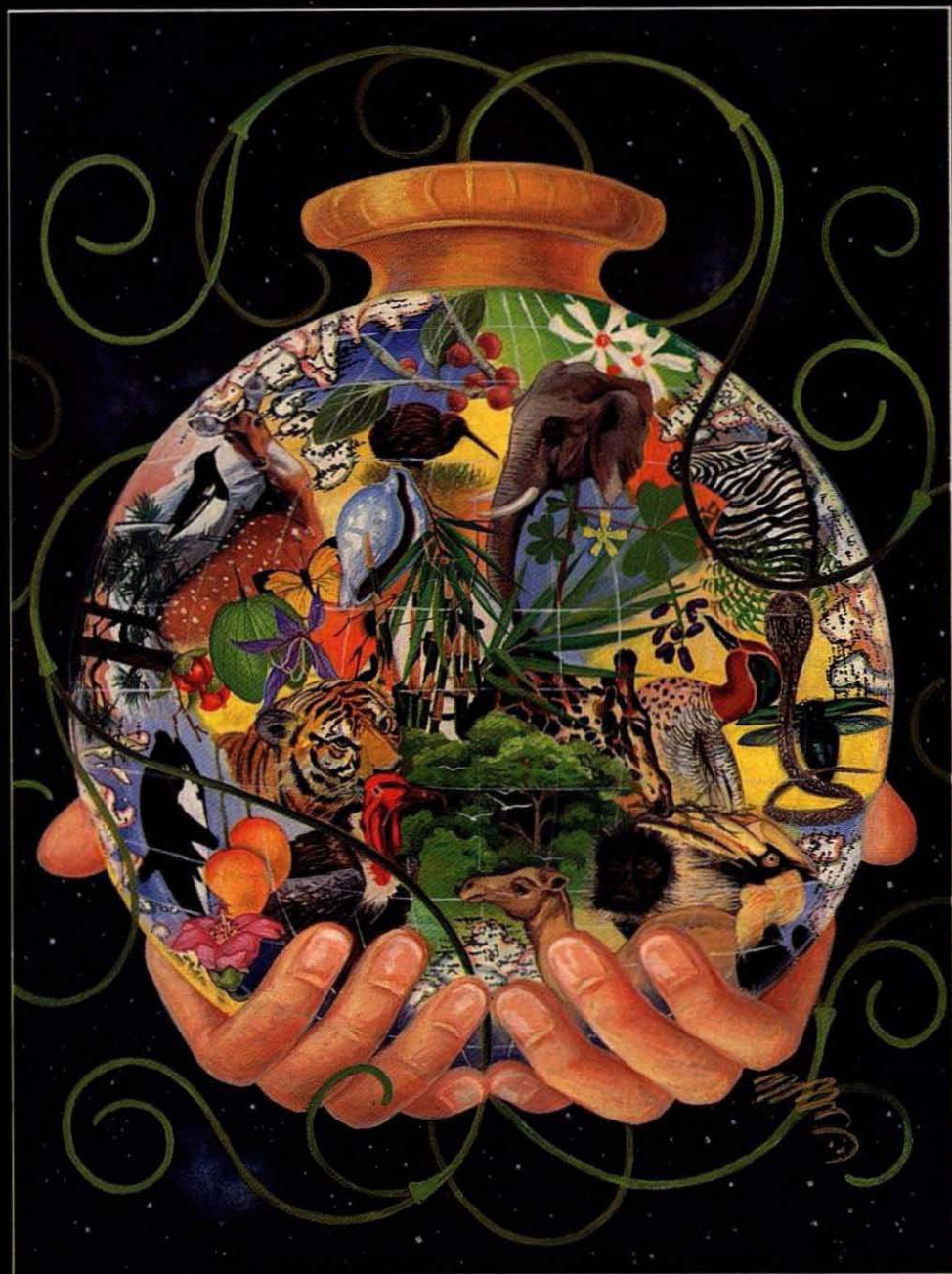


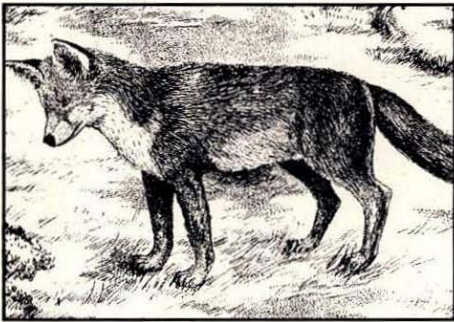
Hornbill

Vol. 1994, No. 2



BOMBAY NATURAL HISTORY SOCIETY

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EDITORIAL

This issue of *Hornbill* is dedicated to the conservation of biological diversity. The cover painted by Arundhati Vartak depicts "the earth as the *Purna ghata* or overflowing vase — a symbol commonly used in ancient Indian art. With the never ending creeper issuing from it, the *Purna ghata* symbolises abundance. The painting shows the earth or *ghata* full of a rich diversity of life forms and the green creeper symbolises life in general. The human hands holding the *ghata* indicate the significant role man has to play in guarding the natural wealth on earth. In the vastness of space, our beautiful earth stands out with a unique identity. She has provided ideal conditions for the creation of life." The artist's words and brushstrokes have said it all.

The future of life on earth depends on us. Humans are in the singular position, never held by any species on the earth before, of being able to control the destiny of most of the creatures with which we share this planet. All of us, prince or pauper, agnostic or believer, young or old, have to shoulder much responsibility to manage this biodiversity crisis, this extinction spasm, wisely and well.

Is there another way of viewing this crisis? Stephen Jay Gould, a leading evolutionary biologist says, "We certainly cannot wipe out bacteria (they have been the modal organisms on earth right from the start, and probably shall be until the sun explodes); I doubt we can wreak much permanent havoc upon insects as a whole (whatever our power to destroy local populations and species). But we can surely eliminate our fragile selves — and our well-buffered earth might then breathe a metaphorical sigh of relief at the ultimate failure of an interesting but dangerous experiment in consciousness..... Our planet is not fragile at its own time scale, and we, pitiful latecomers in the last microsecond of our planetary year, are stewards of nothing in the long run." Is there a right way and a wrong way of viewing this crisis?

It is for you to decide.

RENEE M. BORGES

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THE BIODIVERSITY CONVENTION AND INDIA

Ashish Kothari

In India, most people live their day to day lives in close contact with nature, and would simply perish if their plant and animal resource base were to disappear. We can least afford to deplete this bedrock of human survival. Yet, estimates suggest that each day we are causing the extinction of at least one species.

On 29 December, 1993, there came into force an international treaty of far-reaching significance for the future of humanity's troubled relationship with the earth. This is the Convention on Biological Diversity, signed by almost every country on earth at the 1992 Earth Summit. seventy-five countries have by now ratified the treaty, signaling their readiness to legally abide by its clauses. Dealing with not only the scientific aspects of biodiversity conservation, but also its social, political, and economic ramifications, the Convention offers tremendous potential. Realising this potential is going to be extremely difficult and will take time.

Why the Convention?

Biological diversity refers to the variety of plant, animal, and micro-organic life with which humans share this earth, including the enormous variety of crops and livestock used in agriculture. This diversity forms the bedrock of human survival, providing food, medicine, energy, ecosystem functions, scientific insights, and cultural sustenance to over five billion men and women. Even as artificial a society as the United States would collapse if this resource base were to vanish. In India, most people live their day to day lives in close contact with nature, and would simply perish if their plant and animal resource base were to disappear.

And it is disappearing. Estimates suggest that each day, perhaps each hour, we are causing the extinction of at least one species. Hundreds of thousands of square kilometres of forest, grassland, wetland, and other natural habitats are being converted to human use; most of the earth's terrestrial area is already modified or heavily influenced by human activities.

The impact of natural habitat destruction is felt not just by wildlife, but also by the millions of people who depend directly on natural resources for their livelihood. It is here that politics is prevalent: powerful and rich people and countries are able to exploit these resources for their own greed, with little regard for the survival needs of forest dwellers, shepherds, fisherfolk, and other "ecosystem people". The tremendous diversity of crops and livestock developed and maintained by traditional communities is also facing erosion by modern agricultural practices.

The Convention attempts to put some brakes on these processes. It deals with the conservation of wild plants and animals in their natural habitats, and to a lesser extent with on-farm conservation of crop and livestock diversity. It explicitly recognises the contribution of traditional communities towards biodiversity conservation, advocates respect of their knowledge and skills, and encourages sharing of the benefits of biodiversity utilisation with them. What distinguishes the Convention from previous international treaties, such as the Convention on International Trade in Endangered Species, or CITES, is that it squarely

The Biodiversity Convention deals with the conservation of wild plants and animals in their natural habitats, and to a lesser extent with on-farm conservation of crop and livestock diversity. It explicitly recognises the contribution of traditional communities to biodiversity conservation, advocates respect of their knowledge and skills, and encourages sharing of the benefits of biodiversity utilisation with them.

acknowledges the role of social, political, and economic factors in conservation, and attempts to deal with them. It sets out three major objectives for humanity to achieve: the conservation (i.e. long-term survival) of biodiversity, the sustainable utilisation of its elements (i.e. ecosystems and species), and the equitable sharing of benefits arising from such utilisation. It implicitly recognises that there has been unfairness in the relationship between industrialised and other countries, that fair returns for the industrialised world's use of genetic resources from

the tropical countries (which contain most of the world's biodiversity) have not come, that the critical role of local traditional communities in protecting, enhancing, and sustainably using biological resources has remained neglected, and that current development policies and programmes have failed to integrate conservation and sustainable use objectives.

Significantly, the Convention recognises the sovereign right of countries over their own biological resources. It provides for the framing of mutual

agreements between those who seek access to such resources and those who provide them. So if an industrial country or a corporation looking for a possible cure for cancer seeks plant germplasm from a tropical country, the latter can legitimately negotiate a fair return. The Convention also commits countries to transfer the relevant technologies, and aims to provide for the creation of an international fund to finance biodiversity conservation in the developing countries, a fund which is to be operated in a "democratic and transparent" manner. Finally, the Biodiversity Convention could lead to a binding protocol on curbing the hazards of biotechnology. However several questions and

important issues are raised in the context of this Convention, especially with reference to the developing world.

Will the Convention Work?

