Madhya Pradesh State Biodiversity Strategy and Action Plan

Coordinating Agency: Department of Biodiversity and Biotechnology, Bhopal

Background

The State Biodiversity Strategy and Action Plan (SBSAP) of Madhya Pradesh falls within the broad framework of the exercise carried out by the NBSAP. The state SBSAP was put together through a participatory process by involving village-level organizations, NGOs, academics, scientists, officers from various line departments, the private sector, and others who have a stake in biodiversity. The SBSAP makes an attempt to look at the state's biodiversity in their scientific, economic and cultural dimensions. It also would look at issues related to equitable sharing of benefits.

Methodology

A participative approach was adopted for the preparation of the SBSAP ensuring inputs from all major players in the field of biodiversity and biotechnology. Government of Madhya Pradesh has established a Biodiversity and Biotechnology Board that in turn constituted three Standing Committees viz., Committee on Biodiversity Conservation, Committee on Sustainable use of Biodiversity and Committee on Equitable sharing of Biodiversity. These committees have prepared reports that form an important part of the strategy on biodiversity conservation.

The state government has also created a separate Department of Biodiversity and Biotechnology to act as the nodal department for the subject. A MoU between Government of India and Department of Biodiversity and Biotechnology was signed for the preparation of The State Biodiversity Strategy and Action Plan and a Core Group was formed. The Core Group in its various meetings finalized the report for the preparation of SBSAP. EPCO was appointed as the executing arm of the nodal agency for preparing the SBSAP.

A public hearing was organized in Gwalior in association with Jiwaji University, Gwalior. Similarly consultations were organized at Sagar in collaboration with Sagar University on Biodiversity of Bundelkhand and at Bhopal with NGO's of M.P. A ten day long participatory yatra called the satpuranchal yatra was organized. The yatra covered ten districts of the state.

State Profile

Madhya Pradesh is a land-locked state, surrounding by the states of Uttar Pradesh, Rajasthan, Gujarat, Maharashtra and Chhatisgarh. The geographical area of the state is 308,000 sq km. It is located between longitude 74°-82° E and latitude 21°-26° 50'.N.

Ecological Profile

The country has been classified into 10 bio-geographic zones and 26 biotic provinces, by the Wildlife Institute of India. 22% of the state's geographical area has been classified as semi-arid while 78% is in the Deccan plateau.

The semi-arid zone, comprising of western districts of the state do not have significant forest cover, there is only one National Park and 9 sanctuaries. In the Deccan peninsular zone, there are 9 National Parks and 25 sanctuaries. All the five Tiger Reserves in the state (out of 25 in India upto 1999) are located in Deccan peninsular zone.

Biodiversity Status

Areas rich in biodiversity can be divided into three categories.

- Forest areas including, Protected Areas (National Parks and Wildlife Sanctuaries), Grasslands and Wetlands.
- Livestock diversity
- Agro-ecosystems.

Forests

As per the classification of Champion and Seth (1968), the forests of Madhya Pradesh are categorized as:

- *Sub Tropical Hill Forests*
- *Tropical Moist Deciduous Forests*

- *Tropical Dry Deciduous species like Hardwickia binata.*
- *Thorn Forests (type IV)*

Grasslands

Grasslands are a major area of concern. After independence much of the *Gauchar* land (common pasturelands) was diverted to agricultural purposes and major portions of the remaining *Gauchar* land is under encroachments. Almost 35 lakh ha of *Gauchar* lands were lost to encroachment and subsequent agriculture in the last 40 years. Strictly speaking, the majority of the grasslands of the state are anthropogenic in their origin. The state does not have ecologically generated climatic climax type of grasslands.

Wetlands

The National Policy and the Macro level Action Strategy on Biodiversity document of GOI (MoEF, 1999) identifies freshwater lakes and reservoirs of Madhya Pradesh as one of the predominant wetland types of India. MoEF, GOI has identified 53 man-made wetlands with an area of 1,87,818 ha of water coverage in Madhya Pradesh. Besides the man-made wetlands, it has identified 324 ha natural wetlands in MP.

State of Plant and Animal Species

Wildlife conservation through Protected Areas has generally been centered on a few key individual species or a visible group of species of animals that impart an apparent conservation value to a site. This strategy has been successful in preserving species such as tiger and barasingha (*Cervus duvauceli branderi*). Given the limited financial and manpower resources available, the general approach to conservation has focused on control of animal and wood poaching and mitigation of biotic pressure. This simple approach is not beneficial to small floral and faunal life forms that may be important.

Having stated the approach to species conservation as a part of Protected Area management in Madhya Pradesh, the following brings out some of the species extinction which took place in the chronicled past and recounts the problems faced by numerous species of fauna and flora. Species that have been genetically swamped and wild-gene pools contaminated altered by inter-breeding with domestic variety. For example, Red and Grey jungle fowl, wild pig and wild mango.

Range shrinkage of some major faunal species and their current distributions:

- The Range of Blackbuck has shrunk. Reduction of open ground on account of woody encroachment due to conservation initiatives in Protected Areas coupled with village relocation and stoppage of shifting cultivation have all contributed to the loss of Blackbuck habitat.
- The change from grassland to woodland in the Ghatigaon Wildlife Sanctuary, due to non-management of the habitat, has made it unsuitable for the great Indian Bustard for the protection of which it was created.
- The range of Central Indian sub-species of Barasingha within the State has shrunk owing to the drying away of swamps and biotic pressure. The species, which at the turn of century thrived in several districts of the State like Chhindwara and Hoshangabad, is now localized only in Kanha.
- Tiger, Chousingha, Gaur and the Great Indian Bustard once spread throughout the state are now found only in a few restricted pockets.

Agricultural Ecosystems and Eomesticated Plant/Animal Species

The state has a long history of agro-bio-diversity conservation. There are pockets of crops and cultivar that are in natural state and are traditionally grown. This wealth needs protection and scientific procedure for identification and conservation.

Livestock Diversity

Madhya Pradesh has a large variety of livestock biodiversity. Most of these breeds are well adapted to the conditions in the state, the productivity in terms of milk, meat and egg production is quite low as compared to other developed states of the country. Hence there is a need for characterization, documentation and conservation of livestock genetic resources which can be used as row material for future animal breeding programmes.

The State has a total of 467 lakh animals out of which cattle and buffaloes constitute 79%, goat 17% and remaining 4% animals that include pig, sheep etc. Important recognized breeds of cattle considered as native breeds of Madhya Pradesh are 'Malwi' and 'Nimari'. 'Gaolao' breed is found all over Vidarbh region of Maharashtra and adjoining areas of Madhya Pradesh (Chhindwara dist.) and 'Kankattha' breed of cattle in Panna district. Similarly, 'Bhadawari' breed of buffalo is found in abundance at Bhind and Gwalior districts.

'Jalauni' breed of sheep is found in Tikamgarh and Shivpuri which forms the border with Jhansi and Jalaun districts of Uttar Pradesh. 'Jamnapari' breed of goat is found in various villages of Bhind district situated near Chambal river. Berari Goats are in the

Nimar districts of M.P 'Malwi camel' are also found in Mandsaur district of Madhya Pradesh. In the poultry sector, 'Kadaknath' is the native breed of Madhya Pradesh found in Jhabua.

Problems Relating to Biodiversity

Proximate Process Affecting Wild Biodiversity

Sector	Cause	Effect
Forests	• Biotic pressure • Forest fires • Unregulated grazing by livestock • Timber exploitation for livelihood, illegal trading and fuel needs • Land demands for construction of dams and other irrigation projects • Mining activities • Encroachment for agriculture	• Degradation of forest land • Grassland ecosystem is disturbed due to overgrazing • Destruction of ecosystem and loss of biodiversity • Threat to the endangered wild species • Shrinkage of forest and loss of biodiversity • Impact on ecosystem function, particularly on soil nutrients
Wildlife	• Shrinkage of grazing land • Encroachment • Poaching • Lack of awareness about conservation issues • Wildlife and live stock diseases	• Leading to genetic separation, loss of biodiversity and genetic vigour • Population reduction, extinction of species. • Habitat degradation • Mass mortality.
Wetlands	• Mixing sewage effluent in fresh water • Lack of pre-treatment • Wetland being treated as no men's land 'ownership rights'-'Tragedy of commons' • Encroachment-lack of Catchment Area Treatment (CAT) • Lack of weed control measures • Excess of dissolved nutrients • Reclaiming wetlands for other purposes	• Deterioration in water quality • Pollution • Soil erosion and siltation • Enhanced rate of evapo-transpiration and deposition of decayed vegetation and loss of biodiversity. • Resulting in eutrophication
Grass Land	• Encroachment and diversion due to expansion of agriculture, industries, townships, roads, railways, plantation, irrigation, human settlement, fire, etc. • Over grazing • Lack of stall-feeding • Lack of community conservation	• Shrinkage and even disappearance of grassland leads to loss of biodiversity including species like the Great Indian Bustard Choriotis nigriceps

Proximate Process Affecting Domesticated Biodiversity

Sector	Cause	Effect
Agro-biodiversity and horticulture	• Food scarcity • Mounting demographic pressure for chemical farming • Lack of awareness and small land holdings which are unsustainable, uneconomical, lack of indigenous material and technical know how • Short term gains • Lack of proper management • Use of pesticides, weedicides and fungicides	• Threat to indigenous crop cultivation and *in situ* conservation of large number of cultivars • Loss of indigenous biodiversity • Loss of traditional systems • Loss of wild and uncultivated genetic material • Conversion of fertile land to barren wasteland. • Forced to replace the traditional cultivars and cultivation systems for sustainability

Sector	Cause	Effect
Domestic animals animal husbandry	• Lack of awareness • Economic benefits • Overall policy of breed improvement • Shrinkage of grazing land • Over population of livestock • To improve yield and economic benefits • Replacement of local but less productive breeds of poultry • Over mechanization of Agriculture	• Stagnation and even deterioration of production performance of indigenous species • Loss of indigenous genetic resources • Forest denudation • Disappearance of native varieties and breed • Threat to native draught breed.

Major Actors

Government

- Department of Biodiversity and Biotechnology
- Housing and Environment Department
- M.P. Pollution Control Board
- Department of Agriculture
- Horticulture Directorate
- Forest Department
- Fisheries Department
- Department of Panchayat and Rural Development
- Department of Animal Husbandry
- Tourism Development Corporation
- Department of Science and Technology
- Citizen's groups and NGOs

Gap Analysis

Gaps in Vision

Some of the areas where gaps in vision are reflected were seen in: -

- Programs related to wild-biodiversity conservation which should be worked to a long-term vision taking into consideration the issue of ecosystem stability and environmental security.
- The harvesting of non-timber forest produce which should be based on long-term sustainability avoiding overexploitation.
- The reclamation of wetlands/ponds for agriculture, industry, tourism and other sectoral purposes is avoided as these lead to ecosystem destruction and biodiversity loss.
- Forestry and environment sectors suffering from paucity of financial resources and thereby affecting long term efforts for biodiversity conservation. This serious shortcoming in the planning process needs to be rectified immediately.

Gaps in Information

Scientific knowledge generated by researchers is scattered and does not impact at the community level. Similarly, traditional knowledge and wisdom is not properly documented, a serious shortcoming in an era of intellectual property claims and rights.

Information and data generated by biodiversity related line departments is not disseminated within the government, local communities and researchers.

Procedures and mechanisms to assess and analyze the impact of development activities on biodiversity not given the importance it deserves. Further, there is lack of appropriate indicators for monitoring and forecasting habitat change.

In most cases, studies on ecosystem health prior to development activities are lacking. As a result impact of changes that takes place in the post developmental phase is difficult.

Information especially with respect to change in weed and pest population due to change in cropping pattern and cropping patterns that are detrimental or conducive to wild flora needs to be generated.

Hitherto, the main thrust on biodiversity was mostly confined to species of economic importance only; other species which occupy a niche in the ecosystem have by and large been neglected.

Information dissemination mechanisms are poor, especially in the absence of a strong extension base.
Work on economic evaluation of natural resource is essential as it is not always possible to quantify the benefits in monetary terms.

Gaps in Policy and Legal Structure

Shrinking grazing land not only due to demographic pressure and human activity but also due to Government policy of reducing the percentage grazing lands from 7% to 2% has increased the pressure on already overburdened forest lands. Construction of large dams and barrages has lead to submergence of large biodiversity rich areas and large-scale displacement of local communities adding to pressure on natural resources elsewhere in the vicinity.

Gaps in Institutional and Human Capacity

- There is a general lack of understanding of importance of biodiversity conservation at all levee, in the line departments of the government to the local communities at the grassroots level.
- Data pertaining to biodiversity are scanty, documentation is poor and beyond the reach of the communities.
- Non-appreciation of the role of women in biodiversity conservation and knowledge of traditional system.
- This is mainly a human resource development issue. Awareness dissemination on biodiversity conservation should spread to the communities' right upto the village.

Major Strategies and Actions

The state is endowed with a rich and varied expanse of natural resources including diverse soil and agro-climatic conditions, forests, bovine and aquatic wealth. With economic development, biotic and abiotic pressures on these resources is bound to increase and the present and future requirements of food, health and livelihood security can be addressed only by ensuring their sustainable use, the state government proposes to initiate a concerted strategy and action plan.

The Department for Biodiversity and Biotechnology has been created with the intention to:
- Focus attention on sustainable use of the state's rich and diverse bio-resources;
- Promote the application of biotechnology for deriving benefits in a wide range of sectors such as forestry, environment, agriculture, animal husbandry, fisheries, human health, etc.

The setting up of the department was preceded by the Constitution of the Madhya Pradesh Biodiversity Board headed by the Chief Minister and with the eminent agriculture scientist and administrator, Dr. M.S. Swaminathan as its advisor.

The board will acquire statutory status under the proposed Biodiversity Act. A Steering Committee and three Standing Committees have been constituted under the board. All the three Standing Committees are chaired by eminent persons in their respective fields. These Standing Committees are on 'Biodiversity Conservation', 'Sustainable use of Biodiversity' and 'Equitable Sharing of Benefits'.

Action-points that emerge from the SBSAP shall help decide on the commissioning of further studies and take up implementation of specific projects. Existing programmes of various administrative departments shall be influenced to make biodiversity conservation central to their implementation strategies. A separate programme shall fund such studies.

Some of the major programmes that are proposed to be included in the plan and budget are as follows:

Madhya Pradesh Biodiversity Register

Inventorisation, analysis of information, and informing the policy making function from the biodiversity angle will be facilitated through the systematic development of a "Madhya Pradesh Biodiversity Register". This task shall be undertaken by an agency designated by the state government.

Community Awareness and Participation

Involving the community and deepening its participation in the conservation and sustainable use of natural resources at the state as well as the regional and community level has been at the center of all policy initiatives of the state government. A programme that facilitates such initiatives shall be implemented with active community participation. Funding support to agencies/departments and NGOs shall be covered under this programme.

Legal and Regulatory Aspects

Development of a repository of traditional knowledge is essential for protection of individual and community rights and enabling the establishment of an environment conducive to equitable sharing of benefits. Special concerns arising from the WTO regime including patenting, bio-safety, bio-piracy and intellectual property issues need to be addressed. A programme for such studies shall be taken up and implemented by the departments/agencies or NGOs as decided by the state government.

Funding of Research Projects and Development Programmes

Research and development projects in the field of biotechnology shall be funded under this scheme. Project proposals shall be entertained from educational and research institutions within the state on pure and applied research in the field of biotechnology and related subjects. Development oriented projects involving the community including women and weaker sections of the society shall be encouraged.

Scientific Validation of Traditional Knowledge and its Documentation for IPR Protection

In order to protect the traditional knowledge under IPR regime and facilitate patenting, it is proposed to promote scientific studies on such knowledge for authentication and product development.

Enhancing and Integrating Existing and Planned *In Situ* and *Ex Situ* Biodiversity Conservation Efforts.

- Need to broaden focus to private and revenue lands
- Need to focus on all forms of aquatic habitats, on agro-biodiversity and microorganisms
- Need to assess genetic Potential of a Particular breed in a specific ecological conditions
- Need to strengthen the research and development of DNA and genome mapping.

Promoting Sustainable Use of Biodiversity Resources

- Need to focus on ensuring sustainable and biodiversity friendly patterns of use of living resources such as medicinal plants, timber and non-timber forest produce, fresh water flora and fauns
- Need to coordinate relevant actions pertaining to knowledge base, *in situ ex situ* conservation, policy and legislation, capacity building, education, awareness and communication outlined in various components of the Strategy and Action Plan.
- Agro-climatic zones of MP should be the basis for implementation.

Monitoring and Evaluation

Biodiversity Conservation is a multidisciplinary subject, requires entirely new systems and approach of monitoring and evaluation. It will require services of various subject experts.

For monitoring and evaluation of SBSAP a State Level Coordination Committee (SLCC) may be constituted. The coordinating agency at the state-level will be Department of Biodiversity and Biotechnology. All heads of the concerned departments, EPCO and MPCOST will be the members of the coordination committee.

It is proposed that to assist the SLCC a permanent core group of officers drawn from concerning departments/organizations be formed. The core group will evolve suitable qualitative and quantitative monitoring and evaluation indicators. These indicators will assess the impact of the projects and will make appropriate suggestions to improve the efficacy of the ongoing schemes and programmes of their respective departments. The core group will also act as link between line Department and the Biodiversity Department. The Biodiversity Board shall eventually have to create a small secretariat that performs the vital task of information gathering and storage. It shall also analyze the data and lend support to research projects. In the long run it shall expand its role to include being the watchdog on behalf of communities in the latter's effort to protect and exploit traditional knowledge for the benefit of the society at large.

Maharashtra State Biodiversity Strategy and Action Plan*

Coordinating Agency: Yashwantrao Chavan Academy of Development Administration, Pune

1.1 An Introduction to the MahaBSAP

Biodiversity conservation can be achieved if interventions support innovative, local projects that integrate conservation with social and economic development and through research and analysis of conservation and development techniques and information exchange and outreach. How would a strategy be able to prioritise biodiversity conservation in the Western Ghats of Maharashtra? The Thane district within the Western Ghats and West Coast pereplains comprises the densely populated municipal self-governments of Thane, Kalyan-Dombivili, Navi Mumbai, Bhiwandi, Ulhasnagar, Panvel, Vashi-Vasai and Mira Bhayander. The entire requirement of drinking and industrial water for the districts of Mumbai Suburban, Brihanmumbai and Thane is met from the hydrology and catchments of the Western Ghats. What can be the value of the water that can be perceived as an output of the habitat conservation in these hill ranges? Should there be policy at the level of the State Government only? Should the local self-governments be able to or be required to invest in the conservation programmes of the Western Ghats that provide their people with water? Should the Government of India position statutory imperatives in these hill ranges that would prevent local governments from destroying their own life source?

A State-level strategy for biodiversity conservation needs to be coupled within perspectives of ecologically sustainable development. The strategy also needs to be able to draw upon a computer-based information management system in order to access improved environmental and development information. Such a database would need to be integrated with social and economic objectives. Discussing biodiversity conservation in isolation would not serve to protect biodiversity. Would that mean that the State-level strategy for biodiversity conservation would need to have goals that outline insular biodiversity objectives? Biodiversity conservation strategies would need to recognise the linkages to social and economic information, draw upon its ability to provide for health and sustainability of the environment and reconcile development sectors to understand the action plan as the basis for equitability, social justice and empowerment.

