NATIONAL POLICY AND MACROLEVEL ACTION STRATEGY

ON

BIODIVERSITY

GOVERNMENT OF INDIA

MINISTRY OF ENVIRONMENT & FORESTS

NEW DELHI

1999

Published : December, 1999

Published by the Director, Zoological Survey of India, for the Ministry of Environment and Forests, Govt. of India. The funds for publishing this document were made available by the UNDP from the UNDP/GEF Biodiversity Enabling Activity Project on the Preparation of India's First National Report to the CBD.

सत्यमेव जयते

टी. आर. बालू
T. R. BAALU

मंत्री
पर्यावरण एवं वन
भारत सरकार
नई दिल्ली-110003
MINISTER
ENVIRONMENT & FORESTS
GOVERNMENT OF INDIA
NEW DELHI-110003

PREFACE

Biodiversity is vital for the survival of this planet and for continuation of evolutionary processes. Biodiversity has direct consumptive value in food, agriculture, medicine and industry.

We can understand biodiversity to mean variety of life forms we see around us. The issues relating to biodiversity are however extremely complex. While utilisation of biological resources is essential for human welfare, it is equally essential to conserve these resources for future generations. The challenge lies in adopting a path of utilisation which does not conflict with conservation of biodiversity and also ensures benefit sharing arising from its use.

India has a long history of conservation and sustainable use of natural resources. Strategies and plans for the conservation and sustainable use of biological diversity are rooted in the rich spiritual and cultural traditions of our country.

Over the years, India has developed an organisational structure and a legal and policy framework for the protection of environment and wildlife in the country. After becoming a Party to the Convention on Biological Diversity in 1994, India has taken many important steps in further strengthening the existing strategies. In order to consolidate, adapt, and augment existing strategies and to initiate new programmes based on a sound coordinated policy for future actions, this Ministry after wide-ranging consultations with all stakeholders, has developed this National Policy and Macrolevel Action Strategy. This document will provide the framework for preparing detailed action programmes at the microlevel for conservation and sustainable use of biodiversity in the country.

T R Baalu

(T.R. BAALU)

30th November, 1999
New Delhi.

विश्वनाथ आनंद
VISHWANATH ANAND

सत्यमेव जयते

सचिव
पर्यावरण एवं वन मंत्रालय
भारत सरकार
SECRETARY
MINISTRY OF ENVIRONMENT & FORESTS
GOVERNMENT OF INDIA

Foreword

India is one of the 12 megabiodiversity countries of the world. With only 2.4% of the land area, India already accounts for 7-8% of the recorded species of the world. India is equally rich in traditional and indigenous knowledge. The Convention on Biological Diversity offers opportunities to India to realise benefits from its rich biological resources and associated traditional knowledge.

Biodiversity is a multi-disciplinary subject involving diverse sectoral activities and actions, and has a large number of stakeholders. For addressing the entire gamut of issues involved in conservation and sustainable use of biodiversity, a mix of interventions is required including programmes, policies, action plans and legal framework.

Adopting a consultative process with all stakeholders, this Ministry has drawn up a National Policy and Action Strategy on Biodiversity. This is a macrolevel statement of strategies, gaps and further action needed for conservation and sustainable use of biodiversity in a broader perspective. The document identifies the basic goals and thrust areas and outlines action points for various subjects.

I wish to place on record my appreciation for the sincere and diligent efforts put in by Dr. G.V. Sarat Babu, Joint Director and Dr. Sujata Arora, Deputy Director for developing this document. I also wish to thank my colleagues, Shri Vinod Vaish, Special Secretary and Shri R.H. Khwaja, Joint Secretary for their supervision. Funds for publication of this document have been made available by UNDP under the UNDP/GEF Biodiversity Enabling Activity project.

(VISHWANATH ANAND)

CONTENTS

ABBREVIATIONS

ASEAN	:	Association of South East Asian Nations
BSI	:	Botanical Survey of India
CCMB	:	Centre for Cellular and Molecular Biology
CDRI	:	Central Drug Research Institute
CEE	:	Centre for Environmental Education
CIMAP	:	Central Institute for Medicinal and Aromatic Plants
CITES	:	Convention on International Trade in Wild Species of Fauna and Flora
CMFRI	:	Central Marine & Fisheries Research Institute
CNH	:	Central National Herbarium
CSIR	:	Council of Scientific & Industrial Research
CZA	:	Central Zoo Authority
DBT	:	Department of Biotechnology
DOD	:	Department of Ocean Development
EPA	:	Environmental Protection Act
FAO	:	Food and Agricultural Organisation
FRI	:	Forest Research Institute
FSI	:	Forest Survey of India
GATT	:	General Agreement of Trade and Tariffs
ICAR	:	Indian Council of Agricultural Research
ICFRE	:	Indian Council of Forestry Research and Education
ICIMOD	:	International Centre for Integrated Mountain Development
ICMR	:	Indian Council of Medical Research
IIFM	:	Indian Institute of Forest Management
IPRs	:	Intellectual Property Rights
IUCN	:	International Union for Conservation of Nature and Natural Resources
JFM	:	Joint Forest Management
MOA	:	Ministry of Agriculture
MOEF	:	Ministry of Environment and Forests
MHRD	:	Ministry of Human Resources Development
NBAGR	:	National Bureau of Animal Genetic Resources
NBFGR	:	National Bureau of Fish Genetic Resources
NBPGR	:	National Bureau of Plant Genetic Resources
NBRI	:	National Botanical Research Institute
NCERT	:	National Council of Education, Research & Training
NCS	:	National Conservation Strategy
NEAC	:	National Environment Awareness Campaign
NFP	:	National Forest Policy
NGO	:	Non Governmental Organisation
NMNH	:	National Museum of Natural History