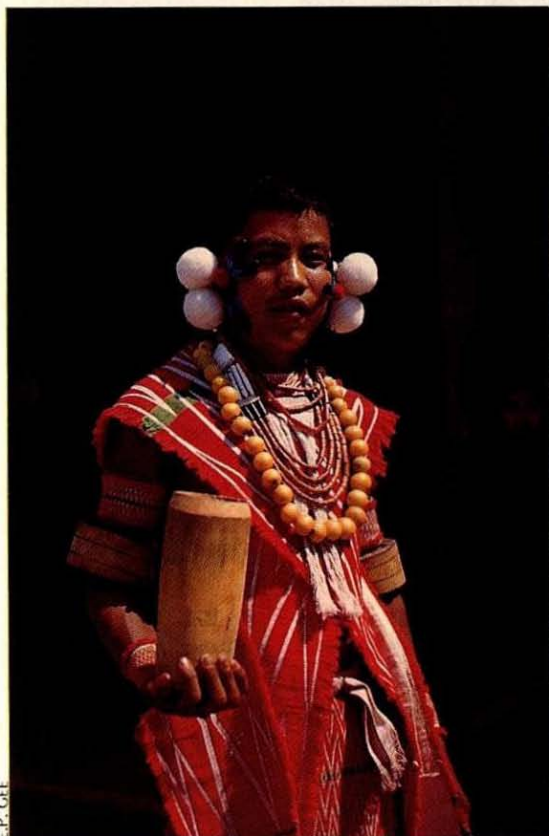
Any document is only as good as its implementation is. Can the potential of the Convention actually be realised? While the quick ratification by several countries does provide some hope, there are also clear indications that the road to

progress will be extremely bumpy. This has been best illustrated in the two intergovernmental meetings held after the adoption of the Convention, in October 1993 and June 1994. These were meetings of the so-called Intergovernmental Committee on the Convention on Biological Diversity (ICCBD), a preparatory body for the first formal meeting of the ratifying countries (the Conference of Parties or COP) in November-December 1994. A number of ticklish issues have been dealt with in the two ICCBDs, including procedural rules, secretariat functions,

priorities for funding, arrangements for setting up an advisory scientific and technical body, and other matters which should help the ratifying bodies to get to work. In no small measure was this progress due to a great deal of documentation prepared by the Convention's interim secretariat. At the same time, both ICCBDs were marked by the failure to adequately address many of the critical issues facing the Convention follow-up, including the causes of biodiversity loss, the financial mechanism to fund the Convention, and concrete ways to guarantee indigenous community rights and benefits.

Addressing the Fundamentals

One of the positive developments at the second ICCBD was the growing realization that the Convention is not limited to narrowly defined conservation programmes, but that sustainable use and benefit-sharing are equally important objectives. This realisation was an outcome of several factors: intense lobbying and awareness work by non-governmental organisations (NGOs) in many countries, the wide-ranging intergovernmental deliberations of a scientific experts' meeting on biodiversity held in Mexico in



Communities must receive the benefit of germplasm traditionally conserved by them



R.B. GRUBH

Bearing the brunt of depleted natural resources

April 1994, and the request of the Commission for Sustainable Development (the intergovernmental body set up to implement Agenda 21, the detailed global plan hammered out at the June 1992 Earth Summit), to advise it on issues related to biodiversity, land use, forests, and agriculture. The relationship of biodiversity to development issues was once again highlighted at a seminar hosted by Spain in October 1994. Clarification of the development-environment relationship is clearly the most critical issue facing the world today. This point was constantly brought up by the several dozen NGOs which were present at ICCBD2 as observers. In a consensus statement delivered on the last day, NGOs noted that: "The root causes of biodiversity loss ... lie in the international economic and political system and its fundamental inequities. Unsustainable production and consumption patterns, materialistic lifestyles, unequal trade relations, multilateral aid policies which continue to promote unsustainable economic growth, the debt crisis, and continuing poverty

created by this economic system: all of these remain serious threats to biodiversity.

We are sure every delegate here knows that unless these issues are tackled, the objectives of the Biodiversity Convention will remain pious hopes ... This is a difficult and long-term task, but a beginning has to be made somewhere".

Local Community Rights

One of the welcome surprises of ICCBD2 was the fact that delegates from several countries spoke in support of the rights of farmers, fisherfolk, forest people, indigenous people, and local community members. These are the people who actually work with and conserve biodiversity on a daily basis. While there has been a general failure of the Convention process to involve them, there is now at least a belated recognition that these people hold the key to its implementation.

At the first ICCBD, the Secretariat of the CBD had been asked to prepare a paper on the issue of farmers' rights, dealing with the recognition of farmers as being the original contributors of the world's crop and livestock genetic material, and with their rights vis-à-vis those of modern plant breeders (scientists, corporations). This paper formed the basis for a lively discussion at ICCBD2, during which several delegates asked for a legally binding regime for ensuring farmers' rights. It was also stressed by some that such a regime must extend to all traditional and local community rights to biological resources, and to their intellectual contributions. Farmers' rights over agricultural biodiversity are also a matter of concern in view of the growing practice of corporations to seek intellectual property rights (including patents) over seeds. To safeguard farmers from the economically debilitating effects of such monopolistic activities, the international community has so far accepted the right of farmers to re-employ patented seed for personal use and non-commercial exchange. Some observers believe that the just accepted draft of GATT (General Agreement on Trade and Tariffs) will considerably dilute this right.

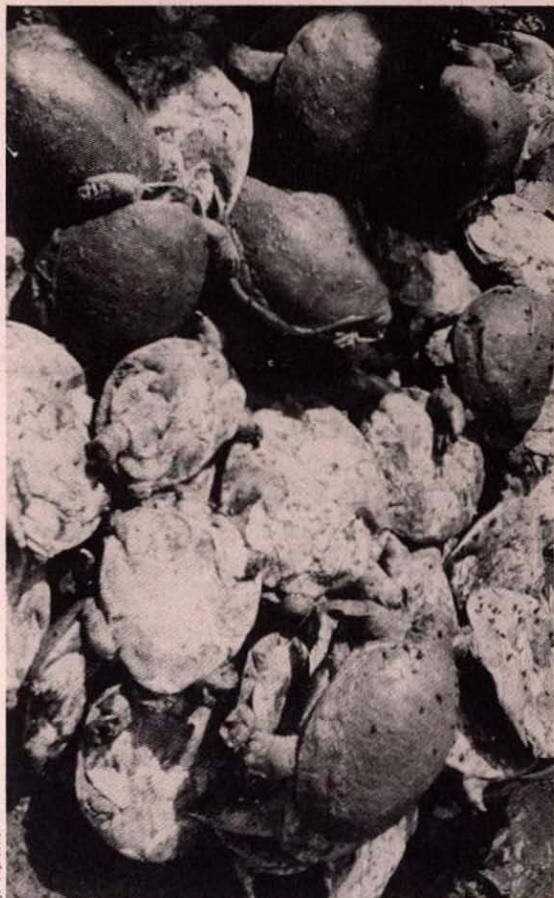
The Convention has the potential, even if weak, of being used to counter the threats feared from treaties like GATT. Article 22 states that the rights and obligations of countries under other international agreements are not affected by the Biodiversity Convention, "except where the exercise of those rights and obligations would cause a serious damage

or threat to biological diversity". Several observers have stated that GATT poses a threat to the diversity of agricultural crops. Whether this is indeed the case, and if so, how the Convention relates to GATT, ought to be a vital topic for further analysis.

International Gene Banks: Who Owns Them?

The issue of local community rights has also become sharply focused around the debate on ownership of and access to international gene banks. Over the last couple of centuries, a great amount of genetic material has been taken out from tropical countries by the industrial nations, to be stored in ex-situ collections or gene banks. Many of these banks are under national control, accessible to private corporations who could use the genetic material for profits without any commitment to channelising some of the benefits to the country of origin. Several other collections are under the International Board for Plant Genetic Resources (IBPGR) or the Consultative Group on International Agricultural Research (CGIAR), a private body consisting of some rich governments, multilateral agencies, and private corporations. The CGIAR system holds about half a million accessions, from which a vast bulk of the genetic material used in modern agriculture now flows. Over the last few months there has been an attempt to bring these collections under the auspices of the Food and Agricultural Organisation (FAO), which is an intergovernmental body of the United Nations. While FAO is not particularly well-known for being sensitive to the concerns of poor farmers and the environment, this move was being considered as positive since it would bring the gene collections under democratic intergovernmental control. The FAO was also considering the possibility of developing its International Undertaking on Plant Genetic Resources, an agreement on the conservation and exchange of plants between countries, into a protocol under the Biodiversity Convention.

Suddenly, in May this year, the World Bank stepped in with a blatant attempt to sabotage the transfer of the CGIAR collections to the FAO. It offered to underwrite the CGIAR's outstanding debts, in return for greater controls over its management. NGOs got wind of this, and immediately raised a furore. At ICCBD2, the controversy snowballed into an open discussion, in which a number of countries openly expressed support for FAO and opposition to the World Bank bid. India, too, strongly supported



Flapshell turtles — unchecked commercial exploitation may lead to extinction

intergovernmental control of the gene collections.

These issues are likely to remain hot topics within the Convention process, and hopefully will move towards some resolution in 1995, if NGOs are able to maintain adequate pressure and if sensitive government delegates continue to respond.

Biosafety

One of the other issues which has come up for considerable discussion was a possible protocol on the safe use and transfer of biotechnological materials, including genetically modified organisms. The western world's biotechnology industry is advancing at a staggering rate, with gene transfers from one species to another already possible. While a number of exciting possibilities of this technology are well advertised, what is usually hidden is the tremendous risk involved, since we have virtually no idea how genetically modified organisms will behave once they are released.

At ICCBD2, most Third World and some western countries, expressed the need for immediate work on a protocol on biosafety. This is critical because export of hazardous genetic materials by multinational companies to the south has already started. Unfortunately, no consensus has been reached, with many industrial countries opposed to a commercially disadvantageous protocol.

Financial Mechanism

Perhaps the most striking failure of both ICCBDs has been on the issue of the financial mechanism. The discussion boiled down to whether the Global Environment Facility (GEF), set up before the Earth Summit to fund the activities of countries on globally important issues, should be the funding mechanism for the Convention. Most industrial countries were insistent that it should be so, while many southern countries were hostile. The difference of opinion was understandable: the GEF is not democratic, as it is dominated by rich donor countries and by the World Bank. It does not, therefore, even meet the requirement of the Convention text, which stipulates that any financial mechanism must be democratic, transparent, and under the authority of the COP.

NGOs and several governments suggested that a number of alternatives to GEF should be considered, including an independent fund contributed by individuals and non-governmental sources, by taxes on the global seed and pharmaceutical industry and on elite consumption of biodiversity products, and by donations from industrial countries who agree that the GEF is inappropriate. Unfortunately, even the Third World countries could not act upon this, especially since countries like India have now abandoned their opposition to GEF. This is likely to remain a contentious issue in the future.

What Should India Do?

In India, ratification of the Convention came in February 1994, and a number of follow-up actions are underway (see Box), but much is yet to be done.

Detailed inventories of the biodiversity present in our natural habitats and agricultural fields are already being prepared in India, but far greater work is needed on characterising this diversity, exploring its potential for agricultural, industrial, medicinal, and other uses, and developing indigenous capacity to utilise it. A national register of biodiversity is urgently needed. The vast knowledge of tribal and

other traditional communities, as also the pioneering work by modern sector scientists, form a solid base to build on.