It is therefore essential that a State-level strategy also focusses upon collation of information on a ecological study process prior to destroying habitats that do not seem to exhibit biological diversity. The Deccan grasslands or the river systems of Marathwada in Maharashtra may have lesser biological diversity than the Western Ghat Hill Systems or the rivers of Satpuras. That does not make them less in importance in a scale of biological diversity.

Nature Conservation Perspectives in Maharashtra

Historical Perspectives: There are obvious historical representations of biodiversity or nature conservation perspectives in Maharashtra. The most representative of them all is the protection of sacred groves along the Western Ghats and elsewhere in the region. Differing in size, as in area, the sacred groves have been considered as essential for the cultural and social well being of the people. Later rulers of the region have been responsible for protection of forests for ensuring the 'sanctity' of their hunting domains, such as the Radhanagari Wildlife Sanctuary. These forests comprise some of the last patches in the State where one can record the Tiger, Leopard and the Gaur or the Indian Bison.

There are also instances of administrative interventions in biodiversity or nature conservation from among the various rulers of Maharashtra. One of the best known of them all is the edict issued by Shivaji, the founder of the Maratha Empire. The edict lists various measures through which the land needs to be managed, and the habitat needs to be protected. Before Shivaji, the land speaks to us of the sanctity given to the forests by the presence of various cave complexes built by buddhist monks. These enormous cave complexes are spread throughout the region of Maharashtra. The ones that are well known include the Ajanta, Ellora, Karla, Kanheri and the island complexes of Elephanta. Not much is recorded of their functional success in protecting the forests around them, but it may not lack in coincidences that these areas are still good forests.

Ecoregional Profiles: Biological diversity is representative of the ecosystem wherein it occurs. The numbers of species and varieties of organisms may be similar between the ecosystems, but the species and varieties by themselves would differ immensely.

Science does not as yet know the complete lists of biological organisms that occur in all ecosystems. Prior to waiting for complete documentation of species, varieties and knowledge about endangered or rare organisms, it is much more effective to manage the ecosystem. Maharashtra has distinct ecoregions, namely, the West Coast, the Western Ghats, the Deccan Plateau, the Satpura hill ranges and the Vidarbha region of the Bastar forest areas. This document will attempt to discuss each of these ecoregions separately and place on record the known flora and fauna lists.

Current Concerns: The once widespread distribution of the Tiger, the Blackbuck, the Chinkara, the Great Indian Bustard and the Lesser Florican, among the larger faunal species, is not true any longer in Maharashtra. The Cheetah was known to occur through most of the dry semi-arid regions of the State, but is now extinct. The Protected Areas, comprising the National Parks and Wildlife Sanctuaries, have not completed their legal processes as yet. Large areas of the State face drought and famine almost each year. Starvation and malnutrition concerns create crises in certain regions. Crop failures such as in Cotton have led to suicides by some farmers as in other States of the nation. Extreme price fluctuations as in onion can destroy the small farmer considerably. Changes in food consumption patterns have wiped out traditional food items from the market as a commercial commodity.

Some Case Studies: The rivers of Maharashtra are a typical case in point about how the entire word play of environmentalism can escape prioritising some of the most important ecosystems. The rivers of the State start their journeys from the hill ranges of the Western Ghats or the Sahyadris, the Satpuras and the hills of Vidarbha. They flow in to the Godavari, Krishna and Wainganga river systems. Strangely, they do not figure in the conservation scenarios of wildlife conservation, ecodevelopment, joint forest management, environmental management or watershed management. A State-level Document such as the Biodiversity Strategy and Action Plan would need to ensure that life-giving systems such as the rivers of Maharashtra, that may not be obvious biodiversity-rich regions, needs to be focussed upon. Relatively low-biodiversity regions should not lose being indexed on some imaginary priority scale.

How does one reconcile the need for conservation of highly endangered and endemic wildlife species such as the Great Indian Bustard? Known to occur only in very restricted areas of the semi-arid Deccan grasslands, and inhabit regions bordering cropfields, along with the crop-destructive Blackbuck and the sheep-predator Wolves, the Bustard is a key example of the paradoxes that exist in nature conservation. Inefficient initiatives such as plantation of exotic tree species in the Deccan grasslands within the drought prone area plots have led to reduction in the natural habitats of the Blackbuck and the Bustard. Alteration of the grassland habitat by excessive plantations of neem trees has led to providing excellent shade and cover for the Blackbuck during the summer, when most semi-arid trees are supposed to shed leaves and cause large mammalian species to disperse, thus using less resources in any one area. We now have the embarassment of riches in bustard conservation areas where tree plantations in grassland patches have led to increases in the numbers of blackbuck. As a result, the forest department faces bi-annual embarassment in the Legislative Assembly when queries are posed about the need to reduce the blackbuck populations. State-level strategies would need to address such overlaps of knowledge and inefficient analysis.

Government Initiatives: Water management and conservation is an important priority area for the Government of Maharashtra. Governance mechanisms for water management resulted in the State formulating the Groundwater Act. Similarly, a similar statute in the erstwhile Bombay Presidency preceded the Wildlife Conservation Act, 1972, of the Government of India. Recognition of community participation efforts and its efficacy have resulted in the Government formulating the '*Adarsh Gaon Yojana*' or the 'Ideal Village Scheme' similar to Annasaheb Hazare's efforts in Ahmednagar. The Employment Guarantee Schemes (EGS) and the Employment Assurance Schemes (EAS) based on an innovative financial instrument have resulted in building up vast capital assets of watershed management programmes, groundwater wells, groundwater replenishment programmes and enabling parallel financial movement to the village panchayats. These schemes have resulted in the national-level employment assurance schemes and are to be implemented in other States as well.

Departmental Separation: The Government of Maharashtra enables nature conservation on sector-specific and multi-sectoral levels in the State. The Forest Department manages all the forest areas in the State, along with specific focus on wildlife conservation through their wildlife wing. Some officers of the forest department comprise the separate Social Forestry Department, focussing on community forestry, watershed management and non-forest areas. The Environment Department was part of the Energy and Environment Department at the State-level and is now a separate department. It includes the Maharashtra Pollution Control Board. The Soil and Water Conservation Department is now with the Zilla Parishads as part of the statutes of the 73rd Amendment to the Constitution of India. Departments directly relevant to biodiversity conservation issues include the Agriculture Department, Animal Husbandry Department, Irrigation Department, Area Development Boards and the Khadi Village Industries Development Board, among others.

Non-government Initiatives: Historically, community initiatives have ensured conservation of forest patches around locations of

religious importance. The network of sacred groves and their conservation perspectives have been documented in various publications. As mentioned earlier, Annasaheb Hazare's work in Ahmednagar had inspired the Government to develop the 'Adarsh Gaon Yojana'. Similarly, his initiatves in ensuring community participation in management of the village's natural resources have inspired many non-government initiatives throughout the State and elsewhere in the nation. Watershed management has now almost become synonymous with the involvement and leadership of the non-government sectors. *Ex situ* conservation of genetic diversity is also another important thrust area in the non-governmental sector in Maharashtra.

The MahaBSAP Process

The Maharashtra State Biodiversity Strategy and Action Plan (MahaBSAP) process is being developed under the aegis of the National Biodiversity Strategy and Action Plan (NBSAP). With reference to Maharashtra, there are more processes in progress than just the Maharashtra State Level process. The documents from these processes would more than justify their independent completion on account of the importance of the thematic concerns, ecoregions or issues that they address. Similarly, various inter-state ecoregions and thematic concerns address issues in Maharashtra. The region-specific plans include:

The Maharashtra Specific Plans

- The Maharashtra State Biodiversity Strategy and Action Plan (MahaBSAP)
- The Vidarbha Sub-State Biodiversity Strategy and Action Plan
- The Satpuras Ecoregion Biodiversity Strategy and Action Plan
- The Nagpur City Biodiversity Strategy and Action Plan

The Inter-State Ecoregion Plans

- The Bastar-Gondwana Central Indian Forests Biodiversity Strategy and Action Plan
- The Western Ghats Biodiversity Strategy and Action Plan
- The Deccan Plateau Biodiversity Strategy and Action Plan
- The Western Coast Biodiversity Strategy and Action Plan

The MahaBSAP process reviewed the thematic concerns and listed various State-level themes for preparation of State-level documents. The thematic concerns at the State-level were listed along with mentions about their linkages with the National-level thematic subjects. Similar to the National-level thematic approaches, the State-level thematic documents will be presented as independent documents while their recommendations will be internalised in the MahaBSAP report. The MahaBSAP process is described in much more detail later.

1.2 Scope of the MahaBSAP Process

Governance Perspectives

The State of Maharashtra has been a pioneer in enabling empowerment to the Panchayat Raj Institutions through the 73rd Amendment and to the Municipal Bodies under the aegis of the 74th Amendment. The State is perhaps the first to transfer more subjects to the Panchayat Bodies than those listed by the 73rd Amendment. So, would the State be able to position a State-level Strategy and Action Plan on Biodiversity Conservation? To what extent would the separation of concerns need to be listed specific to the Panchayat and Municipal Bodies? Can the State Government forward or position recommendations as mandatory requirements for acceptance by the Panchayat and Municipal Bodies? The State and Government of Maharashtra would definitely be able to undertake a pioneering approach for biodiversity conservation as in other concerns such as the Employment Guarantee Scheme, the Panchayat Raj Institutions, Adarsh Gaon Yojana (Ideal Village Schemes) and the Village Ecodevelopment Programmes.

Governance mechanisms for biodiversity conservation cannot however be diverted too afar from prioritising biological resources over administrative models and initiatives in community participation. Certain priorities in biological conservation would need to be projected as imperatives. Endangered, endemic or near-extinct species, in macro or micro- faunal/flora groups would need to be provided a higher conservation priority even if absolutely in conflict with development concerns or community interests. How would the Government be able to choose or exercise an option? Would the Government have the ability to exercise an option in this regard? Should local self-governments or communities be able to exercise judgement over important biological resources?

These factors support a precautionary line in maintaining biological diversity - that is, actually or potentially useful resources should not be lost simply because we do not know about or value them at present. The 73rd and 74th Amendments to the Constitution of India enshrine empowerment to local self-governments. Municipal bodies, both Municipal Councils and Municipal Corporations, need to constitute local multi-community representative committees to review administrative action,

budgets and proposals for future works. Similarly, in a three-tier structure, the Village Panchayat Body, the Tahsil level Panchayat Samiti and the District level Zilla Parishad, are comprised of elected local representatives with statutory functions. To this three-tier structure is now added the Village Body, the Gram Sabha, that requires that every single villager is consulted prior to undertaking common projects or activities. The Gram Sabha can also direct the Village Panchayat to plan its monthly agenda for its statutory meetings.

Governance however has its inherent responsibilities to the people. Priorities such as poverty alleviation, microeconomics, micro-enterprises, the landless tiller, the marginal and the unemployed citizen, the underprivileged women, the uneducated girl child, the backward classes, the urban slum dwellers and the various victims of gaps in the System, need to be focus areas of development administration. It is more important within the Government to ensure that people do not get disheartened with elaborate models of participation in 'vague' and 'abstract' ideas such as nature conservation or biodiversity issues. It is therefore equally more important to understand, identify and list the fact that the underlying causes of biodiversity loss are indeed, poverty, macroeconomic policies, international trade, policy failures, poor environmental law, weak enforcement, unsustainable development projects and lack of local control over resources (Wood *et. al.* 2000).

Community participation can be strengthened only through an elaborate identification process of stakeholder concerns in biodiversity conservation. If not, community participation initiatives can be swayed easily to other objectives once biodiversity conservation is no longer fashionable. There are numerous villages in Maharashtra wherein the Adarsh Gaon Yojana has been initiated. A common and unfortunate refrain however is that the scheme has not been able to take off, because each villager would need their very own 'Anna', or Annasaheb Hazare. Highly individual-driven or individual-ideal based reform programmes would remain only as reform programmes. It may not translate into equal action everywhere.

It would therefore be necessary to enable the convergence of the Four Corners of the MahaBSAP process, namely, biodiversity conservation, community participation, governance, and development administration. The MahaBSAP process would need to separate its recommendations and approaches across the various levels of governance and focus without options on biological resources vis-a-vis community participation. Governance mechanisms would need to internalise various perspectives through cultural and economic factors in order to develop a new grammer and policy matrix for biodiversity conservation.

Policy initiatives, through the State Planning Commission, Area Development Boards, the District Planning and Development Councils, the Municipal Planning Committees and the Gram Sabhas need to enable parallel trickle-down and grassroots-to-treetops approaches to biodiversity conservation. Some common understanding would need to be positioned in order to enable the initiatives to be (a) easy to understand (b) based on standard indicators for decisions, (c) easy to be replicated, and (d) understood within a framework of social justice and equitability.

Current initiatives in governance within development administration focus upon the development of citizens' charters for empowerment and local audit. Various municipal bodies have developed their own citizens' charters called the '*Naagarikaanchi Zaahirnaama*'. The Government of Maharashtra has previously circulated a Village-level Citizens' Charter called the '*Gramasthaanchi Sanad*'. It would be necessary to include perspectives on biodiversity conservation, nature conservation, water and soil management, organic farming, sustainable development and social justice within the framework of the Citizens' Charters. The proposals would need to be presented by the local self governments to their citizens' bodies and would need to be discussed prior to be included or refused in the local Charters. The State Government can also include some options as mandatory ones wherein the local self-governments or communities cannot avoid the need for biodiversity conservation.

Thematic Concerns

The Maharashtra State Biodiversity Strategy and Action Plan (MahaBSAP) document will attempt to develop and position a very detailed, itemised and cross-referenced matrix with reference to biodiversity conservation, environmental management and sustainable development at all levels of governance and community participation. The Strategy document will also explore the availability of financial capital to conserve, control or manage the various categories of environmental or biodiversity concerns. A national-level paradox is seen, one arising out of lack of development (Type I), and the other arising out of developmental projects (Type II). At the State-level, the paradox necessitates an indepth understanding of the type and extent of biological diversity in the State, documentation of the conservation and management processes and an itemisation of the action plan for the future.

Under the aegis of the MahaBSAP, the State-level Strategy is supported by thematic inputs from various resource persons. The thematic groups at the State-level have been listed along with an intended overlap of the NBSAP Thematic groups and sub-groups. The Table below presents the MahaBSAP list of thematic groups along with an indication of the overlap with the NBSAP thematic concerns.

Table: The MahaBSAP List of Thematic Groups and Overlap with the NBSAP Thematic Concerns

S. No.	MahaBSAP Thematic Group	Overlapping NBSAP Thematic Concern	Overlapping NBSAP sub-thematic concern
1.	Status of law in Maharashtra with respect to biodiversity	Policies, laws, institutions and planning	• Mining and biodiversity • Biodiversity in EIA
2.	Domesticated biodiversity	Domesticated biodiversity	• Exotics and biodiversity
3.	Eco-tourism	Technology, industry and biodiversity	• Tourism and biodiversity
4.	Finance, banks and biodiversity	Technology, industry and biodiversity	• PDS and biodiversity • Economic subsidies
5.	Agriculture	Domesticated biodiversity	• PDS and biodiversity
6.	Forests and Forestry	Natural terrestrial ecosystems	• Plantations and biodiversity • Current forestry practices
7.	Wildlife Conservation	Wild plant and animal biodiversity	• Current wildlife management practices
8.	Land and Water Pollution	Pollution	• Biosafety
9.	Flora	Wild plant and animal biodiversity	• Community gene banks
10.	Fauna (excluding birds)	Wild plant and animal biodiversity	—
11.	Birds	Wild plant and animal biodiversity	—
12.	Watershed and Water Management	Policies, laws, institutions and planning	• Water management and biodiversity
13.	IPRs, Benefit Sharing	Policies, laws, institutions and planning	• Community conserved areas and species
14.	Tribals	Policies, laws, institutions and planning	• Sacred biodiversity elements
15.	Gender	Policies, laws, institutions and planning	—
16.	Food Processing	Economics and valuation of biodiversity	• Biodiversity-based enterprise
17.	Renewable Energy	Technology, industry and biodiversity	• Sustainable technologies • Thermal power
18.	Research	Research	• Monitoring
19.	Medicinal Plants	Economics and valuation of biodiversity	• People's biodiversity registers
None	Main Strategy and Action Plan Document	—	History of biodiversity conservation in India

Ecoregions and Habitats

There are four inter-state ecoregions that include Maharashtra within their scope and coverage. These include, as mentioned earlier:

- The Bastar-Gondwana Central Indian Forests Biodiversity Strategy and Action Plan
- The Western Ghats Biodiversity Strategy and Action Plan
- The Deccan Plateau Biodiversity Strategy and Action Plan
- The Western Coast Biodiversity Strategy and Action Plan

Zoogeography of Maharashtra: The State of Maharashtra and its topography lends naturally to its zoogeographical separation. The West Coast, travelling through Thane, Mumbai Suburban, Brihanmumbai, Raigad, Ratnagiri and Sindhudurg districts, is a distinct ecoregion of the State. The western pereplains are at times narrow and mostly inundated with vast tidal mudflats. Most such mudflats and tidal inlets have been filled up for urban growth. Mumbai, Navi Mumbai and the Thane urban regions are examples of metropolitan expansion over previous coastal mudflats. Similar growth is currently taking place between Panvel-Alibag, Dahanu, Virar-Vasai among other sites.

East within the Subcontinent, almost parallel to the West Coast are the Western Ghats, known in Maharashtra as the Sahyadri hill ranges. The Western Ghats lead up to the Deccan Plateau. To the northeast of the Western Ghats and north of the Deccan Plateau are the Satpura hill ranges. These hills converge with the Central Indian forests of the Bastar regions in Maharashtra, i.e., Gondia, Bhandara, Chandrapur and Gadchiroli districts. The Table below presents the MahaBSAP list of ecoregions under review in

Maharashtra towards preparation of the Strategy and Action Plan, along with an indication of the degree of overlap with NBSAP ecoregions.