NWAP	:	National Wildlife Action Plan
NZC	:	National Zoological Collection
RRL	:	Regional Research Laboratory
SACEP	:	South Asian Cooperative Environment Programme
UGC	:	University Grants Commission
UNCLOS	:	United Nations Commission for Law of Seas
UNDP	:	United Nations Development Programme
UNEP	:	United Nations Environment Programme
WII	:	Wildlife Institute of India
WWF-India	:	World Wide Fund for Nature-India
ZSI	:	Zoological Survey of India

LIST OF TABLES

LIST OF BOXES

CHAPTER 1

Conservation and sustainable use of biodiversity is fundamental to ecologically sustainable development. Biodiversity is part of our daily lives and livelihood, and constitutes resources upon which families, communities, nations and future generations depend. Every country has the responsibility to conserve, restore and sustainably use the biological diversity within its jurisdiction. Biological diversity is fundamental to the fulfilment of human needs. An environment rich in biological diversity offers the broadest array of options for sustainable economic activity, for sustaining human welfare and for adapting to change. Loss of biodiversity has serious economic and social costs for any country. The experience of the past few decades has shown that as industrialization and economic development in the classical sense takes place, patterns of consumption, production and needs, change, straining, altering and even destroying ecosystems. India, a megabiodiversity country, while following the path of development, has been sensitive to needs of conservation and hence is still rich in biological resources. Ethos of conservation and harmonious living with nature is very much ingrained in the lifestyles of India's people.

India's strategies for conservation and sustainable

utilisation of biodiversity in the past have comprised providing special status and protection to biodiversity rich areas by declaring them as National Parks, Wildlife Sanctuaries, Biosphere Reserves, Ecologically fragile and sensitive areas, off loading pressure from reserve forests by alternative measures of fuelwood and fodder need satisfaction, by afforestation of degraded areas and wastelands, creation of *ex situ* conservation facilities such as gene banks etc.

The challenge before India is not only to sustain the efforts of the past but also further add to them in accordance with a rational need assessment such that they are to the advantage of the country and humankind while maintaining and accelerating growth and development to alleviate the living standards of Indian people. Distribution and magnitude of biodiversity that exists today is a result of over 3.5 billion years of evolution, involving speciation, migration and extinction. Effect of human influences on such evolution was minimal in this evolutionary process till the onset of advanced agriculture and subsequently industrial revolution. The impact of human influence in recent years has been quite substantial.

Biodiversity refers to variety of life forms we see around us. It encompasses the whole range of mammals, birds, reptiles, amphibians, fish, insects and other invertebrates, plants, fungi and micro-organisms such as protista, bacteria and viruses. Biodiversity is recognised at three levels, namely, species level, genetic level, and ecosystem level. Genetic diversity refers to variation within individual species; species diversity pertains to the variety of species; and ecosystem diversity refers to diversity of ecosystems and habitats.

Biodiversity is dynamic at all the three levels, the genetic composition of species changes over time in response to natural and human-induced selection pressures; occurrence and relative abundance of species in ecological communities change as a result of ecological and physical factors; and ecosystems strongly respond to external dynamics and internal pressures. Ecological systems do not exist as discrete units but represent different parts of a natural continuum.

Global Biodiversity Assessment (UNEP 1995) estimates the total number of species to be between 13 and 14 million. It further records that so far only 1.75 million species have been described. Scientists estimate that a unicellular organism has genes ranging between a hundred to a few hundreds. The enormity of magnitude of genetic diversity harboured by 13-14 million species would seem to be beyond simple imagination even. Ecosystem diversity has not even been reasonably explored as yet. In India, so far, 89,000 species of animals and 47,000 species of plants have been described by the Zoological Survey of India (ZSI) and the Botanical Survey of India (BSI), respectively. Genetic differences between the individuals of a species provide the basis for the diversity that is found between species. Since in nature no organism lives in isolation, each species is dependent on other species as also on ecological systems. As there is complete interdependence in nature, change in a habitat affects the diversity of the species contained in it. Conversely, any change in the number and assemblage of species also affects the nature of the habitat.