Next, model contracts will have to be drafted to be used with those who come prospecting for our biodiversity. Currently the buzz-word in this field is a deal in which a conservation NGO in Costa Rica (InBio) has agreed to provide the world's largest pharmaceutical company (Merck) with biodiversity samples in return for a hefty initial fee and continuing royalties from any products which Merck may derive. Part of what InBio gets goes into a governmental fund for conserving Costa Rica's rich rain forests. This deal has been criticised for not adequately respecting the rights of Costa Rica's indigenous communities, and for giving Merck a free hand to patent what it extracts or develops from the samples. India would do well to take a close look at such deals which are being struck across the world, to learn from their strengths and weaknesses, and develop contracts appropriate to its own position.

One problem is that quite a bit of India's biodiversity is shared by one or more countries of South and South-east Asia. Any one of these countries could undermine the position of others by offering commonly held genetic material on less stringent conditions. It is critical that the South Asian Association of Regional Cooperation (SAARC) and other regional groupings reach agreement on a minimum set of conditions under which biodiversity can be given to prospectors. Also needed is cooperation on inventorying and capacity building in this field. Eventually, it would be ideal for such agreements to extend across the tropics: genetic resources, after all, are the tropical countries' greatest wealth, and consequently could be the strongest tool against dominance by the industrial nations.

The place of local traditional communities in biodiversity-related deals is absolutely critical. The Convention specifically commits countries to "encourage the equitable sharing of the benefits arising from the utilization of such (traditional) knowledge, innovations, and practices". The question is, how? Some people have suggested that farmers, traditional healers, and others possessing such knowledge and resources should also utilise intellectual property regimes to stake a claim. Though this is a theoretical possibility, it raises various complications. Should communally-held knowledge and resources be privatised? How will traditional

communities be able to fight in law courts if they find, say, a multinational company violating their rights? Anyway, should life forms and biotechnologies be patentable at all? Given these problems, other forms of sharing benefits have to be evolved, including payment of collection fees and product royalties to community institutions, channelising special development efforts to these communities, and guaranteeing their land rights. Consultation with community organisations and movements on this is essential.

To reap the benefits of biodiversity in the above ways, Indian biodiversity must be conserved in the first place. One immediate step is to integrate biodiversity concerns into the environmental impact assessment (EIA) system. A serious reconsideration of conservation policy and programmes is also needed, with the focus shifting from individual species to a diversity of species. Also critical, as pointed out by the environment group Kalpavriksh recently, are "legal and institutional mechanisms to ensure involvement of local communities from the stage of decision-making (including the creation and management of protected areas), complete public access to

information, and mechanisms for fixing responsibility on officials responsible for biodiversity destruction".

NGO Participation

Perhaps the best feature of the Convention process at the international level has been the openness shown towards participation by non-governmental groups and individuals. NGOs were able to attend and speak at the formal sessions of the ICCBDs, to set up lengthy round-table conversations, to interact with delegates, and to circulate documents. The Convention Secretariat extended its facilities to NGOs. On their part, the many NGOs present were well organised, holding daily strategy meetings, bringing out a regular newsletter, forging consensus statements, and constantly making constructive and critical inputs. Many government delegates were often heard quoting from NGO documents during the formal sessions, even fitting portions from such documents into their own presentations! Several NGOs across the world now interact to follow up the Convention process; the official process must remain open to this network. □

UPDATE ON INDIAN ACTIONS UNDER THE BIODIVERSITY CONVENTION '94

A number of actions have been initiated in India in response to the Biodiversity Convention. These include, apart from formal ratification of the Convention (February 18, 1994):

1. A comprehensive legislation on biodiversity, including on its conservation and sustainable use, and on the equitable sharing of benefits arising from its use. Currently the draft is in the stage of a detailed statement of principles, and work is underway to put it into legal shape. The exercise has been initiated by the Indian Ministry of Environment and Forests, and has involved various other central ministries, as also a number of independent experts.

2. A National Action Plan on Biodiversity, also dealing with the aspects mentioned above. Currently, the Plan is at the stage of an extended outline, and details are being incorporated. Though a number of governmental and non-governmental persons have been involved, there is a need for much wider consultation with local communities.

3. A meeting of Asian countries, to discuss regional cooperation on matters related to biodiversity (August 22-23, 1994). The meeting was attended by about 10 countries of the south, south-east, and north Asian region, and by a large number of non-governmental delegates.

4. A notification regulating the transfer of Indian genetic material across the borders. Drafted by a group of governmental and non-governmental experts set up by the Ministry of Environment and Forests, the notification is now being handled by the Ministry of Commerce, and is likely to be in force soon. It is, however, not yet very clear how exactly it will be administered, given the serious lack of readiness among Indian customs and scientific bodies to monitor the large-scale transfers of genetic

material that are taking place. Nor are the terms and conditions under which transfers will be allowed clear as yet.

5. A detailed status report on wild and agricultural biodiversity in India, under preparation at the Indian Institute of Public Administration. A detailed report on legal aspects is under preparation at the Centre for Environmental Law (WWF-India). In addition, a number of reports on specific aspects of biodiversity (including monitoring and evaluation, training and educational requirements, in-situ and ex-situ conservation have been commissioned from governmental or independent agencies.

6. A dialogue with industry and scientific agencies, on enhancing indigenous capacity to sustainably utilise biological resources.

7. Several NGO and local community actions relevant to the Convention. Indeed, many of the above actions taken by the government were partly a result of public pressure and concrete suggestions by NGOs. In addition, NGOs are trying to raise a debate on the various issues in the Convention, translate the Convention into some regional languages, and spread awareness regarding its implications for Indian citizens.

Many critical tasks are still needed, including, a review of development policies from the point of view of biodiversity, and reviewing the relationship of other international treaties (e.g. GATT) with the Convention.

Ashish Kothari is a member of Kalpavriksh — Environmental Action Group, and Lecturer at the Indian Institute of Public Administration, New Delhi.

NEWS NOTES AND COMMENTS



MAJOR FEATURES OF THE CONVENTION ON BIOLOGICAL DIVERSITY

The Convention on Biological Diversity, under preparation since 1988, was finalised just before the United Nations Conference on Environment and Development. At this Conference (Brazil, June 1992), a majority of the world's countries signed it. By September 1994, a total of nearly 170 countries had signed, and 89 had formally ratified it, signifying their readiness to abide by its provisions. The Convention commits countries to:

1. Develop strategies for biodiversity conservation and sustainable use, and incorporate biodiversity issues into national plans, programmes, and policies.
2. Identify and monitor important biodiversity components, and activities which have negative effects on them.
3. Establish protected areas and other means of conserving biodiversity in-situ (i.e. in natural habitats, and in the case of agricultural species, in areas where they have been developed). This includes action against any factors destroying biodiversity, restoration of habitats and species, and control of alien species.
4. Adopt measures for ex-situ conservation, i.e. outside natural habitats (e.g. gene banks).
5. The measures to respect and protect the knowledge and skills of traditional communities, and to equitably share with them the benefits that accrue to larger society from the use of these knowledge and skills.
6. Adopt economic and social incentives for conservation.
7. Encourage relevant research, education, and training.
8. Incorporate biodiversity concerns into environmental impact assessment procedures, with public participation.
9. Provide access to genetic resources, subject to the sovereign rights of each country over its biodiversity. Such access is to be on mutually agreed terms, with prior informed consent of the country providing it, and with a commitment on the country taking it to share in the benefits of utilising the resource thus provided.
10. Provide access to relevant technologies (including biotechnologies) on "fair and most favourable terms". This is subject to "effective protection of intellectual property rights" (IPRs), though such IPRs may not be imposed if they are against the Convention's objectives. Countries are also to facilitate transfer of technologies developed by the private sector.
11. Consider an international protocol on the safe transfer, handling, and use of genetically modified organisms resulting from biotechnology.
12. Contribute to a fund (applicable especially to "developed" countries) for use by "developing" countries for biodiversity conservation. Such a fund is to "operate within a democratic and transparent system of governance", and "function under the authority" of the Conference of Parties.
13. Ensure that the exercise of rights and obligations under other international treaties does not cause destruction to biodiversity.
14. Authorise the creation of a Scientific and Technical Advisory Committee, for the purposes of guiding the development of the Convention.
15. Agree to resolve international disputes on biodiversity in accordance with rules and procedures laid down in the Convention and its

Annexes.

16. In addition to the main text, three important resolutions were adopted at the time of finalising the Convention. These dealt with:

- a) accepting the Global Environment Facility as the interim financial measure for the period until the Convention comes into force.
- b) convening meetings of an Intergovernmental Committee on the convention on Biological Diversity (ICCBD) to prepare the ground for the first meeting of ratifying countries.
- c) taking steps to encourage the conservation and use of crop and livestock diversity, and to clarify the provisions relating to farmers' rights, and access to gene banks. ■

RATIFYING COUNTRIES UPTO SEPTEMBER 1994

Albania	Djibouti	Japan	Paraguay
Antigua and Barbuda	Ecuador	Jordan	Peru
Armenia	Egypt	Kazakhstan	Philippines
Australia	El Salvador	Kenya	Portugal
Austria	Estonia	Kiribati	Romania
Bahamas	Ethiopia	Luxembourg	Samoa
Bangladesh	European Community	Malawi	Seychelles
Barbados	Fiji	Malaysia	Slovakia
Belarus	Finland	Maldives	Spain
Belize	France	Marshall Islands	Sri Lanka
Benin	Gambia	Mauritius	St. Kitts and Nevis
Brazil	Georgia	Mexico	St. Lucia
Burkina Faso	Germany	Micronesia	Sweden
Canada	Ghana	Monaco	Tunisia
Chad	Granada	Mongolia	Uganda
Chile	Greece	Nauru	United Kingdom
China	Guinea	Nepal	Uruguay
Cook Islands	Guyana	Netherlands	Vanuatu
Costa Rica	Hungary	New Zealand	Venezuela
Cuba	Iceland	Nigeria	Zambia
Czech Republic	India	Norway	
Denmark	Indonesia	Pakistan	
Dominica	Italy	Papua New Guinea	

Excerpted from: Conserving life. Implications of the Biodiversity Convention for India. Ashish Kothari, Kalpavriksh Publications, New Delhi, 1994.

IMPORTANT NEW BOOK

GLOBAL BIODIVERSITY ASSESSMENT

Conserving biological diversity has become one of the major priorities for environment and development agencies. A number of recent publications, including **Biodiversity** (Wilson and Peter, 1988), **Conserving the World's Biological Diversity** (McNeely *et al.*, 1990), **Global Biodiversity Strategy** (WRI-IUCN-UNEP, 1992), and **Global Marine Biological Diversity** (Norse, 1993), have exposed the topic to scientists and policy-

makers. The Convention on Biological Diversity was signed by 157 countries at the 1992 Earth Summit and entered into force at the end of 1993, thereby creating an even greater need to analyse the practical ways in which the provisions of the Convention can be implemented.

As a major contribution to mobilising the scientific community to help provide a solid basis for further decision-making and follow-up to the

Convention, the United Nations Environment Programme (UNEP) has decided to carry out a **Global Biodiversity Assessment (GBA)**, with funding provided by the Global Environment Facility (GEF).