Table: The MahaBSAP List of Ecoregions vis-à-vis Overlap with the NBSAP list of Ecoregions

S. No.	MahaBSAP Ecoregion	NBSAP Ecoregion	Inter-State Continuity
1.	Konkan Ecoregion (Thematic Group Review)	West Coast Ecoregion	Gujarat, Maharashtra, Goa, Karnataka, Kerala
2.	Deccan Ecoregion (Thematic Group Review)	Deccan Plateau Ecoregion	Maharashtra, Andhra Pradesh, Karnataka
3.	Western Ghats (Thematic Group Review)	Western Ghats Ecoregion	Maharashtra, Goa, Karnataka, Tamil Nadu, Kerala
4.	Satpuras (Thematic Group Review)	Satpura Hill Ranges Ecoregion	Maharashtra, Madhya Pradesh
5.	Vidarbha Forests (Thematic Group Review)	Central Indian Forest Ecoregion	Maharashtra, Madhya Pradesh, Chhatisgarh, AP, Orissa
6.	Natural Ecosystem Diversity: Chapter 3.1 (Coastal, Hill Areas, Deccan Grasslands, Central Indian Forests)	West Coast, Deccan Plateau, Western Ghats, Satpuras, Central Indian Forest Ecoregions	Gujarat, Madhya Pradesh, Chhatisgarh, Andhra Pradesh, Karnataka, Goa
7.	Floristic Diversity: Chapter 3.2 (Konkan, Sahyadri, Khandesh, Marathwada, Vidarbha)	West Coast, Deccan Plateau, Western Ghats, Satpuras, Central Indian Forest Ecoregions	Gujarat, Madhya Pradesh, Chhatisgarh, Andhra Pradesh, Karnataka, Goa

1.3 Objectives of the MahaBSAP Process

Collaboration between the local, regional and/or national governments and the local communities would enable institutional or non-institutional mechanisms for biodiversity conservation and sustainable development. These forms of collaborations would need to be internalised within governance mechanisms. Appropriate linkages with federal or local budgets, local or regional planning, programme implementation methods and land use conflicts or concerns would only continue if positioned within the governance framework. An opportunity should be enabled to invite participation, discussion, practicing conservation, research and administrative guidelines for strengthening local or regional environmental governance.

One of the important objectives in environmental governance vis-a-vis biodiversity conservation would be to understand and record the perspectives and processes of environmental decision-making. These perspectives and processes would need to be separated at the local, regional and national levels as also across departments, sectors or multi-sectoral strategies. An easily recognisable and understandable method for ensuring dialogue and consultation would need to be an important aspect of environmental governance. Concerns of social justice and equity would be a required objective within the governance framework. It should be ensured that concepts based merely on sound scientific and economic analysis do not overtake critical questions of India's challenges of overcoming poverty and social and gender inequity.

Understanding the priorities of biodiversity conservation within the governance framework would not necessarily mean that most recommendations might be implemented. Polity, caution, development concerns, employment and questions of resource productivity may prevent apparently important biodiversity conservation goals from being implemented. It may not suffice to present recommendations for biodiversity conservation and expect that all governments would have to change their functioning in order to implement them. Recommendations would have to consider all the factors that may prevent the objective from being successful and on occasions actually prevent biodiversity conservation. Drawing upon the aspects that would prevent biodiversity conservation and understanding governance frameworks, the strategy and action plan would need to subsequently finalise recommendations that would definitely ensure implementation.

Governance necessarily involves fostering effective, transparent, accountable and responsible governmental institutions guided by the rule of law and dedicated to reducing inequality. Governance mechanisms would need to seek to strengthen the civic and political partnership as also participation of people and communities in charting their future. There needs to be therefore, substantial capacity-building mechanisms within governance frameworks to strengthen internal perspectives on biodiversity conservation programmes.

With the coming of economic reforms and the 73rd and 74th constitutional amendments in 1993 supporting decentralised local governments, the MahaBSAP strategies would need to develop cross-sectoral matrices to outline the recommendations for biodiversity conservation within newer governance frameworks. These are yet to be understood fully and are often misinterpreted and misunderstood. The amendments provided legal status to elected local councils or *panchayati raj* institutions and strengthened existing perspectives in urban bodies. The singularly unique democratic experiment, nation-wide, is accompanied by official support to community management of resources and services through a wide range of programmes and plans.

Laws passed by various States to ensure regular elections for the three tiers of the panchayati raj bodies and the urban local self-governments further strengthen these amendments. These laws clearly indicate the extent of devolution of powers and functions to the PRIs and urban bodies. The MahaBSAP document would need to consider the impact of these structural changes in government processes and understand how it would affect governance at the National, State, regional and/or local tiers of governments.

Community Participation Objectives

Local people and communities have subsisted, survived or successfully utilised their local natural resources over several centuries. If it were entirely true, why should the MahaBSAP process or other such attempt to record and document strategies for communities to participate in biodiversity conservation? The answers lie in the rapidly reducing distances of space, perspective and ownership of natural resources in the current years. People rarely seem to have absolute control over their resources. Decisions by governments, competing-stakeholders, private enterprise and industrial development, among others, overtake the gradual growth in understanding of local communities.

Development programmes that seem logical, beneficial, economically profitable and equitable may not enable nature conservation or protect biological diversity. Governments and community development processes need to be cautious in its inherent ability to assume the superiority of human intellect and intelligence. Humans actively exploit a relatively small proportion of the world's biological diversity, while other elements of biological diversity, as yet unknown, may be important for various reasons. These may include the fact that they have values that are unused or unknown at present. The unknown values of biological diversity may in fact in future be necessary to enhance the material well being of mankind if they were to be discovered and exploited.

Apart from the genetic or the 'unknown' factor being of future support to human society, there is also the need for greater involvement of communities to recognise and accept the usefulness of the unknown gene. Communities must also ensure that equitable and decentralised models of self-governance exist to protect the common resources that may later present the support systems from within biological diversity. Nature conservation programmes and policy should emphasise the need for greater involvement of communities in decisions that may have a direct or indirect impact on their common resources. Development projects may be planned on the basis of the fact that common resources of the community do not currently have declared or recorded assets of biological diversity. Local communities should be enabled to be aware of their potential future loss and should internalise these perspectives in their decision making within self-governance.

The status and validity of the participation of women in community based activities that concern common resources, especially biological diversity, needs to be directly linked with their existing empowerment structures. At the same time, it is essential to understand and accept that tradition and culture may be a barrier to widening the scope of women's participation in biodiversity conservation within their local communities. The Maharashtra State Biodiversity Strategy and Action Plan (MahaBSAP) needs to ensure that new paradigms can be evolved from people's wisdom and local traditional practices. Survival strategies at various levels and across various perspectives have always existed in rural India as in other developing countries. These strategies include examples such as 'Wavli' (wherein income earned by a woman is retained by her) as prevalent among Valsad tribals in Gujarat, to teh Grain Banks and thrift groups in various parts of the Third World. Other examples include the Self-Employed Women's Association (SEWA) in Ahmedabad, Gujarat, with more than 46,000 women participating in the process, and the Grameen Bank of Bangladesh, where the participating individuals see themselves as *agents of change*.

The Maharashtra Rural Credit Project (MRCP) is a recent model for sustainable rural poverty reduction through people's participation and self-help groups. NABARD and Government of Maharashtra (GoM) have been implementing the MRCP since 1994 on a pilot basis in four districts, with financial assistance from the International Fund for Agricultural Development (IFAD) and the Government of India. MRCP focuses on people's participation in credit planning and credit administration for poor and non-poor, developing savings habits and credit culture among the ultra-poor through the medium of Self-Help Groups (SHGs), with support from various agencies, to ensure sustainable socio-economic development of the village.

The Self-Help Groups (SHGs) concept helps the members to develop both economic and social strengths. The collateral substitute positively influences the resources of the SHGs, where members could meet their contingent obligation without going to money-

lenders. Banks have faith in the collective wisdom of the group while lending and persuasive capacity, as also group pressure for recovery of loans. The use of group pressure and moral/social security as a collateral substitute without any tangible security, contributes to the viability of the bank through reduced transaction costs and prompt repayments. It is necessary to further develop a linkage between SHGs and banks to avoid repayment delinquency. SHGs being non-legal entities should maintain their flexibility while trying various models of linkages, depending on local needs. SHGs should also be linked with health, sanitation and education programmes. According to NABARD there were over fifteen thousand SHGs operating in India in 1998.

Convergent Community Action (CCA) is a strategy that enables an organised community to give effective attention to the specific factors of their poverty and to proceed collectively to fulfil their human rights, prominently the rights of women and children. CCA anticipates a change of attitude and approach on the part of official and frontline workers. CCA implies three primary conditions for progressive reduction of poverty and for fulfilling human rights, including those that are specific to women and children - an organised community, household economic security and basic health and education.

While listing objectives for community participation in biodiversity conservation, one needs to emphasise that women are usually at the end of the adverse effects of economic development. Credit as a tool for organising the poor, should be an entry point for larger social change in stakeholder participation in biodiversity conservation. When the poor become stakeholders in development planning, they would necessarily feel a sense of ownership for the programme. It is not always an aspiration for empowerment, but factors like low income and unemployment that persuade them to begin with micro-enterprises that are necessary to supplement the household income. Biological diversity may be very low on their priorities. Conservation of biodiversity may actually be a negative aspect in regard to enhancing their household income.

Community participation in management of natural resources has to be necessarily enabled at the village-level by increasing the awareness of the sarpanch, the panchayat and the gram sabha process. A sarpanch of the village can play an important role as an instrument of rural reconstruction and social change. It is the responsibility of the village panchayat to bring together the efforts of the government, the abilities of non-government agencies, and the aspirations of the villagers to create an ideal village. This convergence was promoted through the achievements and efforts of Annasaheb Hazare through the '*Adarsh Gaon*' approach. The *Adarsh Gaon Yojana* was catapulted across the rural development horizon of Maharashtra by successive governments in order to ensure a catalytic foundation to ensure community participation in local self-governance, management of natural resources and social change.

Apart from Shri Annasaheb Hazare's own village, various other villages in Maharashtra have become praiseworthy of their commitment to community participation in management of natural resources. Most such initiatives in community participation have initially built upon efforts at watershed management. Shri Popatrao Pawar, a young and worthy agent of change, *sarpanch* of Hiware Bazar, Ahmednagar District, is convinced that through watershed development, a village can change their overall scenario and achieve Mahatma Gandhi's dream of self-sufficient villages in rural India. (Shri Popatrao Pawar can be contacted at Yeshwant Krishi Gram and Panlot Vikas Sanstha, Hiware Bazar, Block No. 8, Bhaji Market Building, Marketyard, Ahmednagar 414001 Maharashtra)

Key initiatives in community participation in management of natural resources were in Afforestation, Changes in crop patterns, Ban on grazing, Ban on using the axe, Use of biogas, Enhancing milk production, and Prohibition among various others. Parallel initiatives included Extension research with farmers' participation, Enabling visits of farmers to projects in other districts and states, Emphasising primary education, Conducting risk assessment and changes in health management, Reengineering rural sanitation, Prioritising drought prone area programmes, Strengthening *mahila bachat gats* (Women's Self Help Groups – SHGs) and activating the *gram sabhas*. Capital assets such as contour bunding (ridges) of watershed slopes, nalla (drainage) bunding, forest ponds, cement nalla bunding, afforestation plots, storage *bandharas* (embankments), percolation tanks, and various other earthen structures are now permanent structures for the Hiware Bazar village as a result of community participation.

Thematic Concerns Objectives

The Maharashtra State Biodiversity Strategy and Action Plan (MahaBSAP) process has invited and reviewed various thematic strategy and action plans to strengthen the final document. The matrix of overlap and non-convergence between the Maharashtra State process for the various thematic concerns and the National process has been presented earlier in this document.

It was deemed that certain common objectives would be taken into consideration for preparing the various thematic documents. An important intervention on behalf of human society vis-a-vis biological diversity in areas under severe negative impact is to ensure "*rehabilitation, maintenance and utilisation of biological resources on a sustainable basis for the benefit of the community*". This objective has been common to most of the habitat intervention based development programmes in Maharashtra. Such programmes could include the drought prone area programme (DPAP), watershed development programme, joint forest management, village eco-development, ideal village programmes (*Adarsh gaon yojana*), and the wasteland development programmes among others.

Communities would envisage that biological resources should be managed for conservation and productivity enhancement through active participation of the poor '*bhoomiputra*' (locally born) communities in micro planning, implementation and monitoring processes aimed at biodiversity conservation and natural resource management. The thematic separation and approaches would help the State-level biodiversity strategy and action plan to expand participatory resource management in the various ecological regions of Maharashtra. Each ecological region is inhabited with local resource dependent communities who face high and growing incidence of poverty due to rapid degradation of biological resources.

Why should diverse thematic approaches converge to enable a common biodiversity strategy and action plan? Would convergence be useful? Various thematic concerns and perspectives can come together to strengthen a single development programme if the objectives and output would enable strengthening the poorest of the poor. The Maharashtra Forestry Project, for example, during its Phase-I implementation of Joint Forestry Management (JFM) in 602 villages of Maharashtra, helped develop a symbiotic relationship between the local people and the forest department. The JFM project focuses on regenerating degraded forestlands. The implementation of JFM has provided alternate employment opportunities to the forest dependent people. Some income from non-timber forest products such as fodder grass and gum has already started flowing to people. During the Phase II for the Maharashtra Natural Resource Management Project, the JFM approach would be further refined so that it becomes a programme for rural poverty alleviation.

The Forest Department of the Government of Maharashtra has proposed to position the Phase II component of the Project in 14 districts where there are maximum number of tribals and forest dependent people. These districts as per the project proposal include Amaravati, Bhandara, Buldhana, Chandrapur, Dhule, Gadchiroli, Gondia, Jalgaon, Nagpur, Nanded, Nandurbar, Nashik, Thane and Yavatmal. The focus in these villages would now be shifted from forest protection and regeneration to involvement of local villagers for poverty alleviation through sustainable natural resource management. Thus, the project would seek to achieve the objective of alleviation of rural poverty in regions with high biodiversity values through improving the productivity of forests for sustained growth and increase in income. Strengthening the institutions of *Vana Samrakshana Samitis* (VSS) (Forest Protection Committees) would facilitate the process through the participatory JFM approach. This would be an ideal example of enabling convergence of the various thematic approaches towards a departmental strategy to conserve resources.

It would have been easy to develop a biodiversity conservation action plan with its main emphasis on wildlife conservation. Such a singular emphasis would not have been accurate to the vast range of wild species themselves, and would also not have presented the splendid inter-relationships between various ecological and human systems that exist in nature. Though the biodiversity strategy and action plan is aimed at conservation, it is also about integration of people's cultures and livelihoods, which are dependent on and which in turn nurture, biodiversity. As in the national process, the Maharashtra BSAP aims at covering the entire range of concerns with separate thematic perspectives being identified to look at wild flora and fauna, domesticated biodiversity, ecosystems, laws, intellectual property rights and forests and forestry among others.

Two thematic concerns may directly overlap or may not indicate any obvious convergence. For example, there would be gaps in understanding the relationships between wild flora and fauna and domesticated biodiversity. Some approach papers for thematic concerns may not directly or comprehensively address important issues such as equity and benefit sharing of natural resources. While each thematic report within the Maharashtra BSAP would be a stand-alone document, they would also be collated for the State-level report.

Specific thematic reports, for example, the agricultural diversity document, would need to address various issues that relate to questions of human survival. These questions may include enquiries such as, (a) Is the traditional cropping system based on biodiversity, which was practiced until about a decade ago, beneficial to people, soil and animals in the region? (b) If beneficial, what were the reasons that led to the decline in the cropping system? (c) Can there be solutions to these problems that lead to this decline? (d) Is there a possibility of reviving this system and what roles and responsibilities are farmers willing to take on, and what role do they expect the government to perform?

Finally, one of the most important objectives within the MahaBSAP's thematic approach, would require that traditional ecological ethos, resource use norms, local cultural practices, collective appreciation of the intrinsic or existence value of life forms are reflected within each document. Culture plays a significant role in determining the extent of use, maintenance and preservation of the elements of biodiversity. It is now increasingly being recognised that in the past, high levels of biological diversity supported, and in turn were maintained by, a great diversity of cultures that were dependent on them.

* This BSAP was not completed, but has been accepted subject to final revisions being incorporated. (Footnote)

Meghalaya State Biodiversity Strategy and Action Plan

Coordinating Agency: North Eastern Biodiversity Research Cell, North Eastern Hill University, Shillong

India is a signatory to the Earth Summit held in Rio de Janeiro in June 1992. As a signatory it has agreed to cooperate with other heads of states to conserve biodiversity by framing new policies and strategies to achieve this major goal. This exercise does not rest only with the Union Government but largely and ultimately with the States and Union Territories under the Union. As mandated in the UNDP and GEF and agreed by the MOEF, Government of India, Meghalaya one of the states of the Indian Union, is also a participant in this global agenda. The Strategies and Action Plans proposed for the state of Meghalaya have been compiled after a lot of debates, discussions and hearings conducted by the SSC, during the months of January to December 2001. Literature and field surveys, local literature in vernacular languages and resource persons drawn from the varied population of the state were consulted. Consultative meetings with NGOs and local durbars were followed as important sources for formatting and completing this exercise. At all levels of the exercise a participatory approach was followed. Other organizations collaborating and exchanging information in this process are the various line departments of the state, NGOs, NEBRC, NEHU, Regional SAP, BCIL and Kalpavriksh. Comments available from line departments, experts, TPCG members and others have been considered while preparing the final report.

After the exercise it has been observed that the major problems related to biodiversity conservation are, deforestation, mining and quarrying, jhumming, developmental activities, forest fires, population growth, illegal immigration and lack of awareness among the rural population. Lack of concrete policies combined with the problems of land ownership patterns, have been observed as major hurdles in formulating a comprehensive strategy.

The major strategies evolved for the state are, Establishing Policy Frameworks for Biodiversity Conservation, Creating Conditions and Incentives for Local Biodiversity Conservation and Expanding Human Capacity to Conserve Biodiversity, with Implementable Action Plans having time frames which could be adopted immediately or which could be integrated in the current tenth five year plan.

Mizoram State Biodiversity Strategy and Action Plan

Coordinating Agency: Centre for Environment Protection, Aizawl

Intoduction

The National Biodiversity Strategy and Action Plan (NBSAP), a project of Union Ministry of Environment and Forests (MoEF) aims to produce a series of planning documents dealing with the conservation of India's biodiversity, sustainable use of its biological resources, and equity including in decisions regarding access to such resources and the benefits accruing from them. The project is funded by the Global Environment Facility (GEF) through United Nations Development Programme (UNDP). A unique aspect of the project is that its technical execution is by a Technical and Policy Core Group (TPCG) being coordinated by an NGO Kalpavriksh, and its administrative coordination is by Biotech Consortium India Ltd.

The NBSAP process has included extremely widespread consultation across the country and across all sectors of society, involving tens of thousands of people. It aims to produce not one national action plan, but 18 local (sub-state) plans, 33 state and union territory plans, 10 ecoregional (interstate) plans, and 13 thematic plans. All these will coalesce into a national plan, but will also remain independent for implementation purposes. In addition, over 30 thematic papers have been commissioned on a variety of topics related to biodiversity.

Within this overall process, preparation of Mizoram State Biodiversity Strategy and Action Plan has been done by the Centre for Environment Protection (CEP) and State Steering Committee consisting of persons experienced in the field.

The scope of the Mizoram BSAP includes development of implementable project proposals for possible future support, either from existing funds available or by seeking additional funding. This document namely, State Biodiversity Strategy and Action plan (BSAP) for Mizoram aims to produce short (5 years), medium (10 years) and long terms (20 years) perspective plans for investment and technical assistance proposals for sustainable management and development of the State's biological resources within the overall guidelines of National Biodiversity Strategy and Action plan (NBSAP).