1.2 NEED FOR BIODIVERSITY CONSERVATION

India is one of 12 megabiodiversity countries of the world. The innumerable life forms harboured by the forests, deserts, mountains, other land, air and oceans provide food, fodder, fuel, medicine, textiles etc. Now that the negative side of the synthetic products and processes and side effects of chemical drugs etc. are becoming more and more apparent and the world is shifting to products and processes based on natural resources, these life forms are potentially important for developments in the fields of food, medicines, textiles, energy, recreation and tourism. Value and potential of some species is already known. Bioprospecting for genes and biochemicals has been undertaken to some extent. Yet, there are innumerable species, the

potential of which is not as yet known. It would therefore be prudent to not only conserve the species we already have information about, but also species we have not yet identified and described from economic point of view. *Taxus baccata*, a tree found in the Sub-Himalayan regions, once believed to be of no value is now considered to be effective in the treatment of certain types of cancer. In addition, as discussed in earlier sections, the need to conserve biodiversity because of interdependence of species in nature for survival demands conservation of all elements of biodiversity.

Besides, while the diversity of genes, species and ecosystems is a valuable resource that can be tapped as human needs and demands change, the still more basic reasons for conservation are the moral, cultural and religious values. The close linkages between biodiversity and cultural diversity have helped to determine cultural values. Most of the world's religious texts teach respect for the diversity of life and concern for its conservation.

While the importance of biodiversity can be understood, it is not easy to define the value of biodiversity, and very often difficult to estimate it. Many aspects of biodiversity cannot be quantified, let alone valued. Apart from the tremendous economic benefits, biodiversity has aesthetic, ethical, cultural, social and scientific importance. For purposes of understanding, the value of biodiversity is classified into direct and indirect values.

The direct values imply the uses of components of biodiversity directly for consumptive, productive and non-consumptive purposes. On the other hand, the functions performed by biodiversity which are not of any direct use, but are either ecological processes as future options or due to their mere existence constitute the indirect values.

Biodiversity has direct consumptive value in agriculture, medicine and industry. Approximately 80,000 edible plants have been used at one time or another in human history, of which only about 150 have even been cultivated on a large scale. Today a mere 10 to 20 species provide 80-90% food requirements of the world.

In India, many rural communities particularly the tribals obtain considerable part of their daily food from the wild plants. Some examples are : *Ceropegia bubosa* in Central India and Western Ghats; *Codonopsis ovata* in Himalayan region; *Ardisia* and *Meliosma pinnata* in the North-east; *Eremurus himalaicus*, *Origanum vulgare* and *Urtica hyperborea* in Lahul-Spiti and Ladakh; *Allium*

carolinianum and *Cicer microphyllum* in Kashmir and *Sesuvium portulacastrum* in Coastal areas. Similarly, a variety of faunal species, e.g., insects, molluscs, spiders, wild herbivores are consumed by many tribal and non-tribal communities in India.

At one time, nearly all medicines were derived from biological resources. Even today they remain vital and as much as 67-70% of modern medicine are derived from natural products. In developing countries, a large majority of the people rely on traditional medicines for their primary health care, most of which involve the use of plant extracts. Around 20,000 plant species are believed to be used medicinally in the third world. In India, almost 95% of the prescriptions are plant-based in the traditional systems of Unani, Ayurveda and Sidha. Many indigenous medicines also utilise animals and their parts or extracts as remedies for various diseases.

For housing and construction activities, wood, thatch, bamboo, cane, coconut and other plant materials are utilised. Apart from shelter, plant products are also used for other kinds of construction such as pipes for irrigation and suspension bridges in the Himalaya. A number of house-hold items such as ropes, mats, baskets, brooms, furniture, decorative items, fishing and agricultural implements are made from plant and animal parts. Items of clothing are derived from a large number of plants and animals, while cotton is the most widely used natural fibre, others include silk and wool from animals and jute from a plant.

Diverse habitats and species also have non-consumptive use-value. Tourism, recreation and scientific research are the major examples. The indirect use-value of biodiversity includes ecosystem process of biological diversity which provides valuable ecological services to the biosphere; some examples are the ecosystem's ability to absorb pollution, maintain soil fertility and micro-climates, recharge ground water, and provide other invaluable services.

Considering the potential value of biodiversity in the future, the option value represents the willingness to pay to retain the option of preserving access to a diverse range of habitats, species and genes. An example of option value is the future value of plant-derived drugs.

The existence values are intrinsic values, not associated with actual or potential use, which reflect the utility that people derive from simply knowing that a habitat or a species exists. For example, for many of us, simply knowing that a particular species (e.g., elephant, tiger, whale) or an ecosystem (e.g., wetlands, deserts) exists, is inspiring and comforting.