Using the approach developed by the Intergovernmental Panel on Climate Change for its own assessment, the GBA aims to provide an independent, critical, peer-reviewed scientific analysis of the current issues, theories and views regarding the main global aspects of biodiversity. These aspects include the characterisation, origins, dynamics, measurement, magnitude, distribution, monitoring, and multiple values of biodiversity; biodiversity and ecosystem functioning; human influences on biodiversity; conservation and sustainable use of biodiversity; biotechnology; data and information management; and communications. How much diversity exists, where it is and its state of conservation are questions answered by the **Global Biodiversity Status Report** (World Conservation Monitoring Centre, 1992). The GBA addresses more fundamental issues such as: How does one measure biodiversity in terms of species, genes and ecosystems? What is the ecosystem function of biodiversity? How may these different attributes be monitored? What are the issues involved in predicting probable extinction rates, and their impacts on people? How can biodiversity be valued in economic terms? What are the human and economic limitations involved? What are the implications of modern biotechnology for biodiversity? What is the role of humans in the loss of biodiversity, and what can people do to conserve biodiversity? As many of these issues are highly political, the solid baseline of information generated by the GBA is required to provide the objectivity necessary for progress in conserving biodiversity.

BIODIVERSITY IN INDIA

Edward O. Wilson, a renowned scientist, especially known for the theory of sociobiology and for his monumental work on the social insects particularly ants, has recently written an important book on biodiversity ("The Diversity of Life", 1992, W.W. Norton and Co., New York). Wilson estimates that a total of about 1.4 million living species have been described (of these about 7.5 lakh species are insects, 2.8 lakh species are animals, 2.5 lakh species

The GBA is divided into 12 sections, each containing one or more chapters. Prominent experts have been appointed as coordinators of each section, and contributors are now being sought from all parts of the world to represent a wide range of views. Following a series of workshops a first draft of the Assessment was produced by August 1994. This is being sent to several hundred scientists for critical peer review. One of the international workshops for this purpose was held in Bangalore in July 1994 and was hosted by Professor Madhav Gadgil of the Centre for Ecological Sciences, Indian Institute of Sciences. It was attended by scientists from such organisations as the BNHS, ZSI, and Centre for Taxonomic Studies; social scientists from the Indian Statistical Institute and Indian Institute of Public Administration; the Forest Department; NGOs such as WWF; and media personnel. The draft will be finalised during a final workshop in April 1995 prior to going to press in May 1995.

The coverage of the GBA will be comprehensive, both in terms of organisms and ecosystems. Considerable emphasis will be given to the relationship between biodiversity conservation and resource management, including sectors such as agriculture, fisheries, grazing, tourism, climate, and carbon storage, and to the social dimensions of biodiversity. The assessment will examine the current status of knowledge, identify gaps in knowledge, identify critical scientific issues, and draw attention to the issues where scientists have reached a consensus of view, and where uncertainty has led to conflicting viewpoints and a need for further research. This is a highly ambitious and challenging enterprise whose success will depend heavily on the participation and goodwill of a large number of specialists in the wide range of disciplines pertinent to biodiversity. ■

Courtesy: UNEP

are higher plants, and the rest are protozoa, viruses, bacteria and algae). Wilson further claims that since many species are still unknown and are still being discovered, the total for all living forms should be between 10 and 100 million species.

Where does India feature on this biodiversity scale? India is the natural home of several thousands of different types of creatures. Biodiversity figures (reproduced below) taken from "The Conservation



The wild buffalo — a gene bank that may have to be utilised in future

of biological diversity in India" an unpublished draft prepared by the Indian Institute of Public Administration, New Delhi (1993), and sources cited therein, indicate that in some groups, India represents quite a large proportion of the world's

flora and fauna.

There are still many more life forms to be discovered on Indian soil, many of which will soon have gone extinct without even our knowledge of their existence. ■

Group	Number of species in India	Approximate percentage world share
Sponges	516	10
Flatworms	1,650	9
Roundworms	2,850	11
Earthworms and relatives	840	7
Molluscs	5,050	8
Arthropods	60,383	6
Fish	2,546	12
Amphibians	204	4
Reptiles	446	8
Birds	1,228	13
Mammals	372	9
Bacteria	3,060	28
Ferns	900	9
Gymnosperms	64	12
Angiosperms	15,000	7

SAVING DELHI'S GREEN AREAS

A Citizens' Action Guide

Gitanjali Singhal.

pp 100, 1 map. Published by Kalpavriksh, 1994.

The loss of greenery in metropolitan cities, due to injudicious felling of trees and the building up of agricultural land, has been a concern of citizens, environmentalists and town-planners alike. Agreement on principle may be universal, but what does one do to take concrete and positive steps towards action, instead of merely mouthing platitudes ?

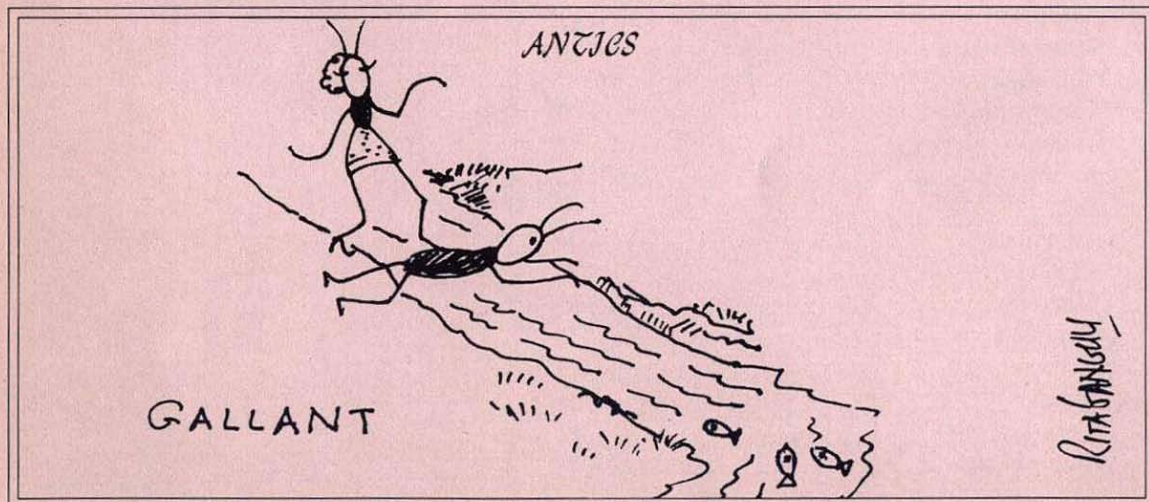
This small book has been written with the intention of providing readers with all the information required. Guidelines are provided as to whom to approach, the legislations regarding tree felling, and the application of the Wildlife (Protection) Act, 1972, which defines National Parks and Sanctuaries, and the Indian Forest Act, 1927, which defines forest areas, in addition to the Delhi Master Plan. It is pointed out that in Delhi there have been major violations of these legislations by both Government and private agencies. In Chapter 8, the writer describes past experiences of Kalpavriksh, an environmental action group of which she is a long-standing member. On the basis of this first hand information, she is well qualified to give practical advice to persons and groups who intend taking up this cause.

Useful appendices include a section on the author's research methodology in compiling this book, format for permission issued by the Deputy Conservator of Forests for tree felling, the forest and wildlife areas in Delhi, addresses of concerned officials, lawyers, NGOs and legal action groups.

The information provided would equip the reader to handle all aspects of the problem, which is compounded by the Nelson's eye attitude of government departments and obstruction by vested interests. A major area of concern is the absence of an efficient public transport system, which is responsible for the ever-expanding roadways network to accommodate private transport. This alone results in a major loss of greenery. *In toto*, the author's work is commendable, but one need shed no tears over the felling of eucalyptus (page 3); it is notorious for depleting the soil of nutrition and moisture.

South Delhi is an oasis of manicured lawns, beautiful flowering trees, wide roads and shaded avenues, though the same cannot be said of the fast expanding suburbs. Even so, Delhi is probably the greenest metropolis in India. However, the loss of traditional avenue trees like neem, jamun and pipal, and their replacement with small flowering exotics which are more decorative, will ultimately change this scenario. "Saving Delhi's Green Areas" addresses, in anticipation, the need to preserve the green cover of this historic city. □

GAYATRI UGRA



BOOK REVIEW

SPIDERS: AN INTRODUCTION

K. Vijayalakshmi and Preston Ahimaz
pp. 112 (17 x 11 cm) with numerous black and white
and colour illustrations. Madras, 1993. Published by
Cre-A: 268 Royapettah High Road, Madras 600 014.
Price Rs. 135.

This little handbook introduces the reader to some of the weirdos of Indian natural history, the children of a lesser god, the scorpions, spiders and other arachnids to whom many people may not wish to be introduced. Yet, as the authors rightly point out, this is indeed a fascinating group of animals. True, many among them, like the whipspiders and sea spiders, look as if they have been dreamed up by the special-effects man of a science fiction movie, the sort of animals one would not like to meet on a dark night. Still, from personal experience, as one who has handled them, I can say that the whipspiders (one species has been named *Phyrnicus phipsoni*, after Phipson, the virtual founder of the Bombay Natural History Society) as also the majority of other arachnids are harmless and should be left alone to pursue their part in the scheme of nature.

This well-planned and smartly produced handbook introduces the various orders of arachnids, the whipscorpions, scorpions, windscorpions, schizomids, whipspiders, harvestmen, microwhipscorpions, false scorpions, armoured bugs, ticks and mites, sea spiders and horseshoe crabs, before elaborating on the main theme of the book, the spiders. It is appropriate at this point to digress and draw attention to the fact that the horseshoe crab which had existed along the eastern coast of India for millions of years is now endangered by commercial exploitation, a victim of the new open-door national economic policy. It would indeed be tragic if a species, a "living fossil" which has existed for over 300 million years, were to be wiped out in the quest for money.

The book gives brief descriptions of the families of spiders occurring in the country and forty selected species are described and illustrated. It is a pity that the distribution of the species described is not indicated for it would have enhanced the value of the book. Common names in English have been coined. One wishes that the flower spiders, the

thomasids, had been more imaginatively named than "Tommys"! Also, *Heteropoda venatoria* is more familiarly known as the common house spider than as the giant crab spider. The selection of species for description is well done and includes all the spiders commonly seen in the Indian countryside. The reviewer is happy that *Artema atlanta* has been included. One cannot imagine a more fascinating species from its habit of rapidly vibrating up and down on the web when disturbed, and becoming virtually invisible. In my younger days, I had spent many happy hours watching this extraordinary phenomenon. In fact the "Vanishing Spider" would be a more suitable name than "Round Long Legs" as it is called in this book.

This is a book which should find a place on the shelves of all those interested in Indian natural history. It is also strongly recommended for school and college libraries. J C DANIEL



MARESH CHATURVEDI

This book will initiate you into the secret world of spiders



ELEPHANTA ISLAND

A GREAT PLACE TO WATCH FLYING RAPTORS

William S. Clark



The adult Brahminy kite in flight

Every day hundreds of tourists visit Elephanta Island, a short one-hour boat trip from Bombay Harbour. They come for a variety of reasons: to sightsee, to picnic, or to escape the noise and pressures of the city. Little do they realize that every day from late October into March — perhaps also at other times — an almost continuous raptor spectacle is taking place over their heads.