Major Biodiversity Related Issues

The main causes of habitat destruction in the State may be grouped into increase in per capita fuelwood and timber consumption, conversion of forestlands to agricultural use due to increase in population and other operations. Shifting cultivation is a widely practiced food production system in Mizoram. In the days when this system of food production emerged, it worked well and there was a balance between population and soil fertility as a result of larger follow cycle of 20 to 30 years. The cycle at present due to overwhelming pressure on land has reduced to 3 to 5 years. Shifting cultivation has many ill effects but it is still widely practiced due to compatibility of the system with the physical environment, steep and undulated topography, Socio-economic and cultural factors, physiographic remoteness and isolation, lack of awareness and unfavorable environment, etc. In recent years, due to rapid growth in population and environmental presence, penetration of market forces, increase in support services and basic infrastructure and the indiscriminate use of natural resources, shifting cultivation has proved disastrous.

In a study undertaken by the Forest Survey of India (FSI), it is estimated that during 1987 - 97, an area of about 0.38 million ha. has been affected by shifting cultivation. As reported by the State's Agriculture Department, during 1998-1999 an area of 1,01,046 ha. has been cultivated for the production of crops of which 46,634 ha. was under shifting cultivation. And during 1999-2000, an area of 89,601 ha. has been cultivated out of which 43,707 ha. was under shifting cultivation. As long as the appropriate technology has not been found to solve the problems of shifting cultivation, large-scale habitat destruction shall prevail.

The situation of aquatic life is very grim due to the unsustainable harvest of fish, crabs, prawns, etc. by means of poison, bomb, electric generator, etc. Meanwhile, hunting, trapping, snaring, etc. of wild animals including birds is still rampant in the State.

Due to lack of deep environmental awareness in the policy-making, many models of developmental works are proved to be unsus-

tainable, and the dimensions of such negative impact are as yet unclear, as monitoring, baseline data, impact assessment and threat or risk assessment are poorly developed in the state resulting in an unfathomable loss of rich biodiversity. For instance, when the Green Mizoram Programme was started, roadside plantations were undertaken along the Aizawl to Lengpui road. But, before long, due to widening and improvement of the road many young plants were destroyed by debris. This is the clear indication of lack of coordination between developmental departments and lack of proper planning. Environmental management plan (EMP) has also never been incorporated in developmental plans in the State. Thus, the outcomes of the developmental activities undertaken in the State are unsustainable due to lack of proper planning methods.

During the regime of Village Chieftains the forest were well protected as removals of forest produce was restricted to meet the barest need for domestic consumption to ensure sustainable biodiversity management. However, during the British regime and after abolition of the Chieftainship, commercial exploitation of wild biodiversity started in accessible areas depleting the rich tropical forests. The traders virtually made in roads into virgin forests. Further, the Mizoram (Forest) Act of 1955 framed for Lushai Hills allowed petty permits which also resulted in selective removal of valuable trees leaving behind only the trees of miscellaneous and inferior quality.

When the management of biodiversity vested with the Government, destabilization of traditional management systems also started resulting in alienation of local communities from natural resources and loss of sense of ownership of natural resources. The main reason behind all this is lack of administrative coordination among various Government Departments and local communities, over-centralization of decision making, inappropriate land tenure system, corruption, lack of enforcement of law and order, lack of political will, lack of public inputs from planning to implementing stages of a program, lack of empowerment to the people towards joint natural resources management, lack of transparency in information towards biodiversity conservation, inequalities, etc. The present issue of alienation of local communities from natural resources management is based on an assumption from our experiences under the environmental governance of the Mizoram State Government.

Ongoing Initiatives and Key Gaps

1. Green Mizoram Program

Key Gap: Due to the absence of proper monitoring and evaluation of the works done for Green Mizoram programs, the outcome of the program is not fruitful as is expected.

2. Joint Forest Management (JFM)

Key Gap: Decentralized administration needs to be activated in the implementation of JFM programs.

3. Bamboo Sector Development

Key gap : Introduction of exotic species needs to be reviewed; attention should be given on utilization of local bamboo resources and propagation of local species only. Bamboo mahal system needs to be reviewed.

4. Conservation of Medicinal Plants

Key Gap: Uncontrolled exploitation of medicinal plants needs to be checked. *In situ*, *ex situ* and *in vitro* conservation need to be made. Indigenous knowledge systems need to be protected from biopiracy.

5. Management of Protected Areas

Key Gap: Inadequate awareness among public and officials. Implementation of eco-development needs to be reviewed. Law and order situations need to be reviewed.

6. Afforestation

Key Gap: Little participation of people in afforestation programs.

7. Policy and Legislation

Key Gap: Lack of proper policy.

8. Planning Process

Key Gap: Lack of baseline data, fund, etc.

9. Gaps in institutional and human capacity

Key Gap: Lack of manpower in the concerned sector.

Proposed Strategy and Action Plans

1.0 Priority 1

Basic issue: The State must give priority to adequately and fully protect the biological resources in a participatory manner from encroachment, fire damage, illicit felling of trees, degradation and diversion of forests area for non-forest purposes. The demand for wood and wood products greatly exceeds sustainable supply from existing forests leading to their depletion, the human and live-stock pressure on forest areas is immense and intensifying protection of existing biological resources is imperative to ensure their sustainability.

Sub-issue 1: Conservation measures to protect from illegal felling, over-exploitation, encroachment, shifting cultivation, fire and other adverse activities are inadequate for their long-term sustainable capacity.

Actions

- Prevention and control of encroachment, diversion, illegal felling through increase patrolling units.
- Prevention and control of encroachment, diversion, illegal felling through people's participation and strict enforcement of laws, survey and demarcation of forests.

Description of Actions: Demand for forest produce is increasing day-by-day thereby increasing tendency to obtain the same by illicit felling and smuggling of timbers, etc. Multipronged measures are therefore to be taken to protect the forests from destruction. Punishment for infringement of laws/rules should be made more stringent and effective control measures will need to be taken by deploying special forest protection forces equipped with modern arms, communication systems and empowering forest officers to take action on the spot against forest offenders. Involvement of the local communities (people's participation) in decision making should be given priority in protection, development and management of forests, and they will need to be involved right from planning stage to implementation of programs so that their confidence on the concerned Department will be stronger. People's participation could be done by the direct involvement of local communities through public consultations along with the direct involvement of NGOs. Survey and demarcation of notified forest will need to be completed soon to prevent encroachments on forestlands.

Sub-issue 2: Uncontrolled access and use of forests results in over-utilization beyond their carrying capacity and further degrades existing biological diversity potential.

Actions

- Demarcation of all notified forests, and limit all forest uses to aggregate carrying capacity.
- Ban on tree felling without a working plan approved by the Union Ministry of Environment and Forests.

Description of Actions: Wood balance studies in the State reveals that there is huge deficit of timber and firewood compared to sustainable supplies available. These demands are met mostly from the existing forests, either free of cost or at a highly subsidized rate. The slow but persistent withdrawals of such produces without a working plan approved by the Union Ministry of Environment and Forests make the forests degraded. The result is soil erosion and loss of fertility. Thus, a working plan needs to be formulated as soon as possible. Similarly, unassessed and uncontrolled extraction of NTFP further depletes the forest of its valuable resources. So, NTFP should be allowed what is feasible on a sustain basis. Apart from natural source, their propagation as inter-crop, value addition of the same by processing and marketing support will need to be attended to. Similarly, the consumption of fuelwood can be minimized by encouraging the use of improved chullahs, bio-gas, liquefied petroleum gas (LPG), pressure cooker, etc. and better supply of kerosene oil in rural areas and restricting extraction of fuelwood for domestic consumption.

Another pertinent point to be given importance is demarcation of all the notified forests in the State to prevent further encroachment and diversion of forestlands. Cattle damage to forest regeneration and plantations raised will assume serious proportion if practice of free grazing in forest areas is not stopped in future. For this, fodder cultivation in their own land by farmers or as inter-crop in plantations and stall-feeding of cattles will need to be promoted.

Sub-issue 3: Management, strengthening and keeping continuity of present village safety, supply and bamboo reserves.

Actions

- Proper management and strengthening systems of village safety reserves, supply reserves and bamboo reserves should be worked out.
- Expansion and creation of more village safety, supply and bamboo reserves need to be encouraged.

Description of Actions: The age-old practice of demarcating village safety, supply and bamboo reserves and the traditional management systems of these reserves need to be revived constantly, for which awareness campaigns may be incorporated. As many Village Councils used to neglect the demarcation of these reserves at present, the significance and biodiversity values of having safety, supply and bamboo reserves need to be created among Village Councils.

2.0 Priority 2

Increase Productivity (economic yield) of Forests

Basic issue: Under existing land use pressure like shifting cultivation, fuelwood demand, encroachments, etc. increasing productivity in the degraded forests cannot be achieved. Limitation and restrictions on use of forest resources on a priority basis are imperative.

Actions

- Control shifting cultivation by developing alternative and take measures to save fuelwood by encouraging use of energy saving devices.

Description of Actions: To increase productivity, a clear policy to control shifting cultivation (jhumming) needs to be evolved by the State, as the present policy has not given desired results. The scheme and programs under implementation by Rural Development, Agriculture and other Departments for control of shifting cultivation needs to be constantly reviewed or modified, based on experience gained to make them more effective. Simple or appropriate technology with minimal financial involvement should be introduced to the farmers keeping in mind the position of the poor farmers. Fuelwood saving devices such as bio-gas plant, improved chullahs, LPG, kerosene, solar cooker/lantern, etc. modified according to local designs need to be encouraged to reduce pressure on existing forests for fuelwood.

Sub-issue I: Land reforms, land ceiling, survey, demarcation and settlement is a prerequisite to evolve proper integrated land use system.

Actions

- Land reforms need to be evolved for the proper management of biodiversity.
- Ceiling of land holdings should be made after having survey and demarcation of lands.

Description of Actions: Land reforms, land ceiling, survey, demarcation and settlement is a prerequisite to evolve proper integrated land use system. This task is yet to be completed in the State. Hence Revenue Department needs to give top priority to above work to complete it as soon as possible as above issue have strong linkage with management of biological resources on sustainable basis in the State.

Sub-issue II: Low-growing stock in degraded forest lands is resulting in continuing low productivity.

Actions

- Improve stocking of degraded forests through afforestation or enrichment planting in degraded forests or abandoned jhum areas.

Description of Actions: The low financial input in the forestry sector for afforestation needs to be enhanced. However, proper planning regarding intended use, site specific species, production of adequate quality nursery stock, protection, raising inter-crops, involvement of people is a must to make the program successful and fruitful. In addition, it is important that this is done with indigenous species; otherwise large-scale plantation of exotics could cause other problems.

Sub-issue III: Lack of knowledge, understanding and motivation among officials and local communities of the real costs of unsustainable development coupled with unrealistic expectation regarding returns.

Actions

- Education, extension and motivation/incentive for farm, social forestry programs, benefit sharing, economic incentives for farm forestry/social forestry, NTFP (including fruit trees and medicinal plants).

Description of Actions: If the pressure on the notified forests can be reduced, it will help in improving their productivity. For this, forestry should be extended outside forest area by motivating the people, through education/extension and giving

them incentive to promote farm/social forestry for meeting their own fuelwood requirement by undertaking biomass plantation, fodder cultivation as inter-crop in forest plantation. For this, the Village Councils and NGOs can play important role to mobilize the people's effort. They can be involved to initiate joint forest management (JFM) with scope for benefit sharing. At the same time, development of NTFP and its proper harvesting and marketing will have to be developed. Private plantation should be promoted. However, afforestation should be made as participatory as possible in degraded forests or abandoned jhum areas only.

3.0 Priority 3

Strengthen policy, legislation and institutional framework

Basic issue: To enhance the performance of the biodiversity sector, the State will require a strengthened institutional framework, which includes biodiversity policy, legislation, organizational and financial support.

Sub-issue I: An adequate statistical data and information base on biological resources does exist to permit judicious biodiversity conservation planning.

Actions

- Improve database and information system; strengthen administration and institutional framework, organization set up, strategic planning and analytical capacity.
- Constitution of State Biodiversity Board.

Description of Actions: The biodiversity sector lacks database for proper planning. Hence, proper data generation, compilation, analysis and retrieval system should be established. Computerization and use of MIS, GIS, remote sensing techniques using satellite imageries should be initiated to help in monitoring, evaluation and processing of data in circles and divisions. The State should also establish Biodiversity Research Institute (BRI), which shall consist of cells like silviculture, agroforestry, botany and biodiversity, ornithology, orchidology, biochemistry and biotechnology, wildlife and herbarium-cum-research laboratory, etc.

After all, information based planning and decisions in place of adhoc and arbitrary decisions will help in judicious management of biological resources.

Studies should be conducted to assess production, local consumption and market needs for both wood and non-wood forest products in the State.

Existing organizational structure will need restructuring/strengthening to improve work culture and to take up above functions and cope up with new emerging challenges. Proper policies about personnel recruitment, promotion, transfer and training to develop skills and abilities will need to be addressed with a view to improve efficiency and services to the people.

Constitution of State Biodiversity Board (SBB) to look after biopiracy, traditional knowledge, intellectual property rights (IPRs) and biodiversity registers is imperative. In other words, SBB will ensure that the indigenous people are entitled to the recognition of the full ownership, control and protection of their cultural and intellectual property; the right to have special measures to control, develop and protect their sciences, technologies and cultural manifestations, including human and other genetic resources, seeds, medicines, knowledge of the properties of fauna and flora, oral traditions, literatures, designs and visual and performing arts.

Sub-issue II: Legislations.

Actions

- Review and revise the existing Forest Acts and Rules from the biodiversity point of view to regulate management and use of biodiversity and its products.
- Empowering forest officers to evict encroachers and be confiscation of vehicles carrying illegal forest produce and providing protection to the forest officers.

Description of Actions: There is a need for creation of legal cell in the PCCF Office and appointment of Retainer Lawyer to effectively deal with rising number of wildlife/forest offense cases and speedier disposal of pending cases by the courts. Concerted efforts should be made to review/revise the existing Acts and Rules pertaining to biodiversity conservation in the State, to take care of the present and future needs. The revise Acts and Rules should incorporate such provisions like power to confiscate vehicles engaged in forest/wildlife offenses, affect eviction of encroachers, etc.

Further, to reduce the man-animal conflict because of the provision in the Wildlife (Protection) Act, 1972 suitable Rules to compensate the victims or damages done to life and properties by wild animals will need to be framed. Besides, there should be specific and clear-cut Rules made for carrying out the provisions of the Forest (Conservation) Act, 1980. A proper legislation to give a legal support to joint forest management (JFM) activities should also be evolved specifying the forest area to be brought under JFM and the investment needs therein.

Sub-issue III: Inter-sectoral co-ordination and linkage are weak and impacts of non-biodiversity sector policies and programs on biodiversity sector are little understood.

Actions

- Better co-ordination among the different developmental departments whose programs/policies at time causes differ duties in management of biological resources.

Methodology: An integrated land use approach involving the participation and co-ordination among different land using Government Departments like Land Revenue, Agriculture, Animal Husbandry and Veterinary, Rural Development, PWD, Tourism, Horticulture, Power, Fishery, Soil and Water Conservation, etc. will need to be adopted and for which Co-ordination Committee should be constituted or this could also be a task or sub-committee of the proposed State Biodiversity Board. Further, such departments should earmark some percentage of their budget for biodiversity conservation to mitigate damages of biological resources done by them. The first task would be to harmonise the various policies and laws within which the departments work.

Sub-issue IV: Lack of monitoring and evaluation limits improvement and perpetuates inefficiencies.

Actions

- Critically evaluate and monitor to assess success or failure of projects; scope for improvement.

Description of Actions: Clear objectives will have to be defined to improve project implementation and to periodically measure progress towards the objectives. Monitoring and evaluation will have to be done by an independent agency to keep track of both physical and financial activity through regular quantified report. Evaluation will also be undertaken to assess the results of the implementation of projects. In addition, community based monitoring should also be done, in which communities will be able to use their own knowledge and indicators, supplemented with outside training and capacity building, to do monitoring and evaluation.

Sub-issue V: Financial support for forestry sector is inadequate.

Actions

- Identify/justify prerequisite financial and investment support.
- Establish clear sector priorities and requirements.
- Document forest revenues (values) as related to forest investment.
- Clarify and strengthen institutional linkages and coordination within and between sectors, rural development, environmental protection, agriculture/livestock, non-forest projects such as hydroelectric project, etc.

Description of Actions: Financial support for forestry is very meager, though direct and intangible benefits from forestry are immense. So whatever may be the issue, strategy and planning, it cannot be achieved until and unless the financial allotment on this sector is increased substantially and for that, decision is to be taken at the highest level. Moreover, investment in forestry sector is highly labour intensive and that too flows to the weakest section of the people/fringe people, so employment generation in such investment is perhaps the highest. As the State does not have its own resource (financial), most of the financial support will have to be provided by the Central Government.

4.0 Priority 4

Expand forest area

Basic issue: Notified forest areas in the State are far less than 66% of the total geographical area as envisaged in the National Forest Policy, 1988. Further, the different categories of forests in the State are subjected to heavy biotic pressures like jhumming, illegal felling, forest fire, encroachments, etc. resulting in continuous degradation of the biological resources. The situation will be worse unless the existing notified forest areas are expanded, protected and scientifically managed on a sustained principle.

Sub-issue I: The jhum lands (unclassed forests) extending over an area of about 6000 Km2 are degrading at a very fast pace owing

to practice of shifting cultivation. Though the implementation of some programs like New Land Use Policy (NLUP) has made some impact to reduce jhum cultivation, yet the jhum lands that would have been available for regeneration are not protected or managed but left open to the local communities for meeting their requirement of timber and other forest produce resulting in no less degradation than when subjected to jhumming at 3-5 years interval.

Actions

- The *jhum* lands that be made available for regeneration and management will be identified.
- Priorities will be given to those areas where the existing forest areas are found inadequate to meet the local demands of timber and other forest produces.
- Identified jhum lands will be constituted into notified forests (i.e. reserved, protected or village safety/supply reserves) as per the existing provision of the Mizoram (Forest) Act, 1955 for protection, development and management for the production of timber, fuelwood and other forest produces on a sustained basis.

Description of actions: It is proposed that about 1550 Km^2 jhum lands will be identified and constituted into notified forest to be developed and managed by the State's Environment and Forests Department in participation with Village Forests Development Committees (VFDCs) and NGOs for sustainable supply of goods and services to the people. Thus, it is expected to increase the area of notified forest from the existing 7843 Km^2 to about 9393 Km^2.

Sub-issue II: Inadequate village safety supply and supply reserve to meet the actual needs of the villages.

There are about 699 inhabited villages in the State many of which either do not have Village Safety Reserve or Supply Reserve near or around the village or such reserves are depleted/inadequate due to unsustained felling of trees by the community. Such degraded reserves need immediate rehabilitation and treatment for providing tree cover around the village as well as for meeting the local demand of timber, small wood, fuel-wood, etc.

Actions

- All the villages in the State, which do not have or have inadequate Village Safety and Supply Reserves, will be identified.
- In consultation with the concerned Village Council, VFDC, NGOs and Revenue Department, the degraded community lands near or around the village will be demarcated for constitution into Village Safety Reserves and Village Supply Reserves.

Description of Actions: Such identified areas after constituting them into Village Safety and Supply Reserves will be initially protected, developed and managed under the joint forest management (JFM) schemes. However, full control should continue to vest with the village community, with the Forest Dept. only playing a facilitating role. This means that the head of the committee should be selected by the community as a whole (with all adults being part members of the committee including women).