Many plants, animals and their parts are used in rituals all over the country. To name a few : flowers of *Hibiscus, Datura* and *Euphorbia*; leaves of *Aegle marmelos* (bel), *Eragrostis cynasuroides* (kusa grass), rice til, chenopods, odorous roots of *Dolomiaea macrocephala* (dhup). Further, sacred values are attached to entire ecosystems, for example patches of forests were believed to be the abode of gods, and are used only for prayers and rituals. Many sacred groves still exist in different parts of India.

1.3 CONVENTION ON BIOLOGICAL DIVERSITY

Concern for conservation of biodiversity at global level figured for the first time in the discussions at the UN Conference on the Human Environment held in Stockholm in 1972. Though UNEP identified conservation as a priority area in 1973, it was only towards late 1980s that systematic and concerted efforts to look at biodiversity conservation profile at international level started with constitution of an Ad Hoc Working Group of Experts on Biological Diversity by UNEP in 1987. Eventually, an Expert Group was constituted by UNEP which started its work in 1989 culminating in the Convention on Biological Diversity (CBD) at the UN Conference on Environment and Development (UNCED) held at Rio de Janeiro in June, 1992. This Convention entered into force on 29th December, 1993. At present, 175 countries are Parties to the Convention.

This international treaty is a historic treaty in that it not only reflects the commitment of global community for conservation and sustainable use of biodiversity, but also visualises sharing of benefits arising out of utilisation of genetic resources with the countries of origin. The three principle objectives of the Convention captured in Article 1 reflect this. According to this, the main objectives of the Convention are :

- the conservation of biological diversity;
- the sustainable use of the components of biodiversity;
- the fair and equitable sharing of benefits arising out of the utilisation of genetic resources.

The objective of equitable sharing of benefits has to be further seen in the reaffirmation of sovereign rights of States over their own biodiversity which entitles a country to equity and fairness in sharing of benefits arising out of the utilisation of their genetic resources.

The 23 preambular paragraphs of the Convention recognise and reaffirm :

- the intrinsic value of biological diversity;
- the sovereign rights of States over their biological resources;
- the fundamental requirement of *in situ* conservation of ecosystems and natural habitats;
- the supporting role of *ex situ* measures;
- the vital role of local communities and women in the conservation and sustainable use of biological diversity;
- the desirability of sharing equitably the benefits arising from the use of traditional knowledge, skills, innovations and practices;

- the importance of and the need to promote regional and global cooperation for conservation; and
- the requirements of substantial investments to conserve biological diversity.

The significant implications of the provisions of the Convention and the main obligations of the Contracting Parties are as follows :

Parties are required to take measures for *in situ* conservation of biological diversity, promote rehabilitation and restoration of degraded ecosystems, and ensure protection of threatened species (Article 8). Parties are obliged to respect, preserve and maintain knowledge, innovations and practices of indigenous and local communities and encourage the equitable sharing of benefits arising from the use of such knowledge, innovations and practices (Article 8 j). Parties are also to adopt measures for *ex situ* conservation of components of biological diversity, for complementing the *in situ* efforts (Article 9). Parties are to facilitate access to genetic resources on mutually agreed upon terms with prior informed consent of the country providing these resources (Article 15). The recepient country is to share in a fair and equitable way the results of research and development and the benefits arising from the commercial and other utilisation of genetic resources with the party providing such resources. The Convention calls for transfer of relevant technologies, including biotechnologies on'fair and most favourable' terms from the developed to the developing nations, which provide genetic resources used for the development of these technologies (Article 16). It also calls on the private sector to facilitate access to and transfer of such technologies developed by them (Article 16.4). The Contracting Parties are to cooperate in this regard to ensure that patents and other intellectual property rights are supportive of and do not run counter to the objectives of the Convention (Article 16.5). Recombinant technology (or genetic engineering) are increasingly gaining ground and are being seen as potentially useful for various sectors by experts. Recognising that introduction of these biotechnologies requires

utmost care and caution based on precautionary principle, outlined in Agenda 21, particularly because recall of an introduced organism in nature would well *nigh* be possible, the Convention commits the Parties to consider an international protocol for safe transfer, handling and use of any living modified organism resulting from biotechnology (Article 19.3). Parties are also to take measures for facilitating access on a fair and equitable basis and on mutually agreed upon terms to the results and benefits arising from biotechnologies based upon genetic resources provided/transferred (Article 19.2). The developed

country Parties are committed to contribute to a fund to enable developing country Parties to meet the 'agreed full incremental costs' for implementing the provisions of the Convention (Article 20.2). The financial mechanism is to operate within a democratic and transparent system of governance and 'function under the authority' of the Conference of the Parties (Article 21).