I first noticed raptors soaring over the peaks at Elephanta while bird watching there with Vibhu Prakash one morning in late October 1990. Vibhu had to return to Bombay for a meeting, so I climbed alone to the west peak to get a better look at the raptors that I had seen flying over it; during that

afternoon I observed 10 species. I have returned to the island over a dozen times since then and have seen between 10 and 18 species on every visit and have identified 23 different species of diurnal birds of prey (see Box). Some species which I was not able to record but may be expected include the Egyptian vulture (scavenger vulture), crested serpent eagle and the short-toed eagle. I have also seen an adult peregrine falcon perched on a channel marker three times during the boat rides to the island.

The best place to observe the flying raptors is the open area at the west end of the east peak. To get there go up the main stairs from the landing dock until just before the toll window. Take the trail leading



An adult black kite *Milvus migrans* silhouetted against the brilliant blue sky over Elephanta

off to the left (east) until it passes between the peaks, where there is a dirt track going up toward the east peak. Take this up until you can see some caves with ornate stone pillars on the right, go around the left

Raptors seen at Elephanta Island

Seen on every visit

Black Kite (Pariah Kite)
Brahminy Kite
White-backed Vulture

Seen on most visits

Crested Honey Buzzard
Black-shouldered Kite (Blackwinged Kite)
Shikra
Common Buzzard
Booted Eagle
White-bellied Sea Eagle
Northern Hobby

Seen on some visits

Northern Sparrowhawk
Marsh Harrier
Long-billed Vulture
White-eyed Buzzard
Steppe Eagle
Common Kestrel

Seen on one visit

Osprey
Montagu's Harrier
Long-legged Buzzard
Greater Spotted Eagle
Black Eagle
Amur Falcon
Peregrine Falcon



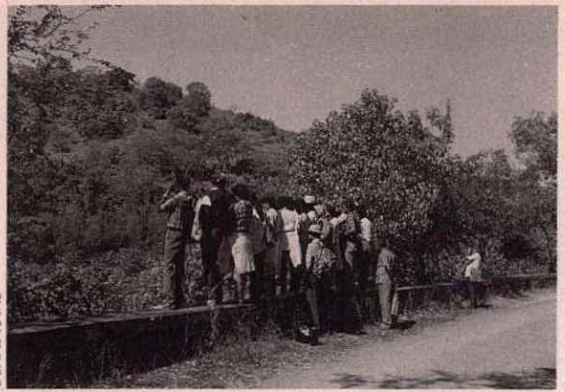
The whitebellied sea eagle can be seen soaring overhead

of the caves and climb up to the peak.

I observed many birds coming in to land on the ridge-top just east of the observation point. They were coming to drink at a pool that is filled with water in November and December.

Having observed raptors in most of the 'premier' parks in India while serving as a U.S. Fish & Wildlife Service advisor to the BNHS Birds of Prey survey project, I judge that Elephanta Island is better than most of these parks, because of the numbers and variety of species seen especially during the migratory season and has the additional advantage that the flying birds of prey can be seen closer. It is especially good for taking photographs of flying raptors.

There are several reasons why raptors are attracted to this island. Firstly, some species, especially the kites and other birds moving up and down the coast, come to take advantage of the slope lift and thermals



A group of raptor watchers from BNHS at Elephanta

found on the island but not on the surrounding waters. Many come to drink at the pond on the ridge, and some, including booted eagles, northern hobbys, and common buzzards, come to hunt. Still others, like the shikra and white-bellied eagles, are breeding residents.

The island has several good restaurants and many stands selling snacks, which make it easy for the dedicated birder to spend long hours on the island.

Anyone with an interest in birds who has a day to spare in Bombay should treat himself to a day of watching raptors on the peaks of Elephanta Island.

William Clark studied raptors in India during his association with the BNHS as the U.S. Fish and Wildlife Service advisor to the Birds of Prey Project.



The temple caves at Elephanta are carved with exquisite sculpture, notably a world renowned Trimurti, depicting the trinity of the Hindu pantheon

PARTNERS IN CONSERVATION

VISIT OF AIR CHIEF TO BNHS

The Chief of Staff of the Indian Air Force, Air Chief Marshal S.K. Kaul, PVSM, MVC, ADC, visited the Bombay Natural History Society on the 4th of March, 1994. He was accompanied by the A.O.C.-in-C of the South West Air Command, Air Marshal S.K. Sarene and A.O.C. of HQs Maritime Air Operations-Bombay, Air Vice Marshal Brahmawar. The Air Chief was received by the Director of BNHS, Dr. Jay Samant, at Hornbill House. Prof. A.M. Bhagwat, Honorary Secretary of BNHS, presented a welcome address. Major Arun Phatak introduced the Air Chief.

This was followed by a presentation by Dr. S.M. Satheesan, the scientist in charge of research on prevention of birdstrikes on aircraft. This study has been carried out by BNHS from 1966 to the present. Dr. Satheesan explained the implications of the findings and conducted the Air Chief through the exhibits pertaining to bird hit problems. The

Air Chief expressed appreciation of the work done by BNHS all these years to reduce bird strikes. He especially appreciated the study of 33 aerodromes all over the country, as part of the research programme on birdstrike prevention. He also stressed the importance of ecological methods as well as a public awareness campaign to contain the bird menace. He said that some trees and vegetation are required inside military airfields for camouflage of vital installations and the Air Force wants technical advice from the BNHS as to the selective felling or retention of tree species.

The Air Chief also examined a display of rare books, and of bird skins of species problematic to aircraft. He praised the work done by BNHS in the field of research in natural history. Air Chief Marshal Kaul expressed a desire to visit BNHS again soon, which was reciprocated by all the members and staff of BNHS. □



Air Chief Marshal S.K. Kaul being escorted through the exhibition of bird specimens. Dr. S.M. Satheesan explains, while the visitors look on

The Bombay Natural History Society (BNHS) started the study and conservation of India's fauna and flora way back in 1883. In the early years of its existence, identification, documentation and collection of India's flora and fauna through expeditions was emphasised. For the past few decades the BNHS has been providing a scientific basis for conservation programmes through studies conducted in the Bharatpur Bird Sanctuary, the Gir lion and the flamingoes in the Rann of Kutch, to name a few.

The need for involving people in nature conservation is being felt at all levels both in India and abroad. The role of the common man is crucial as he is a sufferer as well as the perpetrator of the over-exploitation of natural resources. The BNHS, having understood this, has initiated efforts towards improving the interaction between Man and the environment. The Conservation Education Project (CEP) was conceived in the centenary year of the BNHS in 1983 and launched in September 1993.

The CEP aims to build peoples' support for conservation of natural habitats and their sustainable utilisation. Three important protected areas in India with a rich biodiversity have been chosen for the first phase of the 3 year study. The project areas are Keoladeo National Park in Bharatpur, Rajasthan, Sanjay Gandhi National Park in Borivli, Maharashtra, and the Mudumalai Wildlife Sanctuary in Nilgiris, Tamil Nadu.

Initiation

At the outset, the team members visited the field stations to find for themselves the exact field conditions, met and familiarized the respective forest department staff and the locals with the project.

A Project Orientation Workshop for the team members was conducted in September 1994 by our technical advisers from the Royal Society for the Protection of Birds (RSPB), David Elcome, Head of Education and Kenneth Smith, International Officer. The workshop dealt with knowing the project, its aims and objectives, project planning, project phases, need for a Baseline Survey, potential educational methods, Interpreting Conservation Education Centre, project logo, and evaluation.

Collection of Baseline data to look into the

problems of conservation in the area and practices of local people formed the first phase of the project. Specifically, data were collected during an initial survey on the interaction of different target groups with natural resources, man - wildlife conflicts and available communication media and the media preferred by different target groups.

An interview schedule was designed by the team members to obtain data on demography, literacy levels, crop pattern, sources of drinking water, cooking fuel (firewood/cowdung), animal holdings, hunting practices, predators, forest resource use and possible impact of the protected area on the life style of the people. This data formed part of the educational programmes, and will also be reference material for the team members. This interview schedule was pretested in the Sanjay Gandhi National Park and modified accordingly.

An attitude-awareness survey was designed by the team members, which gave a fair idea of the attitudes of locals towards wildlife, forests, management authorities and legislation. The survey was carried out in all the three field stations.

The awareness survey was meant to judge the extent of people's insight into the problems that they face in their every day life and also to understand their knowledge of environmental aspects.

Control Area

The Conservation Education Project aims to bring about awareness and a positive attitude towards sustainable use of the available natural resources.

A control area has been chosen where none of the CEP educational methods are administered but dependence on forests is more or less identical. A comparison of attitude changes between target areas and control areas will indicate the success of the project.

Workshops

A series of workshops have been conducted for effective exchange of ideas with technical experts from RSPB.

During one workshop in February 1994, Dr. K.C. Malhotra a renowned social anthropologist whose work with the nomadic tribes of Maharashtra is well known, discussed rapport building methodologies for



Village children participating in a tree planting programme at Goregaon

team to income-generating projects. Technical sessions on cattle breeding, sericulture, vermicomposting, raising a nursery, mango orchard project, and non-conventional sources of energy systems. All this was supplemented with field visits and interviews with the beneficiaries. The concept of integrating such a programme into the CEP was also investigated.

The next phase of the project was the experimental education phase wherein education programmes were field tested in a sample village to identify effective approaches and media. Six months of this phase are now complete.

This helped the teams to build up a good rapport with the villagers, children, local leaders, NGO's and the forest staff who participated in many of the programmes. The messages were kept as simple as possible and active participation of the audience was sought to make sure that the messages were understood.

Slide talks, posters, nature trails, group meetings, demonstrations of alternate energy sources, songs, street plays, eco-rallies and nature games were among the methods used.

The team members have returned after a successful fifteen day visit to the U.K. in September '94. Experts from the RSPB and International Centre for Conservation Education lectured on communicating on the environment

through games as well as participatory rural appraisal techniques with case studies in Kenya. Time management, presentation skills and case studies on environment programmes in Ghana and Sierra Leone were discussed. The development of an environment education programme for children younger than five years was also discussed.

The member of the team was placed with a local wildlife trust U.K. for two days with the objective of discovering the philosophy of the organisation which was communicated to visitors through the development of materials, interpretive displays, visitor programmes educational activities as well as the general ambience of the site, attitudes of staff and volunteers. The evaluation techniques used by the organisation to assess their effectiveness in achieving their communications objectives were also reviewed.

The lessons learnt from this exercise are being incorporated into the CEP programmes and there appears to be a positive feedback from our target groups.