It is estimated that a minimum of 100 ha. of community lands will be made available by Revenue Department around each of the village for constitution into Village Safety and Supply Reserves. Thus, total area of about 600 km^2 is earmarked to be notified as Village Safety and Supply Reserves for management under JFM. This is expected to increase the area of Village Safety and Supply Reserve from the existing 2648 km^2 to about 3248 km^2. In addition, biodiversity should be integrated into the management priorities of village safety reserves.

5.0 Priority 5

Non-Timber Forest Products (NTFPs)

NTFPs are drawing greater attention today as many of these are not only used as food and medicine by local tribals but can also supplement their livelihood and income generation. The major NTFPs are bamboo, cane, broomsticks, medicinal plants, agar, wild fruits, vegetable, leaves, honey, etc. However, there is no complete record available regarding the removal of many NTFPs. In absence of adequate data, projection for future needs could not be made. Hence, their survey, conservation, cultivation, harvesting and marketing in organized manner will be necessary. Simultaneously studies on their consumption pattern and utilization would be necessary to plan for their judicious development.

Sub-issue I: NTFPs form importance source of food, medicine and livelihood especially for the rural people and need planning for development and conservation accordingly.

Actions

- Plantation of various species whose fruit, leaves or other parts is used as food or medicine or other purposes on degraded/abandoned jhum lands and community lands.

- Enrichment plantation of cane in and tending of natural cane areas.
- Protection and distribution of seedlings free of cost for planting by farmers on their lands.

Description of Actions: All the actions should be taken through people's participation. Women's empowerment and participation would also be integrated.

Sub-issue II: Commonly used and effective herbal plants became rare and endangered species, and some plants are on the verge of extinction unless crash conservation measures are taken up for revival.

Actions

In situ Conservation: The existing national parks and wildlife sanctuaries are not enough to conserve medicinal plants diversity; smaller matrix conservation sites will also be promoted. The rich conservation areas of habitat-specific, ecological niches including fragile ecosystems would be identified and conserved through the involvement of the local people, since no *in situ* conservation can succeed without the fullest cooperation and involvement of the local people. Villages whose vicinity is rich in ethnoflora are encouraging to preserve tribal medicinal forests or ethno-forests in natural habitats. It is necessary that the local people feel ownership of their native resources and usufractory rights to protect the bio-resources from over-exploitation. For instance, *smilax glabra* (local name *tluangngil*), *homalomena aromatica* (local name *anchiri*), *cinnamomum zeylanica* (local name *thakthing*), *aquilaria malaccensis* (local name *thingrai*), etc. had been collected from outside the Mizoram State since 1970s as if their own property; and as a result *smilax glabra* and *aquilaria malaccensis*, etc. become critically endangered species.

Ex situ Conservation: Germplasm collection of the common, rare and endangered species for *ex situ* conservation through the establishment of herbal farms, drug gardens or living pharmacy in suitable agro-climate conditions is imperative. Introduction or reintroduction and incorporation of important medicinal plants in traditional eco-agrosystems, homestead and semi-permanent gardens are also practicable. Development of agro-forestry models incorporating medicinal plants should be encouraged.

In vitro Conservation: Vegetative propagation alone cannot meet the market demand or supply of raw materials to the pharmaceutical industries. Micro-propagation and cryo-preservation of prototypes in gene banks is required for large-scale multiplication. *In vitro* tissue techniques and hardening techniques suitable to the local environment for transfer of laboratory technology to the field condition disease free or resistant species need to be evolved instantly in the State. Development of infrastructural facilities to accommodate tissue culture laboratory is needed.

Sub-issue III: The age-old bamboo mahal system of the State should be made more effective and dynamic in order to ensure exploitation of bamboo on sustained basis. Further involvement of local people in exploitation of this resource is not taking place under the present system.

Actions

- Local villagers in whose village area exploitation of bamboo is going on should be actively involved in the process to ensure equitable distribution of economic returns from the resource.
- Sufficient provision of fund for regeneration of bamboo stock in the harvested should be made for improvement and development of this resource, and these activities should be implemented in a participatory manner.

Sub-issue IV: The gregarious flowering of bamboo is predicted to occur during 2005 - 2007 in North Eastern States. Scientists have predicted that gregarious flowering of bamboo will occur in an estimated area of 18,000 square kilometer in the States of Mizoram, Tripura, Manipur and parts of Assam and Meghalaya during 2005-2007. The epicenter of bamboo flowering will be in Mizoram. In order to mitigate the catastrophic famine subsequent to gregarious flowering of bamboo, the following actions have been recommended.

Actions

- Detailed survey and mapping of bamboo resources in collaboration with Forest Department and Forest Survey of India (FSI) should be prepared.
- A bamboo flowering database should be prepared involving International Bamboo and Rattan Research Institute (INBAR), Beijing, Rain Forest Research Institute (RFRI), Jorhat, FSI and Forest Department.
- Improve State and National Highways to facilitate timely extraction of bamboos that are set to flower after three years from now.
- Feasibility of transporting bamboos by waterways through Bangladesh needs be explored for making resource available for users in Orissa, Andhra coast, etc.
- Setting up of mini-mechanical pulping mills at strategic locations and the pulp to be compressed into high-density pulp sheets and blocks in the small scale industry sector for long-term space effective storage and economic transportation.

- Suitable technology be imported to convert bamboo into high value products like laminated board, composite boards, railway sleeper board, etc.
- The possibility of using flowered fruit seed of bamboo for animal feed through collection just before maturity be explored.
- The steep and inaccessible areas should be left to regenerate naturally while in accessible areas 50% will be taken up for regulated natural regeneration, 30% for mixed bamboo plantation and the balance 20% for the tree plantation.

6.0 Priority 6

Soil and Water Conservation

Mizoram is very hilly having steep and rugged terrain with deep gorges in between. Thus, site-specific technologies will be adopted depending on the terrain and feasibility. Various soil and water conservation measures proposed which will also form part of afforestation activity are given below:

Actions

- **Check dams and plugs in drainage line using locally available wooden pores and stones.**
- Inter-cropping with legumes.
- Growing legume cover crops, etc.
- Stacking wooden poles and cut brushwood across the slope along the contours.

7.0 Priority 7

Expansion of Protected Areas (PAs):

At present, protected areas in the State include two National Parks, eight (8) wildlife sanctuaries and one Tiger Reserve covering total area of 1155.5 sq. km. which is 5.47% of the total geographical area of the State (i.e. 21087 sq. km.).

Issue No. I: Inadequate Protected Area Networks (PANs) in view of the low population density but rich flora and fauna.

Actions

- The State shall identify ecologically sensitive areas to be declared as protected areas (PAs) in consultation with leading institutions like the Indian Council of Forestry Research and Education, Wildlife Institute of India, leading NGOs, etc.

Issue No. II: Lack of data and reliable informations on wildlife, awareness and appreciation about importance of wildlife for man.

Actions

- It is proposed to undertake research/studies on wildlife through consultancies or research fellowship in collaboration with Universities/Institutions and NGOs.
- To highlight the importance of wildlife protection and conservation among public and school children, wildlife awareness campaign through publicity media and extension should be taken in collaboration with NGOs and various religious organizations.

Issue No. III: Wildlife organizational setup at present to manage protected area networks (PANs) is inadequate. The community and people's participation in management of PAs is also imperative.

Actions

- At present, Wildlife Organization is inadequate in respect of trained manpower, equipments and facilities. Hence, to manage the protected areas properly in the line of scientific management, Wildlife Wing organizational set up will need strengthening adequately.
- Local community should be involved in the management of PAs.

Description of actions: Wildlife field staff are posted in protected areas, which are remote and lacking in facilities. Further, the nature of duties of staff posted in such areas is tougher as compared to other Territorial Forest staff. Hence to improve the welfare of wildlife field staff, the incentive such as special pay, uniform supply (twice a year), medical aid, accommodation facilities, etc. as recommended in Subramanium Committee Report (1994) should be given. Special pay per month Rs. 600, Rs. 500, Rs. 400, Rs. 300 to D.F.O., A.C.F., R.O. and Foresters/Forest Guards respectively, is proposed. In addition, local community, NGOs, etc. should be involved in the management of PAs in which benefits sharing would also be ensured in the process.

Issue No. IV: The existing protected area network (PAN) of National Parks/Sanctuaries should be expanded and strengthened to

include biodiversity, environmental and related conservation values.

Actions

- Increase protected area network, promotion of eco-tourism, allocation of adequate fund to Wildlife Wing, encouragement of people's participation and increase eco-development for such protected areas (PAs).

Description of Actions: The State is rich in biodiversity. Density of population is low at 42 km^2. Existing PAN is inadequate to cover all bio-zones. More areas will need to be brought under PAN covering all the major ecosystems. Promotion of eco-tourism in PAs is need of the hour. Considering the importance of wildlife in the State, enhancement of fund allocation to Wildlife Wing from the State's plan budget/forestry plan budget is recommended for development of PAs. People's participation in the conservation of wildlife should be encouraged without which the wildlife sector will face serious setbacks, and eco-development programs should also be increased to cover all PANs.

In the fringe villages of all PAs an eco-development committee (EDC) should be constituted under the chairmanship of respective President of each Village Council and representative of Forest Department as Member Secretary of EDC. EDC members shall be representatives of Village Council, school/college teachers, NGOs, farmers, etc. including women. Government will bear the expenditure to be incurred for implementing action plans proposed by EDC through the Forest Department. The operations of EDC fund shall be in Joint Account system in the name of Chairman and Member Secretary.

Local people should be centrally involved in planning, implementing, and monitoring PA management as well as receiving benefits from them that are in consonance with the conservation values and objectives. Independent monitoring agency should also be appointed, which may be researchers of Universities/Institutions or reliable NGOs.

8.0 Priority 8

Adoption of New Panchayat Act

There are some provisions to provide for people's empowerment in the management of natural resources. One formal manifestation of this was a Central government circular in 1990 to all States, on Joint Forest Management (JFM). This quasi-policy statement directed the involvement of village communities in the regeneration of degraded forestlands. However, there are conflicting reports on the success or failure of JFM, with serious flaws such as inadequate devotion of power to local communities. Nevertheless, JFM is seen as a progressive step away from the centralized, exclusive State-managed regime of the last 100 years.

The most powerful, however, is the Constitution (Seventy-third-Amendment) Act, 1992, regarding village panchayats. This law sought to bring the power to manage local resources closer to the people. The Panchayat (Extension to Scheduled Areas) Act, 1996 is even more powerful in this respect, bestowing unprecedented elements of self-government to scheduled adivasi/indigenous areas. Thus, the State should adopt or extend New Panchayat Act to fully exploit the possibility of successful programs implementation in joint natural resources management, etc.

9.0 Priority 9

Education, Awareness and Training for Biodiversity Conservation:

Basic Issue: The education, awareness and training for biodiversity conservation are essential for the younger generation as well as for the older generation. It also needs to cover both urban and rural populations, and actions should reach out sectors like decision makers and government agencies, formal education/training systems, non-formal education/training systems, local communities and industry. The following objectives should be adopted for creation of education, awareness and training for biodiversity conservation:

1. To develop an awareness of biodiversity and sensitivity to the environment and its problems.
2. **To help in acquiring knowledge and various type of experiences of the loss of biodiversity.**
3. To develop the basic understanding of structure, processes, problems and interdependence of biodiversity components.
4. To help in acquiring skills for identifying and solving problems of biodiversity.
5. To develop attitudes, a set of values and feelings of concern for the biodiversity and to encourage for active participation.
6. To develop ability for evaluating biodiversity components and educational programs in terms of ecological, economic, social, cultural, aesthetic and educational factors.

Actions

- *Decision Makers and Government Agencies:* Policy level decisions are most crucial in any development or conservation program; therefore, policy makers need to be fully aware of biodiversity conservation issues. Thus, presentation kits and awareness train-

ing need to be given to decision makers and government agencies from time to time.

- *Formal Education System:* The formal education system provides a great scope for creating awareness about biodiversity and its conservation among children and youth. The following methodologies should be adopted by the State in this regard.

Stage	Objectives	Content	Teaching Strategy
Primary	Awareness	Surroundings from home to outdoor situations	Audio-visual and field visits
Lower Secondary	Real life experiences, awareness and problem identification	As above and general sciences	Classroom teaching, practicals and field visits
Higher Secondary	Conservation, assimilation of knowledge, problem identification and action skills	Science based and action oriented work	Classroom teaching, practicals, and fieldwork

- *Non-formal Education Systems:* Non-formal education systems among general population through various media are very effective in creating awareness about biodiversity and its conservation. Traditional knowledges/practices, biopiracy, intellectual property rights (IPRs) should be emphasized in this action. Traditional practices that support biodiversity conservation need to be documented in a popular way. This is with respect to documentation both in story format, as well as factual documentation. This information needs to be shared in the form of songs, stories and lessons from all over the State. Journals/Newsletters also need to be published in local language to inform the people about latest development in biodiversity related initiatives, etc. In addition, local folk media and traditional modes of learning should be used to impart biodiversity education and awareness.

- *Local communities:* There is a need for capacity building on biodiversity at village level through village level training institutions and environmental NGOs. The State Government should make a separate budgetary allocation for this.

- *Industry:* As industries are major consumers of biodiversity, awareness on biodiversity needs to be created among entrepreneurs. Environmental impact assessment (EIA) should also be made mandatory for any developmental projects.

- *Media:* Print and electronic medias should be utilized for disseminating biodiversity related informations to various sections of society.

10.0 Priority 10

Hydroelectric Power Projects

Basic Issue: Large numbers of power projects are being proposed and initiated in ecologically sensitive areas. These will not only cause a lot of damage to the local environment, but in most cases will also cause a lot of hardship to and displacement of the local population. In addition, many power projects do have the potential for serious damage to the area's unique and critically important biodiversity and also to cause major social disruption. Thus, based on inputs received at the public hearing on biodiversity conservation (with reference to hydel project) the following actions have been recommended.

Actions

- The State has vast hydropower potential. However, due to the potentiality of detrimental impact on environment by hydel projects, development of power potential in the State should be need based only.
- Alternatives like wind energy, solar energy, micro hydel and run of the river projects need to be explored more seriously.
- Big dams should not be encouraged and hydel projects should not be done in ecologically sensitive areas (ESAs).
- To ensure sustainable development, environment impact assessment be taken with people's participation more seriously.
- The implementing agency should strictly adhere to the conditions set out in the environmental clearance letter. In addition, it should be evaluated if the conditional clearance for power projects that has been given to the project authorities in the past has been followed. If the conditions have not been met, no further projects should be allowed.
- Expenditure incurred for compensatory afforestation (CA) should be evaluated and monitored strictly by authority as well as independent agency.

11.0 Priority 11

Public participation in the Environmental Impact Assessment Process

Basic Issue: Environmental impact assessment (EIA) is a key tool meant to ensure that economic development does not undermine the ecological basis on which all life depends. EIAs are progressive tools in the direction of sustainable development planning. EIAs are supposed to give a full understanding of the impact of a proposed project on nature and people, and help assess whether the project should or should not be built. Public involvement needs to be built in centrally, at all stages of the process. EIAs also form the base of mitigatory plans if the project is approved. The following actions have been recommended to ensure public participation in the EIA process for any major undertakings, i.e. projects, plans, programs or policies, etc.

Actions

- *Identification of issues and impacts (scoping):* This establishes the scope of the environmental impact study. Public participation activities at this stage are primarily devoted to informing the public about the project and determining what citizens feel about the need being addressed and the potential project. The effort by the proponent agency or entity should be to establish a rapport with the involved parties and a spirit of cooperation.
- *Conduction of baseline studies of the environment:* The baseline study records the environmental status quo in the study area. At this stage, the information given to the public could take the form of what is being surveyed and why. Feedback to this information is often helpful in identifying existing databases. Thus, the public's response can reduce the time and cost of the baseline survey. Often, citizens can also identify areas of particular local interest, which should be highlighted in the environmental impact report.
- *Prediction and evaluation of impacts:* Impact evaluation consists of the prediction and interpretation of changes that would result from implementation of the alternatives under consideration. The public can assist in this process in several ways. For example, by reviewing the alternatives being considered, they can ensure that no viable alternative is inadvertently omitted. Where legal standards are not in force, comments from the public can be useful in establishing project-specific criteria or maximum tolerable levels of change. Finally, the information-feedback cycle must be maintained to hold the public's interest and prevent alienation.
- *Mitigation planning:* Mitigation measures are planned to reduce undesirable project effects. One of the major inputs at this stage is ensuring that the mitigation measure is itself acceptable. Consider, for example, a new housing development that draws heavily on a diminishing water supply. One mitigation measure is to collect and treat waste water from the urban area and recycle it. In many areas this measure, though technically feasible, is culturally unacceptable. As before, public review will ensure that all reasonable measures are considered.
- *Comparison of alternatives:* The comparison of alternatives is done to identify the one or several preferred actions. Local values could be used to weight the importance of environmental factors at this stage. It is very important at this stage that the public have an input into what is recommended to decision makers. It is at the comparison-of-alternatives stage that the preferred project alternative is identified. Therefore, at this stage any potential conflicts will come clearly into focus. If the public involvement program has been effective to this point, it should be possible to resolve conflicts in a spirit of cooperation.
- *Decision making relative to the proposed action:* The 6th stage in an environmental impact study is the actual decision on which alternative will be implemented. At this stage, public involvement activities have three objectives. First, the public should be informed what the decision is and why. Ideally, the decision should be based on the recommendations arising out of the comparison of alternatives. However, This is not always the case. The second objective is the final resolution of conflicts. In this regard, it may be necessary to compensate certain publics in order to even out the distribution of benefits. Finally, if the decision makers are responsible to the public, the third objective will be the solicitation of feedback concerning the final decision.
- *Study documentation through the preparation of an environmental assessment (EA) or an EIS (environmental impact statement):* The 7th stage is the preparation of study documentation in the form of an EA or EIS. Public involvement would consist of reviews and comments on draft documents. Stages 6 and 7 in the EIA process could actually be combined. If public participation is to be effective in the various stages of the EIA process, the public participation program must be carefully planned. A good public participation program does not occur by accident. Planning for public participation should address the following elements:
  - Delineation of objectives of public participation during the pertinent EIA stages.
  - Identification of publics anticipated to be involved in the pertinent EIA stages.
  - Selection of public participation techniques which are most appropriate for meeting the objectives and communicating with the publics. It may be necessary to delineate techniques for conflict management and resolution.
  - Development of a practical plan for implementing the public participation program.

However, background information on three topics should be considered: (1) levels of citizen participation, (2) inherent problems in implementing public participation programs, and (3) usage of observations and/or general principles related to planning public participation programs.

Levels of citizen participation can range from situations in which the citizens do not participate at all, to situations involving token citizens participation, to situations where citizens share equally in planning, to situations where citizens actually control the planning process. The following table shows various stages along this continuum.