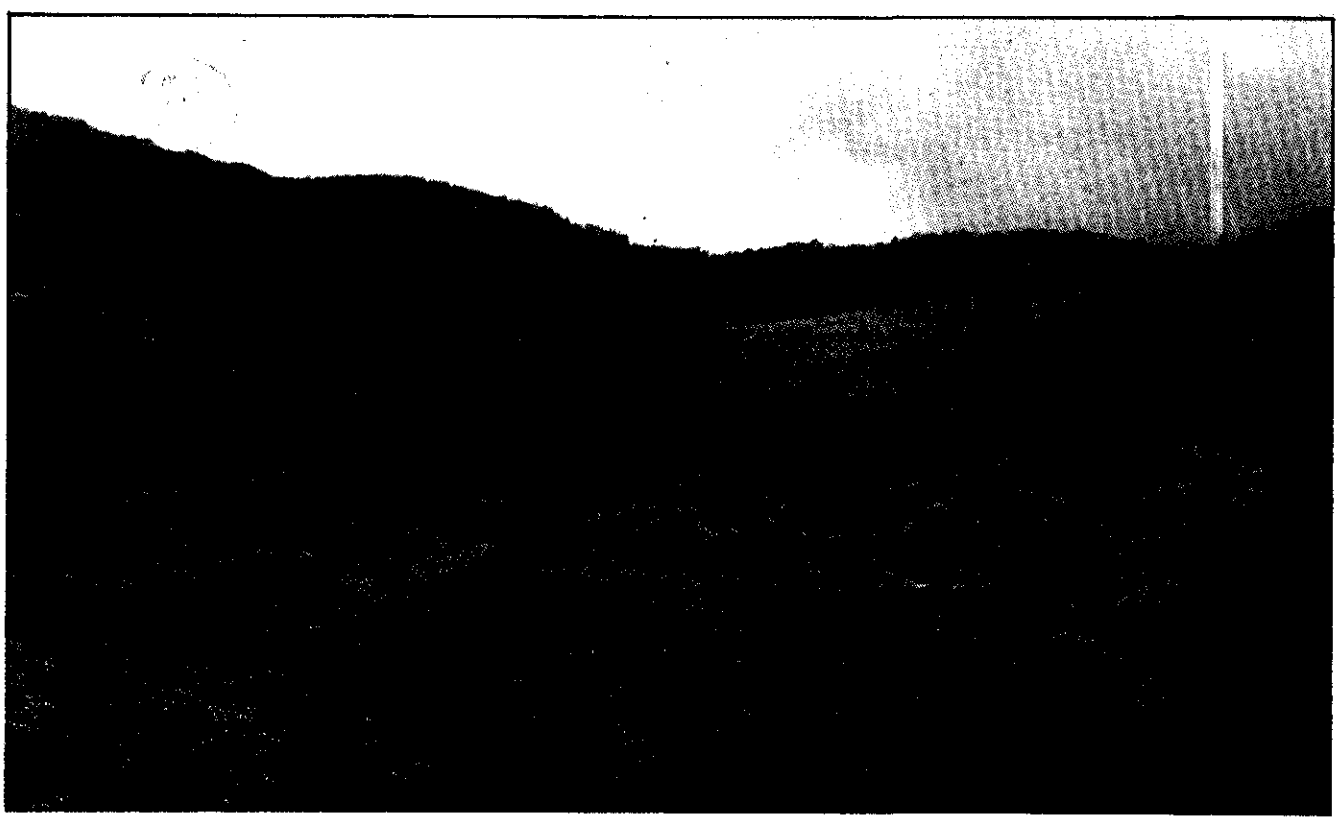
Important points to note about the Convention are that facilitation of access by developing countries is linked with equitable sharing of benefits; thus, making it a two-way process. Technology flows are also founded on the principle of equity with the developing countries providing resources and traditional technologies, and developed countries sharing and transferring technologies including biotechnologies and providing financial resources to help developing countries meet their commitments and realise benefits.

From the foregoing, it is amply clear that the Convention is the first global comprehensive agreement to address all aspects of biological diversity — genetic resources, species and ecosystems — which would have revolutionary and far reaching implications. Being based on considerations of equity and shared responsibility, the Convention envisages a reciprocity of arrangements between developed and developing countries, thereby promoting a renewed partnership between them.

The main implementation measures for the Convention are to be through national strategies, plans or programmes, to be developed in accordance with each country's situations and capabilities. Although qualified with phrases like 'as far as possible' and 'as appropriate' throughout its text, the Convention commits the Contracting Parties to take substantive action in many areas including :