The project has moved into the second half of the experimental education phase in which education resource materials will be produced, field tested and standardised to suit local needs. These will be available for use by any NGO or non-NGO in the project field areas. □

CONSERVATION NOTES

MELGHAT TIGER RESERVE

"For Whom The Bell Tolls"

On 24th December 1993, the State Legislative Assembly passed a resolution purportedly under section 26-A (3) of the Wildlife Act reconstituting the Melghat Tiger Reserve and Gugamal National Park by denotifying over 500 sq. km of the existing sanctuary area. Environmentalists reacted immediately, protesting against the resolution and pointing out that it was a disastrous blow to prime forest lands and the wildlife therein. They have argued that any reduction in the area of the tiger reserve is very much against the species' survival in the long run.

This picturesque tiger reserve, straddling the Satpuras in Amravati District of Maharashtra, is one of the last undisturbed stretches of forest in the state. Fortunately for environmentalists, the

denotification has been checked for the moment by a stay order obtained from the Nagpur bench of the Bombay High Court, by the Bombay Environmental Action Group. On the outcome of this petition hinges the fate of several such protected areas in Maharashtra, reportedly earmarked for similar denotification, like the Koyna Wildlife Sanctuary, Bhigwan Wildlife Sanctuary and the Malvan Marine Sanctuary.

The 1,600 sq. km reserve of which about 308 sq. km forms the core or the sanctum sanctorum now stands reduced to 1144.53 sq.km. Because of the very high commercial value of Melghat's teak and bamboo forests, the emphasis seems to be more on the revenue aspects rather than on increasing the core area of the reserve. On top of all this, we face



Poached out — the pride of Melghat

the grim scenario of denotification.

The Melghat forests have enjoyed statutory protection for more than a century. The Bairagarh and Gugamal forest reserves were constituted in 1866 and 1876 respectively, under the Berar forest laws. On 25th November, 1913, the erstwhile Central Provinces issued a notification under the Indian Forest Act of 1878, whereunder 15 designated blocks of forest land were declared as reserve forests. In June 1969, wildlife in the region received special statutory protection when the state government constituted an area of about 381.59 sq. km as the Dhakna-Kolkaz game sanctuary. The Melghat forests were regarded as an ideal habitat in which to develop a viable tiger population. These forests were constituted as a tiger reserve in 1974.

The state government has purported to denotify one-third of the sanctuary under the guise of altering the sanctuary boundaries under section 26-A (3) of the Wildlife Act. The resolution is vague, as it does not specify the areas of the sanctuary that are proposed to be denotified. There is no map or boundary demarcation or mention of the survey block numbers to indicate which 500 sq. km are to be denotified.

If the Government's intention is to avoid shifting villages then the argument is totally specious. Recognising the economic and social difficulties involved in resettling villagers living within a sanctuary, Parliament amended section 24 of the Wildlife Act in 1991 to permit villagers to remain within a sanctuary. Hence after 1991, resettlement

of the villagers and/or acquisition of such lands by the state government is no longer mandatory. The villagers within Melghat Tiger Reserve may continue to remain within its boundary. Nevertheless, the ostensible reason for denotification is the difficulty in translocating about 37 villages of the total 59 villages within the limits of the sanctuary. All these villages are in the buffer area and occupy only 76 sq. km.

Melghat Tiger Reserve is a vital water catchment area of central India. It is because of the protection afforded to "habitat" that water tables underground and overground are recharged in the natural course. This also prevents soil erosion and in fact improves soil productivity over a much larger area. Consequently, the statutory protection afforded to the reserve is actually not only beneficial to the wildlife therein, but also to the human population outside the reserve.

Ecodevelopment is now an avowed national policy of India. Hence the present resolution, it is argued, is completely irrational and will create the biggest natural imbalance for the poorest of the poor in India.

Besides the tiger, the sanctuary is home to the panther, wild dog, hyena, sloth bear, gaur, sambar, cheetal and reptiles like the marsh crocodile, monitor lizard, Russell's viper and the python.

Today we are smug in the feeling that it is a distant chiming of the bells, but we forget that the bells toll for us indeed. □

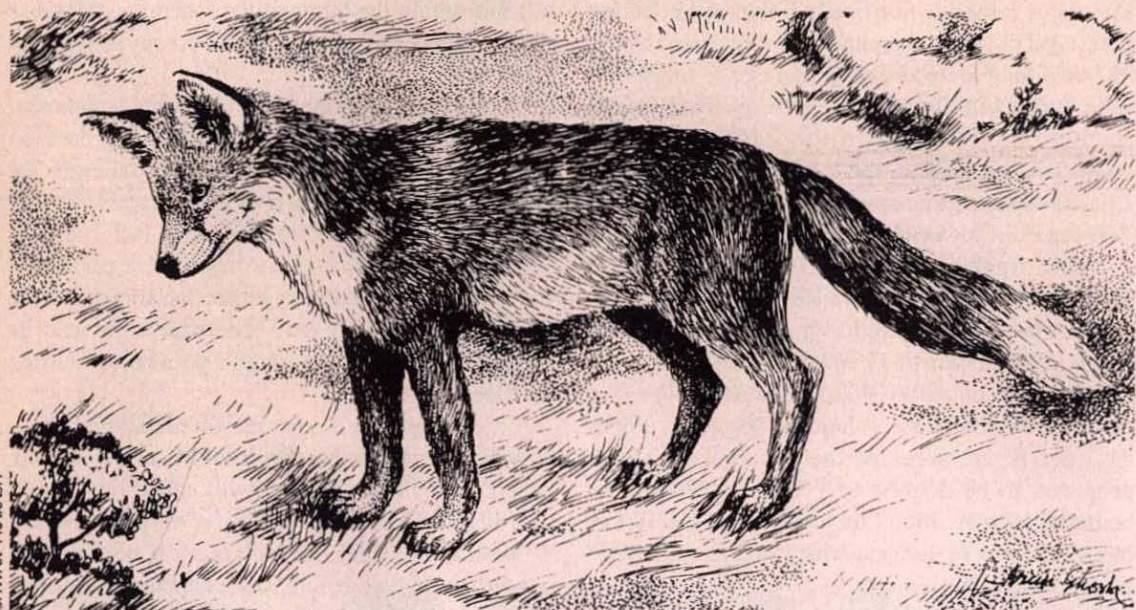
Compiled by S. Asad Akhtar, Conservation Officer, BNHS.

BIRDS OF MELGHAT

Melghat has a rich bird life with more than 250 species belonging to 54 families. Eagles and falcons are found associated with steep hillsides and cliffs while hawks and hawk eagles are found all over. The crested serpent eagle is a prominent bird. Its high pitched call is often heard as it flies overhead. Waterbirds are seen in the Sipna and Tapi rivers during winter. There are few lakes in Melghat and these are mostly small hence waterbirds are not very diverse. Owls are usually seen in the large trees that border the streams and river particularly the brown fish owl. Birds which are partial to human settlements are seen in the fields and villages. There is a recent record of the black woodpecker in Melghat while the forest spotted owl was last recorded in 1914. The stork billed kingfisher is seen in only one or two localities. The fairy bluebird too is reported to have occurred in Melghat in the past but is seen no more. Such names should prove a challenge to the dedicated bird-watcher.

THE HAUNTING DESERT

Ishwar Prakash



The desert fox, one of the important mammals of the Thar desert

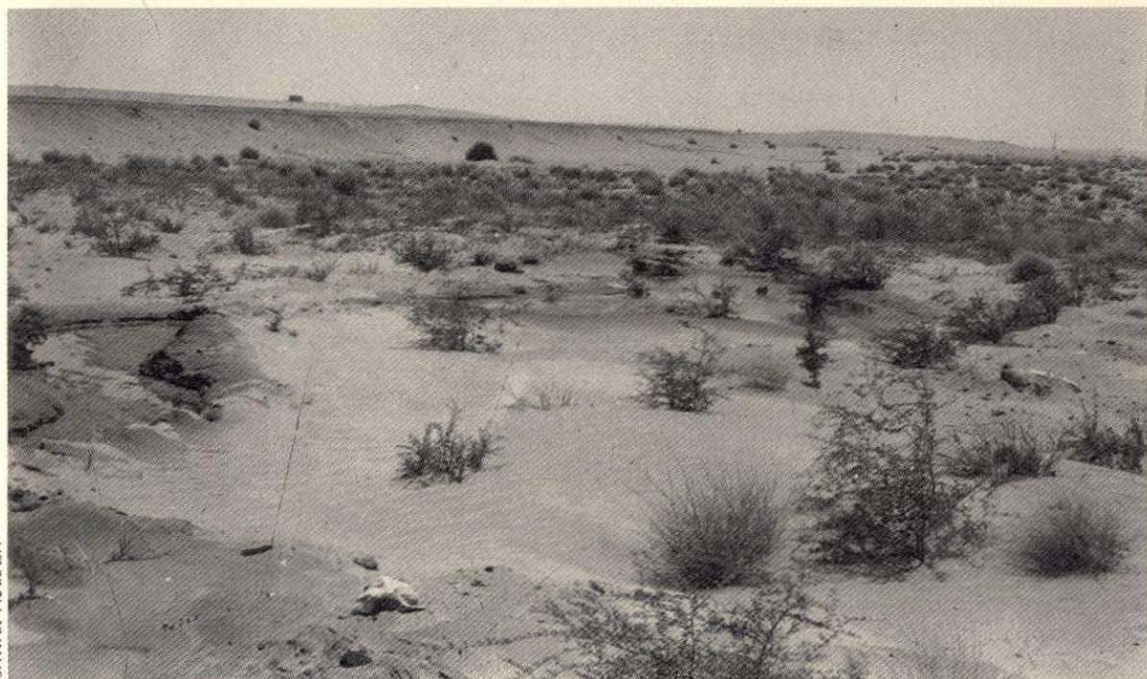
Pilani was a formidable place in 1950 but my stay there left me infatuated with the desert environment. From our hostel to the College of Science we used to walk about 10 kilometres every day through sand and shrubs, watching coveys of partridges, quails, flocks of larks and Indian coursers. The desert gerbils (*Meriones hurrianae*) were abundant, popping their heads from burrow openings and ducking as they perceived danger.

During the evening walks the scenario changed, hedgehogs (*Hemiechinus auritus collaris*) emerged from their shallow burrows, the nocturnal gerbil *Tatera indica* ran from bush to bush in search of food. The lamp posts exhibited a complete food chain, innumerable insects, one or two predatory *Galeodes agilis*, some toads and the viper *Echis carinatus* lurking in the shadow of the post waiting for a chance to prey. A city dweller in the xeric wilderness, I was fascinated by the beauty of the desert. The burning sand cooled down with moonlight. The aroma of the flowers of *Capparis decidua*, the whispering wind singing through the leafless branches of the deserticolous shrubs *Leptadenia pyrotechnica* and

Calligonum polygonoides bewitched me. I never wanted to go out of the desert. As luck would have it, born and educated in the arid environment, I completed my service career in the Thar, trying to unveil the mysteries of desert life!

At Pilani, I had developed the hobby of going through the back volumes of JBNHS and had gathered that the BNHS Mammal survey teams did not visit the desert of Rajasthan. So I relinquished a gazetted post of lecturer and joined a UNESCO Programme with Prof. D.K. Mathur at Jaswant College, Jodhpur, to study the ecology of desert vertebrates.