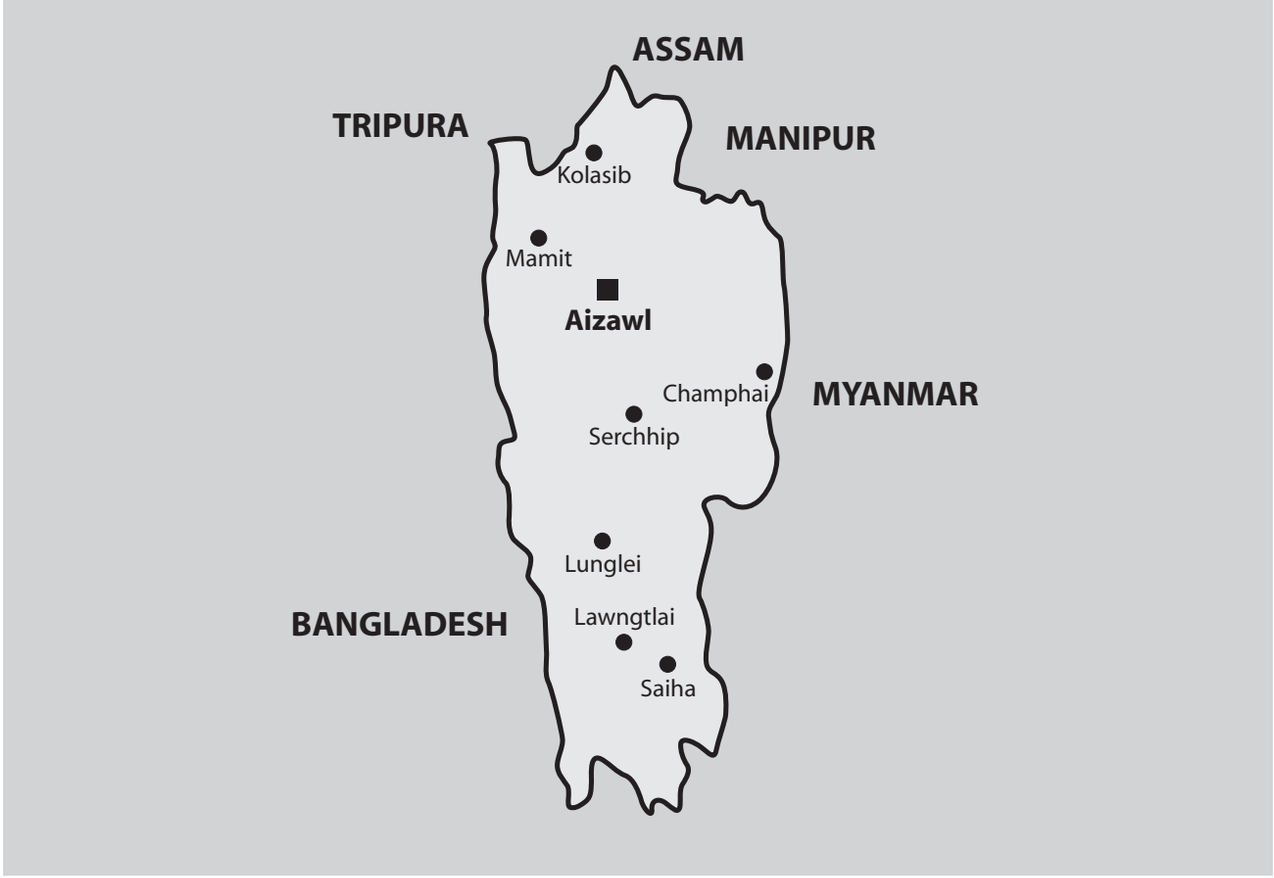
1	2	3	4	5	6	7	8
Manipulation	Therapy	Informing	Consultation	Placation	Partnership	Delegated Power	Citizen Control
Non-participation		Degrees of tokenism			Degrees of citizen power		
(Arnstein, 1969, p.217)							

Non-participation (manipulation + therapy): This describe levels of non-participation that have been contrived by insincere public participation planners to substitute for genuine participation. Their real objective is not to enable people to participate, but to enable *power holders* to educate or persuade the participants.

Degrees of tokenism (informing + consultation + placation): Here, the outsiders are allowed to hear and to have a voice. When these activities are preferred by power holders as the total extent of participation, citizens may indeed hear and be heard. But under these conditions they lack the power to insure that their views will be heeded.

Degrees of citizen power (partnership + delegated power + citizen control): These are levels of citizen power with increasing degrees of decision making involvement. Citizens can enter into a *partnership* that enables them to negotiate and engage in trade-offs with traditional power holders. Have-not citizens obtain the majority of decision making seats, or full decision making power. Most public participation programs stop at serial numbers 3, 4 or 5 of the above table.

Map of Mizoram Showing Where Public Hearings were Conducted for NBSAP



Index

1. 7.1 Priority 1: Sub-Issue 1 and 2: *Implementing agency*: Environment and Forests Department, Govt. of Mizoram through direct involvement of NGOs. Sub-Issue 3: *Implementing agencies*: Environment and Forests Department, Local Administration Department and reliable NGOs (for awareness creation).

2. 7.2 Priority 2: Basic Issue: *Implementing agencies*: Environment and Forests, Rural Development, Horticulture and Agriculture Departments. Sub-Issue I: Implementing agency: Land Revenue and Settlement Department. Sub-Issue II: *Implementing agencies*: Environment and Forests, State Remote Sensing Centre (Planning Department) and Soil and Water Conservation Departments. Sub-Issue III: *Implementing agencies*: Environment and Forests Department, Environmental NGOs and village-based NGOs.

3. 7.3 Priority 3: Sub-Issue I: *Implementing agencies*: Environment and Forests Department and State Remote Sensing Centre, Planning Department. Sub-Issue II: *Implementing agencies*: Environment and Forests and Law and Judicial Departments. Sub-Issue III: Implementing agency: Initiative may be taken up by Govt. of Mizoram in which the Co-ordination Committee should be constituted under the chairmanship of the Chief Secretary, PCCF/Secretary, E&F Deptt. as member secretary and all other Heads Departments and leaders of NGOs as members or this could also be a Sub-Committee of the proposed State Biodiversity Board (SBB). Sub-Issue IV: *Implementing agencies*: Forestry Department, Mizoram University and local environmental NGO (e.g. Centre for Environment Protection). Sub-Issue V: *Implementing agencies*: Environment and Forests and Planning Departments, Govt. of Mizoram.

4. 7.4 Priority 4: Sub-Issue I: *Implementing agencies*: Environment and Forests Department, State Forests Development Agencies through Village Forests Development Agencies (VFDCs) and local NGOs. Sub-Issue II: *Implementing agencies*: Environment and Forests, Local Administration, Land Revenue and Settlement Departments and local NGOs.

5. 7.5 Priority 5: Sub-Issue I and II: Implementing agency: Environment and Forests Department through the direct involvement of people. Sub-Issue III: Implementing agency: Environment and Forests Department through people's participation involving local NGOs. Sub-Issue IV: Implementing agency: Environment and Forests Department in consultation with Forest Survey of India (FSI), International Bamboo and Rattan Research Institute and Rain Forest Research Institute.

6. 7.6 Priority 6: *Implementing agencies*: Environment and Forests and Soil and Water Conservation Departments.

7. 7.7 Priority 7: Issue No.I: Implementing agency: Environment and Forests Department. Issue No.II: *Implementing agencies*: Environment and Forests Department in consultation with Universities/Institutions and local environmental NGOs. Issue No.III: Implementing agency: Environment and Forests Department. Issue No.IV: Implementing agency: Environment and Forests Department through the direct involvement of local people involving environmental NGOs.

8. 7.8 Priority 8: Implementing agency: Steps should be taken by the State Government.

9. 7.9 Priority 9: *Implementing agencies*: School Education Department (for formal education) and Centre for Environment Protection (CEP) with Central Young Mizo Association (CYMA) for non-formal education.

10. 7.10 Priority 10: *Implementing agencies*: Environment and Forests and Power and Electricity Departments in consultation with Research Institutes and local environmental NGOs.

11. 7.11 Priority 11: *Implementing agencies*: Environment and Forests and Power and Electricity Departments in consultation with Research Institutes and local environmental NGOs.

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Nagaland State Biodiversity Strategy and Action Plan

Coordinating Agency: Nagaland Forest Department, Kohima through Centre for Environmental Studies, North-Eastern Hill University, Shillong

Nagaland is one of the eight states of the north-eastern region of India. It is situated between 25°06'N and 27°04'N latitude and 93°20'E and 95°15'E longitude and covers an area of 16,579 sq. km. The altitude varies between 194 m. and 3048 m. The highest peak in the state, Saramati in Tuensang district is 3840 m. high. The topography of Nagaland is very dissected, full of hill ranges, which break into a wide chaos of spurs and ridges that form catchment area for a number of seasonal and perennial rivers. Nagaland has a typical monsoonic climate with variants ranging from tropical to temperate conditions. The foothill plains, sheltered valleys and the ranges are marked with climatic contrasts.

The state is divided into 8 districts (*Kohima, Phek, Wokha, Zunheboto, Mokokchung, Tuensang, Mon* and *Dimapur*) headed by DCs, 17 sub-divisons and 32 Blocks headed by SDOs and BDOs, respectively. Nagaland has a total of 1,225 villages, which are locally administered and managed by Village Councils (VCs) and Village Development Boards (VDBs). Nagaland is inhabited by tribal communities, such as Angami, Ao, Lotha, Sema, Rengma, Phom, Pochury, Sangtam, Chakhesang, Zeliang, Yimchunger, Khiamungan, Chang, Konyak and Kuki. Some other tribal and non-tribal groups also live in Nagaland. The population of Nagaland according to the 2001 Census is 19,88,636. Out of this, 16,35,815 persons live in rural areas, whereas the urban population is 3,52,821. The literacy rate of Nagaland is 67.11% where the male literacy is 71.77% and female literacy is 61.92%. The population density of the state is 120 persons per sq. km.

Biodiversity of Nagaland

Nagaland harbours rich biodiversity of all types ranging from the genetic and species diversity to ecosystem and landscape diversity. The biodiversity of the state essentially stems from its unique geographical location, which borders with the states of Assam and Arunachal Pradesh on one side, Manipur on the other and also has a vast international border with Myanmar.

Forest Cover and Type: The forest cover in the state is about 52% (8,62,930 ha) of the total geographical area of 16,57,583 ha. This includes 1,00,823 ha of government and 7,62,107 ha of private forests. The extent of dense and open forests has been assessed as 5,137 sq. km. and 9,027 sq. km. respectively. Despite the fact that Nagaland is a small state, it possesses a variety of forest types, namely Northern tropical wet-evergreen forests, Northern tropical semi-evergreen forests, Northern sub-tropical broad-leaf wet hill forests, Northern sub-tropical pine forests, Northern montane wet temperate forests, and Temperate forests.

Flora and Fauna

The State of Nagaland harbours a very rich floristic diversity. The angiospermic flora is represented by 2,431 species belonging to 963 genera and 186 families. In this, the share of dicots is 1,688 species, 724 genera from 158 families and monocots by 743 species under 239 genera from 28 families. Gymnosperms also register their presence with 9 species, under 6 genera from 5 families. A large number of plant species found in Nagaland is reported to be endemic to the State or the northeastern part of India. Also, Nagaland is home of hundreds of species of orchids, several species of bamboo, a large pool of germplasm of a variety of agricultural and horticultural crops. Nagaland is also home of a large number of vertebrate and invertebrate species. The mammalian fauna includes Tiger, Leopard, Elephant, Bison, Sambar, Bear, Mithun, Jungle Cat, Civets, Monkeys, Wild Boar, Barking Deer, Flying Squirrel, Wild Dog, Hoolock, Langoor, Rhesus Monkey etc. The important birds found in Nagaland include *Tragopan blythii*, Hill partridges, Green Pigeon, Jungle Fowl, Mountain Quails, Woodpecker, Owl, Pheasants etc. In addition to these, the state provides habitats to a large number of Reptiles, Amphibians and fishes and invertebrates.

Major Biodiversity Related Issues

Shifting cultivation, intensification of agriculture, monoculture of tree plantation, deforestation, urbanization, destructive and over use of natural resources, hunting and poaching, forest fire, degradation of water and soil, establishment of hydel projects, mining, lack of awareness and biodiversity concerns in infrastructure development etc. are some of the issues that are adversely affecting the biodiversity of the state.

Ongoing initiatives and Key Gaps

Some actions have been initiated at community, Government and NGO levels regarding conservation and sustainable use of bio-

diversity of the state. However, these actions are inadequate in prevailing situation of diversified threats, and lack of awareness amongst the majority of people.

In order to fill the existing key gaps in peoples participation, awareness, and biodiversity and IKS database, there is an urgent need of organizing district level training programmes for officials of VDBs and VCs, inventorization of biodiversity and identification of biodiversity hotspots for focused conservation, documentation of medicinal and other non-timber forest products, documentation of traditional ecological knowledge of the state. The information, thus generated can be used for formulating site specific, target oriented conservation measures as suggested below in the Strategy and Action Plan.

Strategy and Action Plan for Conservation of Biodiversity of Nagaland: ***The following 23 strategies together with action plans have been suggested for the conservation and sustainable use of rich biodiversity of Nagaland.***

Strategy I: Incorporating Biodiversity Concerns in State Policies and Laws

Proposed Actions: Review state policies concerning use of natural resources and developmental works; Enact new acts/amend existing acts and other legal instruments making them sensitive to biodiversity conservation; Document traditional laws and practices concerning use of natural resources and implement these for biodiversity conservation and dispute resolution, and other related matters; Strictly enforce existing biodiversity related laws.

Strategy II: Involving people in biodiversity conservation

Proposed Actions: Organize trainings, meetings, lectures, workshops, debates and rallies on biodiversity related topics; Use print and electronic media for generating mass awareness; Sensitize the NGOs, Women Organizations and Socio-Political Institutions (SPIs) to work for biodiversity related issues; Associate common people in participatory documentation of local biodiversity; Incorporate biodiversity value and conservation methods in school curricula; Involve village people, both women and men in decision-making.

Strategy III: Involving Socio-Political and Religious Institutions and NGOs in promotion of sustainable use of biodiversity

Proposed Actions: Utilize the influence of above institutions in motivating people to desist from hunting, unsustainable harvest and marketing of wild biodiversity; Organize training and experience sharing workshops for SPIs, RIs, and NGOs

Strategy IV: Reviving and documenting traditional biodiversity conservation practices

Proposed Actions: Document traditional biodiversity conservation practices and Indigenous Knowledge Systems; Respect and revive indigenous practices and knowledge, and integrate them with relevant practices and knowledge from outside; Ensure fair and equitable sharing of benefits; Facilitate preparation of a biodiversity register for every village; Conduct periodic census of wildlife species in each village/cluster of villages by local institutions.

Strategy V: Motivating individual landowners to adopt biodiversity conservation measures

Proposed Actions: Educate people on the nutritive, medicinal and economic values of minor agricultural crops and homestead biodiversity; Encourage village institutions to socially recognize/provide incentives/awards to the households for best maintenance of homesteads; Develop mechanism for compensating the owners of big chunk of natural forests for the ecosystem services; Provide loan to individuals for raising diverse tree plantations on private wastelands; Encourage bioresource-based enterprises to produce raw materials for their use.

Strategy VI: Controlling spread of agriculture and human habitations in forest areas

Proposed Actions: Help VDBs and VCs develop a land use plan for their respective villages using participatory tools; Motivate and empower them to formulate strict rules governing transfer of land from one land use to the other.

Strategy VII: Reducing dependence on biomass for household

Proposed Actions: Demonstrate the methods of using LPG/Kerosene for cooking/space heating etc., and educate rural people about its economic and environmental benefits; Popularize use of non-conventional sources of energy and energy saving devices; Improve availability and encourage use of modern house building materials

Strategy VIII: Checking degradation of land and water resources

Proposed Actions: Prepare a comprehensive report on the status of land and water resources including their management practices; Categorize the degraded lands and water bodies for treatment and ecorestoration; Take steps for prevention and control of soil and water pollution

Strategy IX: Involving youth and students in biodiversity conservation

Proposed Actions: Motivate and involve Youth Organizations of all major Naga tribes in sustainable use and protection of biodiversity; Organize seminars/workshops for them.

Strategy X: Reducing adverse impacts of industries on biodiversity

Proposed Actions: Assess and monitor the impacts of industries on biodiversity; Make Environmental Impact Assessment more sensitive to biodiversity; Monitor the implementation of Environmental Management Plan; Authorize local socio-political institutions for taking actions against the guilty; Encourage biomass-based industries to raise captive plantations; Identify industrial zones in areas where the impact on biodiversity is minimum.

Strategy XI: Generating timber and fuel wood in the vicinity of human habitations

Proposed Actions: Identify and select fast growing indigenous tree species using participatory methods; Raise plantations of fast growing tree species on the wastelands; Reforest with indigenous tree species and/or regenerate the degraded forests; Provide incentives for tree plantations on private lands; Redouble the social forestry programmes and conduct EIA of such plantations, especially in terms of biodiversity

Strategy XII: Increasing area under protected area network

Proposed Actions: Identify privately owned biodiversity rich forest areas; Motivate communities to lease out forest lands to the government on 'care and share' basis; Purchase pristine forest lands for the conservation of rare and endangered species.

Strategy XIII: Ensuring equitable sharing of benefits of biodiversity

Proposed Actions: Train local institutions in sustainable extraction, value addition and marketing of biodiversity products; Create new institutions like village cooperatives, women societies, and educate them to deal with matters relating to equitable sharing of benefits.

Strategy XIV: Building new institutions for biodiversity conservation

Proposed Actions: Constitute a State Biodiversity Board; Create an office of State Biodiversity Adviser to advise the Govt. on implications of various developmental projects on the biodiversity; Establish a State Biodiversity Research Institute for inventorying, documenting, developing/standardizing the techniques for value addition to biodiversity products, extension and training etc.; Establish herbaria/pictorial atlas of flora and fauna; Establish Biodiversity Park in each district for *ex situ* conservation, education and recreation and promotion of eco-tourism. Encourage people to raise herbal gardens and wildlife farming.

Strategy XV: Incorporating biodiversity concerns in planning and project implementation

Proposed Actions: Involve biodiversity experts in planning and project formulation; Critically analyze short term and long term impacts of proposed action on biodiversity; Develop a state specific curriculum on biodiversity, and train/sensitize decision makers.

Strategy XVI: Promoting inter-departmental cooperation for biodiversity conservation

Proposed Actions: Develop mechanism for information sharing and confidence building among officers and staff of various development departments; Involve line departments in decision-making process; Constitute an interdepartmental committee for evaluation and monitoring of the cooperation.

Strategy XVII: Taking appropriate steps to use market forces for the benefit of biodiversity

Proposed Actions: Enact suitable legislation for sustainable collection, harvest, marketing and commercial exploitation of bio-resources, focusing conservation; Educate people about market price and value of biodiversity; Develop marketing network for organic farm products; Establish cooperative society/other local institutions to safeguard people from middle man and external market forces; Khadi and Village industries board may take a proactive role in promotion of bio-resource based handicrafts, health and medicinal products.

