the salmon catch. They were unable to do so. In addition, the salmon no longer returns to Portugal, Holland or Switzerland and stocks in France and Spain have dwindled drastically.

It appears conclusive, then, that a policy of strict prohibition is the only current answer to the recent increasing and uncontrolled exploitation of stocks, particularly by the Greenland and Norwegian fisheries.

Controlled use of an international resource does present grave problems but these are not insurmountable: the honest adoption by all interested nations of such majority-agreed conservation measures; the sharing of costs of research or restocking by all harvesting as well as breeding countries; the free exchange of technical and scientific information all form the basis of an effective international co-operation. The Atlantic salmon, marine turtles, whales, polar bears and seals are all resources of a *cosmopolitan* nature and world stocks can only be maintained on a sustained yield basis by full participation in an international conservation programme.

Again, the conservation principle of sustained yield requires a full knowledge of population dynamics. It was universally agreed at the key meetings mentioned above that continued research on salmon life history and

migrations, on production techniques and conservation methods was essential. All efforts to obtain such knowledge and to reach agreement on controls deserves support.

Poland: fish farming helps to combat pollution

Fish farming, a growing source of protein foods, is helping to provide an answer to the growing menace of water pollution.

Polish scientists are experimenting with ways of converting non-toxic industrial wastes, rich in organic compounds, into fertilizer for enriching ponds used in fish culture.

At the Laboratory of Water Biology of the Polish Academy of Sciences in Krakow, sugar industry wastes have been successfully used to fertilize carp ponds. Fish production in test ponds in Golysz increased five times by using such wastes.

Almost similar results were obtained at the Research Institute of Fisheries and Hydrobiology in Vodnany, where effluents from starch factories and waste water from poultry were used. Both substances, particularly poultry waste water, produced life-sustaining plankton in ponds, with encouraging increases in fish production. There were no residual effects.

The experiments are reported in the current issue (Vol. 1, no. 3) of the Fish Culture Bulletin of the Food and Agriculture Organization, which notes that "Fish culture as a means of pollution control is receiving increasing attention".

The Bulletin, which contains news on fish culture developments around the world, reports that research is being done in India, at Delhi University, using light to stimulate the breeding cycle of fish. "By exposing catfish to longer day lengths in the nonbreeding season by means of artificial light, it was found that the gonads attained maturity three months ahead of the normal season", it said. — FAO.

Bhutan: wildlife refuges planned

The Himalayan kingdom of Bhutan recently announced plans to establish two vast wildlife sanctuaries. One of 148 square miles will adjoin the Indian frontier, the other, of 120 square miles, will lie in the high mountain zone.

EEC: reforestation plans

For some years, agricultural surpluses and wood deficits have been increasing in the countries of the European Economic Community — Belgium, Luxemburg, the Netherlands, France, Germany and Italy. A recent memorandum issued by the EEC — entitled the "Mansholt Plan" — proposes that between now and 1980 cultivated areas should be reduced by at least 12½ million acres in EEC countries. Of these, 2½ million acres would be put aside for relaxation and public health purposes, mainly in the form of wooded natural parks. Agriculture will lose 4.3 per cent of its total area in these countries, mainly by the elimination of smallholdings and the consolidation of medium-sized farms. Forestry will expand from 22.9 per cent of the total area to 26.3 per cent.

An interesting moral object lesson is provided by a community, which for over 20 centuries has been happily hacking down its forests to make way for crops and livestock, but which has slowly come to appreciate the economic, ecological and socio-psychological need for a wooded countryside and now acts upon its convictions. As reported in IUCN Bulletin 2 (11) : 89, Lebanon is valiantly attempting to bring back its cedars and further down this page we see that Britain is trying to salvage its hedges. Surely, before it is too late, rapidly deforesting countries will pause and take stock and attempt to evaluate their food needs vis à vis their timber, watershed and mental health needs. An entirely deforested country is usually a tired and thirsty one.

* International Council for Exploration of the Sea.