Collection equipments were acquired quickly, and I was ready for my very first scientific expedition into the desert — destination Jaisalmer via Barmer which was connected by railway but, further, I had to take a bus that plied just once a week. It was a 16-seater but more people were sitting on its top. Being *safed-posh*, I was given a seat next to the driver. I was taken by the village headman to his hut and I was his guest till the arrival of the next bus, a week later. While departing, I enquired about paying for



The monsoon brings a revival in the desert with bushes and scrub coming up amidst the sand dunes

the food and stay. "No charges from a *pahuna*" (a welcome guest). This was 1953. Today, the whole desert is "civilised" and one has to pay for every thing.

At Sheo, the helpful village headman had arranged a camel for my survey work for Rs. 2/- per day. This was changed to a bullock cart for the same price after I had fired my gun at or running desert fox from camel back and the beast panicked, throwing me off to sustain scores of bruises. From both my slow-moving carriages, I could survey long stretches of desert. The desert fox *Vulpes v. pusilla* was most common. I saw 10 or 12 different animals every day. However, a few years ago I did not see a single fox near Sheo, in a 30-40 km run. This charming creature is hounded by hide traders. I used to see a few desert cats *Felis libyca ornata*, but they were not as common as the fox.

Another spectacular sight was a desert monitor *Varanus griseus*; so large that it looked like a small crocodile. Running fast, with its body lifted 12-15 cm above the ground, it won the race against the camel and I couldn't collect it. Monitors were quite common but more abundant were the diurnal *sanda*, supposedly having much sought-after aphrodisiac properties. These spiny-tailed lizards *Uromastix hardwickii*, were once common up to Jaisalmer.

After a fruitful week-long stay, I boarded the bus for Jaisalmer. At about 7 p.m., the bus broke down and we were stranded 3 km short of Devikot. The driver announced that every one should climb onto the top of the bus till morning as the region was infested with the *phoorsa* viper and the *pivna* krait *Bungarus caeruleus*. He had to walk to Jaisalmer to fetch help. My halt at Devikot was most eventful. The policeman arrived with a lantern in hand after hearing about our predicament from the bus driver. My name is I.P. but the *thanedar* made me a V.I.P. by escorting me to his *chowki*. On our way, with my powerful torch, I watched 9 *Echis* vipers in a 3 km-long walk, coiled in their typical fashion over dried cow dung and so well camouflaged. The population of this viper today is as large as it was in 1953. A gun shot awoke me around 4 a.m. and I found that my musket was gone. I panicked but soon the policeman returned with it and a desert hare *Lepus nigricollis dayanus*. Later, we had a delicious breakfast. Believe it or not, the bones were thrown to a goat tethered nearby and it crunched them with great relish!

In the light of the stars, I went out of the fortress which housed the *chowki* and collected a hedgehog and several nocturnal lizards *Stenodactylus orientalis* and *Cyrtodactylus scaber*, one viper and a sand snake



The desert dwellers welcome these demoiselle cranes with kurja songs

Psammophis schokari. This creature can move even faster than the rat snake *Ptyas mucosus*. In a few hours before dawn, my collection exhibited such a wide species diversity, but today the numbers of even such unexploited animals have declined.

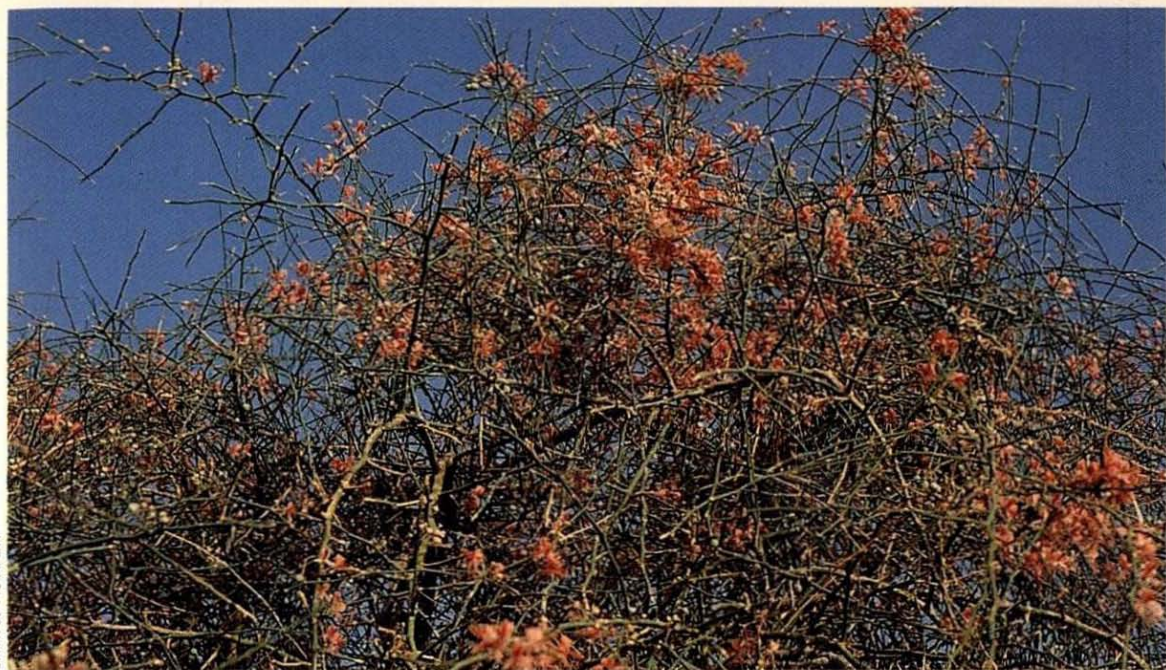
The sunrise over the vast horizon of sand dunes was vibrant with divine grace. At about 8 a.m., a curious noise in the sky attracted my attention — and what a sight it was — clouds of common sandgrouse *Pterocles exustus* were landing on a rain water pond near the fortress. Till 8.45 a.m. flock after flock poured in to have a drink. That morning my estimate was 10,000 sandgrouse. The memory of the sight is deeply imprinted in my brain, though the flock sizes have gradually reduced. Presently one would be fortunate to observe 200 sandgrouse in a flock, that too during summer when drinking water sources are restricted.

After this, I went out on a collection spree. I was warned by the *thanedar* that I should not wander far as the region was dacoit-infested. However, I lost my way and was happy to see four camel riders approaching. On looking closer, I saw that their faces were masked. Dacoits? They were huge fellows and their camels were extremely stout. One fellow jumped off his mount and faced me. Trembling, I

was unable to answer any of his questions; he snatched my gun, examined it and shouted “*Dhokomaro* (musket) hai”. He caught hold of my wrist in a powerful grip, and examined my watch. It was an old one, my mother’s. All the four surrounded me and were quite amused to see a sand boa *Eryx conicus* in one of the cages, and a large number of beetles in a jar. I had regained normalcy and explained to them the purpose of my visit. Getting nothing from “*Topi wala saab*”, they not only let me go with my gun, but also directed me on how to return to the *thana*. The *thanedar* was down below the fortress with my luggage, awaiting my arrival. By evening I was in Jaisalmer.

The Jaisalmer-Pokran-Phalodi region was an animal lover’s paradise, with herds of *Gazella gazella bennetti*, each with 200-300 graceful animals. They would feed fearlessly on a variety of grasses, and browse on almost all the shrubs, *Zizyphus nummularia* being preferred. In the sixties, 8-10 years later, the herd size dwindled to 50-100, then to 30-50 in the seventies and at present 2-6 pairs only. What a regrettable loss!

In the Pokran - Bhiniyana region, up to the sixties, during winter, I have watched flocks of 500-1000 imperial sandgrouse *Pterocles orientalis*, clouds of



The flowers and fruits of *Capparis decidua* are an important component of the desert food chain

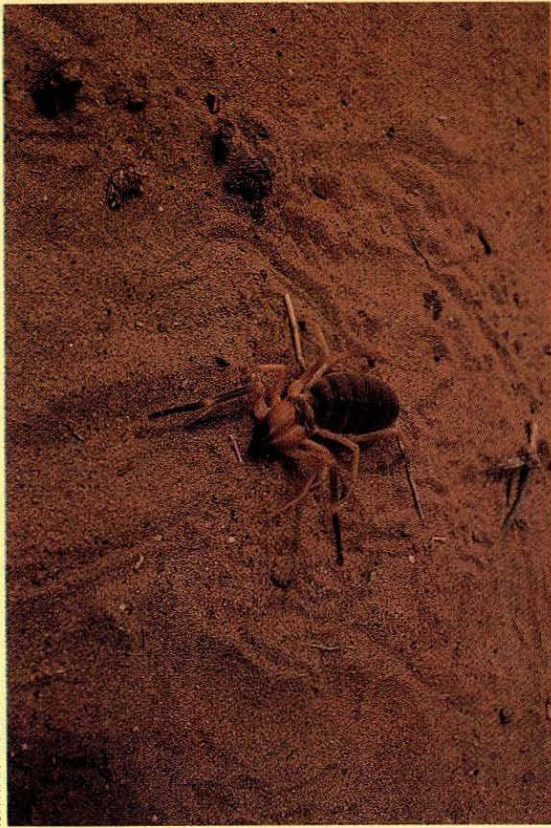
Calandrella larks, rosy pastors *Sturnus roseus* and spotted starlings *Sturnus vulgaris*. Large flocks of demoiselle cranes pass through this region early in September but do not land. Their favorite grounds are around the Jodhpur-Nagaur region. Even the migratory birds are fast vanishing from the desert scene.

The damage to wildlife in the desert has been more due to habitat loss than to persecution. During the last forty years the escalation of the *Homo sapiens* population in the desert has been quite alarming, from 3.4 million (1901) to 23.2 million (1994) and that of livestock from 13.4 million (1981) to 23.3 million (1991). Cultivation of marginal lands has increased manifold and overgrazing is rampant. The monsoon greenery is transient, mostly unpalatable herbaceous cover. Even the regeneration cycle of most perennials has been upset. Unless a strict grazing policy for the Thar desert is promulgated and enforced, there is very little future for wild animals. The grazing pressure is too much for the healthy survival of herbivores. It is only due to their extra-ordinary adaptability to the extreme paucity of food, water and the harsh xeric environment, that they are still surviving. Given the slight fillip of protection as in the Desert Park or around Bishnoi village complexes, they can reclaim

the glory of the past. The wildlife section of the Forest Department must give serious thought to translocate the excessive populations of blackbuck and chinkara to reduce their pressure on Bishnoi crops, so that the dampened will of the Bishnois to protect them is reversed.

Eighty percent of desert mammals are nocturnal and to observe them in their natural environment, I used to walk at night with a petromax in one hand and a stout stick in the other. During the winter of 1964, at Gadra Road, only five kilometres from the international boundary, I was collecting *Gerbillus gleadowi* at night, standing on the running board of the moving jeep and scooping up the rodents with a butterfly net. That night was especially rewarding — 30 live gerbils. At midnight, I was alerted by a chorus of "Halt". Panicking, I thought "Have we crossed the international boundary?" Our jeep was stopped by about 20 soldiers with their machine guns pointed at me who took me to the Company Commandant. He was quite amused to see the gerbils in the cage and a Government of India vehicle. He politely told me that seeing the blazing lights of a vehicle moving in different directions so close to the border at midnight, he took me for a smuggler.