Strategy XVIII: Promoting Organic Farming

Proposed Actions: Inform people about adverse impacts of agrochemicals; Desist from promotion of chemical fertilizers and synthetic pesticides; Promote bio-fertilizers and bio-control of pests; Undertake market survey for organic farm produce; Help selling the produce in domestic and international markets; Identify crops having market potential and suitable for cultivation in Nagaland; In due course, declare Nagaland an organic state

Strategy XIX: Protecting wild animals from game and hunting

Proposed Actions: Involve student and social organizations in conservation of wildlife; Enforce wildlife laws with peoples cooperation; Establish captive breeding facilities for threatened/endangered species such as Tragopan, Hornbill etc.; Discourage people from consuming wildlife meat and enact social sanctions for this purpose.

Strategy XX: Developing eco-tourism for biodiversity conservation

Proposed Actions: Identify biodiversity rich areas of tourist interest such as Japfu peak, Dziikou valley etc.; Develop eco-tourism related infrastructure; Educate local people about the benefits of eco-tourism by organizing awareness programmes; Manage biodiversity friendly tourism with people's cooperation.

Strategy XXI: Involving Defense Personnel in Biodiversity Conservation

Proposed Actions: Train and sensitize defense personnel with biodiversity concerns; Provide funds and expertise to defense organizations for formulation and implementation of biodiversity conservation related projects; Involve defense personnel during peacetime in afforestation activities by allotting particular area to each Unit.

Strategy XXII: Discouraging monoculture tree/commercial plantation

Proposed Actions: Select tree species with people's participation considering economic as well as ecological benefits; Develop nursery and plantation management methods for native tree species; Establish nurseries of native tree species at village level; Avoid raising of bamboo, rubber, tea, coffee, plantations on forest lands.

Strategy XXIII: Promoting Community Conservation Practices

PROPOSED ACTIONS: Document existing village conservation practices, including community conserved areas; Demarcate new village forest reserves, village forests and other common property resources (CPRs), or clarify the boundaries where currently unclear; Provide legal backing to community conserved areas; Document/codify benefit sharing mechanisms for CPRs for each village; Provide cash or kind incentives to VDBs for maintenance and management of biodiversity rich CPRs; Provide technological and managerial inputs to the communities declaring/maintaining village forest reserves.

Orissa State Biodiversity Strategy and Action Plan

Coordinating Agency: Nature and Wildlife Conservation Society, Bhubhaneshwar

1. Introduction About the Geographic Location and Biodiversity Profile of Orissa.

1.1 **Location and Area:** Orissa State, In India, is situated between 17° 50' to 22° 30' N Latitude and 81° 24' to 87° 28' E. Longitude lies on the east coast of India. Situated in the Deccan peninsular biogeographic area clasified as "Zone.6", of India, consisting of major Biotic Provinces of, The Eastern Plateau-6C, Chhotanagpur plateau-6D, Ganjetic plain-7D, and the coasts-10B (Ref: Table: 2.19), covering a land area of 1,55,707 sq. Km, which is, the 4.74% of India's landmass.

Physiography: The physiography of the State can be divided into four distinct geographic regions, namely, 1. The Costal Plains, 2. The Eastern Ghats, 3. The Central table land, and 4. The Northern plateau having, 7. Different soil types, from Forest Red soil, to Black soil ; with high mountains the tallest Chandragiri, having an elevation of 5486 Ft

1.2 **Rainfall and Temperature:** The State has three distinct seasons, as winter, summer and rainy. The divergent seasonal temperature range from a minimum of, 2.6° C, in Phulbani in winter season, to a maximum hot temperature of, 49.6° C in Titlagarh during mid summer and an average rainfall of 127.98 cm. per anum.

1.3 **Wetland Resources:** The State has total, inland fresh water resources covering an area of, 3,07,282ha including, tanks 1,14,822 ha, lakes, swamps and bheels, 1,80,000 ha; rivers and canals, 1,55,400 ha, include the rivers and rivulets such as Mahanadi, Brahmani, Baitarani, Subarnarekha on the North, and Bahuda, Rushikulya, Vansadhara, Nagavali, Indravati, Sileru and Sabari, on the south, having several waterfalls such as Barehipani, Joranda, Pradhanpat, Duduma, and many other hot springs such as Taptapani, Atri. The man - made reservoirs 2,56,000 ha, including the 39 major and medium dams like Hirakud, Rengali, Salandi, and others, (Ref. Table: 3.15). The total brackish water resources of the state including Chilika is 4,17,537 ha; including the famous Ramsar site of Chilika (1165 Sq. Kms), estuaries of 2,97,850 ha, also including the famous Bhitarkanika mangrove forests on the estuaries of Brahmani and Baitarani rivers harbouring a rich array of 64, Mangrove species and associates, the highest such congregation of mangrove flora in India(Ref: Annexure.3.3). Besides this, the marine, continental shelf, cover an area of 23,830 sq. Kms.

1.4 **Flora (General):** The above combinations of land and water resources are responsible for a rich diversity of plant and animal life. The floral wealth of the state are, estimated at 2727 angiosperms, Gymnosperms, and pteridophytes, which includes 166 species of cultivated plants. (Saxena and Brahman, 1994-1996) (Para - 3.2.2.), Out of the total number of plants 46 taxa are endemic to Orissa only (Ref. Table: 3.2). The above data on flora includes, 129 taxa of Orchids, which occur in Orissa (Misra.1996, 1982, 2000).

1.5 **Forests Flora:** The State, now (2001-2002) has a total forest area of officially recognised, 57184 Sq. Kms, which is 36% of the total land area, out of which, an area of, 26065 sq. Kms, is covered with dense forests, which is 16.74 %, land area of Orissa, consisting of, 4 major forest types like, (1) Tropical Semi Evergreen, (2) Tropical Moist Deciduous, (3) Littoral and Swamp Forests, (4) Tropical Dry Deciduous; (Ref:Table. 2.17) (Refer Annexure 2.2 for forest eco-types). The total land mass of Orissa is graded down from the North West, to the South East, where it meets the coast line of 480 kms, on the shore of the Bay of Bengal.

1.6 **Fauna:** The rich mosaic of, land,water and vegetation, the total autotrophic wealth, as portrayed above, offering an intricate web of life support systems, offer a rich tapestry of favoured habitats for lesser animal forms and microorganisms, as 48 species of Bacteria, 49 species of fungi, 28 species of Protozoans, 2 species of Viruses (Table 3.19). The larger animal life include, 19 species of amphibians, 110 species of reptiles, 443 species of Birds (Ref.: Dev), 86 species of mammals, 54 taxa of threatened species in them, (IUCN, Red Data Book). Orissa has, 3 species of Horseshoe Crabs, having immense monetary value because of their medicinal use. Orissa has immense water resources, as the habitat for a divergent veriety of fish fauna, but not much comprehensive data was available(Dr G. N. Mitra) But according to,Dr. P. Das, Retd. Director of Fish

Genetic Resources in 1999 out of 79 species of fishes, 4 were endangered, 21 vulnerable, 2 rare and 52 indeterminate. Chidambaram 1999 has pointed out that out of 327 species of fresh water fish in Orissa, 98 were endangered, 82 vulnerable. In the coastal areas including Chilika to Bhitarkanika, brackish water shrimp culture has encroached, both physically and economically on the habitat of local fishes. Also has over powered the traditional fisherman in such a way that, fish farming and fish catching is no more a profession of few castes of fishermen, but is now a heavy dollar spinning business, which has reached very un-ecological dimensions.

1.10 Domesticated animal Biodiversity of Orissa biodiversity of is, totalling to 242.66 lakhs (1995) out of which, the population of cattle, is 147.66 Lakhs, Buffaloes 16.52 Lakhs; Goats 54.12 Lakhs; sheep, 18.65 Lakhs, pigs 5.72 Lakhs. Unfortunately though the population of cattle is quite high their productivity of milk is very low. Thus the situation has given way to an inroad of hybrid cattle and now there is a fear of extinction of the local breeds of cattle from the state. There are traditional breeds of chicken as Aseel, Naked Neck, and other local strains as Kalahandi, Vezaguda, and Dhinki, which are fast vanishing.(3.11: Int) (Annexure-2.4)

1.11 Domesticated plant Biodiversity or Agricultural biodiversity it is necessary to portray the Agroclimatic regions of the State. The State is divided into 10 Agroclimatic regions (Table; 2.1). Looking at the agricultural crop diversity we find that there are 108 of species of crops (Ref. Table: 3.18) Among which rice is the main. In our crave for feeding the growing millions, the high yielding species of Paddy have practically over powered the thousands of old strains of rice to vanish. However efforts have been made to conserve many of these vanishing strains through an effort by National Bureau of Plant Genetic Resources OUAT and Central Rice Research Institute.

1.12 **Sacrade Groves:** Indian civilization had been basing on nature worship and conservation of forests had been one of the main themes in India's tradition, so also in Orissa and is totally prevelent till now among the tribals. The Goddesses of the sacred groves are worshipped in different places in different names and are conserved ultimately. As investigated by different agencies about 322 sacred groves are now existing in South Orissa.

1.13 The tribal culture biodiversity indicates that there are 64 tribes which live in harmony with nature.

1.14 There are 11 community conserve, wildlife biodiversity sites like Bhetanai in Gunjam District, where Black bucks (Antilopa cervicapra) are conserved by the people, Golia tank of Gunjam and Maneswar tank of Sambalpur where soft shelled ganjetic terrapins are conserved by people.(Ref: Annexure-3.2).

1.15 Orissa with a human population of 367.06 Lakhs, constitute 3.57% of India's total demography, is one of the very potential biotically diverse area of India, which has been facing demographic explosion, and more of it is unavoidably expected in future, though a healthy sign of population decline has been noticed in the recent yers.

2. Biodiversity Related Issues, at the Site/Themes

2.1. Mahendragiri-Devagiri-Singharaj Hill complex, in Gajapati and Gunjam districts of Orissa, with the highest peak Chandragiri in Koraput District, 1,516 m is the abode of diverse variety of tropical including some Sub-Himalayan fauna, is facing heavy deforestation and faunal depletion.

2.2. Gandhamardan Hills, situated in Bargarh and Bolangir districts, with her hills, ranging between 2020 m to 1060 m, the highest at "Satyamba Paat", are the treasure strove of 220 species of Medicinal Plants (BSI) is also a treasure of 213 millions tonnes, which is her most disturbing problem for conservation.

2.3 Pradhanpat, is a Hill complex situated in Deogarh District having the highest point of Kaidonta which is 801 m. in height from mean sea level (Deogarh 270 m high from the sea level). There are 14 perennial stream among which Pradhanpat is the tallest. This complex includes Kurdukut, waterfall, first hydroelectric power generation centre for the whole of India; Kailash hill is also important because of having an ancient building portraying Chinese art; Koidantaa watchtower of Usakuthi wildlife sanctuary, having, the rare, Gaint Flying Squirrel (Petaurista petaurista philippensis) is now under heavy demographic threat.

2.4 Malyagiri reserved forests occupies and area of 114 Sq. Kms. of moist deciduous forests with its highest peek of 1187.18 m. is famous for places like, the Nageswar Plantation and its Khuludi waterfall added to Jamara hot water spring is a complex, a junction between the Gadjat Hills and the Eastern Ghats, is important as one of the 5 important elephant corridors avail-

able in the whole of the Orissa. (Fig.5 of Remote sensing report, Sept.1999, Govt. of Orissa).

2.5 Chilika, the 1165 Sq.km brackish water lake, the famous Ramsar site (Now Ramsar award winner), with Nalabana is a sanctuary of 15 Sq.Km. submersible island, is the winter refuge for 1.5 millions of resident and migratory birds belonging to 169 taxa; also the abode of, Irawady Dolphin, Orcaella brevirostris (Owen); though protected by law, by the Government, now suffers from demographic threat of heavy prawn culture (Though restricted by the court of law) also is heavily infested by power driven fishing boats, is a great matter of concern, in way of environmental conservation.

2.6 Bhitarkanika, the tidal mangrove forests on the estuaries of the rivers Brahmani, Baitrani and Dhamara on the North Eastern Coasts of Orissa is an abode of 1330 estuarine crocodiles, attracts 217 species of resident and migratory birds, where the river, Dolphin (Sishumar), Platanista gangetica (Lebeck) is under heavy pressure of prawn culture and human settlements which had built up after the establishment of Bangladesh refugee settlement.

2.7 Gahiramatha on the same coast, is declared as the marine sanctuary situated in the Mahanadi Delta attracts tens of thousand, Pacific redly (Lepidochelis olivacia), in winter, is a world famous site of estuarine biodiversity, is under heavy threat of demographic activities such as artificial lighting and heavy artificial blasts.

2.8 Rusikulya Mouth on the coast of Ganjam is another newly discovered sea turtle rookery, is under threat of chemical pollution from the nearby Industries and deserves immediate conservational programmes and actions.

2.9 Sunabeda Plataeu, the 600 sq.kms, of dry deciduous forest, in Nuapada District of North western Orissa, a continuation of the Central Indian upland, is the abode for, large and small cats, gaur, nilgai, and various deer species, is an unique forest, where Hard Ground Barasingha, (Cervus devaucelli branderi) lived in the past, is now under heavy pressure of deforestation bears its importance, as a sanctuary, is also, a biodiversity hot-spot, where restocking of Asiatic Cheetah (Acinonyx jubatus) now extinct from Indian subcontinent, can be planned.

2.10 Chandaka, a stretch of 193.39 sq.kms. of forest very near to the State capital of Bhubaneswar is now a place for constant clash between the 62, odd numbers of elephants with human population situated in the vicinity of any state capital in India, also has a historic site of Buali Gada.

2.11 Lakhari Valley a sanctuary of 195 sq. kms, is a patch of moist deciduous forests situated in Parlakhemundi forest division of Orissa, bears her importance as, an abode of a herds of 68 elephants, and is the southern most boundary of the Eastern Ghat elephants, is also the abode of tigers, leopards, along with the adjoining Taptapani, the hot spring, Ujwaleswara temple tank, with a population of, fresh water crocodiles, with the Ghodahada, Harabhangi and Gopalaganda dams, also Ongaito lake, are the wetlands which are the favoured sites for fresh water crocodile, also attract a large number of migratory waterfowl, are also the biodiversity hot spot.

2.12 Satakosia Gorge is a 795.52 sq.kms. of moist deciduous forests situated on the both sides of 22 Km. long gorge through which river Mahanadi passes. This place bares its uniqueness due to its being the habitat for the rare and endangered Ghadial Crocodiles (Gavialis ganjeticus) where a captive breeding programme for these crocodiles was initiated and more than hundreds of these crocodiles were released. Here there is a small population of tigers but the human population here is posing an acute threat to the wildlife habitats.

2.13 Simlipal is one of the very important biodiversity hot-spots in this state of Orissa. But as it is undertaken and identified as a Sub-state site, this report does not deal with it.

3. Ongoing Initiatives and Key Gaps

3.1.1 The ongoing initiatives detailed in Chapter 4 of the report; are all, basing on the Government Initiatives through enactment and laws including the national and state level enactment enlisted in the chapter 4 Box.4.1.; and Box 4.2. in this report.

3.1.2 There are many biodiversity programmes going on it the state such as follows:
1. Biosphere Reserves, 2. Wetlands, Mangroves and Coastal Reefs.3. Forest Conservation,4. Joint Forest Management; 5. Wildlife Conservation, Protected Area Network; 6. Development of National Parks and Sanctuaries; 7. Eco-development in and around National Parks and Sanctuaries; 8. Project Turtle; 9. Project Tiger; 10.Project Elephant, 11.Biodiversity Conservation and many others.

3.1.3 The major actors apart from the Government agencies are the Non-Government Agencies, (NGOs) (Ref.:4.9.2.2.) Apart from this there are a large number of organisations striving very hard in way of field surveys, and conservational activities by NGO's.

3.2 The Key Gaps:
The key gaps are explained in detail in the chapter 4, from items 4.11.1 to 4.11.6.of this report.

3.2.1. The key gaps, in the whole set up, is the lack of coordination between Govt and Non-Gvt organisations.

3.2.2 The lack of inter-department and intra-department, coordination within the Govt structure and acute compartmentalism, which disturbs the whole structure.

3.2.3 The second gap in the structure is lack of education (among the masses, leading to lack of consciousness and awareness.

3.2.4. The lack of financial support to the deserving NGO's arising out of deficiency in identification structure in the Govt and the granting organisations machinery, the proper or improper NGO's. The "Getter gets it the Non-getter goes on, not getting."

3.2.5 Lack of trust, by the sponsoring institutions, also lack of sincerety among quite a few, of the NGO's.

4. Strategy and Action Plan

The strategy and action plan are fully explained in Chapter no.5 of this report.

4.1 Status Survey of all wild floral and faunal resources. Both within existing Pas and potential habitats for Conservation management. Several projects in way of research and survey are proposed.

4.2 Identification of all potential habitats having assemblage of rare and critically endangered ecosystems and species.

4.3 Enumerating criteria for economic evaluation of wild natural resources including intangible benefits

4.4 Developing technologies which makes least dent on the wild natural resource.

4.5 Encouraging community participation in policy decisions, identification of site specific projects and community implementation.

4.6 Development policies/regulations for access to genetic resources and its sustainable use including *ex situ* conservation at community level.

4.7 Developing welfare schemes linking wild biodiversity issues and concerns.

4.8 Complete EIA before launching of all welfare schemes to exclude possible adverse impact.

4.9 Inclusion of biodiversity issues in school/College/Adult literacy and other non formal education programmes.

4.10 Capacity building of community/and Govt field staff through training and symposia on various issues affecting conservation of wild biodiversity.

4.11 In depth need based research/Consultancy for inventory of elements of biodiversity, like computerised data- banks of different subjects. documentation of uses, technologies for management and setting criteria for evaluation of action plan implementation.

4.12 Punishment for destructive activities and incentives for activities promoting wild biodiversity.

4.13 There are proposals for research and survey to be conducted in future and some proposals are provided in the report. Such projects instead of the presently practiced 3 years time must be for a minimum period of 5 years. They need financial support and support of the Government.

4.14 The State is suffering from "BrainDrain" as the highly educated also the hard workers go out of the state to earn better. Such cases must be considered to be remunerated properly.

4.15 There has to be a centrally located board for biodiversity matters where quick decissions have to be taken. Such a board must be headed by the Chief Secretary of the State, for proper implemantation.

4.16 In such a board for Biodiversity minitoring, the word of the technocrat must be the last, but not otherwise, which is now the case.

Pondicherry State Biodiversity Strategy and Action Plan

Coordinating Agency: Secretary, Environment, Pondicherry through Department of Biological Sciences, Pondicherry University, Pondicherry

The Union Territory of Pondicherry, spread over an area of 492 sq. km, comprises four erstwhile French establishments of Pondicherry, Karaikal, Mahe and Yanam, geographically separated from each other. This report provides a preliminary exhaustive check list of the flora of Pondicherry region for the first time. Pondicherry does not have reserve forest or scrub jungle to support wild animals. The document has attempted to list plant and animal biodiversity of Pondicherry along with a list of rare, endangered and threatened plant species. Relative insensitivity to environmental and biodiversity issues have caused significant damage to plant and animal biodiversity.