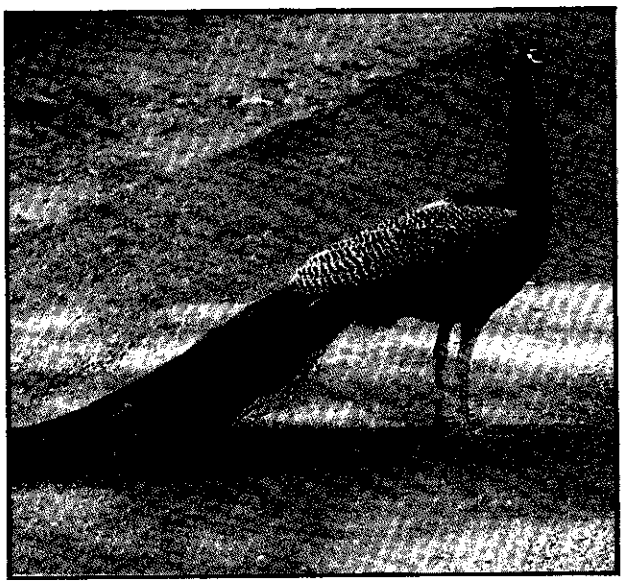
- development of national plans, strategies or programmes for conservation and sustainable use of biodiversity; and integrating these into relevant sectoral or cross-sectoral plans, programmes and policies;
- inventorisation and monitoring of components of biodiversity and of processes adversely impacting it; developing and strengthening of *in situ* mechanisms for biodiversity conservation both within and outside protected areas;
- development of *ex situ* measures for biodiversity conservation, as a complement to *in situ* approaches;
- restoration of degraded ecosystems and recovery of endangered species;

- adopting measures to avoid and minimise adverse impacts on biodiversity;
- protecting and encouraging customary use of biological resources that are compatible with conservation or sustainable use requirements;
- adopting economically and socially sound measures that act as incentives for conservation and sustainable use of components of biodiversity;
- promoting and encouraging research contributing towards achieving the objectives of the Convention;
- developing educational and public awareness programmes with respect to conservation and sustainable use of biodiversity;
- facilitating access to genetic resources on mutually agreed terms and prior informed consent; and taking measures for fair and equitable sharing of benefits arising from utilisation of the resources thus transferred;
- facilitating access to and transfer of technology, including biotechnology to developing countries under fair and most favourable terms;
- facilitating exchange of information relevant to biodiversity;
- promoting scientific and technical cooperation with other Parties;
- consideration of a protocol for safe transfer, handling and use of living modified organisms resulting from biotechnology; and
- providing new and additional financial resources by the developed country Parties to enable the developing country Parties to meet the agreed full incremental costs for implementing the provisions of this Convention.



1.4 APPROACH

India's central concern is to formulate and implement a Biodiversity Action Plan which is consistent with the ecological, social, cultural and economic mosaic of the country. India's cultural diversity which is closely linked with its



biogeographic features, offers a major challenge to implement a biodiversity action plan. The current phase of 'graduated' economic liberalisation in India which began in 1991, proceeds hand in hand with a sustained process of political decentralisation which aims to devolve works and responsibilities on culturally diverse populations to implement local development plans. Project and programme designs for biodiversity conservation need to be predicated on socio-cultural convergence and user harmony. This is particularly important as stakeholders of biological resources are not a homogenous lot on account of their varying social and cultural situations. The stakeholders have varying and often conflicting demands on biological resources. While it is axiomatic that biodiversity values arise from consumptive and non-consumptive use values of bioresources, it is often overlooked that these values are inherently 'non-cumulative'. Thus management of forest ecosystems from the point of 'option value' may be at the cost of, say, its consumptive use value on which may depend the subsistence base of tribals and other village communities inhabiting these ecosystems. What emerges in such a scenario may not just be the loss of consumptive use values but also social displacement effects induced by disruptions of traditional lifestyles and subsistence base of the affected human communities due to altered management practices. New techniques for ex-ante impact assessment of biodiversity conservation projects need to be formulated and developed to capture the appropriate institutional and other support for biodiversity conservation efforts in India.

Natural resource accounting systems and techniques are still in their infancy, and reliable and easily usable methods are not as yet available. A direct casuality of this absence of reliable technique is biological diversity. Often cesses, charges and other fiscal instruments have therefore been advocated to confer value on biological resources. Underlying assumption in these suggestions is that utilisation by secondary users of biological resources such as industry would be controlled once they are confronted with the rising costs of obtaining these resources on charges. Overt objective of such suggestions is to generate revenues which could provide much needed financial resources for biodiversity conservation programmes. However, the latitude, feasibility and the eventual usefulness of these controls and fiscal instruments need to be clearly analysed and understood before fiscal tools for biodiversity conservation are designed. The scenario is extremely complex viewed in the context that basically biological resources lie in the boundaries of the State; tribals in particular and local population in general

in most States have rights of access to Non Timber Forest Produce (NTFP) either through well-defined rights or through traditional rights; large size of populations depend for their daily food, health care and energy needs on bioresources.

The Biodiversity Action Plan of India proposes to design actions based on the evaluation of on-going strategies, and programmes, assessment of current and future needs of conservation and sustainable utilisation, recognition of the current and future use of bioresources by secondary users, designing of physical and fiscal instruments, particularly implications and impacts of such instruments in the short and long term.