After being released by the Gorkhas, I returned to my hut, to see the most amazing spectacle of my



ISHWAR PRAKASH

The predatory *Galeodes* ventures out after dark

life. The lantern we had left behind was surrounded by several thousands of blister beetles *Mylabris phalerata*.

Some years later, while surveying the Shahgarh bulge, west of Jaisalmer, a treeless arid region, I reported a new lizard, amazingly abundant, which was later described as *Phrynocephalus laungwalensis* Sharma. This desolate part of the desert was teeming with animal life, dung beetles in thousands, briskly rolling dung, and blood-sucking mites. We collected 24 *Gerbillus gleadowi* in a single line of 30 snap traps. In such harsh climatic conditions, such an abundance of animals is beyond my explanation.

The south-western area of this extremely arid area comprises a belt of longitudinal dunes, 30 to 40 metres tall, occupying an area of 40 km². The interdunal valleys are well vegetated due to the availability of water. Healthy *Prosopis cineraria* trees and *Calligonum polygonoides* shrubs occur in this stabilised, sand hill system which looks like a forest during the monsoon. A number of porcupine quills were collected, revealing the presence of the

porcupine *Hystrix cristata*, — a new habitat — as usually it is found in rocky habitats elsewhere in India.

Jodhpur surrounded by hills was once full of sounders of wild boar, under the protection of the erstwhile Maharaja. They visited the town at night, making it dangerous to venture out after dusk. This was upto the 1920s. During 1954, I saw only one sounder of about seven wild boar *Sus scrofa cristatus* at Sardar Samand. These have vanished, like the panthers once common over the Jodhpur hill.

Bishnoi village complexes around Jodhpur, now declared protected areas, carried a large number of blackbuck *Antelope cervicapra rajputanae* and the Indian gazelle. In the fifties, I used to watch 3 groups (at Dhawa, Peench, Gudha) with about 6000, blackbuck in each; closely associated with each were up to 1500 gazelles; now only a few remain. The younger generation of Bishnois is hostile, as the ungulates inflict severe damage to the crops. Educational programmes have become a must to restore the faith of the community in conservation.

After the infamous emergency, the situation has improved. People in the area are conscious of the consequences of shooting and populations of desert wildlife species like grey partridge, quail, sandgrouse, and the migratory Macqueen's or houbara bustard have built up, but most mammals are still scarce. Due to the phenomenal increase in the area under double-crop cultivation, man's intervention is leading to the ecosystem being used as a future land bank.

Men and livestock leave no solitude for the wildlife. However, the blue bull *Boselaphus tragocamelus* has multiplied manifold. Nobody kills them as they are considered to be "gai" or holy cows, though they are the most severe pests of *rabi* crops and orchards. Grassland rodents too, have multiplied with green food all the year round and they ravage the standing crops.

To stop the adverse impact of excessive cultivation on wild animals, it is necessary to declare small national parks and protected areas scattered all over the desert for wildlife conservation. The law should be strictly enforced. This appears to be the only hope to conserve wildlife in the Thar desert. □

Ishwar Prakash has studied desert vertebrates for four decades. Superannuated as Professor of Eminence from the Central Arid Zone Research Institute, Jodhpur, he is working at the Desert Regional Station, Zoological Survey of India, Jodhpur, as a Senior Scientist of the Indian National Academy of Sciences.

THE LAST FLOWERING FOR THE 20TH CENTURY

Strobilanthes kunthiana

K.M. Mathew

This folklore plant that bursts gregariously into flower, clothing entire hill slopes in mauve-violet blossoms, like some standing crop, is a household word on the Western Ghats of South India where the plant is endemic. Right on schedule, the blossoming of the *kurinji* started by early summer in 1994 on the Palni Hills and continued for some months. Since 1838 this is the 14th recorded consecutive flowering at regular 12-year intervals in the Nilgiris and the Palnis.

The plants start flowering simultaneously and continue to do so for months, after which the plants die and the next generation takes 12 years to flower; this clear periodicity makes for a sort of folk calendar, especially in rural settings. A rich harvest of honey is available during this mass flowering. During the 1922 flowering, 32 colonies of the rock bee (*Apis dorsata*) were counted on a single rock, 28 on a single eucalyptus tree, and 7 on the corridors of Sacred Heart College, Shembaganur. No wonder this folklore plant has found a place in literature that is at least 2000 years old; also the occurrence of these plants on the hills rather far away from habitations in the plains gave them an aura of otherness, the best illustration being the Kurinji Andavar Temple (the temple of the Lord of *Strobilanthes*) at Kodaikanal.

It may sound strange, but it is quite true, that

hardly any new worthwhile comprehensive scientific studies have been made on this extremely interesting group of plants which are marked by periodicity of flowering. Even though the 12-year periodicity is fairly certain for this species, out-of-step flowerings do occur. To take an example, on the Servarayan hills (Shevaroy), the last two flowerings were in 1980 and 1992, about two years ahead of the schedule for the Nilgiris and the Palnis. Even on these hills, sporadic flowerings, especially close to the general flowering, are common. This need not surprise us, since man-made labels and calendars need not circumscribe nature's laws adequately and follow their own schedule.

As far as popular reports on flowerings of "*Strobilanthes*", often referred to only by the vernacular name, due caution is in order. The reference is clearly to the genus *Strobilanthes*, or even to a related genus, rather than to any

particular species. In fact, there are related genera the flowers of which can be mistaken for *Strobilanthes* and with similar-sounding vernacular (Tamil) names.

The study of the physiology over the maturing years of these plants may throw light on the long intervals between flowering. Why and how is the flowering hormone released in such abundance? Why do the plants die after flowering? Do all the viable



The twelve-year wonder in bloom on a hillside



The mythical flower, in a riot of mauve over the hillside

seeds germinate simultaneously during the year following their dispersal? Can seeds be kept viable for several years, so that if some of these could be germinated and planted out every year for 11 consecutive years, flowering thereafter should be every year?

The gregarious flowering of kurinji and its impact on people at large can serve as a means of monitoring the environment in various ways. Comparisons with data on previous flowerings can indicate how rapidly the primary vegetation is disappearing. During this year's flowering (the fourth I am witnessing), I surveyed the Palni Hills extensively. On the Palni Hills plateau, these plants have disappeared where gregarious flowerings were reported formerly. Commercial species like wattle, pine and eucalyptus introduced on a war-footing during the past four decades have definitely taken over, in addition to agricultural lands, so that the entire plateau is now effectively an environmental wasteland as far as primary vegetation is concerned.

This is the last gregarious flowering for this century. The next is due in 2006. Will there be one? Even if it does occur, how impressive will it be? That depends on what we do *now*. It is obvious that the few tracts of plants still intact are there by neglect, not by design! These tracts were too steep, or

inaccessible for 'development'!

The plea to preserve *Strobilanthes* is no mere elitist ivory tower counsel. This plea is an integral part of the case for preserving the primary vegetation, not as a luxury but as the very basic condition for the well-being of the ecosystem. The primary vegetation, besides its role in aesthetics, and biodiversity conservation, safeguards watersheds which are so vital for all forms of life. Humans should realize that they are only one species in the ecosystem, and that the role of manipulator they arrogated to themselves since the industrial revolution should be repudiated on behalf of other forms of life on the planet.

There is a slope near Kodaikanal, contiguous with Coaker's Walk, that has an intact population of the plant. The steepness of the slope, the precipitous boundaries on two sides, and larger land holdings on the other two sides have saved this population.

Proposals have been sent to the Tamil Nadu Forest Department and the Palni Hills National Park Committee to include this slope under the Pambar Shola Nature Reserve. If this slope can be preserved, it will indeed be a fitting gift for the next century. □

K.M. Mathew is Director of the Rapinat Herbarium, Tiruchirapalli (Research base) and of the Anglade Institute of Natural History, Kodalkanal (Environmental base). His acquaintance with the Palni Hills extends over four decades.

NATURE ALIVE



E.P. GEE

The Khasi pitcher plant *Nepenthes khasiana*

The pitcher of the endangered Khasi pitcher plant has a lid formed by the extended tip, or tendril, of the modified cup-shaped leaf. Insects which land on the inside of the pitcher fall into a pool of sticky fluid below. This fluid is taken orally to treat urinary infections and applied to locally for eye infections by the inhabitants of Garo, Khasi and Jaintia hills where this plant is found.

To attract its prey, the inner wall of the pitcher is coloured bright red. *Nepenthes* secretes a slightly acidic fluid into the pitcher from small glands lining

the inner surface of the pitcher. The glands also secrete special protein-digesting enzymes, including nepenthesin, a chitin-digesting enzyme similar to pepsin. The body wall (exoskeleton) of the insects comprising the food of *Nepenthes* contains chitin, a nitrogen-rich protein. *Nepenthes* is capable of digesting this virtually indestructible material. By obtaining essential nutrients in this way, carnivorous plants, such as this pitcher plant, are able to survive in poor soils and mineral-deficient habitats. □

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**PADMA VIBHUSHAN DR. SALIM ALI
BIRTH CENTENARY YEAR
NOVEMBER 1995-1996**

The Birth Centenary year of the late Padma Vibhushan, Dr. Salim Ali, ex-President of the Bombay Natural History Society will be celebrated with a variety of programmes in which the participation of his friends, admirers, well wishers and the general public is invited. The following are some of the programmes contemplated:

Salim Ali International Awards for outstanding work in Field Ornithology/Nature Conservation.

Salim Ali Young Scientist Award for outstanding research work in the field of Natural History, Conservation Biology or Restoration Ecology.

Salim Ali Memorial Lecture by an eminent person in the field of Natural History and Nature Conservation from India or abroad.

Salim Ali Memorial International Seminar on Ornithology and Nature Conservation on issues related to nature conservation.

Dedication of the BNHS Conservation Education Centre at Goregaon, which is an outcome of the vision of the late Dr. Salim Ali. The Centre will be dedicated to the nation in his memory on 12-11-1995.

Release of Commemorative Stamp on Dr. Salim Ali during the Centenary Year.

Exhibitions at Bombay and other places on Natural History and Wildlife on coins, Ornithological Surveys by Dr. Salim Ali, History of the BNHS, Wildlife and Nature paintings.

Other activities include Workshops, symposia, regional meetings of NGOs, publication of revised and enlarged edition of the **Book of Indian Birds** by Dr. Salim Ali, special issue of the **BNHS Journal** and **Hornbill**, release of **Bird Call Cassettes**, fund raising to augment the Dr. Salim Ali Memorial Fund to perpetuate the work done by him and by the BNHS for the study and conservation of nature.

We invite you to participate and help to make the celebration a success.
For details contact the Director, Bombay Natural History Society, Hornbill House,
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