The major causes of loss of biodiversity in Pondicherry have been excessive population growth, habitat destruction and commercial exploitation of natural resources. As a result of increased human activities the area under irrigation has sharply fallen, the ground water has alarmingly depleted and pollution has increased significantly. Excessive use of fertilizers and pesticides has extensively damaged the micro-environment of the agriculture fields. Moreover, cultivation of only selected crop varieties has resulted in the loss of traditional varieties. Beach erosion, pollution and threats to nesting habits of turtles along the coastal areas have severely damaged the marine biodiversity.

Recently several government departments have taken some steps which, in the long run, would help protecting biodiversity. The Department of Agriculture has been promoting the use of bio-fertilizer, organic manure and integrated pest management. The government has also started Farmers' Markets which would eventually help farmers to sell the traditional varieties of vegetables and crops. In a quest for higher yields the traditional knowledge of farmers about seed selection, preservation and storage has been neglected. There is an urgent need to formulate a policy of agro-biodiversity to stop monoculture and loss of traditional varieties.

The government has started projects for rehabilitation of tanks and afforestation of mangrove plantations. The government has enforced fishing holiday and the fisher folk have been provided with increased compensation. The government is taking steps to conserve the existing heritage buildings and to declare Pondicherry city as a heritage town. This would help protection of biodiversity in these buildings. The government is trying to promote 'eco-tourism' which is yet to be clearly defined through a policy document. The government has not initiated any systematic activity to prepare an inventory of biological resources in the Union Territory of Pondicherry. The following strategies and action plans have been suggested for the Union Territory of Pondicherry.

1. **Integration of Biodiversity in Governance:** Decision makers, officials, social workers, politicians and legal experts have to be sensitised to bio diversity and environment related issues. In order to integrate biodiversity in governance, all the departments have to be provided with a biodiversity fund. Experts in biodiversity conservation should be involved in all the planning activities and every project should highlight biodiversity component in it.

2. **Empowerment of Local Communities and Decentralisation of Planning Process:** Documentation and protection of traditional knowledge is possible only through empowerment of local communities. The government should hold elections to local bodies immediately and provide legal backing to decentralised planning at local level. At least 25% of the planned budget of the Union Territory should be earmarked for the local planning process.

3. **Establishment of a Biodiversity Board:** A State Biodiversity Board has to be established in the Union Territory of Pondicherry. The Board should be a non-governmental independent set up under the chairmanship of an eminent person having adequate knowledge and experience in conservation and sustainable use of biological diversity and in matters relating to equitable sharing of benefits. The Board may consist of ex-officio members from various departments, French Institute, Pondicherry University, NGOs, women groups and environmental experts. The functions of the Biodiversity Board would be to advise the government on matters relating to the conservation of biodiversity, sustainable use of its components and equitable sharing of benefits arising out of the utilisation of biological resources and to coordinate the biodiversity conservation related projects submitted by the various government departments and organisations.

4. **Biodiversity Education:** Inclusion of biodiversity related issues in the school/college curricula is urgently required. Teachers should also be familiarised with the concept of biodiversity. Students should be involved in arranging exhibitions, festivals and competitions highlighting various aspects of biodiversity.

5. **Public Awareness and Training:** Biodiversity festival and seed exchange fairs should be conducted to create awareness, to highlight the importance of conservation and to share the views on traditional ways of farming. These efforts will help the public to become aware of food security, nutritional security, sustainable agriculture development, farmers' rights and intellectual property rights.

6. **Conservation of Agriculture Land:** The Union Territory of Pondicherry has faced serious problem of dwindling land availability and use of agriculture land for non-agricultural purposes. In order to prevent further loss of the agricultural land, appropriate rules need to be framed and law enforcement mechanisms to be geared up. The government should also release a document spelling out its agriculture policy.

7. **Promotion of Native Varieties and Agro-biodiversity:** The government should encourage cultivation of traditional varieties of crops, vegetable and pulses by providing incentives. In order to promote traditional varieties of crops the government could initiate food festivals using traditional varieties of crops and also include them in the breakfast and noon meal schemes. The farmers should be encouraged to bring native varieties of foods and vegetables and sell them in the Farmers' Markets.

8. **Checking the Use of Chemical Fertilizers and Integrated Pest Management:** Farmers should be educated about the impact and the risk involved in using chemical fertilizers and pesticides. Use of bio-fertilizers, organic manure, enriched compost and bio-pesticides should be encouraged. The government should undertake surveys to evaluate microbial population in various areas. A knowledge information centre should be established in all the key villages to provide updated information regarding day to day agriculture development, weather forecast and biodiversity related information.

9. **Restoration of Botanical Garden and Cultivation of Medicinal Plants:** Due to increased human activity, release of saline water from the aquarium, dying of trees have resulted a great damage to the biodiversity in the botanical garden. There is a strong need of rejuvenating the existing botanical garden. Since most of the trees are getting aged an alternate botanical garden can be established in a silent zone of Pondicherry. A collaborative programme between the Department of Agriculture and Pondicherry University should be established to encourage the cultivation of medicinal plants.

10. **Eco-restoration of Mangroves:** Due to population growth and overexploitation, the mangrove vegetation in Pondicherry has rapidly degraded and depleted in the last two decades. A mangrove vegetation map should be prepared which will provide the mangrove vegetation scenario of Pondicherry. On-site research and demonstration should be undertaken to grow the other economically important mangrove species. Participation of rural communities in mangrove-based plantation activities should be given priority. It is also intended to educate local public to get them involved in protecting their own resources. Strict law should be enforced to protect the existing mangroves.

11. **Protection and Conservation of Sacred Groves:** The sacred groves are facing threats of encroachment and destruction. Immediate steps need to be taken in order to protect and conserve the sacred groves. Some of the sacred groves in the Union Territory which are facing destruction and need immediate attention are situated in Pooanankuppam, Keezhkumaramangalam, Manapet, Sedarapet, Karasur, Mangalam, Moorthikuppam.

12. **Conservation of Swadeshi Mills Campus Vegetation:** The only existing forest patch in Pondicherry is the vegetation available in Swadeshi Mills Campus. During the process of preparation of this action plan, a sizeable patch of Swadeshi Mills forest was cleared off its vegetation and was given for the construction of district court building. In this process a huge loss of biodiversity has occurred. An evaluation should be done to enumerate the lost species and steps to restore them should be initiated. The area should be declared as a protected area and all human activities should be stopped.

13. **Conservation of Fish and Marine Biodiversity:** The government should attempt to enlist rare, threatened, endangered and extinct marine animals. In order to make fishing holidays more successful and effective the government should try to address the issue at the grassroot level and the fisher folk should be made to feel partners in the whole effort. The government should increase the compensation to the fisher folk and also provide them training for value added fish products like pickles and handicrafts.

14. **Water Conservation and Rain Water Harvesting:** Conservation of ground water resources for agriculture could be done by conducting field schools in the villages. It would help crop water management and inculcate awareness among farmers

towards usage of water judiciously. The government should popularise the use of sprinkler and drip irrigation system for orchard crops to conserve water. The village ponds should be desilted and tube wells can be constructed in all these ponds as rain water harvesting structures.

The existing regulations of rain water harvesting for houses and buildings are being hardly followed, which is causing serious threat to this precious natural resource. Percolation pits should be provided in all the small houses. All the house owners must be given a deadline to comply with the regulations. All the government buildings, educational institutions should become model examples for rain water harvesting. Rain water harvesting systems should also be installed at public places so as to popularize the concept. Incentives in the form of tax deductions for house tax, water tax etc., could be provided. Banking loans could be arranged for fixing rain water harvesting system.

15. **Urban Biodiversity:** The government should immediately declare all the buildings constructed during French rule as heritage buildings and stringent measures have to be adopted for their preservation and maintenance. Use of such buildings for biodiversity conservation must be ensured. Any additions, alterations and renovations in these buildings must follow strict guidelines so that the architectural and biodiversity heritage of Pondicherry could be protected.

16. **Eco-tourism:** The government should encourage eco-friendly practices that focus on harmony with nature and spirituality and to develop the conscious process at all levels. The government should aim to encourage low volume but high value tourism in Pondicherry. The mangrove vegetation in Yanam should not be disturbed and the damaged patches should be restored. Usage of 'environmental friendly' constructions would not help conserving biodiversity. Any activity damaging the natural ecosystem in islands near Yanam should not be allowed. Ousteri lake could be developed as an 'eco-friendly' tourist spot in Pondicherry and local communities should be involved in the whole process. It is necessary that the water inlets to the lake be opened so that the lake could get enough water. Fruit bearing and shade trees could be planted near the lake so that migratory birds could start visiting again.

17. **Pollution Control:** The commune municipalities should identify places for disposal of organic waste and for vermicomposting. Public transport vehicles using kerosene and sub-standard fuel with high emission of toxic substances should immediately be seized. The government should encourage plying of battery driven public transport vehicles. There is an urgent need to strengthen the existing public transport system so that people are not forced to use their own vehicles. Due to increase in number of vehicles many roads have been widened after removing age-old as well as young trees. Traffic congestion could be reduced by staggering school and office timings which would greatly reduce the density of polluting agents during peak hours. Awareness should be created in all the sections of the society for proper disposal of household and industrial waste. Penalty should be fixed for littering public places with plastic bottles, bags etc. The existing system of door to door collection of solid wastes in some of the areas should be introduced to all the residential and business areas of Pondicherry. The government should try to introduce bags of different colours in order to handle biodegradable and non-biodegradable wastes. The non-biodegradable waste should not be allowed to be used for land fills. Efforts must be made to get the non-biodegradable waste recycled. No fresh licenses should be granted to start units manufacturing non-biodegradable products. The use of plastic should be eliminated in a phased manner and the government should provide avenues for alternate employment opportunity to the employees working in plastic industries.

Punjab State Biodiversity Strategy and Action Plan

Coordinating Agency: Punjab State Council of Science & Technology, Chandigarh

The variety of genes, species and ecosystems which encompass populations, communities and habitats constitute biological diversity. Increasing human population, industrialization, intensive agricultural and animal husbandry practices and over-exploitation of natural resources are, however, threatening our bioresources. The Convention on Biological Diversity, which came into force in 1993, makes it mandatory for all signatory countries to conserve their biodiversity and prepare strategies and action plans for its conservation at the national level. In this context, the process of preparation of National Biodiversity Strategy and Action Plan was initiated by the Govt. of India in 2000. A unique mechanism has been adopted for the same, which envisages preparation and merger of Strategies and Action Plans for all States and Union Territories, Eco-regions, Sub-state sites and several Thematic documents.

The present document defines the Biodiversity Strategy and Action Plan (BSAP) for Punjab. It establishes a general frame work for the State's Policy on conservation and sustainable use of its biological resources, defines their current status, identifies processes leading to its deterioration and sets out guidelines and specific programmes for future action. It should, therefore, be regarded as a bridge between the National Biodiversity Strategy and Action Plan (NBSAP) and role of the State government for application of measures and actions at the ground level.

The document covers, both, natural and agricultural systems and attempts to collect and collate available data on wild and domesticated species/varieties of flora and fauna. It attempts to promote conservation and sustainable use of the State's biological resources by promoting awareness amongst the masses, cooperation between stakeholders and creating mechanisms required to plan for natural resource management and its long-term conservation. The strategy is guided by the cross sectoral concepts of conservation and sustainable use, public participation and coordination, gender and equity, planning, education, training and research and economic, legal, ethical and cultural issues.

A multi pronged approach was adopted for preparation of this document. This included notifying a state level steering committee, collection of primary data through questionnaire and six public hearings, discussions and interviews with representatives from various departments, academic institutions, NGOs, village Panchayats and knowledgeable local persons and experts and collection and collation of secondary data from universities, R&D bodies, Govt. departments & research institutions as well as published journals & reports.

The document presents, both, the geographical and ecological profile of Punjab. The state is one of the smaller states of India with an area of 50,362 sq. km located in the northwestern part of the country. The climate is typically sub-tropical. Land is shared by activities like, agriculture, water resources, wetlands, forests, living spaces, industrial and commercial use, transportation network, etc. Eighty four percent of the state's area is under agriculture with a cropping intensity of 183%. About 5.7% of the area is under forests. Sutlej and Beas are the two important rivers traversing the state, whereas Ravi touches it at its northern border and Ghaggar passes through the south. The state is however, traversed by a large network of canals, distributaries and choes. It is also well known for its large dams and several barrages, which have resulted in the formation of 9 manmade wetlands. Out of these the Harike, Kanjli and Ropar wetlands are among the Ramsar sites of India. Several natural wetlands also exist. The natural forests in the state are found in the Shivalik area in the districts of Ropar, Hoshiarpur and Gurdaspur, and in form of Bir forests in district Patiala and Mand forests around wetlands. These are the areas of high biodiversity in the state. To protect the existing biodiversity 10 protected areas have been identified covering a total area of 317.79 sq. km. The important sanctuaries include the Abohar wildlife sanctuary, the Harike wildlife sanctuary and sanctuaries in the Shivaliks. Some community-conserved areas also exist, out of which the most important is the Abohar wildlife sanctuary which exists on private land of 13 villages and 3 closed areas belonging to the Bishnoi community. For *ex situ* conservation of biodiversity, one zoological garden, one tiger safari and 3 deer parks have been set up. Several botanical gardens (some of which date back to the time of the Moghuls) also exist, important being Aam Khas Bagh, Fetehgarh Sahib; Rambagh, Amritsar; Baradari Gardens, Patiala, etc.

A review of the various components of the state's physical environment indicates that intensive and extensive agriculture, high human population density and increased urbanization and industrialization has adversely affected the natural habitats and thus, the biodiversity in the state. Diverse historical events, frequent reorganizations, over exploitation of soil and water resources and

consolidation of land holdings have also contributed to habitat and biodiversity loss. Palaentological records of the area indicate that it was floristically and faunistically rich in the geographical past. Available data indicates the presence of 371 species of algae, 448 species of fungi, 10 species of bryophytes, 26 species of pteridophytes, 21 species of gymnosperms and 1939 species angiosperms in the state. Five angiospermic taxa recorded from the state are new taxa to science whereas 8 species are new reports from India. Although no systematic studies have been carried out to identify the rare or endangered flora of the state, however, a reference to Red data book of Indian plants indicates one species as endangered and one as rare. Faunal studies indicate the presence of 112 species of fishes, 15 species of amphibians, 35 species of reptiles, 442 species of birds and 43 species of mammals besides a large number of invertebrate species.

The ushering in of green revolution has led to a considerable change in the area and varieties of crops under cultivation. Data indicates that whereas area under wheat has increased by 2.42 times, area under rice has increased by 11.5 times from 1960-61 to 1999-2000. At the same time, however, area under bajra has decreased by 24.6 times, under barley by about half and under jowar it is less than 500 ha now. Further considerable varietal changes have also taken place. Prior to the green revolution 31 varieties of wheat, 31 of rice, 4 of maize, 3 of bajra, 11 of sugarcane, 18 of pulses, 8 of oil seeds and 17 of cotton were reported to be in use and propagated through pure line selection by various workers. Since the advent of green revolution. The traditional varieties have been replaced by high yielding varieties introduced by PAU and the Deptt. of Agriculture. Though 37 varieties of wheat, 18 of rice, 34 of pulses, 10 of sugarcane, 18 of maize, 9 of bajra, 28 of oilseeds and 14 of cotton have been released since 1964 but only a few of them are actually in use by the farmers. Further, the population of domesticated fauna in the state has also increased by 8.7% in the past two decades. Though two desi breeds of cow have been reported but the pure breed has been cross bred with Jersey and Holstein and is now usually not available. Further, , 3 native breeds of buffaloes, 3 local breeds of sheep, 2 of goat, one of horse and two of poultry are being reared in the state.

The major processes which have affected wild and domesticated biodiversity in the state include intensive and extensive agriculture, promotion of monoculture plantation, urbanization, industry, transport, trade, etc. Unsustainable development models, lack of administrative coordination amongst Development departments and peoples participation in planning and implementation of developmental projects are also important causative agents of biodiversity loss.

The Departments of Forests and Wildlife, Agriculture, Animal Husbandry, Fisheries, Horticulture, Industry, Irrigation and Power, Science, Technology and Environment, etc. are the key departments which can play a major role in biodiversity conservation in the state besides academic institutions, local communities, NGOs, industry and corporate sector, as well as, religious and cultural groups. The initiatives taken up by some of these departments include promotion of social instruments to protect biodiversity (e.g. projects which promote peoples' participation), enactment of specific laws and promotion of scientific studies. However, economic instruments need to be strengthened for the purpose.

Based on available data, gaps in information, vision, policy and legal structure and institutional and human capacities have also been identified for both wild and domesticated biodiversity. These include inadequacies in information on baseline data, absence of review mechanisms to assess impact of developmental activities on biodiversity, poor information dissemination, emphasis on short term benefits, poor implementation of existing legal systems and lack of understanding of importance of biodiversity issues in developmental projects, cross sectoral research studies and trained personnel, etc. There is also a distinct gap in linkages amongst various departments and in awareness and education.

The strategies identified to fill these gaps include an assessment of status of existing wild and domesticated biological resources, defining of criteria for economic evaluation of resources, promotion of policies and schemes linking wild and domesticated biodiversity elements, developing resource efficient technologies, optimizing application of environmental impact assessment and fostering public participation in biodiversity conservation. Efforts need to be made to restore original ecosystems and improve canopy density in existing forests for conservation of wild biodiversity. Critically endangered and threatened species need to be actively preserved and local communities need to be involved in management of areas rich in biodiversity including protected areas. For conservation of domesticated biodiversity the state needs to promote diversity in agricultural crops besides revival of traditional species based on collective wisdom of the Punjabi farmers in addition to the opinion of experts. A social security system for farmers needs to be put in place by extending insurance to several crops and increasing demand of diverse crops (like jowar, bajra, pulses, etc.) through diversity in food grains supplied through the public distribution systems. The problem of excessive production of certain crops (like wheat, rice and potato) also needs to be tackled besides improvement of storage capacities especially at the village level. Further, Integrated pest management, traditional farming systems, biofertilizers and biopesticides need to be promoted.

In response to the need to implement the strategies outlined above appropriate actions for key government departments and other stakeholders need to be identified. The State Deptt. of Science, Technology and Environment needs to take up the responsi-

bility of promoting inter-departmental coordination and establishing liasion with the State Planning Board and Deptt. of Finance to ensure adequate funding of biodiversity conservation programmes. A state level data base of existing wild and domesticated biodiversity and traditional knowledge systems needs to be prepared and awareness, education and training on biodiversity issues needs to be promoted. Further, guidelines for use and management of natural resources including habitat restoration and *in situ* and *ex situ* conservation of species, assessment of unsustainable farming methods, ways of conserving relatively less grown crops, reduction in excessive use of water and farm chemicals, incentives for conservation and promotion of sustainability in agriculture and animal husbandry practices need to be developed. Institutional, legislative and economic reforms also need to be taken up education, awareness, training and research need to be promoted. A State Biodiversity Authority could also be set up to promote interdepartmental coordination within the government as well as between GOs, NGOs, industry, academicians and R&D scientists, Further, suggestive actions be taken up by key participating departments and stakeholders have also been specified.

For operational implementation of the action plan, it is proposed that each participating agency may set up a technical unit/cell for drawing up and implementation of sectoral plans related to biodiversity and the state government may ensure sufficient human, material and economic resources to achieve these objectives.