CHAPTER 2

All biological resources indigenous to or naturalised in India fall within the sovereign jurisdiction of the State. Though conservation has been a concurrent theme in various policy pronouncements in the forestry sector and to a certain extent in other related sectors, a formal policy statement on biodiversity of the country has not been there, even though India is one of the few countries which have established institutions for biodiversity related issues. Some examples are Botanical Survey of India and Zoological Survey of India for survey and economic description of its biodiversity.

Diversified uses of biological resources have been established in the past couple of decades and the trend is on the increase. Commercial products and biotechnologies based on the use of biological resources are gaining ground in trade and economic spheres. The Convention on Biological Diversity taking note of all these developments, as also the urgent need of ensuring conservation and sustainable utilisation of biodiversity, provides an enabling environment for countries to secure conservation and sustainable utilisation with equity in sharing of benefits.

Attributing intrinsic value to biodiversity has

been a part of India's cultural ethos. The main goals of the National Policy and Macrolevel Action Strategy on Biodoversity are based not only on the extrinsic worth but also on the intrinsic value of biodiversity. The main goals of the National Policy and Macrolevel Action Strategy on Biodiversity are :

(i) Achieve conservation and sustainable use of biological diversity through consolidating ongoing efforts and initiating new steps, wherever necessary. This would include regeneration and rehabilitation of threatened species.

(ii) Secure participation of State Governments, communities, people, NGOs, industry and other stakeholders including women in the conservation and sustainable use of components of biodiversity.

(iii) Realise consumptive and nonconsumptive value of biodiversity through necessary investments in R&D and biotechnology development.

(iv) Ensure benefits to India as country of origin of biological resources and to local communities and people as conservers of biodiversity, creators and holders of indigenous knowledge systems, innovations and practices.

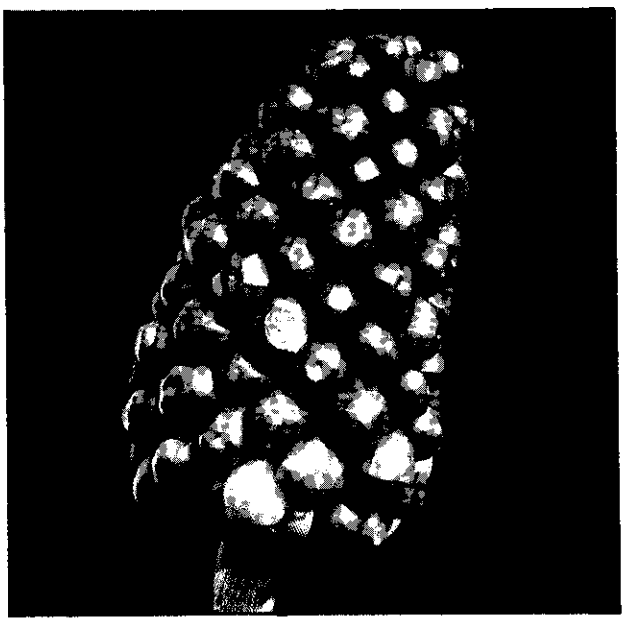
(v) Ensure consideration of biodiversity concerns in other sectoral policies and programmes.

The range of strategies and plans to achieve these five main goals will have to incorporate various missions and objectives which would be crucial to achieve the main goals. The major loci for action would be the State Governments and local bodies. The National Policy and Macrolevel Action Strategy would be governed by the following basic principles :

(i) India has sovereign rights over its own biological resources. Access to and utilisation of the biological diversity occurring in India would be in accordance with the administrative and legislative measures of the State, including with the prior approval of the Central Government or the State Governments as the case may be.

(ii) Local communities and people have over the years developed lifestyles, innovations and practices conducive to conservation and

sustainable use of biodiversity. They have developed a body of knowledge regarding the use of these resources for food, medicines, pesticides etc. Considering the dependence of the lifestyles of communities and local people on biological diversity, practices of utilisation conducive to conservation would be encouraged. Such practices, innovations and



knowledge would be protected and propagated for wider use subject to ensuring benefits to these communities/people for utilising such knowledge and practices. Any commercial use of such knowledge, innovations and practices would be permissible only after ensuring a due share of the community in the benefits realised from such knowledge, innovations and practices.

(iii) The existing network of protected areas for *in situ* conservation would be strengthened. These efforts would be complemented appropriately by the *ex situ* conservation measures.

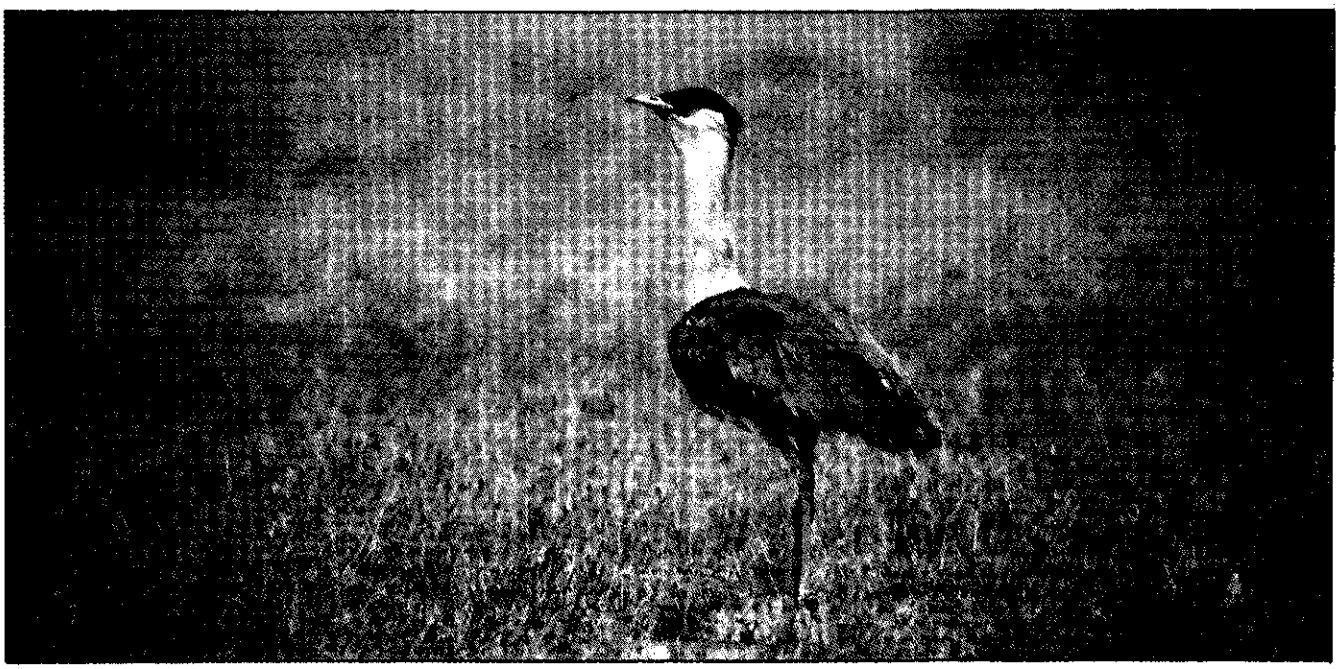
(iv) Special attention would be paid for conservation of representative ecosystems as Biosphere Reserves, and fragile ecosystems such as wetlands, mangroves and coral reefs.

(v) Considering the occurence of medicinal plants in India as also the richness of both coded and non coded knowledge systems of therapeutic, health and nutritional uses of these plants, one of the thrust areas would be conservation and *ex situ* cultivation of these plants alongwith scientific validation of priority applications to realise their economic and social potential.

(vi) Encouragement would be given to policies and programmes securing technological capacity building of the country for realising the actual and potential value of biodiversity along with conservation.

(vii) Sacred groves are the rich heritage of India. Occurring in various parts of the country, sacred groves harbour ecosystems at pristine level. These would be treated as special areas deserving full protection and conservation.

(viii) India is rich in endemic species. It has two hot-spots, namely, Western Ghats and Eastern Himalaya. There are other rich areas such as Andaman and Nicobar Islands and Satpura ranges which deserve similar mention. Developmental and other programmes and policies in these areas would take due note of such richness and would be designed that they



do not adversely affect the richness of these areas.

(ix) Rehabilitation and regeneration of threatened and endangered species of fauna and flora would be given priority in conservation efforts.

(x) Conservation and sustainable utilisation principles would equally and strongly apply to domesticated biodiversity as well including wild relatives of crop plants and domesticated animals etc.

(xi) Policies which directly or indirectly work as incentives for indiscriminate use of biodiversity will be discouraged. This would include review of policies to ensure that *ex situ* conservation of threatened and endangered speices or economically viable species is not jeopardised for want of policies which would make such cultivation remunerative.

(xii) Knowledge base of the flora and fauna occurring in the local areas would be created, strengthened and expanded by mass awareness. This would encourage stake building in conservation at the local levels.

(xiii) Considering of conservation and sustainable use of biodiversity would be integrated in sectoral programmes.

(xiv) Private and public sector investments for the development of sound practices for use of biological diversity including bioprospecting and development of bio-technology would be encouraged. Conservation and sustainable use would be integrated in such research and development.

(xv) Promotion of community and NGO participation would be encouraged in endeavours of conservation and sustainable use of biological diversity.

(xvi) Educating and building capacity of policymakers, industrialists, NGOs, local communities etc. on the need for biodiversity conservation, emphasizing its intrinsic worth.

(xvii) To channelise the conservation ethos of people into meaningful conservation and sustainable utilization of biological diversity, awareness building and education activities in this regard would be taken.